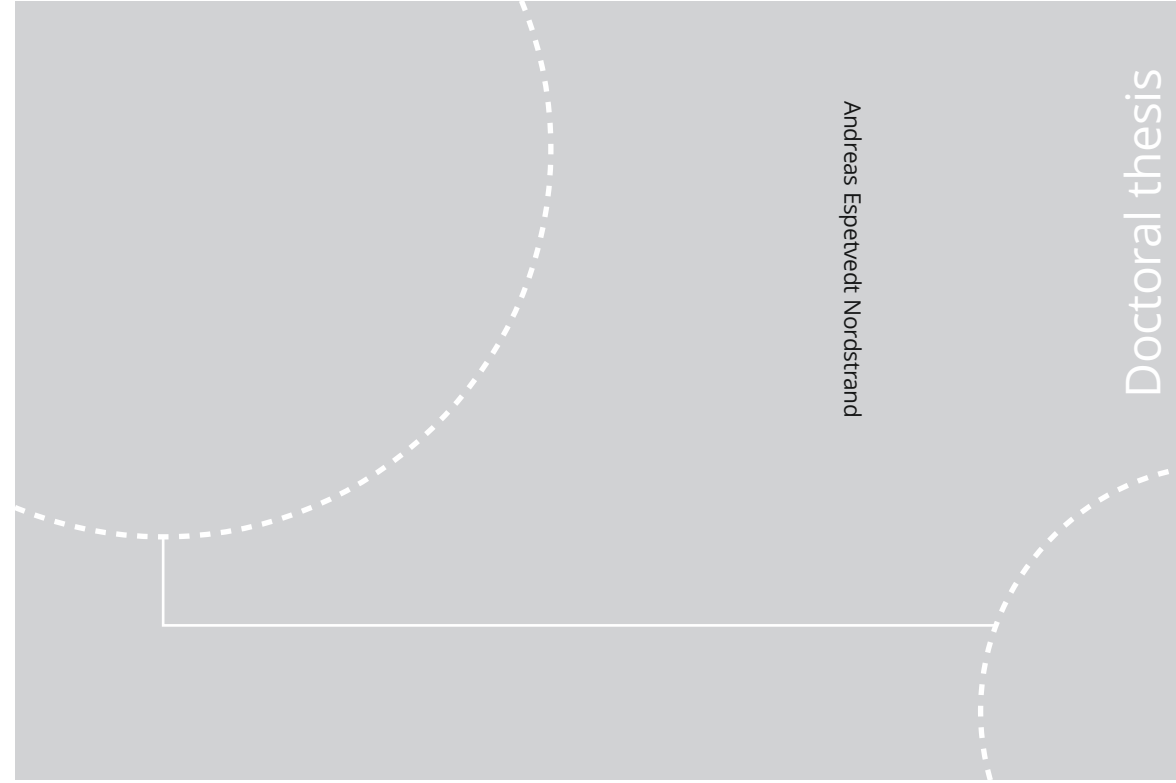


ISBN 978-82-326-4468-1 (printed ver.)  
ISBN 978-82-326-4469-8 (electronic ver.)  
ISSN 1503-8181



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**NTNU**  
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Thesis for the Degree of  
Philosophiae Doctor  
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Andreas Espetvedt Nordstrand

# Posttraumatic Deprecation or Growth among Norwegian Veterans Who Served in Afghanistan: Influences of Peri-and Post-Traumatic Factors on Personal Development



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Thesis for the Degree of Philosophiae Doctor

Trondheim, January 2020

Norwegian University of Science and Technology  
Faculty of Social and Educational Sciences  
Department of Psychology



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ISSN 1503-8181

Doctoral theses at NTNU, 2020:57

Printed by NTNU Grafisk senter

## Norsk Sammendrag

### **Posttraumatisk forringelse eller vekst blant Norske Afghanistanveteraner: Påvirkningen av peri- og post-traumatiske faktorer på personlig utvikling.**

**Bakgrunn og mål:** Norge har hatt militært personell utplassert i Afghanistan kontinuerlig siden slutten av 2001. Hoveddelen av norske veteraner som tjenestegjorde i Afghanistan, inngikk i den internasjonale sikkerhetsstyrken (ISAF) som ble avsluttet i 2014. Denne doktoravhandlingen er en del av et større prosjekt ved Institutt for Psykiatri og Stressmestring (IMPS), Forsvarets Sanitet (FSAN), som undersøker ulike sider ved norske Afghanistanveteraners mentale helse og velvære etter deployering. Del 1 av prosjektet, Afghanistanstudien 2012, ble avsluttet i 2012. Data i denne avhandlingen er hentet derifra.

Målet med denne avhandlingen var blant annet å utvikle et verktøy som kan gi bedre innsikt i den psykologiske etter-utviklingen hos veteraner med tjeneste fra Afghanistan; opplevde de en psykologisk forringelse (PDT), en psykologisk vekst (PTG) eller hovedsakelig å være uforandret av erfaringene sine? Det var også et mål å kartlegge mulige forhold som kan bidra til å forklare retningen på veteranenes etterfølgende livsutvikling – mot eventuelt forringelse, vekst eller ingen endring.

**Metode:** Datainnsamlingen fra veteraner med tjeneste i Afghanistan i årene 2001-2011 ble foretatt våren 2012. Den ble utført som en tverrsnitts- og retrospektiv spørreundersøkelse ved hjelp av både etablerte og nyutviklede spørreskjemaer. I alt ble 7,232 brev med anmodning om deltagelse i undersøkelsen sendt ut. Noen kom i retur på grunn av feil adresse eller feil i tjenesteregisteret. Dette ga et invitert utvalg på 7,155 veteraner. Totalt 4,053 av dem ga skriftlig samtykke til å delta i studien og returnerte fullstendige surveysvar. Det ga en responsrate på 56,7%.

Spørreskjemaheftet var på 20 sider. Det besto av spørsmål om mentale helse, posttraumatisk utvikling, mulig rusmisbruk, samt sivil og/eller militær traume-eksponering. Demografiske forhold ble også kartlagt. Svarene ble lagret i Forsvarets Helseregister og siden hentet ut derfra. Det ble også hentet ut informasjon fra Norges Arbeids- og Velferdsadministrasjon (NAV) for å avdekke eventuelle forskjeller mellom de som svarte på spørreskjemaet, og de som ikke gjorde det. Disse instansene gir forskere kun anonyme data. Alle forskningsprosedyrer, datainnsamling, lagring og distribusjon av data ble gjort i samsvar med gjeldende lovgivning for Forsvarets Helseregister. I tillegg godkjente det regionale etikkutvalget for medisin og helseforskningsetikk i Sørøst-Norge en anonym innhenting av helseinformasjon om de veteranene som ikke svarte på undersøkelsen.

**Resultater:** Av i alt 45 spørsmål om veteranenes psykologiske livsutvikling etter Afghanistan viste våre analyser at det var 26 ikke-overlappende spørsmål. Disse 26 spørsmålene ble brukt i et nytt spørreskjema, kalt Posttraumatic Change Scale (PTCS). Totalskåren angir retningen på veteranenes psykologiske livsutvikling etter opplevelser i Afghanistan – enten i negativ retning (PTD), i positiv retning (PTG) eller om de anså seg uforandret. De 26 spørsmålene lot seg ytterligere dele inn i fire underområder; disse ble gitt følgende betegnelser: Selvtillit, Inter-personlig Involvering, Bevissthet og Sosial Tilpasning.

De fleste veteraner rapporterte PTG (80,8%), mens en minoritet viste PTD (8.1%) eller ingen endring (11.1%). PTCS-skårene korrelerte negativt med graden av symptomer på depresjon, angst, søvnforstyrrelser og posttraumatisk stress. Det tyder på at PTD målt med PTCS, er signifikant assosiert med psykiske plager, mens PTG ikke er det. Videre analyser tyder på at både peri- og posttraumatiske forhold, det vil si forhold under og etter traumet, kan påvirke den videre psykologiske utviklingen hos veteranene etter eksponering. Med en inndeling av deres sterke opplevelser fra Afghanistan i farebaserte og ikke-

farebaserte stressorer, viste resultatene at de ikke-farebaserte stressorene var signifikant ( $p < 0.001$ ) oftere forbundet med PTSD enn de farebaserte. Hvis veteranene opplevde å ha god sosial støtte etter hjemkomst, hadde de oftere en god posttraumatisk utvikling preget av PTG. Sammenhengen mellom god sosial støtte og PTG så man også hos veteraner som fant det vanskelig å dele sine krigsopplevelser med andre etter hjemkomst.

**Konklusjoner:** Den nye skalaen, PTCS, viste seg å ha adekvate psykometriske egenskaper; den fanget variasjonsbredden av ulike typer posttraumatisk utvikling fra PTSD til PTG etter traumeeksponering. I motsetning til flere tidligere studier med andre måleinstrumenter var PTG ikke forbundet med høy psykisk symptombelastning. Man fant også at forhold både ved opplevelser i Afghanistan, og ved tiden etter hjemkomst påvirket veteranenes videre psykologiske utvikling. Funnene i doktoravhandlingen avklarer flere momenter som kan være til nytte i oppfølgingen av Norske veteraner. Den peker også på flere områder som er egnet for videre forskning og mulige intervensjoner i arbeidet med å forbedre veteraners situasjon, både under og etter deltagelse i internasjonale oppdrag.

## English Summary

**Background and objective:** Since late 2001, Norway has continuously had military service personnel deployed to Afghanistan. The main bulk of the Norwegian veterans who has been deployed to Afghanistan, were part of the International Security Assistance Force (ISAF) mission that ended in 2014. This thesis is part of a larger project aiming to investigate the mental health and wellbeing of Norwegian veterans from the conflict in Afghanistan. Part one of this investigation (The Afghanistan Study, 2012) collected data from 2001-2011, and was concluded in 2012. The current thesis is based on data from this project. The objective of the current thesis was to develop a means of gauging psychological development in the veterans after trauma exposure in terms of either posttraumatic deprecation (PTD), posttraumatic growth (PTG) or no-change. Moreover, the thesis aimed to identify peri- and post-traumatic factors that might influence the direction of such posttraumatic developments.

**Methods:** In the spring of 2012, data were collected from veterans who had served in Afghanistan during the years 2001-2011. In total, 7,232 postal invitations to participate in the survey were sent out by mail, some were returned due to incomplete address information or incorrect service records. This made a final invited sample of 7,155 veterans. A total of 4,053 veterans gave their written consent to participate and returned completed survey responses. This made the final response rate 56.7%.

The study was conducted as a cross sectional and retrospective survey with both already well-established and newly developed questionnaires. The survey questionnaire was 20 pages; it consisted of questions related to mental health, posttraumatic development, substance abuse, both civilian and military stressor exposures, as well as information about the veterans' wellbeing. Demographic information was also gathered. The survey data were stored and extracted from the Norwegian Armed Forces Health Registry and the Norwegian

Labor and Welfare Administrations (NAV). They provide researchers with anonymous data only. All procedures, data collection, storing and distribution of data were done in accordance with the existing legislation regulating the Norwegian Armed Forces Health Registry. In addition, the Regional Ethics Committee for Medicine and Health Research Ethics of South-East Norway approved an additional anonymous collection of health information about the non-responders.

**Results:** From an initial pool of 45 questions regarding the veterans' psychological development after trauma, analysis identified 26 non-overlapping items. These 26 items constituted the new bi-directional Posttraumatic Change Scale (PTCS). The total PTCS score indicates PTD, PTG or no-change after trauma, i.e., a negative, a positive or no personal change. The 26 items formed four sub-dimensions; that were given the following designations: Self-Confidence, Interpersonal Involvement, Awareness, and Social Adaptability. A minority of the veterans reported PTD (8.1%), while most reported PTG (80.8%) or no-change (11.1%). PTCS scores correlated negatively with measures of depression, anxiety, sleep disorders, and posttraumatic stress symptoms. This indicates that PTD as measured by the PTCS is significantly associated with psychological distress, while PTG is not.

Further analysis revealed that both peri-traumatic and post-traumatic factors influenced the veterans' posttraumatic development. By categorizing traumatic exposure as related to either danger-based stressors or non-danger-based stressors, results showed that non-danger-based stressors were significantly ( $p < .001$ ) more associated with PTD. Moreover, the results demonstrated that perceptions of good social support after returning from deployment was significantly associated with posttraumatic development in the direction of PTG. The association between good social support and PTG persisted even if the veterans had personal barriers towards sharing their war zone experiences with others.



**Conclusions:** The PTCS demonstrated acceptable psychometric properties and was able to capture the range from PTD to PTG after exposure to major stressors. Contrary to several previous studies, PTG, as measured by the PTCS, was not associated with increased symptoms of psychological distress. Importantly, both peri- and post-traumatic factors were significantly associated with the directions of the posttraumatic development. Taken together, the findings of the current thesis identify several important areas of further research and intervention in the efforts to improve the care given to veterans, both during and after deployment.

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## Acknowledgements

I want to begin this thesis by expressing my sincere appreciation for the service and sacrifice made by the Norwegian Afghanistan veterans, as well as other Norwegian military veterans throughout the years. I dedicate this thesis to all Norwegian military veterans.

Secondly, this thesis is part of a larger project, the Afghanistan 2012 Survey. I would like to thank the many people who made a substantial effort in order to bring this project to its completion. In particular, Øystein Jack Næss, Maj. Hans Jakob Bøe, Ph.D. and Arnfinn Tønnessen, Ph.D. have contributed directly in finalizing the data set that the current thesis is based on. I am very grateful for their effort. Moreover, I am grateful for the support and encouragement from all my fellow officers and colleagues in the Norwegian Armed Forces, particularly those at the Institute of Military Psychiatry (IMPS). Cpt. Christer Lunde Gjerstad at IMPS contributed with excellent critical revisions of my last two papers. In addition, my friend and superior Maj. Morten Tvedt has been very patient regarding my need for time to write.

Two people in particular influenced my decision to embark on this Ph.D.-project, those were Maj. Gen. Jon Gerhard Reichelt, M.D, Ph.D. and Maj. Hans Jakob Bøe, Ph.D. Jon used to be the head of the Institute of Military Psychiatry, and was my boss for most of the time I have been working on this thesis. From the get-go, I have felt that he believed in my abilities, and trusted me to accomplish what I set out to do. Hans Jakob inspired me to tackle the subject of posttraumatic growth. In addition, he gave me the encouragement and confidence I needed to take on the challenge of doing a Ph.D. despite my, in hindsight, quite fumbling first attempts at writing a Ph.D. proposal.

Hans Jakob was also one of my supervisors, and I am very grateful for the many hours of patient and fruitful mentoring he has given me during my doctoral work. My main supervisor on this project was Prof. Odin Hjemdal, Ph.D. Odin is a genuinely warm, competent and positive person, and has always been available to give this Ph.D.-project momentum, whenever I have been stuck. Particularly his knowledge on quantitative methods have been invaluable to my doctoral work. I am very grateful for all his help. My final supervisor was Prof. Are Holen, M.D., Ph.D. I first meet Are when he supervised some of my clinical work at St. Olavs Hospital, and his academic work and clinical insights have inspired me since. Are has painstakingly tried to teach me the art of academic writing. The blame for any literary shortcomings of this thesis should be put on the student, and not on the teacher. I feel very lucky to have had his help in my doctoral work, and have been studying at “the feet of the master”.

I am very lucky to have a loving family and dear friends. They have been of tremendous support through this process of writing my Ph.D. My old and dear friend Erlend Hassel, M.D., Ph.D., has patiently listened to my complaints over some drinks, helping me to stay optimistic. My wonderful mother-in law and father-in law, Ingerid and Tore, are the world’s best and most dedicated grandparents to our children. Through babysitting so often, they have been central to the completion of this thesis. Jens and Ragna, my two beautiful children, are a major source of happiness in my life. I look forward to spending more time with them, now that I finish this thesis.

Last, but in no way least, I am profoundly grateful to my lovely wife, Solveig. This Ph.D. project would not have been possible without her. She is my best friend and favorite climbing partner. Solveig has been ever patient and supportive of my work. In addition, she is an excellent text editor and has a critical eye for details. This thesis would look much worse without her assistance! Thank you Solveig, for all the help. I love you.

## **List of Papers**

### **Paper 1**

Nordstrand, A. E., Hjemdal, O., Holen, A., Reichelt, J. G., & Bøe, H. J. (2017). Measuring psychological change after trauma: Psychometric properties of a new bi-directional scale. *Psychological Trauma: Theory, Research, Practice, and Policy*, 9(6), 696.

### **Paper 2**

Nordstrand, A. E., Bøe, H. J., Holen, A., Reichelt, J. G., Gjerstad, C. L., & Hjemdal, O. (2019). Danger- and non-danger-based stressors and their relations to posttraumatic deprecation or growth in Norwegian veterans deployed to Afghanistan. *European journal of psychotraumatology*, 10(1), 1601989.

### **Paper 3**

Nordstrand, A. E., Bøe, H. J., Holen, A., Reichelt, J. G., Gjerstad, C. L., & Hjemdal, O. (2019). Social support and disclosure of war zone experiences after deployment to Afghanistan – Implications for posttraumatic deprecation or growth. *Under review in Traumatology*.

## Abbreviations and Acronyms

<b>APA</b>	American Psychiatric Association
<b>ANOVA</b>	Analysis of variance
<b>CFA</b>	Confirmatory factor analysis
<b>CFI</b>	Comparative fit index
<b>DSM</b>	Diagnostic statistical manual of mental disorders
<b>HADS</b>	Hospital anxiety and depression scale
<b>HADS – A</b>	Hospital anxiety and depression scale (Anxiety sub-scale)
<b>HADS – D</b>	Hospital anxiety and depression scale (Depression sub-scale)
<b>ICD</b>	International classification of diseases
<b>IFI</b>	Incremental fit index
<b>ISI</b>	Insomnia severity scale
<b>ISAF</b>	International Security Assistance Force
<b>KZ syndrome</b>	Concentration camp syndrome
<b>M</b>	Mean
<b>N / n</b>	Population size / sub-population size
<b>NATO</b>	North Atlantic Treaty Organization
<b>NAFJMS</b>	Norwegian Armed Forces Joint Medical Services
<b>NAV</b>	Norwegian Labor and Welfare Administrations
<b>Norbatt</b>	Norwegian infantry battalion in UNIFIL
<b>n.s.</b>	Non-significant
<b>p</b>	Probability value
<b>PCA</b>	Principal components analysis
<b>PTCS</b>	Post Traumatic Change Scale
<b>PTD</b>	Posttraumatic deprecation
<b>PTG</b>	Posttraumatic growth
<b>PTGI</b>	Posttraumatic growth inventory
<b>PTSD</b>	Posttraumatic stress disorder
<b>PTSS</b>	Posttraumatic stress scale
<b>RMSEA</b>	Root mean square error of approximation
<b>SD</b>	Standard deviation
<b>SE</b>	Standard error
<b>SRGS</b>	Stress related growth scale
<b>UNIFIL</b>	United Nations Interim Force in Lebanon
<b>VIF</b>	Variance inflation factor
<b>WHO</b>	World Health Organization
<b>WW I</b>	World War I
<b>WW II</b>	World War II
<b><math>\alpha</math></b>	Cronbach's alpha
<b><math>\beta</math></b>	Standardized beta
<b><math>r</math></b>	Pearson's correlation coefficient
<b><math>\chi^2</math></b>	Chi-squared

## Preface

The main focus of this thesis is on psychological trauma and its effects on human development. In part, the current thesis aims to further the understanding of the etiological basis for diverging reactions to trauma. It is therefore useful to clarify the position taken in the thesis on some central issues in this field of study.

This thesis holds the position that it is useful to distinguish between the external event and the psychological suffering it can cause (McNally, 2009). The commonly used terms “trauma”, “traumatic stress/stressor”, or simply “stressor”, all refer to the external event. The word trauma comes from Greek and means wound, or penetration as in stabbing. Technically, the Greek meaning can imply physical injury that may range from minor to lethal wounds, and trauma always implies a significant degree of suffering. The suffering itself is commonly referred to as the “trauma response”, “distress” or “impact” (Figley, 2012).

An analogy from somatic medicine may be useful in separating the traumatic stressor from the psychological response to it; there is a difference between the *force* or *pressure* on a bone, and *the fracture* it causes. This analogy can also illustrate the distinction between a bone that *has been strained* and a *broken bone* (Figley, 2012). Predisposing factors such as bone density, supporting musculature, ligaments, tendons, but also previous injuries, can moderate the effects of a *physical* trauma. Similarly, previous psychological experiences, characteristics of the trauma, as well as genetic predispositions, can moderate the impact of a *psychological* trauma.

Scientific interest in traumatic stressors and their impact has increased substantially over recent decades. For a long time, the main emphasis was on incidents involving threats to individuals’ lives, health and physical integrity, and subsequently to trauma responses such as fear and psychopathology (Figley, 2013). In recent decades, there has been a shift

from the exclusive focus on danger-based stressors and fear-based responses towards the inclusion of non-danger-based stressors as well (Valent, 1999). Non-danger-based stressors do not necessarily involve danger or life-threats, but provoke individual or normative morality, or entail witnessing suffering and the violent loss of life in others (Ramage et al., 2015). Frequently, the related responses to non-danger-based stressors are not fear, but rather emotional states such as shame, guilt and/or depression (Friedman, Resick, Bryant, Strain, Horowitz, & Spiegel, 2011). Moreover, concepts such as resilience and posttraumatic growth have widened the scope of scientific inquiry on trauma. In addition to the traditional focus on the negative consequences, studies now also look at the possibility of long-term positive changes in people after exposure (Joseph & Linley, 2008). The current thesis recognizes both danger and non-danger-based stressors as relevant psychological traumas (Figley & Nash, 2007). Furthermore, this thesis presumes that responses to trauma are not limited to fear, nor are the outcomes of such experiences exclusively negative.

Unfortunately, there is no unifying theory that can give us clear and comprehensive descriptions of how to understand trauma and its psychological impact. There are many uncertainties and contradictions in the attempts to understand these terms. This has given rise to criticisms of empirical approaches to the study of psychological phenomena such as the impact of trauma on individuals (Lincoln, Lynham, & Guba, 2011). The current thesis acknowledges the problems associated with the reductionist epistemology (Bhaskar, 1986) often utilized when formulating central concepts in current psychotraumatology. However, it holds the position that such empirical knowledge is essential in furthering our understanding of how humans respond to trauma.



# **1 Introduction**

## **1.1 Background**

The current thesis is based on survey data collected about the mental health of Norwegian armed forces personnel who served in Afghanistan during the period 2001-2011. Efforts from the Norwegian government to improve the care and recognition of veterans who contributed in international deployments resulted in a comprehensive action plan (Departementene, 2011). As part of this plan, the Joint Medical Service of the Norwegian Armed Forces (Forsvarets Sanitet, FSAN) initiated several post-deployment surveys. The aim was to increase the knowledge of the post-deployment mental health of the Norwegian veterans. One of these surveys focused on veterans who had served in Afghanistan during the period 2001-2011, and part one of the project was completed in 2012. Part two of this project is currently under development by the Norwegian Armed Forces, and collection will tentatively commence in 2020.

Norwegian military personnel in Afghanistan contributed mainly in the NATO led International Security Assistance Force (ISAF) within the 2001-2011 time frame. The ISAF forces were deployed to Afghanistan in response to a request from the newly formed government of Afghanistan, following the fall of the Taliban regime. The ISAF force was established on December 6, 2001, after a UN Security Council resolution, and the main mission goal was to support the Afghan forces in securing and stabilizing the country.

## **1.2 Norwegian Post Deployment Surveys**

Mental health surveys have been conducted on Norwegian veterans from international deployments, both before and after the Afghanistan 2012 Survey. Borud (2016) has given an extensive accounting of such studies. In order to place the current thesis in a larger context within these efforts, Table 1 provides a brief outline of the main

dissertations, studies and surveys that have been focused on Norwegian veterans. Table 1 also gives a summary of the main findings.

Table 1.  
*Overview of main mental health studies on the Norwegian veterans.*

<b>Service country</b>	<b>Sample</b>	<b>Subject</b>	<b>Author (year)</b>	<b>Type of publication</b>	<b>Summary</b>
<b>Lebanon 1978</b>	UNIFIL – contingent 1	Psychiatric problems	Weisæth	Clinical report and article	UNIFIL Syndrome – “double helplessness”
<b>Lebanon (1978-1998)</b>	UNIFIL-1 2,627 men from Norbatt I-IV	Psychiatric problems	Weisæth, Aarhaug, Eitinger (1982)	Report and Articles	Higher rates of PTSD in prematurely repatriated soldiers (16%) than in total sample (5%).
	581 men from Norbatt XVIII	Alcohol use	Mellin-Olsen (1988)	Article	Alcohol use was equivalent to the Norwegian norm <sup>2</sup> , but higher on leave.
	1,062 men and women from Norbatt I-XXVI	Mental health	NAFJMS (1993)	Report	Majority of veterans were satisfied with their deployment. Approx. 5% reported PTSS. Indications of increased alcohol consumption.
	UNIFIL-1 888 men from Norbatt I-XXVI	Stress and alcohol use	Mehlum (1999)	Article	Alcohol consumption during deployment increased in 43.5% of soldiers, mainly for reasons such as tension, restlessness, anxiety, and stress.
	UNIFIL-1 1,624 men from Norbatt I-XXVI	PTSD	Mehlum (2002)	Article	Low rates (1.6%) of self-reported psychiatric disorders <sup>1</sup> .
	187 UN observers and	Risk factors for post-traumatic	Mehlum & Weisæth (2006)	Article	Higher rates of PTSS and alcohol consumption in

	211 UNIFIL soldiers (men)	stress reactions (PTSS)			UN observers than in UNIFIL soldiers. Risk of PTSS was associated with high mission strain and post-deployment adjustment difficulties.
	UNIFIL-1 1,172 men from Norbatt I-XXVI	Traumatic stress and suicidal ideation	Thoresen & Mehlum (2008)	Article	Higher rates of suicidal ideation in prematurely repatriated soldiers (17%) than in total sample (6%). Suicidal ideation was associated with service stress exposure level (mediated by PTSS and general mental health combined).
	22,198 men and women from Norbatt I-XLI	Suicide rate	NAFJMS (2014)	Report	A small, but non-significant increase in suicide rate was found in UNIFIL veterans after deployment <sup>1</sup> .
	10,605 men and women from Norbatt I-XLI	Mental health	NAFJMS (2016)	Report	Mental health condition of Norwegian UNIFIL veterans 27 years after service was generally good <sup>1</sup> . Prevalence of mental illness 12.4%.
<b>Bosnia (1993-1996)</b>	141 relief workers and 72 UN observers	Trauma exposure and PTSS	Kaspersen, Matthiesen, & Gøtestam (2003)	Article	Trauma exposure did not predict PTSS in UN observers; social support as the most important moderating variable. The opposite was true for relief workers; trauma exposure

					predicted PTSS, and several different social network variables moderated this effect.
<b>Kosovo</b> (1991-2011)	144 men	Coping strategies and mental health	Thomassen et al. (2015)	Article	Hardiness and cohesion (both separately and in combination) were associated with lower levels of mental health complaints.
<b>Afghanistan</b> (2001-2011)	Afghanistan-1: 4,053 men and women	Mental health	NAFJMS (2012) <sup>2</sup>	Report	Mental health of Norwegian Afghanistan veterans four years after service was generally good <sup>1</sup> . Prevalence of mental illness 4.4%.
	7,783 men and women	Suicide rate	NAFJMS (2013)	Report	Afghanistan veterans had an equivalent, or lower, suicide rate than Norwegian norm <sup>1</sup> .
	Afghanistan-1: 3,403 men	Mental health	Hougsnæs et al. (2016)	Article	Male Norwegian veterans from Afghanistan; prevalence of mental health was low <sup>1</sup> (5.1%), mainly associated with post-deployment factors.
	Afghanistan-1: 4,503 men and women	Mental health care service use and barriers to care	Johnsen & Bøe (2016)	Article	Mental health disorders are still associated with social stigma and avoidance in seeking mental health care among veterans.
<b>Other countries</b>	22,275 men several missions,	Suicide rate	Thoresen (2006)	Doctoral thesis	Moderate, non-significant, increased risk of

	(chiefly UNIFIL).				suicide was found in veterans <sup>1</sup> . Risk factors were relationship status (not married), loss/lack of social support, premature repatriation, mental health problems, negative pre-deployment life events.
	491 veterans (Gulf War)	Gulf War Illness (GWI)	NAFJMS (2011)	Report	A small sub-group of veterans (n = 11) with especially long and demanding service displayed a high rate of GWI (54.5%), PTSD (45.5%) and mental health problems (54.5%).
	1,402 men (several missions)	Coping strategies and alcohol use	Bartone et al. (2012)	Article	1.9% of recently deployed veterans had indications of alcohol abuse, and 5.7% were at risk of developing alcohol problem. Low hardiness and high avoidance coping were significant predictors of alcohol abuse.
	1,851 men and women (Lebanon, Iraq/the Persian Gulf, the Balkans and Afghanistan)	Living conditions	Statistics Norway (2013)	Report	When compared to the Norwegian norm <sup>3</sup> , veterans had a higher employment rate, as well as equivalent, or lower rates of sick leave and mental health problems.

*Note.* Overview based on table developed by Gjerstad (2017). <sup>1</sup>Compared to Norwegian general population (Mykletun, Knudsen, & Mathiesen, 2009). <sup>2</sup>Current thesis based on data from this survey. <sup>3</sup>Norm extracted from Statistics Norway (SSB). PTSD – Posttraumatic Stress Syndrome. PTSS – Posttraumatic Symptom Scale. GWI – Gulf War Illness.

### 1.3 Historical Perspectives on Traumatic Stress

Definitions of what constitutes a traumatic stressor have evolved over the years. In particular, major military conflicts have instigated research, improvements of care, and served to deepen the understanding of traumatic stress. The current thesis is related to war and its psychological impact on individuals. Accordingly, it is relevant to give an account on how the scientific understanding of trauma, specifically in relation to war and war zone stressors, has evolved over the years. This introduction aims to highlight central aspects of the scientific discourse on traumatic stress as it has evolved. This is done in order to give a context for the interpretation of the findings in the current thesis.

The term Post-Traumatic Stress Disorder (PTSD) has only been in circulation since 1980. However, the disruptive psychological consequences from extreme and negatively salient experiences have been in the public consciousness, both in legal, medical, and popular discourse throughout written history (Figley, 2012). Even the earliest literature describes that peril, witnessing death, bereavement and moral transgressions can lead to chronic psychological injury. In a Nordic saga, Gisli Súrsson was described as suffering from recurring nightmares as a result of having upheld his honor by engaging in a blood feud. The following passage in the saga illustrates how his nightmares eventually became so distressing that he was afraid to be alone at night: *“At last Gisli was so sore pressed with dreams that he grew quite afraid to be alone in the dark, and could not bear to be left by himself, for as soon as ever he shut his eyes the same wife appeared to him.”* (Grieg, Lie, Holtsmark, & Shetelig, 1973, p. 207). This description fits well into modern categorizations of post-trauma suffering.

### 1.3.1 Railway Spine and Soldiers Heart

Some of the earliest attempts to codify traumatic stress emerged in the beginning of the industrial age. An epidemic of nerve problems without any obvious physical injury was described in survivors of train crashes in the 1860s. This gave the rise to a phenomenon coined as railway spine (Harrington, 2003). The contemporary physician John Eric Erichsen (1866) described the phenomenon as being a psychological product of diffuse bodily harm of a type that had no clear physical etiology. It was speculated that it was due to compression injuries of the spinal cord from the crash (Harrington, 2003). The posttraumatic suffering was thus understood as the result of somatic, albeit invisible, traumas. Accordingly, the word trauma shifted from exclusively describing physical wounds or obvious bodily harm to include damage to the human nervous system and psyche. Even so, the general understanding of psychological trauma was firmly rooted in the physical body. There were notable exceptions though. Some scholars highlighted the psychological aspects of the trauma and pointed to the subjective experience of horror. This is familiar to the modern trauma discourse (Micale & Lerner, 2001). A contemporary of Erichsen, John Furneaux Jordan argued that the psychological impact of being involved in a railway accident in itself could be injurious, he wrote: *“The vastness of the destructive forces, the magnitude of the results, the imminent danger to the lives of numbers of human beings, and the hopelessness of escape from the danger, give rise to emotions which in themselves are quite sufficient to produce shock or even death itself.”* (Micale & Lerner, 2001, p. 49).

Other early accounts were concerned with the effects of war on soldiers. “Nostalgia” was one term used to describe psychological reactions among troops during the American Civil War (Hyams, Wignall, & Roswell, 1996). The American physician Jacob Mendes Da Costa studied a condition he termed “Soldier's heart”, or the Da Costa's syndrome. He

described this as an anxiety related syndrome with symptoms such as effort fatigue, dyspnoea, palpitation and sweating. Da Costa first observed these symptoms during the American Civil War and documented them in an 1871 study (Da Costa, 1951, reprinted). However, there was no clear perceptions of the etiology linking such behavior to specific mechanisms or psychological stressors. In addition, pathological suffering due to psychological experiences was highly stigmatized among soldiers (Chamberlin, 2012).

### **1.3.2 World War I**

The horrors of trench warfare and the use of chemical weapons during World War I prompted efforts to classify symptoms of psychological suffering as well as its proximate causes. Diagnoses of psychopathology due to traumatic stress during the early years of World War I differentiated between soldiers suffering from “Hysteria” and “Neurasthenia” (Acton & Potter, 2012). Hysteria was understood as a short-term reaction to a particular extreme situation. In contrast, neurasthenia was understood as long-term nervous attrition and typically associated with responsibilities of command (Acton & Potter, 2012). Neither were comprehensive diagnoses, and traumatized soldiers were often left untreated. The term “Shell Shock” was also commonly used in relation to psychological suffering. This term was eventually adopted by the British War Office as the official diagnostic label covering all neuroses arising among officers and soldiers of the British armed forces (Jones & Wessely, 2005). Shell shock, in contrast to hysteria and neurasthenia, was initially not understood as the result of psychological stress or extreme experiences. Rather, it was viewed as the physical effects of proximity to explosions. Various somatic explanations for the psychological symptoms were proposed. This line of thinking persisted even as cases of shell shock consistently emerged in soldiers who had not at all been proximate to exploding shells (Jones & Wessely, 2005).



The need for better understanding of the psychological suffering the soldiers of WW I led psychologists and psychiatrists to explore more accurate explanations. Psychologist John T. MacCurdy proposed a new diagnostic category as a replacement for shell shock called; “War Neuroses” (Jones, 2010). MacCurdy noted that shell shock *“implies a single etiology – the physical effects of high explosive shells on those subjected to bombardment, who suffer no external physical injury – and this is far from being even the main factor in the determination of the symptoms”* (MacCurdy, 1918/2013, p.1). In contrast, the term war neuroses accommodated a wide variety of psychological symptoms demonstrated by affected soldiers. MacCurdy emphasized the direct proximate cause of such symptoms to be the combat experiences themselves, without the *“misguided emphasis on exploding shells”* (MacCurdy, 1918/2013, p.1). The ideas of MacCurdy and likeminded contemporaries such as William Brown and Charles Myers acknowledged that exposure to traumatic stress could cause psychopathology. However, there was a heavy emphasis on predisposing personal vulnerabilities (Feudtner, 1993). This debate about the relative contributions of innate predispositions and stressor exposure continues to this day, but falls outside the scope of the current thesis.

WW I also saw efforts aiming to reduce attrition rates among soldiers due to nervous conditions. Several centers were set up close to the front lines; they admitted soldiers displaying nervous symptoms directly from the battlefield, and they allowed the soldiers rest and light military routines (Jones & Wessely, 2003). The American Expeditionary Force, when deployed to France, utilized this treatment (Salmon, 1919). Later it was referred to by the acronym “PIE” (proximity, immediacy, and expectancy) by Artiss (1963). The effectiveness of the PIE-programs was, however, disputed. Some proponents reported that 70-80% of the soldiers returned to the front (Russel, 1919; Holmes, 1939). Others found that only a modest minority regained reliable function (Wiltshire, 1916; Johnson &

Rows, 1923). Despite controversies, these psychiatric programs served to educate both mental health professionals and the military on the importance of psychic stress reactions.

### 1.3.3 World War II

Some important lessons from World War I were carried over to World War II. In particular, an emphasis on the selection of personnel, better training of troops, and public recognition of service. In addition, there was an increasing acceptance of fear as a normal reaction to combat experiences (Holden, 1998). These efforts proved to be important improvements in preventing chronic trauma-related psychopathology (Jones & Wessely, 2005). Rather than shooting soldiers for cowardice, which was one strategy for managing stress reactions during WW I, there was interest in managing the issue humanely. A report delivered by Lt. Colonel, Dr. Rogers, to the 1922 “Shell Shock Committee” illustrates the evolving attitude towards stress reactions during WW I. The following excerpt gives an example of new perspectives, which were carried over to WW II *“It is a great mistake to look on men as malingerers [...] I think there is a psychology in the whole matter [...] When you get these emotional cases, unless they are very bad [...] Give him a rest at the aid post if necessary and a day or two’s sleep, go up with him to the front line, and, when there, see him often, sit down beside him and talk to him about the war or look through his periscope and let the man see you are taking an interest in him, [and] you will not have nearly so many cases of anxiety neurosis”* (Army Report, 1922, p. 62-68). The medical officer Dr. Rogers was later credited with the popular quotes *“Humanity has only a certain limit of endurance”* and *“Without the rum ration we would have lost the war”*. These quotes reflect a mainstream notion, prevalent during WW II, that emotional reactions to severe stressors were a normal part of war participation (Shephard, 1999). The practical doctrine that evolved during World War II utilized terms such “battle fatigue” or “exhaustion” to

describe psychological reactions to combat. These phenomena were to be understood as a result of severe traumatic experiences or prolonged stress (Holden, 1998). The terms “battle fatigue” or “exhaustion” were chosen to emphasize that reactions to traumatic stressors were not serious medical disorders, but rather a depletion of resources. Moreover, the conditions were viewed as transitory; the soldiers would recover naturally. Afflicted personnel were to be retained within the forces rather than evacuated, and the proscribed remedy was usually to manage acute fear and allow for some time of rest and respite before returning to battle (Van der Kolk, Herron, & Hostetler, 1994; Jones & Wessely, 2006).

At the end of WW II, the American psychiatrist Abram Kardiner published a revision of his seminal book “War Stress and Neurotic Illness” (Kardiner & Spiegel, 1947). Based on his experiences with veterans of both WW I and WW II, Kardiner gave one of the first comprehensive descriptions of what we today would recognize as PTSD. He labelled this condition “traumatic neurosis”, and described a syndrome including a paralyzing fear of death, emotional and physical numbness, withdrawal, severe depression, and impaired combat functioning. Moreover, Kardiner recognized the possible long-term psychological impact of trauma, and stressed the importance of quickly providing treatment in order to prevent chronic suffering.

#### **1.3.4 Post-War Era**

The many reports of psychological suffering among seemingly uninjured soldiers during the two world wars prompted researchers to intensify efforts to codify psychological responses to traumatic stress. These studies primarily defined traumatic stress as combat fighting, e.g., being involved in a firefight, bombardment, hand-to-hand combat or having one’s life threatened by enemy action (Stouffer, Suchman, DeVinney, Star, & Williams, 1949). The efforts resulted in a diagnostic manual intended to support both clinical

interventions, as well as research on traumatic stress. In the foreword to the first Diagnostic and Statistical Manual of Mental Disorders (DSM-I), George N. Raines notes that civilian categorizations of psychopathology were inadequate for the experiences on the battlefield. He stated that *“No provision existed for diagnosing psychological reactions to the stress of combat, and terms had to be invented to meet this need”* (APA, 1952, p. vii).

Accommodating such concerns, the term “gross stress reaction” was introduced in the DSM-I, to describe a response in normal individuals to exceptional stressors. The publication of the DSM-I (APA, 1952) served in defining emotional reactions to severe stressors as a reactive disease, thus validating the suffering of afflicted persons. Moreover, it provided a common terminology that enabled statistical quantification (Lating, 1995). The emphasis both in the DSM-I (APA, 1952) and the subsequent DSM-II (APA, 1968), was about the unusual and extreme nature of precipitating events that were considered to be traumatic stressors. The following excerpt illustrates this: *“This diagnosis is justified only in situations in which the individual has been exposed to severe physical demands or extreme emotional stress, such as in combat or in civilian catastrophe (fire, earthquake, explosion, etc.)”* (APA, 1952, p. 40). In this, the new DSM-I increased the focus on the proximate causes of posttraumatic distress, i.e., the traumatic stressor. It was a major clarification of the fuzzy boundaries between the stressor and the response that were common to theories of trauma during WW I and WW II (Holden, 1998). However, the effort to quantify traumatic stress also limited the range of what would formally constitute such events. Traumatic stressors were primarily understood as incidents involving the threat of death or physical harm (Lating, 1995).

### **1.3.5 KZ Syndrome and War Sailor Syndrome**

Several unofficial labels existed in Europe to describe the long-term sufferings related to traumas from the WW II. In this context, the physical consequences of the brutal detainments in the Nazi concentration camps became a subject of scientific inquiry. Danish researchers first described a widespread condition among the concentration camp survivors that they labelled the “KZ syndrome”; it included a range of somatic and psychiatric symptoms (Helweg-Larsen et al., 1952; Hermann & Thygesen, 1954). Initially, they thought the etiology of KZ syndrome was somatic, i.e., multi-organ failures due to extreme physical hardship, many severe infections, persistent malnourishment and starvation. Gradually, however, it was acknowledged that a major factor in the etiology was the prolonged psychological stress and continuous fear of death the survivors experienced (Eitinger, 1964; Eitinger & Strøm, 1973).

Underscoring this understanding was the discovery of the “War Sailor syndrome”, which had many similarities to the KZ syndrome. However, the war sailors had not been subject to the hardship of the concentration camps, nor had they had many severe infections or been exposed to malnourishment. The war sailor syndrome came into use to cover a range of psychiatric manifestations frequently found among the trade fleet sailors who time and again crossed the Atlantic during WW II (Askevold, 1976; Egede-Nissen, 1978). Their ships were constantly at risk of being attacked and torpedoed by the German submarines, particularly in the years from 1941-1943. To mitigate the risks, the ships sailed in convoys with strict orders not to stop if any ship was attacked or torpedoed during the crossing. Rescuing of sailors from sinking ships was only to be done if it was possible without impeding the speed of the convoy. Accordingly, the war sailors of the Norwegian ships were living under constant threats of a brutal death at sea. Moreover, they frequently witnessed the sinking of fellow ships and comrade-sailors who perished at sea (Egede-

Nissen, 1978). After the war, sailors would often report a range of distress symptoms such as hypervigilance, social withdrawal, survivors' guilt, personality changes and heavy alcohol consumption (Eitinger & Strøm, 1973; Askevold, 1976; Egede-Nissen, 1978; Moldestad, 2007).

In the Norwegian context, both the KZ syndrome and the war sailor syndrome have been well recognized. The scholarly explanations of these syndromes emphasized external factors as the main reason for the precipitation of these conditions rather than any innate predispositions of the person (Askevold, 1976; Egede-Nissen, 1978). The scientific work on both the KZ syndrome and the war sailor syndrome were instrumental in establishing a clearer etiology for the trauma-based diagnoses (Weisæth, 2002). The scientific studies of these syndromes documented the potentially chronic and detrimental outcome of prolonged stressor exposures. In particular, the impact of the stressors that KZ survivors and the war sailors were exposed to during WW II, supported a shift of emphasis towards external factors in explaining major posttraumatic suffering and chronic trauma-related personality changes (Eitinger, 1964; Eitinger & Strøm, 1973; Askevold, 1976). Norwegian scholars have thus been instrumental in the later efforts to revise the International Classification of Diseases (ICD) system in the 1980's (Malt, Schnyder, & Weisaeth, 1996).

### **1.3.6 Vietnam War**

Due to the growing focus and understanding of psychological aspects of trauma, there was a buildup of military psychiatry in the years after WW II. The hope was that by formulating interventions or treatments based on scientific studies, it would be possible to reduce the impact of exposure to traumatic stressors (Jones & Wessely, 2005). During the Vietnam War, there was a concerted and premeditated effort to prevent attrition of personnel due to combat stress reactions (Jones & Wessely, 2006). Several forward

psychiatric programs, with abundant resources, were deployed together with the troops. Evaluations found the efforts to be successful in reducing cases of combat stress reaction (Tiffany, 1967). During the entire Vietnam War, less than 5% of the casualties were placed in this category, and even fewer in to other psychiatric conditions (Jones, 1995). However, the promisingly low rates of immediate combat stress reactions during the Vietnam War did not seem to reflect the long-term mental health outcomes of the veterans.

The discrepancy between combat stress reactions and the long-term mental health may have been partially due to the characteristics of the conflict in Vietnam (Breslau & Davis, 1987). Whereas World War II was both a war for territory and an existential war for democracy and human values, the Vietnam War quickly evolved into a war of attrition (Perret, 1990). With no clear aim of holding territory, the war was bereft of the traditional measures of success in military conflict. Officers were instead encouraged to maximize enemy casualties. Gen. William C. Westmoreland, head of the US forces in Vietnam during the heaviest engagements of the war, commented; *“Statistics were, admittedly, an imperfect gauge of progress, yet in the absence of conventional frontlines, how else to measure it?”* on the use of “body count” as an indicator of mission success (Gartner & Myers, 1995).

Another characteristic of this conflict was the fierce fighting between U.S. troops and civilians engaged in organized guerrilla warfare. This put the non-combatant status of civilians into question. Such elements, along with other factors, served to generate a particular set of war zone stressors for soldiers serving in the Vietnam War. Unfortunately, these were not always in line with the established concepts of trauma (Laufer, Gallops, & Frey-Wouters, 1984). Incidents such as witnessing or participating in abusive violence, i.e., torturing prisoners, mutilating enemy bodies, or raping or killing civilians, did not necessarily involve any threat to the soldiers’ life, and would often not be regarded as traumatic stressors (Breslau & Davis, 1987).

Subsequent studies found that decades after the war as many as 30.9% of Vietnam veterans suffered from war related mental health issues (Dohrenwend et al., 2006). Though these numbers have since been adjusted down, they sparked an intense lobbying to implement a new classification of trauma related psychological suffering (Dohrenwend et al., 2006; Jones & Wessely, 2006). Of note, substance abuse was also very common among soldiers during the Vietnam War. Studies have found that 80% of enlisted men tried cannabis, and that 20% were addicted to narcotics at some point during deployment (Robins, 1993). While most discontinued use when they returned home, substance abuse continued to be a problem for many of those who suffered from combat related stress (Bremner, Southwick, Darnell, & Charney, 1996).

When the DSM-III (APA, 1980) was released, it introduced the diagnosis of Post-Traumatic Stress Disorder (PTSD). This disorder was originally labelled “Post-Vietnam syndrome” or “Delayed-Stress syndrome” (Jones & Wessely, 2006). The PTSD diagnosis attempted to establish the parameters for understanding traumatic stressors as a *“psychologically distressing event that is generally outside the range of usual human experience”* (APA, 1980, p. 236). This definition of a traumatic event was labelled Criterion A, the stressor criterion, and it was a prerequisite for the new diagnosis (Davidson & Foa, 1991). Criterion A broadened the concept of trauma, extending beyond previous conventions that related such stressors exclusively to life-threatening stressors. However, the praxis at the time still focused on finite, identifiable, and significant stressors (Figley & Nash, 2007).

### **1.3.7 Trauma in International Classification of Diseases (ICD) System**

Of note, in Norwegian clinical practice the commonly used diagnostic system is the World Health Organizations’ International Classification of Diseases (ICD), rather than the



DSM system. Like the development of the DSM, the ICD system was heavily influenced by the experiences from WW II in its classification of psychological trauma (Brett, 1996). Historically, the emphasis of the ICD system was on acute psychological reactions to stress. The classification system described these conditions as transient disorders in both severity and occurrence. Individuals without any apparent mental disorder could respond with mental health complaints when exposed to exceptional physical or mental stress, such as natural disasters or combat experiences. In other words, the symptoms were regarded as circumscribed or situation-related, generally reversible and thought to commonly last no more than some months. The ICD system utilized labels such as “acute situational maladjustment” (ICD-6, World Health Organization (WHO), 1948), “transient situational disturbance” (ICD-8, WHO, 1968), and “acute reaction to stress” (ICD-9, WHO, 1977) to describe trauma responses. Eventually, the diagnostic category PTSD was introduced in the ICD system (ICD-10, WHO, 1992), albeit several years after the DSM system.

Moreover, there are some important distinctions between the diagnostic emphasis in the ICD and DSM diagnostic systems, relevant to the current thesis. The DSM system has a strong emphasis on the specificity of symptom criteria in its requirements for a diagnosis, and gives more descriptive diagnostic criteria than the ICD. The DSM is therefore considered more accurate and reliable than the ICD in a statistical context (Andrews, Slade, & Peters, 1999; Eid & Herlofsen, 2004). For this reason, researchers primarily utilize the DSM system when studying traumatic stress and reactions to trauma. Accordingly, the main emphasis of the current thesis will be on how the understanding of psychological trauma is conceptualized and how it has evolved, within the DSM system.

## 1.4 New Concepts in Trauma Research

Both the historical accounts and the subsequent developments of the PTSD criteria are relevant in relation to the current thesis. Neither the etiology, nor the typical patterns of responses to trauma have been finally settled. These issues are still subject to revisions and debates. This thesis involves several descriptions of war zone experiences that would normally fall outside the current DSM criterion of traumatic stress. Nevertheless, all the war zone stressors and trauma responses explored in the thesis have historical precedents in previous trauma research. The introduction of the diagnosis PTSD in the DSM-III in 1980 represented a watershed moment in the field. Both in terms of the recognition of peoples' suffering after trauma, as well as in the increased research interest and scholarly debate generated by the new diagnosis. The following segments of the introduction gives some account of this debate, as well as a description of some emerging concepts in the field of psychotraumatology relevant to the current thesis.

### 1.4.1 Diagnostic Debates, 1980 to Modern Era

Attempts to create an objective definition of stressors for the DSM-III resulted in criteria for PTSD that actively narrowed its definitions of trauma. The aim was to identify the types of events that predictably would precipitate psychopathology in people. Descriptions in the DSM-III acknowledged a range of responses to trauma, stating that *"Some stressors frequently produce the disorder (e.g., torture) and others produce it only occasionally (e.g., car accidents)"* (APA, 1980, p. 236). However, the diagnosis was mainly based on danger stressors and fear responses. The effects of non-danger-related stressors prompted some researchers to expand the studies of trauma to also include other distressing events. Witnessing death and the suffering of others (Green, Grace, Lindy, Gleser, & Leonard, 1990), failure to prevent death or injury to others (Fontana, Rosenheck, & Brett,

1992), as well as exposure to morally transgressive incidents (Yehuda, Southwick, & Giller, 1992) were all found to be associated with PTSD. Despite suggestions from such studies, the formal definition of trauma still focused on the life-threatening stressors and some severe experiences of witnessing. The DSM-III-R, published in 1987, partially expanded the definitions of traumatic stressors to include in the stressor criteria for PTSD, i.e., the criteria A, learning about some kinds of incidents *“In some cases the trauma may be learning about a serious threat or harm to a close friend or relative, e.g., that one’s child has been kidnapped, tortured, or killed”* (APA, 1987, p. 248).

In the years following 1980, trauma as a field of research expanded. In 1994, the new DSM-IV postulated more liberal criteria for what constituted a traumatic stressor. Moreover, the range of the associated responses was broadened, though PTSD was still classified as an anxiety disorder (Scott & Stradling, 1994). In order to differentiate between traumatic stressors and the challenges of a normal life, the emphasis in the DSM-IV was on subjective experiences dominated by intense fear, horror, or helplessness. The revision of the Criterion A, from objective stressor criteria to also include subjective interpretations, led to what some called the “criterion creep” (Rosen, 2004). This shifted the focus in the trauma research from looking at the specifics of the traumatic stressors to the clinical syndrome of responses that conformed to the PTSD model (Spitzer, First, & Wakefield, 2007). Having subjective responses as parts of the qualifying criteria for the stressor was problematic; it could conflate the subjective experience with the objective aspect of the stressor (North, Suris, Davis, & Smith, 2009). As stated by McNally (2009), this was *“confounding the response with the stimulus”* (p. 598). The heavy emphasis on the reported responses was problematic in several ways. Potentially, a combination of symptoms of mood disorders and phobias could meet the criteria for diagnosing PTSD. This raised the

concern that PTSD might simply be an amalgamation of other disorders (Spitzer et al., 2007).

In the DSM-V (APA, 2013), the criteria covering the subjective personal responses were abandoned. A wide variety of events and experiences that previously could be categorized as traumatic stressors were no longer included. By contrast, the responses to trauma as described in the DSM-V were expanded further. Recent research has demonstrated that emotions other than those of the fear-anxiety spectrum are also associated with exposure to traumatic stressors. They are emotions such as guilt, shame or anger, which can be prominent after trauma (Resick & Miller, 2009). Accordingly, DSM-V no longer classifies PTSD as an anxiety disorder, but uses a new category called “Trauma- and Stressor-Related Disorders”. Even so, the formal criteria for what constitutes the traumatic stressors are still subject to debate. Many argue that a range of relevant responses or emotions clearly fall outside the current definition of the DSM-V (Pai, Suris, & North, 2017).

#### **1.4.2 Differentiating Trauma**

Brown, Fielding, & Grover (1999) have suggested distinguishing between psychological trauma as a limited and finite event such as a fire or a car accident, and the trauma as an interpretive process. Within this framework, a threatening event precipitating fear-based distress may be best understood through a neuro-biological model of fear dysregulation (Norrholm & Jovanovic, 2010). In contrast, the etiology of distressing emotions may be less obvious in cases where the suffering is caused by the individual’s interpretation of the event (Brown et al., 1999; Janoff-Bulman, 2010).

An example of such a trauma could be, e.g., an experienced forensic technician who is examining a murdered child. He has done this kind of task many times before with little

discomfort, as he is interpreting his work as rather important. Thus, he is able to distance himself from the distressing nature of what has happened (Vaillant, 1995). However, the murdered victim may suddenly remind him of his own child. The forensic technician therefore experiences the circumstances of this crime as particularly horrific. Such interpretations may make it difficult to utilize his normal coping strategies (Janoff-Bulman, 1989). With regard to the interpretive traumas, it may “at a glance” be difficult to identify any single external cause for the emotional distress of the technician. Janoff-Bulman (2010) emphasizes the loss of innocence, shattering of assumptions, and the subsequent personal integration of the disruptive experiences as the central element in what constitutes a traumatic stressor. Dissecting the trauma narrative will sometimes reveal disruptive moments that brings an individual towards negative cognitive and emotional processing of the self, of others and the world (Janoff-Bulman, 2010). In this context, trauma can include morally transgressive experiences, or strong aversive impressions.

### **1.4.3 Moral Injury**

Litz et al., (2009) propagated the concept of “Moral Injury” to cover some of these experiences and defined it as incidents that “*transgress deeply held moral beliefs and expectations*” (Litz et al., 2009, p. 695). Accordingly, a Moral Injury as a stressor is either an act, or an observation of an act, that shatters the person’s fundamental moral and ethical convictions, e.g., about fairness, the value of life, right and wrong. Exposure to Moral Injury seems to be particularly associated with negative emotions such as shame and guilt (Bryan et al., 2014). Moreover, this type of trauma has been linked to a range of psychological disorders such as PTSD, depression, interpersonal difficulties, sleep disorders and substance abuse (Frankfurt & Frazier, 2016). Studies have also demonstrated that

exposure to such moral stressors may actually cause people more suffering than life-threatening situations (Stein et al., 2012; Jordan et al., 2017).

Despite these findings, there are several grievous experiences involving moral choices that the DSM-V criteria do not define as trauma. The DSM-V acknowledges that shame, guilt and ruminations related to immoral acts can be important components of posttraumatic distress. However, the emphasis of the DSM-V is on moral struggles as a response to trauma, not as a stressor in itself (Molendijk, Kramer, & Verweij, 2018). The problematic nature of this position can be illustrated by the following example. An inexperienced military officer gets a report that a young teenager wearing heavy clothing makes a beeline towards a control post manned by the officers' own forces. Due to the potential dire consequences if this teenager is wearing a suicide vest, the officer has to make a quick decision about what to do. Over the radio, he orders a subordinate to shoot the teenager. Afterwards it is revealed that the teenager was not wearing a suicide vest, it just looked like it. The officer in this case was not at the control post, he was never under any personal threat, and he did not even have any major sensory impressions of the incident. Even so, is this event not a traumatic stressor? This is not a hypothetical scenario, but an actual experience of a veteran who struggled with psychological distress for a long time. There are many similar real world experiences from the veterans of recent conflicts (Brock & Lettini, 2012). According to current DSM-V definitions, such incidents are not regarded as proper traumatic stressors (APA, 2013). This fact reflects the unsettled nature of the scientific concepts about psychological trauma.

#### **1.4.4 Non-Danger-Based Stressors**

Recent neuro-imaging studies have given an empirical basis for diversifying what constitutes traumatic stressors. Studies of fearful stress display neural activation primarily in

the fear circuitry, specifically involving the amygdalae, hippocampi, insula, anterior cingulate and medial prefrontal cortex (Felmingham et al., 2009; Simmons et al., 2011; Killgore et al., 2014). Ramage et al., (2015) proposed a distinction between danger-based stressors and non-danger-based stressors. Danger-based stressors encompasses incidents akin to the traditional understanding of trauma, where there is a direct threat to life or health. In contrast, non-danger-based stressors include a range of distressing events, where the key experiences do not involve any physical threat. Instead, they involve witnessing the suffering of others, hearing about the death or suffering of others, or experiencing moral transgressions i.e., Moral Injury. Neuro-imaging studies show that neural circuitry is differentially engaged by danger-based relative to non-danger-based traumatic events. Meta-analyses of studies employing specified trauma scripts find that non-danger-based stressors elicit hyperactivity of precuneus and cingulate regions (Etkin & Wager, 2007; Patel et al., 2012; Ramage et al., 2015). These regions, located in the superior parietal lobule on the medial surface of each brain hemisphere, are associated with autobiographical memory (Spreng et al., 2009), guilt (Basile et al., 2011) and moral cognition (Bzdok et al., 2012), not the elicitation of fear. Such studies demonstrate that danger-based, and non-danger-based stressors have separate neural foundations for their emotional responses. These findings can help improve the current understanding of the etiology and proper diagnostic entities for psychological trauma.

## **1.5 Positive Changes after Trauma**

The idea that traumatic events can lead to positive personal changes is not new. Since their inception, major religions and folkloric epics have recognized positive changes as a possible outcome of traumatic events (Joseph & Linley, 2005). Ancient Greek and Roman narratives of the hero reflects the historical roots of the concept of “growth through

adversity”. In these epics, an ordinary person experiences an extraordinary struggle, overcomes or survives it, and returns home to express important wisdom about life (Morgan, 2008). More recently, testaments from the survivors of various traumatic incidents have pointed to how traumatic experiences have affected their lives in a positive manner. This can be illustrated by the following statement from a Vietnam veteran “*I have gained much more than I lost from being in Vietnam. The taste is sweeter. The flowers are more beautiful. The delights of this earth are more fully appreciated and enjoyed*” (Tedeschi & Calhoun, 2004).

### **1.5.1 Existentialist Perspectives**

The efforts of the mental health professionals have mainly focused on people with problems and their responses to fearful experiences. Existential psychologists such as Rollo May (1975) and Victor Frankl (1959/1985) have, however, long pointed to the limitations of gauging life-satisfaction by hedonic experiences only. Their line of thought points out that the normal human condition will inevitably involve a substantial amount of suffering. Many people describe their life-experience as good despite the occurrence of negative events, while others may have many positive peak experiences and still feel miserable. This illustrates that hedonistic well-being is not necessarily a prerequisite for life-satisfaction (Kahneman & Egan, 2011). Even though exceptional suffering due to significant tragedies, traumatic losses or violence can be detrimental in the short and long-term, this will not always lead to a miserable existence. Traumatic experiences can actually lead to an increase of eudemonic well-being (Frankl, 1959/1985). The term “Eudaimonia” is usually attributed to Aristotle; it refers to an experience of meaning, of self-actualization and the person perceiving himself/herself to live a valuable life. Eudemonic well-being does not necessarily depend upon only the presence of positive emotions, nor the absence of negative



emotions; it is, rather, an experience of living an authentic or fuller life (May, 1960). Rollo May (1960) suggested that some experiences can force individuals to confront the inauthentic aspects of themselves, and thus generate feelings of anxiety and loss, but ultimately enable a better life.

### **1.5.2 Posttraumatic Growth (PTG)**

Since psychological trauma was made a field of scientific scrutiny, the main focus has been on the potential disruptive effects of extreme, distressing and threatening experiences (Norris, 1990, 1992). In recent decades, however, the topic of personal growth after trauma has entered the scene. A major influence in this field of study has been the conceptualizations of Tedeschi and Calhoun, who in 1995 coined the term “Posttraumatic Growth”. They also developed a self-report assessment tool of positive changes after trauma, called the Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996). In spite of major criticism (Infurna & Jayawickreme, 2019), their way of measuring the phenomenon is still the most used measure of posttraumatic growth (Jayawickreme, Rivers, & Rauthmann, 2018). Other concepts such as stress-related growth, adversarial growth, benefit finding, and posttraumatic change have also been introduced to capture the positive changes after trauma (Park, Cohen, & Murch, 1996; Tedeschi & Calhoun, 1996; Linley & Joseph, 2004; Helgeson, Reynolds, & Tomich, 2006). These concepts tend to divide psychological changes into three domains: the personal domain, the relational domain and the existential domain (Woodward & Joseph, 2003; Linley & Joseph, 2004; Calhoun & Tedeschi, 2006; Joseph & Linley, 2008). This structure parallels the perceptual alterations seen in persons with PTSD, i.e., altered perceptions of self, altered perceptions of self in relation to others, and altered perceptions of the world and its meaning (Janoff-Bulman, 1989; Foa & Rothbaum, 1998). In practical terms, growth in the personal domain

commonly implies that the person strengthens his/her self-confidence and the ability to manage life. In the relational domain, growth typically implies that the person reports enhanced and deeper relationships, e.g., feeling closer to friends and family, feeling increased trust and more compassion toward others. Finally, in the existential domain, growth will often entail developments in the person's life philosophy; he/she values life more and recognizes its positive aspects, and he/she may become more aware of personal priorities.

### **1.5.3 Distinctions Between Growth and Resilience**

The American Psychological Association (2014) defines resilience as *"the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress"* (para. 4). Resilience has been found to be a common occurrence among trauma-exposed individuals (Bonanno, 2005).

Distinctions between PTG and resilience are controversial, and some lines of thinking regard PTG as a phenomenon closely related to resilience (Westphal & Bonanno, 2007; Bossick, 2008; Nishi, Matsuoka, & Kim, 2010; Stewart & Yuen, 2011). Contrary to this position, Tedeschi & Calhoun (2004) claims that PTG *"involves going beyond pretrauma levels of adaption"* (p. 4), while resilience is a continuation of normal functions. Within this framework, resilience against the effects of trauma implies that a person is able to accommodate the traumatic experience (Rogers, 1959; Linley & Joseph, 2005; Janoff-Bulman, 2010). In other words, the stressful incident can be uncomfortable, but it does not shatter core assumptions about the self, others or the world; the normal functions are quickly regained (Linley & Joseph, 2005). In contrast, if trauma shatters a person's core assumptions, this may lead to a period of struggle and suffering. However, PTG refers to successful reconstruction of new and more adaptive core assumptions that enable higher

levels of function than before the trauma (Tedeschi & Calhoun, 2004; Linley & Joseph, 2005; Taku, Kilmer, Cann, Tedeschi, & Calhoun, 2012).

#### **1.5.4 Posttraumatic Growth – Some Challenges**

Many recent studies have called into question the strength and accuracy of psychological growth concepts as gauged by the much-used instrument PTGI developed by Tedeschi & Calhoun (1996). This is due to findings of high correlations between symptoms of posttraumatic suffering and reported growth (Taylor & Armor, 1996; Frazier, Conlon, & Glaser, 2001; Holgersen, Boe, & Holen, 2010; Dekel, Ein-Dor, & Solomon, 2012; Boals & Schuler, 2018). Most of the concern has been raised in relation to results produced by studies utilizing the PTGI as an indicator of growth (Infurna & Jayawickreme, 2019).

The PTGI, as well as other common PTG measures like the original Stress Related Growth Scale (SRGS), are unipolar scales; i.e., they only measure positive changes after trauma with items such as “*I learned a great deal about how wonderful people are*” (Tedeschi & Calhoun, 1996, p. 460). Respondents are then asked to rate how much this has occurred for them. This is problematic because people often have overly positive perceptions of their current selves while deprecating their previous selves (Hamilton & Gifford, 1976; Lechner & Antoni, 2004). In having positively formed statements, the PTGI encourages such cognitive biases rather than trying to counter them. This is potentially a source of major response bias, and raises questions about the construct validity of the PTGI (Tomich, & Helgeson, 2004; Jayawickreme & Blackie, 2014).

In a large prospective study, Frazier and colleagues (2009) raise serious doubts about the ability of the PTGI to capture real positive change after trauma. They found that 25% of their sample did indeed experience growth after exposure to traumatic stressors. This *actual* growth was indicated by several independent measures that gauged changes in

the most common domains of PTG, i.e., the personal, relational and existential domains. PTG, as indicated by this approach, was associated with decreasing levels of psychological distress over time and increasing levels of life satisfaction. In contrast, PTG as measured by the PTGI was primarily linked to continued psychological distress and low levels of life-satisfaction. The authors of this study sum up their findings by warning of the consequences of continuing to study PTG without better ways of gauging the phenomenon. They write *“existing approaches to the assessment of posttraumatic growth [...] are not in keeping with current practice in all other areas of psychological research, and this significant flaw impedes progress in what we believe is a most promising area of inquiry”* (Frazier et al., 2009, p. 917). Other scholars have published even stronger sentiments and state that *“post-traumatic growth – a construct that has now generated hundreds of articles – continues to be studied with flawed methods and a disregard for the evidence generated by psychological science”* (Coyne & Tennen, 2010, p. 24). Despite such criticism, the PTGI remains the most common method to gauge PTG, and was the main outcome measure in 94% of the publications on growth after trauma between 2016 and 2017 (Jayawickreme et al., 2018).

Growth, as measured by the PTGI, has an inconsistent relationship with posttraumatic suffering across studies; there have been results showing no association, inverse, positive, and curvilinear associations (Frazier, et al., 2001; Tedeschi & Calhoun, 2004, Zoellner & Maercker, 2006). Some researchers have proposed that true growth and posttraumatic distress are mutually exclusive, and cannot coexist in the same individual (Frazier, et al., 2001). Others have proposed that PTG is not a uniform construct.

Zoellner and Maercker (2006), have put forward a comprehensive theory of posttraumatic growth to account for such findings. Their Janus-Face Theory argues that the reports of posttraumatic growth may consist of two co-existent aspects. One aspect reflects

constructive or real posttraumatic growth, while the other aspect reflects positive illusions of personal growth. Tedeschi and Calhoun (2004) assert that PTG is the result of a constructive cognitive emotional processing of a traumatic experience, which ultimately will be associated with good adjustment. In contrast, illusory PTG reports, i.e., when co-occurring with high levels of posttraumatic suffering, are hypothesized to reflect cognitive distortions or self-defense mechanisms (Hall, Hobfoll, Canetti, Johnson, & Galea, 2009; Cho & Park, 2013). This perspective is supported by studies that find illusory growth to correlate with avoidance-oriented coping, and with defense mechanisms such as denial and repression (Shakespeare-Finch & Lurie-Beck, 2014). Compensatory illusions of growth are thought to serve a palliative function (Maercker & Zoellner, 2004) that may alleviate emotional distress in the short-term, but not in the long-term (McFarland & Buehler, 2012).

Despite the challenges associated with PTG, most researchers do not question the existence of PTG, but rather the validity of the way in which growth is commonly measured (Frazier et al., 2009, Jayawickreme & Blackie, 2014; Boals & Schuler, 2018). There are serious doubts of whether the most used approach to assessing PTG capture a real positive development after trauma, or illusions of growth (Frazier et al., 2009). New approaches to measure PTG have been called for (Cheng, Wong, & Tsang, 2006; Park & Lechner, 2006).

### **1.5.5 New Approaches to Posttraumatic Growth**

Recently, efforts have been made to measure growth in ways that may increase the likelihood of genuine reports of positive changes after trauma (Marshall, Frazier, Frankfurt, & Kuijter, 2015; Michélsen, Therup-Svedenlöf, Backheden, & Schulman, 2017; Boals & Schuler, 2018). The aim of these approaches is to capture self-perceived PTG that does not reflect defense mechanisms and illusions of change.

One way to increase the realism of the PTG-reports and reduce the illusory aspects is to capture both the negative and positive consequences of trauma in the PTG measures (Cheng et al., 2006). This perspective builds on an acknowledgement of the possibility of both costs and gains as results of traumatic experiences (Livneh, McMahon, & Rumrill, 2019). Measures such as the PTGI aim only on capturing positive changes. This may lead to a faulty understanding of what growth after trauma represents (Frazier et al., 2009; Coyne & Tennen, 2010). Many have argued that acknowledging the negative consequences of trauma paired with PTG will reflect a more realistic approach to gauge posttraumatic life changes (Park, 1998; Park & Lechner, 2006; Cho, & Park, 2013). Studies have found that individuals who report both positive and negative psychological effects after trauma score lower on measures of defensiveness compared to individuals who only report positive changes (Cheng et al., 2006; Kunz, Joseph, Geyh, & Peter, 2018).

#### **1.5.6 Costs and Gains of Posttraumatic Development; Deprecation and Growth**

As an improvement in the common measures of PTG, Park and Lechner (2006) suggested that items assessing post-trauma development should simultaneously assess negative changes. This introduces the concept of posttraumatic deprecation (PTD) (Baker, Kelly, Calhoun, Cann, & Tedeschi, 2008; Cann, Calhoun, Tedeschi, & Solomon, 2010) together with PTG. Cross-sectional and longitudinal studies have found that people report much less PTD than PTG (Kunz, Joseph, Geyh, & Peter, 2017, 2019; Michélsen et al., 2017; Boals & Schuler, 2018). Moreover, studies have compared PTD and PTG as predictors of the quality of life, showing that that PTG was significantly positively correlated to quality of life, while PTD was not (Baker et al., 2008; Cann et al., 2010). Under such circumstances, the findings indicate that the reported PTG is not illusory. This

gives credence to the new approach for capturing personal growth in individuals after exposure to traumatic stressors.

There are two different conceptualizations of PTD, and the issue of how to understand the phenomenon is not settled. Deprecation has been regarded both as the opposite of growth, (Marshall et al., 2015; Boals & Schuler, 2018), and as a related but separate construct to growth (Baker et al., 2008; Barrington & Shakespeare-Finch, 2013). This has given rise to two distinct approaches to capture both negative and positive changes after trauma. Both approaches explore changes in the traditional domains of posttraumatic development, i.e., the personal, the relational and the existential domains (Livneh et al., 2019).

Conceptualizing PTD as being on the opposite end of the same continuum as PTG builds on previous research which suggests that genuine growth should have a low association with psychological distress (Frazier, et al., 2001, 2009; Hall et al., 2009; Jayawickreme & Blackie, 2014). This understanding of PTD implies that trauma may generate deprecation in one aspect of a person's character and growth in another. However, the development after trauma cannot genuinely be both positive and negative with regard to the same domains of change; either a person appreciates life more, or he/she appreciates it less (Boals & Schuler, 2018). Moreover, this position holds that measuring PTD and PTG as independent dimensions invites reports of illusory growth (Frazier et al., 2001). Accordingly, this implies that capturing the costs and gains after trauma should be done with a *bi-directional* measure (Frazier et al., 2001; Marshall et al., 2015). Such bi-directional measures use neutral statements and only allow respondents either a negative, a positive or a no-change response in relation to each item on the scale. Thus, the resulting scores indicate *either* PTD, PTG or no-change.

In contrast, understanding PTSD as a related but distinct construct different from PTG, builds on studies suggesting that negative and positive changes following major stressors are typically independent phenomena (Park & Lechner, 2006; Cann et al., 2010). Proponents of this *bi-dimensional* view acknowledge that it may seem paradoxical to experience both negative and positive changes in the same areas of one's life (Cann et al., 2010). However, they argue that understanding PTSD as part of a continuum with PTG imposes artificial constraints on a person's experience of personal changes after trauma (Tedeschi & Calhoun, 2004). Accordingly, this line of thought holds the position that PTSD and PTG should be measured as independent constructs by means of an instrument divided into two distinct sub-scales (Baker et al., 2008). These two sub-scales have analogous items intended to gauge the same aspects of change; however, one sub-scale has negatively framed statements, while the other sub-scale has positively framed statements. This results in two scores that simultaneously indicate *both* PTSD and PTG with regard to the same items.

Longitudinal studies have produced mixed findings regarding the correlations between the PTSD and the PTG constructs. A high correlation between the two, as found by Kunz and colleagues (2017, 2018), supports the bi-directional approach. In contrast, findings of low or no correlation between PTSD and PTG suggest that they are separate constructs (Kroemeke et al., 2017; Michélsen et al., 2017). Such findings support the notion of measuring along independent dimensions (Kroemeke et al., 2017). More longitudinal studies comparing the two approaches for gauging PTG and PTSD, preferably in the same sample, are needed to further clarify these constructs.



## **1.6 Social Support and Trauma**

In the aftermath of trauma, the extent to which people's social environment is sensitive to the needs for relatedness, competence and self-efficacy will often influence the long-term outcomes (Waysman, Schwarzwald, & Solomon, 2001). Research has demonstrated social support to benefit people in several ways after trauma. It may be through emotional support, by challenging fear-related misconceptions and facilitating experiences of the world as safe and non-threatening, as well as giving a sense of self-efficacy and control (King, King, Fairbank, Keane, & Adams, 1998; Guay, Billette, & Marchand, 2006; Tedeschi & McNally, 2011). Moreover, positive outcomes are not necessarily predicted by the actual received social support, but rather by having positive perceptions of the quality and availability of social support (Helgeson, 1993).

### **1.6.1 Posttraumatic Growth and Social Support**

Positive perceptions of social support are important in trauma recovery, and may even buffer physiological stress activation (Cohen & Wills, 1985). Studies have identified a direct beneficial effect from the social support on the activation of the hypothalamic-pituitary-adrenal (HPA) axis, and as a part of that, on the immunological responses (Ditzen & Heinrichs, 2014). Such findings are congruent with several studies demonstrating that high social support is a major contributor towards the development of PTG after exposure to trauma (Tedeschi & Calhoun, 2004; Prati, & Pietrantonio, 2009; Pietrzak et al., 2010). To illustrate this, Maguen and colleagues (2006) found that military veterans who initially rated their posttraumatic social context as supportive reported more PTG, particularly in the relational domain. Growth in this domain can have transactional effects that deepen close relationships and increase compassionate behavior, which again can strengthen the quality of social support (Schaefer & Moos, 1998; Prati & Pietrantonio, 2009).

Psychosocial models of PTG emphasize the importance of the post-trauma social environment in addition to innate factors such as personality, defense mechanisms, cognitive appraisal styles and the capacity for independent emotional processing (Schaefer & Moos, 1992; Park, 1998; Armeli, Gunthert, & Cohen, 2001). However, knowledge is still limited on how social perceptions may influence the posttraumatic development towards PTD or PTG.

The ecological model for individual differences suggests that posttraumatic recovery depends on not only the person's perceptions of support, but also the characteristics of the social environment (Harvey, 1996). Maton (1989) proposed that an important contributor to negative developments after trauma was a failure to achieve "ecological fit". This refers to the compatibility between the individuals' psychological needs and the capacity of the social context to meet those needs (Harvey, 1996). Linley and Joseph (2004, 2005), hypothesized that if the social environment is not perceived as providing psychological need-satisfaction after trauma, people tend toward negative accommodation of the traumatic experience.

### **1.6.2 Disclosure of War Zone Trauma**

The cognitive processing theory of PTG (Tedeschi & Calhoun, 2004) emphasizes that an important function of social support is to give people opportunities to talk with others about their traumatic experiences. Studies have found that disclosing such experiences may promote PTG by providing social correctives to negative perceptions of oneself, as well as by promoting a positive change in cognitive schemas of the world (Taku, Tedeschi, Cann, & Calhoun, 2009).

Studies have also highlighted the risks associated with disclosure if the recipient of the trauma narrative has a negative reaction to the content (Ullman, 2000; Ullman & Filipas,

2001). Some traumatic experiences, such as certain war zone events may transgress both the social norms of the afflicted person and his/her socio-cultural and political community context (Guay et al., 2006). This is what Maton (1989) would refer to as a low ecological fit. In circumstances when the trauma of a person relates to issues that are perceived as taboos, empathic listening and support upon disclosure may be the exception rather than the normal response (Wortman, 2004). Negative reactions from the recipient of a trauma narrative may not only constrain social support, but it can also increase the posttraumatic suffering and social ostracizing of a veteran (Ullman & Filipas, 2001). This raises the question: Is disclosure of traumas essential in order to benefit from social support? Alternatively, may people benefit from social support even if they are reluctant to share or they withhold such painful experiences from others?

## **1.7 Summary of Introduction**

Through history, the understanding regarding what constitutes the essential components of traumatic stressors has shifted. Similarly, the range of the psychological responses to trauma has expanded. In the first scientific attempts at codifying the posttraumatic phenomena, trauma was initially regarded as structural damage to the nervous system. Experiences from the two world wars generated research in the field of psychotraumatology, and the paradigm evolved towards an understanding of trauma as primarily a psychological phenomenon. Traumatic stress was defined as situations involving life-threats with fear and anxiety being the adjunct responses. After the Vietnam War, there was some recognition of psychological distress also after exposure to stressors not involving life-threats or fear. However, when the PTSD diagnosis was introduced in 1980 by the DSM-III, the emphasis was primarily on the threat – fear links. Subsequent revisions of the DSM sought to encompass new findings in the trauma research field;

however, reaching satisfying criteria for PTSD was problematic. Emphasizing the subjective experience of distress risked blurring the criteria for the diagnosis. On the other hand, being overly restrictive could exclude traumatic stressors that did not fit the proscribed criteria, which sometimes invalidated individuals' subjective perceptions of their suffering. Theoretical developments suggest differentiating between distinct types of traumatic stressors. Recent neural imaging studies support the notion of dividing trauma into danger-based and non-danger-based stressors, which seems promising and may clarify some of the conceptualizations regarding traumatic stress.

In recent decades, phenomena such as resilience and posttraumatic growth have been subject to concerted research efforts. Particularly, there has been an emphasis on the possibility for psychological gains after distressing experiences. Tedeschi & Calhoun (1995, 1996) introduced the concept of posttraumatic growth (PTG) in an effort to study empirically positive changes after trauma. Recent decades have seen rising research interests in relation to PTG. There have been concerns regarding the validity of the growth reports after trauma. Several suggestions on how to improve both the understanding and the measures of the concept have been launched, introducing new instruments that measure posttraumatic deprecation (PTD) together with growth.

Finally, as with most mental health complaints, it has been demonstrated that good social support in aftermath of major stressors facilitates positive personal changes in afflicted individuals. However, there are many concepts of social support, and it is not clear which components that are most essential in facilitating PTG.

## **2 Aims of Thesis**

The general aim of this thesis was to explore the occurrence of posttraumatic deprecation or growth in Norwegian veterans after deployment to Afghanistan in the period 2001-2011.

Moreover, the thesis aimed to investigate how characteristics of the traumatic stressors and post-deployment social context would affect the direction of veterans' posttraumatic development towards deprecation or growth.

*Specific research questions addressed in the dissertation*

### **Aims Paper I:**

- I-1: Develop a new scale that measures the posttraumatic development along the dimension from deprecation to growth after exposure to traumatic stressors.
- I-2: Examine the validity of the new scale by exploring the associations between reports of deprecation, growth or no-change with traumatic exposure and with the measures of psychological distress.

### **Aims Paper II:**

- II-1: Examine how exposure to three types of trauma; Personal Threat, Moral Challenges and Witnessing, may differ in their associations with posttraumatic deprecation or growth.
- II-2 Test the relative contributions of the stressor types, Personal Threat, Moral Challenges and Witnessing, in relation to reports about psychological distress.

### **Aims Paper III:**

- III-1 Investigate the associations of structural and functional social support, as well as personal barriers towards sharing war zone experiences, in relation to the posttraumatic development towards PTD or PTG.

- III-2 In the *same* model, analyze barriers to sharing war zone experiences, and the functional and structural social support. The aim was to investigate the *relative* contributions towards posttraumatic development, i.e., towards PTD or PTG.

## **3 Methods**

### **3.1 Design**

Papers I-III utilized data from a comprehensive survey, the Afghanistan 2012 Survey. This survey gathered data through a self-report questionnaire composed of both established and new psychometric measures. The study was designed as a cross-sectional and retrospective study of Norwegian veterans who had been deployed to Afghanistan in the years 2001-2011.

### **3.2 Procedure**

The Norwegian Armed Forces Joint Medical Services (NAFJMS) conducted the Afghanistan Survey in the spring of 2012. A total of 7,155 personnel of both sexes were identified by the Recruiting Department of the Norwegian Armed Forces to fit the requirements. The identified personnel received a mailed invitation to take part in the study by completing an enclosed 20-page questionnaire regarding various mental health and psychosocial issues. The invitation also contained extensive information concerning the study and its aims, information on the psychosocial support available to veterans, as well as information regarding confidentiality and the manner in which the response data would be used. The respondents could either return the paper version by mail or complete a web-based version. An incentive to participate was that all responders would be included in a lottery of three sport watches. The data collection phase lasted thirteen weeks, from the 20th of February to the 24th of May 2012, and it included two reminders for those who did not respond. Descriptive statistics of the frequencies of responses are presented in Table 2.

Table 2.

*Invitations, returns, and active refusals to participate in the Afghanistan 2012 Survey.*

Populations	<i>N</i>
Invited sample	7,232
No valid address	69
Misplaced *	8
Sample	7,155
Returned responses by post	1,931
Returned responses electronically	2,294
Non responders	2,930
Total received responses	4,225
Active refusals (postal and web returns), and incomplete responses	172
Total completed responses (Final Study Sample)	4,053

*Note.* \* The person was either dead or wrongly registered as having been deployed to Afghanistan.

### 3.3 Participants

Of the 7,155 invited personnel, 4,225 (59%) responded, 1,931 (46%) of them by mail and 2,294 (54%) electronically on the internet; 172 (2.4%) returned responses that were either incomplete or were active refusals. Twenty-nine respondents answered both by mail and on the web; the duplicates were removed to retain only one response per person. The data collection was done in collaboration with the firm TNS Gallup. In all, 4,053 individuals returned fully completed questionnaires, resulting in a final response rate of 56.7%. Table 3 presents the demographic characteristics of the final respondent sample.

Table 3.

*Demographic Characteristics of Final Participants (N=4053) in the Afghanistan 2012 Survey.*

Variable	Characteristic	Participants <i>N</i> (%)
Biological Sex ( <i>n</i> = 4,053)	Female	337 (8.3)
	Male	3,716 (91.7)
Continued Military Service Following Deployment ( <i>n</i> = 4,044)	Yes	2,716 (67.2)
	No	1,328 (32.8)
Work Situation at Time of Study ( <i>n</i> = 4,043)	Military Employment	2,202 (54.5)
	Civilian Employment	1,841 (45.5)
Civil Status ( <i>n</i> = 4,028)	Single	934 (23.2)
	Cohabitant	1,422 (35.3)
	Married	1,407 (34.9)
	Divorced	146 (3.6)



	Widow/Widower	7 (.2)
	Other	112 (2.8)
Civil Education Level ( <i>n</i> = 4,035)	Primary School	88 (2.2)
	Secondary School	1,448 (35.9)
	Vocational Training	511 (12.7)
	University, Lower Degree	1,377 (34.1)
	University, Higher Degree	611 (15.1)
Military Education Level ( <i>n</i> = 3,977)	Basic/Specialist Training	1,299 (32.7)
	Officer Candidate Academy	1,339 (33.7)
	Military Academy	893 (22.5)
	Staff College	446 (11.2)
Livelihood at Time of Study ( <i>n</i> = 4,017)	Full Time Employment	3,394 (84.5)
	Part Time Employment	55 (1.4)
	Self-employed	74 (1.8)
	Pensioner	21 (.5)
	Unemployment Benefits	55 (1.4)
	Other Government Benefits	9 (.2)
	Student	387 (9.6)
	Homemaker	6 (.1)
	Other	16 (.4)

*Note.* Variable *n* inconsistent due to incomplete service records. Basic/Specialist training is minimum one year. Officer Candidate training also includes Non-Commissioned Officer candidates.

### 3.3.1 Non-Responder Analysis

To validate the representativeness of the responders in the sample, NAFJMS conducted a non-responder analysis of those veterans who did not participate in the Afghanistan 2012 study (Table 4). The non-responders plus those with incomplete responses and active refusals amounted to 3,102 (43.3%) persons. The non-responders, those with uncompleted responses, and the active refusals (*n* = 3,102), were compared with the responders (*N* = 4,053). This comparison was done with data retrieved from the central health registry that includes all Norwegian military personnel, and also with data from the Norwegian Labor and Welfare Administrations (NAV), see Table 4. The results brought out a gender and age bias. Women and older veterans had significantly higher response rates. In the first version of the Afghanistan 2012 report there were some errors in the non-responder analysis. When later discovered, they were corrected, and a revised report was published. The current thesis did not utilize any of the error-corrected measures in data analysis.

Table 4.  
*Comparisons of Demographic Characteristics of Participants (56.7%) and Non-Responders (43.3%) of Norwegian Afghanistan Veterans (N = 7,155) by numbers and percentage.*

Variable	Characteristic	Participants n = 4,053 (%)	Non-Responders n = 3,102 (%)	$\chi^2$
Biological Sex	Female	336 (8.3)	164 (5.3)	<.001
	Male	3,717 (91.7)	2,938 (94.7)	
Marital Status	Married	1,256 (31.0)	977 (31.5)	<i>n.s</i>
	Unmarried	2,797 (69.0)	2,125 (68.5)	
Deployment Age (years)	20-30	1,305 (32.2)	1,256 (40.5)	<.001
	30-40	1,528 (37.7)	1,070 (34.5)	
	40-50	884 (21.8)	512 (16.5)	
	50+	336 (8.3)	264 (8.5)	
Employed in the Military	Yes	1,905 (47.0)	1,442 (46.5)	<i>n.s</i>
	No	2,148 (53.0)	1,660 (53.5)	
Unemployed	Yes	182 (4.5)	130 (4.2)	<i>n.s</i>
	No	3,871 (95.5)	2,972 (95.8)	
At Least one Period of Sick-leave < 14 Days	Yes	1,111 (27.4)	813 (26.2)	<i>n.s</i>
	No	2,942 (72.6)	2,289 (73.8)	
Children Under 18 Years	0	2,412 (59.5)	1,815 (58.5)	<i>n.s</i>
	1	697 (17.2)	549 (17.7)	
	2	709 (17.5)	533 (17.2)	
	3 or more	235 (5.8)	205 (6.6)	

*Note.* Chi-square test, *n.s* = Not significant discrepancy ( $p < .005$ ) between responders and non-responders. Age registered at beginning of the deployment.

### 3.3.2 Participant Involvement

A focus group was invited at the outset to complete a pilot version of the survey. This was done to ensure that the items and questionnaires utilized in the Afghanistan 2012 Survey were understandable and able to capture the intended information. The focus group consisted of representatives from various veteran associations in Norway, and their feedback was incorporated into the final questionnaire.

### 3.4 Variables

In the data collected by the Afghanistan 2012 Survey, there were several psychometric measures and questions intended to indicate mental health factors and gather socio-demographic information. Four main types of variables were used as target variables

or main outcome variables in Papers I-III: a traumatic stress exposure index, a posttraumatic change (deprecation and growth) scale, measures of psychological distress, and measures of post-trauma social factors.

### **3.4.1 Traumatic Stress Exposure**

The Afghanistan 2012 Survey included a traumatic exposure index; a list consisting of 23 items ( $M = 10.17$ ,  $SD = 7.78$ ) describing a wide range of typical war zone stressors that could occur during deployment. In Paper I, this 23 item index was used as an indicator of the veterans' traumatic stress exposure. Each item was rated on a 5-point Likert scale based on the frequency of exposures. The response options were 0 – “not experienced”; 1 – “experienced 1–2 times”; 2 – “experienced 3-12 times”; 3 – “experienced 13-50 times”, and 4 – “experienced 50+ times”.

In Papers II and III, a modified version of the original index was used. The 23 items were pared down to 12 items covering both-danger-based and non-danger-based traumatic stressors. The remaining 11 items were discarded. The item selection was done on the basis of literature reviews of the relevant research (Fontana et al., 1992; Vogt, Proctor, King, King, & Vasterling, 2008; Litz et al., 2009; Stein et al., 2012; Ramage et al., 2015; Shea, Presseau, Finley, Reddy, & Spofford, 2017; Jordan et al., 2017). The Danger-Based category consisted of items related to life-threatening situations. The Non-Danger-Based category consisted of two stressor types: moral challenges (Litz et al., 2009) and witnessing (Green et al., 1990), which respectively related to items covering moral transgressions and the witnessing of major suffering. The three stressors were labelled Personal Threat ( $M = 1.32$ ,  $SD = 1.86$ ), Moral Challenges ( $M = .98$ ,  $SD = 1.43$ ) and Witnessing ( $M = 2.60$ ,  $SD = 2.38$ ). The three variables were not mutually exclusive; some events could involve more than one of these three stressors. In the current sample, 10.82% of the respondents reported

having been exposed to all three stressor categories, either simultaneously or on separate occasions. In Papers I-II the traumatic stressor indices were used as continuous variables.

### **3.4.2 Posttraumatic Change Scale (PTCS)**

The development of the PTCS was described in Paper I of this thesis, and utilized as the primary outcome measure in Papers I-III. The project group for the Afghanistan 2012 Survey aimed to develop a new scale for measuring the development after trauma towards PTSD, PTG or no-change. The project group initiated development of such a scale by conducting a literature review of commonly used measures of PTG and relevant theoretical publications on posttraumatic development (Park et al., 1996; Tedeschi & Calhoun, 1996; Foa & Rothbaum, 1998; Joseph & Linley, 2005; Janoff-Bulman, 2010). This resulted in an initial pool of 45 statements related to five broader sub-dimensions: interpersonal closeness, self-esteem, coping with stress and hardship, family and social life, faith/values and the sense of self.

Taking into account the call for new approaches to measure PTG (Cheng et al., 2006; Park & Lechner, 2006) the items were designed as non-leading statements with bi-directional response options. The given format of each item was, e.g., “My social life is...” or “My trust in other people is...”, and the items were rated on a 5-point Likert scale. The response options were 1 – “a lot worse/less than before”; 2 – “worse/less than before”; 3 – “same as before”; 4 – better/more than before”; 5 – “a lot better/more than before”. “*Before*” refers to before exposure to traumatic stressors. This format allows respondents to indicate the direction of their posttraumatic development to be either towards deprecation (PTD), growth (PTG) or no-change.

In Paper I, the 45 original statements were used to develop the PTCS. The sub-dimensions initially proposed by the project group, did not emerge in the PCA analysis.

This was likely related to the low endorsements of the items related to the proposed “faith/values and sense of self” dimension. Instead, the PCA analysis produced a four factor solution of 26 items; they constituted the final PTCS items ( $M = 3.28$ ,  $SD = .34$ ,  $\alpha = .91$ ).

The term posttraumatic change scale (PTCS) was chosen for this bidirectional scale aiming to reflect the range of possible post-deployment personal developments after exposure to major war zone stressors. The sum score range of the PTCS is 26-130. In order to obtain a score indicating either PTD, PTG or no-change, the mean sum is calculated as the sum score divided by the number of items in the PTCS, i.e., 26. Since the PTCS is a bi-directional scale, the median score represents no-change. A mean score below the average median of 3 indicates PTD, while a mean score above 3 indicates PTG.

From the 26 items, four sub-dimensions of the PTCS emerged: *Self-Confidence* (8 items,  $M = 3.45$ ,  $SD = .51$ ,  $\alpha = .89$ ), *Interpersonal Involvement* (6 items,  $M = 3.0$ ,  $SD = .37$ ,  $\alpha = .73$ ), *Awareness* (6 items,  $M = 3.4$ ,  $SD = .459$ ,  $\alpha = .79$ ) and *Social Adaptability* (6 items,  $M = 3.20$ ,  $SD = .35$ ,  $\alpha = .70$ ). These four sub-dimensions of the PTCS relate to four different psychological aspects of the posttraumatic development. The Self-Confidence sub-dimension relates to trust in oneself. The Interpersonal Involvement sub-dimension relates to trust in others. The Awareness sub-dimension relates to appreciation of life and inner values. The Social Adaptability sub-dimension relates to social strategies and function. All four sub-dimensions have demonstrated a good model fit and satisfying psychometric properties (Nordstrand et al., 2017).

### **3.4.3 Posttraumatic Stress Scale (PTSS-10)**

The PTSS-10 was utilized in the studies reported in Papers I and II. It is a 10-item self-report questionnaire assessing the presence and intensity of the PTSD symptoms during the last seven days (Holen, Sund, & Weisæth, 1983). A research team from Norway

developed the PTSS (12/10) questionnaire while doing research on the survivors of the North Sea oil rig disaster in 1980. Originally, the scale was meant for research purposes, but it is now widely used as an aid to clinical assessments. The version used in the current thesis consists of 10 statements, describing symptoms related to the DSM-III PTSD criteria, i.e., sleep problems, nightmares, bodily tension, irritability, depression, startle reactions, mood fluctuations, guilt and fear of trauma reminders. The instrument has a high face validity, and it has been utilized across various nationalities and populations for monitoring PTSD symptoms (Weisæth, 1993; Boer et al., 2007). Originally, the PTSS-10 items were scored by way of reporting symptoms as present or not-present, but in the revised version, each item is rated on a 7-point Likert scale from 1 (never/rare) to 7 (very often). The questionnaire has been shown to have a high sensitivity and specificity for trauma related mental health complaints (Schüffel, Schade, & Schunk, 1996). The total potential sum scores range from 10 to 70. Studies have indicated that a total sum score greater than or equal to 35 on the PTSS-10 may be used as a cut-off threshold for likely PTSD (Eid, Thayer, & Johnsen, 1999). Of note, PTSS-10 scores alone cannot give a formal PTSD diagnosis, but rather an indication of the levels of symptoms empirically associated with PTSD.

The Cronbach's alpha for the ten items of the PTSS-10 questionnaire in the current sample ( $N = 4,053$ ) was .90 ( $M = 16.94$ ,  $SD = 8.82$ ), indicating a good reliability. Comparable reliability coefficients have also been identified in other study populations such as in an un-traumatized control sample ( $\alpha = .86$ ), and in a sample of firemen ( $\alpha = .81$ ) (Schelling et al., 1998), as well as in a United Nations soldiers' sample ( $\alpha = .85$ ) (Capodilupo, Danieli, & Sansoni, 2012).

### 3.4.4 Hospital Anxiety and Depression Scale (HADS)

The HADS was utilized in Papers I and II, developed by Zigmond and Snaith (1983), it is a brief, self-report measure of anxiety and depression. Originally, it was developed to indicate anxiety and depressive symptoms in medical outpatient populations, but nowadays it is widely utilized for both clinical work and research in many countries (Herrmann, 1997). The HADS has been validated across various populations for several purposes such as clinical use, screening of depression and/or of anxiety disorder, epidemiological studies, as well as for other research proposes (Bjelland, Dahl, Haug, & Neckelmann, 2002). Moreover, the HADS has been validated in a large Norwegian general population sample (Mykletun, Stordal, & Dahl, 2001). The scale is bi-dimensional, and was developed to detect both depression and anxiety without confounding influences of somatic symptomatology attributable to physical illness.

The total HADS consists of 14 items, which can be divided into two subscales of seven items each: the anxiety sub-scale (HADS-A:  $M = 2.91$ ,  $SD = 2.78$ ,  $\alpha = .77$ ) and the depression sub-scale (HADS-D:  $M = 1.76$ ,  $SD = 2.41$ ,  $\alpha = .78$ ), both with a score range of 0-21. Higher scores indicate greater levels of anxiety or depression. The HADS-A and HADS-D sub-scales have been found to be sensitive, specific and valid for independent use, e.g., as separate indicators of anxiety and depression (Aben, Verhey, Lousberg, Lodder, & Honig, 2002; Bjelland et al., 2002). These sub-scales were used in Papers I and II of the current thesis as indicators of anxiety symptoms and symptoms of depression. The HADS and its sub-scales have no standardization for age or gender. Generally, the utilized cut-off scores have varied in different applications of the scale (Spinhoven et al., 1997). Interpretation of the HADS is, however, based on norm scores indicating levels of distress (Bjelland et al., 2002). The authors proposed that for both the Anxiety and Depression scales, scores of 8-10 suggest mild cases, 11-15 moderate cases, and 16 or above, severe

cases (Snaith & Zigmond, 1994). Similar cut-off scores have later been confirmed (Hinz & Brähler, 2011).

### **3.4.5 Insomnia Severity Index (ISI)**

The ISI was utilized in Papers I and II ( $M = 3.67$ ,  $SD = 3.98$ ,  $\alpha = .89$ ). It is a seven-item self-report questionnaire assessing sleep problems during the last month (Bastien, Vallières, & Morin, 2001). Sleep problems as identified by the ISI correspond to the diagnostic criteria for primary insomnia in the DSM-IV (Gerber et al., 2016). The index was designed for both clinical use and research purposes (Morin, Belleville, Bélanger, & Ivers, 2011). The ISI evaluates the following: sleep onset problems, sleep maintenance problems, early morning awakening problems, sleep dissatisfaction, interference of sleep, difficulties with daytime functioning, attribution of impairment to sleep problem, and concern caused by sleep difficulties. Each item is rated on a 5-point Likert scale giving a possible sum score range of 0 to 28. A cut-off score of 14 has been found to reliably distinguish between people diagnosed with primary insomnia from control samples (Bastien et al., 2001). However, further cut-off scores have been proposed: 8-14 indicates threshold sleep problems, 15-21 moderate sleep problems, and 22-28 severe sleep problems (Morin et al., 2011). Three versions are available of the ISI: patient, clinician, and significant others. In the current thesis, the patient version was used.

The ISI has demonstrated good face validity with insomnia across various demographic samples (Bastien et al., 2001). Studies have also reported satisfying psychometric properties across different nationalities (Gerber et al., 2016); however, the ISI has not yet been validated in a Norwegian population. The ISI gauges only insomnia severity and impact it does not include items relevant to other sleep problems, which may



occur more frequently in PTSD populations, e.g., nightmares, hyperarousal, startle reactions.

### 3.4.6 Social Support Measure

The measure of social support in Paper III was adapted from an inventory (Oslo 3 Support Scale) developed for use in the European health surveys (Nosikov & Gudex, 2003). The Oslo 3 Support Scale measures a person's perceptions of the quality and availability of social support. The inventory has shown good predictive validity regarding mental health outcomes, as well as high utility in large surveys (Dowrick et al., 1998). Changes in the wording of the instrument was made to relate the items to the social support of the post deployment contexts of the veterans, e.g., *"In the time after returning from deployment, I have had access to people who can support me if I have problems"*. Moreover, two items specifying social support from family were added. The questionnaire includes questions about the number of close confidants, the sense of concern, interest and support from friends, family and other people. The respondents are asked to rate these items on a 5-point Likert response format with the response options: 1 – "Completely Disagree"; 2 – "Disagree Somewhat"; 3 – "Either Or"; 4 – "Agree Somewhat"; 5 – "Completely Agree". The five items indicating functional social support gives sum scores of 5 to 25 ( $M = 9.65$ ,  $SD = 3.01$ ,  $\alpha = .66$ ). The obtained Cronbach's alpha in the current sample is consistent with the multidimensional structure of the index (Dalgard et al., 2006; Dalgard, 2008).

Instead of calculating an overall score for the quality and availability of social support, these scores were entered separately into the analyses. The following single item indicated the availability of the social support: *"How many people are so close to you that you can count on them for support if you have substantial personal problems?"*. The item had a 5-point Likert response format with response options of 1 – "none"; 2 – "one"; 3 –

“two”; 4 – “three to five”; 5 – “six or more”, giving sum scores of 1 to 5 ( $M = 4.03$ ,  $SD = .87$ ).

### **3.4.7 Personal Barriers to Disclose**

In Paper III, personal barriers to disclose traumatic experiences from Afghanistan were indicated by three items giving a range of scores from 3 to 15 ( $M = 6.7$ ,  $SD = 2.73$ ,  $\alpha = .60$ ). The project group for the Afghanistan 2012 Survey developed these items based on reviews of relevant literature about the veterans’ perceived barriers to talking with others about war zone experiences, and personal problems related to trauma (Lepore & Ituarte, 1999; Ullman & Filipas, 2001; Frattaroli, 2006; Guay et al., 2006; Figley & Nash, 2007; Litz, 2007). Respondents were asked to relate the questions to their service in Afghanistan and to rate the following items: (1) *“I experienced incidents in Afghanistan which I have not been able to tell others about, even those closest to me”*; (2) *“I have/had problems that I am not able to discuss with family or friends”*; and (3) *“There is no one here at home that is able to understand what I have experienced”*. Each of these items had a 5-point Likert response format with response options of 1 – “Completely Disagree”; 2 – “Disagree Somewhat”; 3 – “Either Or”; 4 – “Agree Somewhat”; 5 – “Completely Agree”.

## **3.5 Statistical Analyses**

The analyses in Papers I-III were carried out by using SPSS for Windows, version 25.0. In Paper I, Mplus version 7.3 was used in order to carry out a confirmatory factor analysis. In Papers I-II, group comparisons between respondents reporting mainly PTSD, PTG or no-change were made. In order to compare the respondents’ reporting of PTSD, PTG and no-change on the PTCS, the sample ( $N = 4,053$ ) was split into three groups based on the participants’ mean scores on the instrument for analysis of variance (ANOVA).

The PTCS is a bi-directional scale. The mid-score, representing no-change, is 3. Mean scores lower than 3 indicate PTD, while scores higher than 3 indicate PTG. The negative-change group, i.e., the PTD group, consisted of respondents with mean total scores of 1-2.9. The positive-change group, i.e., the PTG group consisted of respondent with mean total scores of 3.1-5. A narrow inclusion interval for the no-change group was chosen; it consisted of respondents with mean total scores between 2.9 and 3.1. Very few respondents (< 2%), scored both 1 and 5 on items of the PTCS. Therefore, no mixed-change groups were made. Moreover, when deciding the appropriate significant p-values for Papers I-III the large sample size was taken into account ( $N = 4,053$ ). Accordingly, a conservative significance level of .001 was chosen for all appropriate analyses (Dixon, 1998).

### **3.5.1 Descriptive Statistics**

In Papers I-III descriptive statistics were applied to find the mean values ( $M$ ), the standard deviations ( $SD$ ), or the frequencies. Possible differences in the frequencies and the mean values between the responders and non-responders with regard to relevant demographic variables were analyzed by Chi-square.

### **3.5.2 Principal Components Analysis and Confirmatory Factor Analysis**

The development of the Posttraumatic Change Scale (PTCS) in Paper I was done in a two-step process. In the first step, a randomized selection of 1,000 respondents for model development by means of a Principal Components Analysis (PCA) was conducted. In the second step, the remaining sample ( $n = 3,053$ ) was utilized to test the fitness of the model identified in step one by means of a Confirmatory Factor Analysis (CFA).

The PCA (oblimin rotation) included 45 original items, the component loadings were estimated freely (unconstrained model), and the number of components was

determined by using the criterion of eigenvalue  $\geq 1$ . A main component loading correlation to the factor of at least .40 and no loading above .40 on any other component was regarded as acceptable for the final item selection. This was followed by a scrutiny of the internal consistency to exclude any redundant items without compromising Cronbach's alpha levels. Gorsuch (1983) recommends that in PCA there should be at least ten respondents per item. In Paper I this ratio was more than doubled in order to maximize the probability of getting an optimal component solution.

The CFA procedure of the 26 items identified in the PCA was conducted with the asymptotically distribution free method to examine the overall fit of the model. Error terms in the items were allowed to correlate. The indices derived were the comparative fit indices (CFI) and the incremental fit indices (IFI); values  $\geq .90$  were regarded as acceptable model fits. The root mean square error of approximation (RMSEA) values that were equal to or less than .05 were regarded as indicating a good model fit.

### **3.5.3 Group Analysis**

To answer the research questions in Papers I and II, group comparisons of the possible divergent effects of the target variables were made by means of separate analyses of variance (one-way ANOVAs) with post hoc Bonferroni corrections. Levene's test of homogeneity of variance was significant for all ANOVAs in both Papers I and II. Accordingly, Welch's  $F$  was reported.

In order to answer the research questions in Papers II and III, the relative contributions of the targeted independent variables were investigated by means of multivariate linear regressions (Stevens, 2002). The relative importance of the target variables in the investigated models was compared using the standardized regression coefficients, the  $\beta$  weights.

In Papers I – III, Pearson correlations were made to construct correlation matrices in order to explore the relationships between the target variables. Moreover, the collinearity statistics, i.e., the tolerance, the VIF and the condition indices were investigated in order to control for multicollinearity.

## **4 Ethical Aspects**

All the information gathered by the Afghanistan 2012 Survey is stored in The Norwegian Armed Forces Health Registry, which provides researchers with anonymous data only. In addition, all participants gave written informed consent. Study procedures, collection, storing and distribution of data, were done in accordance with the existing legislation that regulates the Norwegian Armed Forces Health Registry. The collection of anonymous health information about the non-responders was approved by the Regional Committee for Medicine and Health Research Ethics of South-East Norway.

## 5 Summary of Results

### **Paper I: Measuring Psychological Change after Trauma: Psychometric Properties of a New Bi-Directional Scale**

The study aimed to find new and improved ways to measure PTSD and PTG after traumatic stress exposure. The most commonly used scientific measures of positive posttraumatic outcomes are unidirectional. In contrast, this study attempted to develop a scale that captured the continuum from negative to positive psychological changes after trauma on a bi-directional scale. Forty-five statements were initially presented to the sample ( $N = 4,053$ ) with the request to report posttraumatic changes in relation to each item and indicate either negative, positive, or no changes as a result of their exposures in Afghanistan. A random selection of 1,000 respondents were utilized as a sample for model development. Through principal components analysis, we found 26 non-overlapping items with factor correlations above .40. These 26 items were included in the final version of the scale. The 26 items fell into four sub-dimensions. Based on the semantic content of their included items they were labelled Self-Confidence, Interpersonal Involvement, Awareness and Social Adaptability. A confirmatory factor analysis in the remaining sample ( $n = 3,053$ ) indicated that this structure had good model fit, and the full scale was labelled the PTCS. The scale has a possible sum score range from 26 to 130. As measured by the PTCS, most veterans reported PTG (80.8%) whereas a minority reported PTSD (8.1%), or no-change (11.1%). In contrast with many previous studies, PTG on the PTCS correlated negatively with measures of depression, anxiety, sleep disorders, and posttraumatic stress symptoms. In conclusion, the posttraumatic change scale (PTCS) demonstrated acceptable psychometric properties and captured the range from negative to positive posttraumatic changes after exposure to traumatic stressors.

## **Paper II: Danger- and Non-Danger-Based Stressors and their relations to Posttraumatic Deprecation or Growth in Norwegian Veterans deployed to Afghanistan**

This study aimed to explore how three distinct types of traumatic war zone stressors were associated with PTSD and PTG in the veterans after deployment to Afghanistan. Twelve war zone related traumatic events were selected, and divided into two stressor categories labelled danger-based stressors and non-danger-based stressors. The non-danger-based stressor category was further sub-divided into two stressor types: moral challenges and witnessing. This gave three stressor types for further analysis. Exposure to the different stressors were explored in relation to the self-reported scores on the Posttraumatic change scale (PTCS).

Results showed that the veterans who reported PTSD were significantly more inclined to report exposure to the two non-danger-based stressor types, Moral Challenges ( $p < .001$ ) or Witnessing ( $p < .001$ ), compared to the veterans who reported mostly PTG. Moreover, the relationship between the exposure to the different stressor types and the reported levels of distress were explored. Both the non-danger-based stressors and the danger-based stressors contributed to higher posttraumatic stress symptoms as measured by the PTSS ( $p < .001$ ). The non-danger-based stressors also contributed to distress in terms of depression, anxiety and insomnia ( $p < .001$ ) as measured by HADS-D, HADS-A and ISI, respectively. The danger-based stressor did not emerge with significant associations in relation to those measures. The findings highlight the particular negative impact of non-danger-based stressors on veterans.



### **Paper III: Social Support and Disclosure of War Zone Experiences after Deployment to Afghanistan – Implications for Posttraumatic Deprecation or Growth.**

This study aimed to explore how the quality and the availability of social support, as well as the veterans' personal barriers to disclose war related traumatic experiences, related to PTSD or PTG. A war zone stressor exposed sample was selected ( $N = 3,465$ ) from the Norwegian Afghanistan veterans. Inclusion was based on their self-reported exposure to one or more of the twelve possible war zone stressors covering both danger-based and non-danger-based stressors. Using a series of hierarchical regression equations, we compared the relative contributions of personal barriers to disclose war zone experiences in relation to perceived quality of social support and perceived availability of social support in the prediction of posttraumatic changes, towards PTSD or PTG. Both perceived availability of social support ( $p < .001$ ) and perceived quality of social support ( $p < .001$ ) were found to be important contributors in the development of PTG after exposure to major stressors. Moreover, personal barriers to disclosing war zone experiences was in itself a contributor towards PTSD ( $p < .001$ ). However, when included in a model with the perceived quality and the availability of social support, the personal barriers were no longer a significant contributor to PTSD. This indicates that when a veteran has high levels of perceived social support, barriers to disclose war zone experiences no longer have a significant negative impact on the posttraumatic development.

## **6 Discussion**

### **6.1 Improving Measures of Growth**

Several previous studies have explored the PTG phenomena, both in civilian and military populations. However, few of them have considered the dual outcome of PTD and PTG in the wake of trauma (Jayawickreme et al., 2018). PTG research has predominantly used measures enabling respondents to report only positive psychological changes (Jayawickreme et al., 2019). The negative changes that can arise in the same domains have been neglected (Park & Lechner, 2006). Some recent studies, however, have used different kinds of measures, that capture both the negative (PTD) and the positive (PTG) posttraumatic development (Cann et al., 2010; Barrington & Shakespeare-Finch, 2013; Marshall et al., 2015; Michélsen et al., 2017; Boals & Schuler, 2018). Consistently, such studies have found lower levels of reported PTD than PTG. Moreover, PTD was found to be inversely associated with life satisfaction and correlated positively with indicators of PTSD, anxiety and depression (Cann et al., 2010; Barrington & Shakespeare-Finch, 2013; Boals & Schuler, 2018). Thus, these new approaches seem to avoid the previously reported problem of high associations between PTG and the psychological distress (Zoellner & Maercker, 2006; Frazier et al., 2009).

In Paper I, we considered these recent advances in developing a new bi-directional scale; the PTCS. On the same continuum, this new scale indicates both negative and positive personal changes after trauma exposure, i.e., the scale can capture both PTD, PTG and no-change depending on the score. A recurring recommendation in the trauma literature regarding the new measures of PTD and PTG is the use of large samples for the model development, and also the use of longitudinal prospective research designs (Linley & Joseph, 2004; Livneh et al., 2019). To the best of our knowledge, the PTCS was developed in the largest sample of any published bi-directional measures so far. The PTCS was

developed by means of a cross-sectional design. However, the planned second phase of the NAFJMS survey of the Norwegian Afghanistan veterans will enable further investigations on the PTCS in a longitudinal design.

A substantial majority of our current sample reported PTG (80.8%), while a minority reported PTD (8.1%), or no-change (11.1%). These percentages are comparable to the results of most studies using measures that capture both PTD and PTG (Kroemeke, Bargiel-Matusiewicz, & Kalamarz, 2017; Michélsen et al., 2017; Boals, & Schuler, 2018). Thus, both the large sample size of Paper I and the results of other studies indicate that what we have found is a common distribution of cases in reports of PTD and PTG.

Another major finding in Paper I was that PTG did not correlate with measures of psychological distress. It seems fair to assume that this indicates that the trap related to illusory growth reports was successfully avoided. This supports the approach of measuring PTG together with PTD, and also it contradicts the arguments that self-perceived PTG mainly reflects illusory changes, denial or avoidance of negative changes (Frazier et al., 2009). Our finding does not fully rule out the possibility that PTG may sometimes be compensatory, as suggested by the Janus face model (Zoellner & Maercker, 2006). However, the significant association between PTD and psychological distress indicates that the PTG captured by the PTCS mostly does not represent defensive illusions of growth (Shakespeare-Finch & Lurie-Beck, 2014). Further studies with longitudinal design are still needed in order to verify the abilities of the PTCS to measure non-distress related PTG in a long-term perspective.

Among researchers, there are opposing opinions on how to understand and measure PTD. Some posit that PTD belongs on the same continuum as PTG. This implies that PTD represents the negative outcome of the same constructs that indicate PTG (Marshall et al., 2015; Kunz et al., 2017; Boals & Schuler, 2018). Others hold the view that PTD and PTG

are discrete constructs (Tedeschi & Calhoun, 2004), and therefore they should be measured independently by different dimensions (Cann et al., 2010). The PTGI-42 is one example of such a scale (Baker et al., 2008). This measure consists of two sub-scales: one captures PTD and the other captures PTG, giving the instrument a *bi-dimensional* scale. A reiterated criticism of the previous growth measures has been the biased wording of the items on these scales (Frazier et al., 2009; Coyne & Tennen, 2010; Jayawickreme & Blackie, 2014). On the PTGI-42, and similar bi-dimensional measures, all items have either a negative framing format to indicate PTD, or a positive framing format to indicate PTG. This approach can be suggestive, and may possibly generate a response bias (Tomich & Helgeson, 2004). The biased wording of the items in the previous measures of PTG is thought to be a major reason for the over-reporting of PTG (Frazier et al., 2001; Hall et al., 2009; Jayawickreme and Blackie, 2014). Therefore, in developing the new PTCS we concluded that a bi-dimensional approach for assessing PTD would be problematic. In contrast, we chose to give the PTCS bi-directional response options, and the items were given a neutral wording, as suggested by Park (1998). The neutrally worded items can be rated either in a negative direction, in a positive direction, or as representing no-change.

The PTCS is similar in structure to the recently revised SRGS-R (Boals & Schuler, 2018), as well other bi-directional measures based on the PTGI (Frazier et al., 2001; Marshall et al., 2015). The new SRGS-R has also demonstrated negative correlations between the PTG, and psychological distress (Boals & Schuler, 2018). This adds further support to our choice of a bi-directional approach for measuring PTD and PTG.

Both the SRGS-R and the similar bi-directional scales based on the PTGI, differ from the PTCS in their item composition (Frazier et al., 2001; Marshall et al., 2015). In particular, the items related to spirituality and religiosity had low endorsement among the Norwegian veterans both in the pilot sample, as well as in the PCA analysis done with the

larger study sample. Accordingly, no items related to religiosity were included in the PTCS. In contrast, such items are prominent in the SRGS-R, as well as in most other scales measuring PTD and PTG after trauma (Livneh et al., 2019). Religious items such as “*I have a stronger religious faith*” (Tedeschi & Calhoun, 1996, p. 460), usually have a high endorsement from their respondents (Tedeschi, Cann, Taku, Senol-Durak, & Calhoun, 2017). However, studies exploring PTG across samples with different cultural backgrounds find that this is mostly the case in US samples (Taku & Cann, 2014).

In particular, the PTGI sub-dimension Spiritual Change seems to be culturally dependent (Taku & Cann, 2014). Both the PTGI and the SRGS were developed in relation to US samples. However, our sample consisted solely of Norwegian veterans. Compared to most other countries, Norway has a highly secular population (Pollack & Rosta, 2017). The monthly church attendance in the general Norwegian population is 11%, compared to 43% in the United States (Kvande, Reidunsdatter, Løhre, Nielsen, & Espnes, 2015). Growth measures have been found to be culturally sensitive (Tomich & Helgeson, 2004), and the difference in religiosity between the Norwegian and the US populations is likely to explain the low endorsement of items related to spirituality.

Of note, Frasier and colleagues’ (2009) prospective study found that growth in terms of higher religious commitment was correlated with increasing psychological distress from pre- to post trauma. Religiosity was actually the only growth related sub-dimension in the study to display this correlation uniformly. Such findings highlight the importance of validating the growth measures in national samples, and considering cultural differences when applying items for use in new cultural contexts (Taku & Cann, 2014). Ideally, instruments should aim to be universally applicable. Accordingly, if religious items continue to be controversial indicators of growth, one should consider not including them in future measures.

## **6.2 Exposure to Non-Danger-Based Trauma**

In recent years, an increasing number of studies have explored how trauma types other than the traditional “life-threat” stressors, may lead to psychological suffering (Figley & Nash, 2007; Drescher et al, 2011; Figley, 2013; Vargas, Hanson, Kraus, Drescher, & Foy, 2013; Bryan, Bryan, Morrow, Etienne, & Ray-Sannerud, 2014). In particular, the concept of moral injury (Litz et al., 2009) has been related to both PTSD symptoms (Pietrzak et al., 2010; Jordan et al., 2017), depression (Frankfurt & Frazier, 2016; Shea et al., 2017) and to substance abuse (Currier, Holland, Jones, & Sheu, 2014). The results in Paper II support the notion that non-danger-based stressors such as Moral Challenges and Witnessing may instigate posttraumatic distress. Paper II demonstrates that both danger-based and non-danger-based types of stressors were associated with posttraumatic stress symptoms. However, our findings suggest that exposure to non-danger-based stressors may be worse than exposure to danger-based stressors in terms of psychological distress. In the current sample, morally challenging incidents and the witnessing of death and suffering of others seem to precipitate distress more frequently in terms of anxiety, depression and insomnia than do fear-based situations. This is in line with recent studies researching the impact of different stressor types (Jordan et al., 2017; Shea et al., 2017).

A few studies have explored how different trauma types may affect personal changes differently with regard to PTD and PTG (Marshall et al., 2015; Michélsen et al., 2017). However, to our knowledge, no previous studies have compared the proposed danger-based and non-danger-based distinctions of trauma types (Ramage et al., 2015), regarding their influence on PTD and PTG. Our main aim in Paper II was to investigate these possible distinctions. The findings demonstrate that exposure to the two non-danger-based stressor types Moral Challenges and Witnessing were more associated with reports of PTD, than with PTG. In contrast, there were fewer such associations between danger-based

stressors and PTSD. The results in Paper II highlight a pressing question: why are moral challenges or witnessing other people's suffering, significantly more associated with negative personal changes than the experience of life-threatening situations?

One line of thinking that may partially explain the findings in Paper II is the trauma theories of Janoff-Bulman (1989, 2010). She was concerned with providing insights into the mechanisms by which trauma can lead to psychological distress. Her theory of "shattered assumptions" has heavily influenced the subsequent theories of PTG (Tedeschi & Calhoun, 2004; Joseph & Linley, 2005). Moreover, several predictions made by this theory are in line with the results of recent prospective studies (Schuler & Boals, 2016). Building on the previous work by Horowitz (1982), the theory proposes that people have fundamental assumptions about themselves, others and the world. Often people will hold unrealistic assumptions; they may assume that the world always is predictable, meaningful and benevolent. According to Janoff-Bulman (2010), trauma sometimes forces people to reorient their perceptions about themselves, others and the world because the experience is incongruent with their preexisting assumptions. The fundamental assumptions of people exposed to traumatic stressors may thus become shattered (Horowitz, 1982; Tedeschi & Calhoun, 2004; Janoff-Bulman, 2010). Moreover, the theory postulates that the new threatening information implied by the trauma can be assimilated within existing mental models, i.e., the existing assumptions remain. If such assimilation is impossible within existing mental models, the assumptions must be reconfigured.

In the framework of PTG, a shattering of fundamental assumptions can facilitate a helpful reconfiguration that creates new, more robust and adaptive assumptions, i.e., growth (Rogers, 1959; Tedeschi & Calhoun, 2004). However, this process can also lead to negative developments such as PTSD (Joseph & Linley, 2005).

The findings in Paper II fit well into to the theoretical framework of shattered assumptions. The theory predicts that both inter-personal trauma and value-transgressive experiences will be more difficult to accommodate in a healthy manner, compared to random situations of danger (Janoff-Bulman, 2010; Schuler & Boals, 2016). During deployment, a veteran may witness cruelty between humans, i.e., exposure to non-danger-based stress. Thus, the veteran can have his/her assumptions shattered about the benevolence of others. The process of reconstructing new assumptions may lead to outlooks on humans that are more realistic, and a better appreciation of good people (PTG). In contrast, it could also lead to a nihilistic outlook and less appreciation of people in general (PTD). In the case of danger-based stressors, a veteran may be in a firefight and strongly fear for his/her life. This could shatter his/her unrealistic assumptions about personal invulnerability. The process of reconstructing new assumptions may subsequently generate realistic views on the frailty of human life, which may lead to higher awareness of how he/she spends his/her limited time on earth (PTG). However, realizing how easily one might die could also make the veteran fearful and unsure of himself/herself (PTD).

Both scenarios have the possibility of generating PTD or PTG, but the results in Paper II indicate that positive outcomes may be more likely in the latter scenario, that is, after exposure to danger-based stressors. Put in the framework of Janoff-Bulman (2010), it may be harder to reconstruct new and more adaptive fundamental assumptions after the experiences contained in the non-danger-based trauma (Schuler & Boals, 2016).

### **6.3 Negative Emotions**

PTD in the current sample is mostly reported in the form of negative interpersonal changes, the loss of trust in others, intolerance of other people, and a reduced capacity for emotional closeness with others. This is congruent with other recent findings (Zięba,



Wiecheć, Biegańska-Banaś, & Mieszczenko-Kowszewicz, 2019). Studies have demonstrated strong correlations between non-danger-based stressors and feelings of guilt, shame, and depression (Norrholm & Jovanovic, 2010; Ramage et al., 2015; Jordan et al., 2017). Moreover, it has been suggested that when trauma is related to feelings of shame and guilt, this increases reticence about telling others about such events (Pietrzak et al., 2010; Gray et al., 2012). Having social barriers towards sharing traumatic experiences may subsequently have a negative effect on the posttraumatic development (Tedeschi & McNally, 2011; Vermetten & Jetly, 2018).

Few studies have compared how different peri- and posttraumatic emotions, such as fear, guilt or shame, may be instigated to a lesser or greater degree, depending on the specific type of trauma. However, Amstadter and Vernon (2008) found that reports of shame, guilt and sadness were more frequent following sexual assault, than after physical assault and robbery. In contrast, experiencing violent non-sexual assault has previously been found to correlate with fear responses (Kaysen, Morris, Rizvi, & Resick, 2005). Moreover, shame and guilt responses increased with time after trauma, unlike the fear responses, which tended to decrease with time (Amstadter & Vernon, 2008). Amstadter and Vernon (2008), hypothesized that their findings may be partially explained by the social stigma associated with sexual assault. Social stigma may similarly have influenced the associations between experiencing non-danger-based traumas and PTSD, as observed in Paper II. Veterans risk receiving negative responses from others if they disclose stigmatizing war-zone experiences, such as taking a life, seeing atrocities and the dehumanization of the enemy (Wortman, 2004; Gray et al., 2012). In contrast, a life-threatening experience with subsequent fear responses may be less stigmatising, and to a lesser degree instigate reticence for sharing. A possible consequence may be that the veterans exposed to danger-based stressors are more available for support from their family,

colleagues, and mental health professionals (Möller-Leimkühler, 2002; DeViva et al., 2016). Accordingly, feelings of guilt, shame and fear of social stigma associated with exposure to non-danger-based stressors may partially explain the findings in Paper II.

#### **6.4 Social Support and Posttraumatic Development**

Social factors, as explored in Paper III, can facilitate recovery after trauma (Waysman et al., 2001). Moreover, the cognitive processing theory of PTG (Tedeschi & Calhoun, 2004) proposes that disclosure of trauma and distressing emotions is an important mechanism by which social support promotes growth. In Paper III, we find partial support for this claim. We found that having personal barriers to sharing war zone experiences was significantly associated with PTSD. However, when such personal barriers were included in a model together with social support, we no longer found this link. In the model, only the veterans' perceptions of high quality and high availability of social support affected the PTSD score, and then in the direction of PTG. In other words, feeling reluctant to tell others about painful war zone experiences may have a negative impact on a veteran in terms of his/her personal development after deployment. However, if the veteran also has the impression that the people closest to him/her are both able to be supportive and are readily available if he/she needs them, such reticence may no longer have an impact. Instead, such perceptions of high social support still facilitate growth. This finding underscores the potential impact of good social support.

The concept of disclosure has been widely and successfully applied as a way to alleviate psychological suffering (Foa & Rothbaum, 1998; Norrholm & Jovanovic, 2010). Nevertheless, sharing painful experiences as a way of managing trauma is a Western perspective of coping, primarily anchored in clinical studies aiming to treat PTSD symptoms (Taylor, Welch, Kim, & Sherman, 2007). It is not given that the same approach

is helpful for veterans attempting to alleviate distress related to war zone trauma, by seeking social support from families and friends. It is an open question whether most people are able to be empathic listeners if a veteran tells them of his/her painful, and perhaps shocking, battlefield experiences (Wortman, 2004). Rather, a more probable scenario may be that the recipient of such a narrative feels unable to help, as well as insecure because the accounting he/she hears threatens his/her own views of the world (Lerner, 1980). This would make the disclosure situation uncomfortable for both parties, and possibly destructive for the veteran (Wortman, 2004).

A novel way of understanding the findings in Paper III can be found in studies of culturally specific ways of engaging in social support. Kim, Sherman, Ko, & Taylor (2006) found that people with cultural taboos against disclosure of traumatic experiences profit more from “implicit” social support than “explicit” social support. This is in line with the notion of ecological fit (Maton, 1989). Implicit social support is defined as “*being in the company of close others or thinking about close others without disclosing or discussing one’s problems vis-à-vis specific stressful events*” (Kim, Sherman, & Taylor, 2008, p. 522). Such strategies are at odds with the common Western notions of explicit social support. In Europe and the US, social networks often try to provide direct emotional and cognitive support to process specific traumatic events (Taylor, Welch, Kim, & Sherman, 2007). The findings in Paper III indicate that implicit social support can promote PTG in veterans. Thus, in a social context where veterans are vulnerable to social stigma and negative reactions if they disclose traumatic experiences, implicit social support may be a good way of promoting PTG. Moreover, considering the findings in Paper II, implicit social support may be particularly applicable if veterans are suffering after exposure to non-danger-based stressors.

Vaillant (1995) lists several mature defenses such as altruism, sublimation, suppression, anticipation and humor. In cases where suffering cannot be tolerated, mature defenses can have the potential to sustain function despite emotional pain (McCullough-Vaillant, 1997). Similarly, such defenses may allow veterans to engage in implicit social support and integrate the traumatic experiences, without actually sharing the details with others. This may allow PTG to develop, facilitated by social support, with mature defenses operating in order to protect the individual from negative social reactions (Kunz et al., 2018). Sublimation, for example, generally channels emotions, ideas and thoughts into socially acceptable behaviors in order to make them tolerable to other people (Vaillant, 1995). Accordingly, a military veteran may gain substantial benefits from social support, while the details of war zone traumas are represented by vaguer expressions such as “my deployment” or “the war”. These expressions may be more readily tolerated in a civilian social context, and this way of being with others would be analogous to the implicit social support described earlier.

## **6.5 Summary of Discussion**

The findings of the thesis underscore the nuances and heterogeneity of human responses to trauma. The results support the understanding of posttraumatic development as a continuum of possible psychological costs and gains, from PTD to PTG. A majority of the veterans in our sample report a positive development after the war zone stressors. At first glance, this may appear counterintuitive. However, many reports increased self-confidence and a deeper appreciation of life after having managed life-threatening situations.

When discussing positive changes after war zone stressors, it is worth noting that these are major challenges and often imply suffering: traumas are not desirable experiences. This is perhaps easier to understand in relation to non-danger-based stressors such as

witnessing a child being killed, or making unfortunate mistakes that harms others. In this thesis, the results indicate that the most common war zone experiences may indeed be hard to grow from, even if they involve no threat to life or physical health.

The findings in Paper III emphasizes the relevance of mobilizing the veterans' social network as a recovery resources in the aftermath of war zone trauma. However, there may be challenges to engaging in common conceptions of social support after the participation in war. The results in Paper III illustrate the potential positive impact of social support. Moreover, the results indicate that talking about the war experiences may not always be a prerequisite to benefit from supportive relations. This finding can give some directions on how veterans may benefit from social support in trauma recovery, without the risks associated with disclosure of war zone experiences.

This thesis conveys the relevance of expanding the current understanding of both war zone trauma and the possible reactions to such stressors. In the history of trauma research, the understanding of central concepts has been revised several times (Kroll, 2003). Nevertheless, newer concepts within the field, such as posttraumatic growth and non-danger-based stressors, have historical roots in various research traditions. In order to acknowledge the past efforts and maintain progress in the field of psychotraumatology, it is important to be aware that the concepts presented in this thesis are not yet fully explained.

## **6.6 Strengths and Limitations**

The main strength of the findings in Papers I-III comes from the large and data-rich sample we used in our studies. This allows comparisons of sub-groups within the sample while retaining a relatively robust sub-sample size. Moreover, in the development of the PTCS, the large sample size allowed a random sample division for the two-tiered development of the instrument. Another strength of Papers I-III is that we were able to

conduct comparisons of the responders and non-responders. The comparisons involved central demographic characteristics and health information obtained through the Norwegian Labor and Welfare Administrations (NAV). Because the comparison enabled control for several possible response biases, the presented results are likely to reflect trends of both the responder and non-responder samples. The non-responder analysis underscores the strength and generalizability of the findings in Papers I-III.

There are also several limitations of the studies. Papers I-III are based on cross-sectional survey data, and caution is required when interpreting the findings. Cross-sectional data do not capture changes over time. It is important to avoid the classical fallacy of inferring causation from correlations when interpreting the presented associations. The respondents may have passed through various developmental phases with regard to PTSD and PTG, psychological distress, and in how their war zone experiences are remembered. The veterans' self-reports on the target variables can be subject to both time-varying confounding and time-modified confounding (McNally, 2005). In the regression analysis in Paper II, we controlled for the length of time since the deployment by exploring the association between time elapsed and psychological distress. In this analysis, the time since the deployment proved not to be significant in the equation as a predictor for any of the psychological distress measures. However, we did not control for time in any other analyses in the thesis.

Due to the large sample size, we were not able to conduct diagnostic interviews; nor did we have objective information regarding the war zone traumatic stress exposures. Accordingly, all the results presented are based on self-reports. Therefore, the data may be subject to the limitations of people's ability to retrospectively self-evaluate personal changes, report psychological distress, as well as adequately remember their war zone

exposures. This limitation is not unique to these studies, but has been a reiterated criticism, particularly of research on PTG (Zoellner & Maercker, 2006; Frazier et al., 2009).

The biological sex of the participants in Papers I-III was predominantly male (91.7%). However, females had a significantly higher proportion of response rate than the males; thus, females are likely overrepresented in the sample relative to their total numbers. The gender distribution in the Norwegian military, when including both internationally deployed personnel and personnel serving domestically, from 2002-2012 was 90% male. Accordingly, the gender split of the current sample is likely representative of other Norwegian deployments. A predominantly male sample is common in most veteran studies. Nevertheless, the gender bias may have influenced our results. Studies have shown that females are at greater risk of psychological distress after exposure to traumatic events (Olf, Langeland, Draijer, & Gersons, 2007), and they tend to report more PTG than males (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010). Moreover, there was also a significantly higher mean age in the responder group compared to the non-responders. Higher age has previously been found to be associated with lower rates of reported PTG (Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003). The influence of age was controlled for in Paper III, but may have influenced the results in the Papers I-II.

The Afghanistan 2012 Survey was an investigation into the mental health and life development of military veterans. Accordingly, all the respondents had been through rigorous selection and screening procedures with regard to physical fitness and mental health complaints before deployment. Moreover, all participants received extensive military training before any war zone stressor exposure. The fact that the sample consisted exclusively of selected personnel is likely to reduce the generalizability of the findings to the general population, but not to other military populations.

We did not include any measures of personality in this study. Such traits have been found to predict posttraumatic outcomes (Schnurr, Rosenberg, & Friedman, 1993). Due to the pre-deployment selection process, it is possible that there are personality confounders influencing the results. Such confounders may have influenced the results of our study to some degree, particularly in Paper II, that directly investigates the stressor–response links. The respondents’ preparedness may also be a reason for the high levels of PTG found in Paper I. This preparedness could have buffered the effects of danger-based stressors relative to non-danger-based stressors. Psychological responses to traumatic stressors are related to the perceptions of control and the situational awareness during the traumatic event (Somer, Weitzman, & Heth, 2004). Thus, it is likely that the perceptions of danger-based stressors in particular, such as being attacked by the enemy, would be affected by the soldier’s prior military training. In short, the training and preparedness of the respondents increased the probability of favorable outcomes after danger-based war zone related stressors.

Of note, there may also have been an additive impact from exposure to multiple types of trauma in some of our respondents. In the current sample, 10.8% of the respondents had been exposed to all three stressor categories, either simultaneously or on separate occasions, which may have had some influence on the results in Paper II.

In Paper III, we utilized an adapted version of the Oslo 3 scale in order to gauge social support, and we constructed a new inventory to capture the personal barriers to disclose war-related experiences. It is worth noting that the two inventories have not been fully validated for use in military populations. Similarly, we did not have validated score ranges or established cut-off norms for the groups based on the reported PTCS scores of the respondents. The mean response scores below, above or at the median score of the PTCS (i.e., 3), which indicates no-change, was used to categorize the respondents into PTSD, PTG or no-change groups respectively. There is a chance that we may have over-included no-



change respondents into both PTD and PTG groups. Establishing normative scores to indicate cut-offs between these groups warrants further studies.

Finally, the regression analyses show that the explained variance for some outcome measures in Papers II and III is small. Of particular note is the associations between stressor types and the distress variable insomnia ( $R^2 = .024, p < .001$ ) in Paper II. In other words, there are likely other variables, such as perhaps personality traits, that may also be influencing the results. However, significant associations with a low  $R^2$  in a large sample, such as those in both Papers II and III, can still provide relevant information on data trends, particularly when studying psychological phenomena (Figueiredo Filho, Silva, & Rocha, 2011). In addition, the results presented in Papers I-II are comparable to several previous findings regarding similar associations (Figley & Nash, 2007; Kim, Sherman, & Taylor, 2008; Stein et al., 2012; Ramage et al., 2015; Shea et al., 2017). This indicate that the associations between our predictors and response variables are reasonably valid.

## 7 Conclusions

The Posttraumatic Change Scale (PTCS), developed in Paper I, addresses the call for new measures of posttraumatic developments. The PTCS demonstrated satisfying psychometric properties. Reports in our study of PTD and PTG as measured by the scale are comparable with findings from other studies (Marshall et al., 2015; Michélsen et al., 2017; Boals & Schuler, 2018). PTG, as measured by the PTCS, is not associated with psychological distress. In contrast, PTD is significantly correlated with symptoms of anxiety, depression and insomnia; we tend to regard this as the sign of a more healthy and clear-cut measure.

Following the proposed distinctions between danger-based and non-danger-based stressors (Ramage et al., 2015), we found that PTD and PTG, as measured by the PTCS, had significant associations with exposure to specific stressor types. Compared to the danger-based stressors, the non-danger-based stressor types (Moral Challenges and Witnessing) were significantly more associated with PTD. In addition, the non-danger-based stressor types were significantly associated with symptoms of posttraumatic stress, anxiety, depression and insomnia. Of note, the danger-based stressor types were only associated with symptoms of posttraumatic stress.

In order to investigate the influence of different social factors that may affect the post-trauma developments, we analyzed the contributions of having personal barriers to disclose war zone experiences in veterans, in relation to two aspects of social support. The analysis indicated that having barriers to disclosing war zone experiences influenced the posttraumatic development in the direction of PTD. In contrast, having positive perceptions of the quality and availability of social support influenced such development in the direction of PTG. However, when we compared the relative contributions of these variables by analyzing them in the same model, personal barriers to disclosure did not have a significant

influence on the posttraumatic development. In this model, having positive perceptions of social support significantly influenced the posttraumatic development in the direction of PTG.

In conclusion, it is relevant to highlight some overarching reflections on conducting research on the mental health of veterans. Deployments abroad are not without controversy. There are politicians, scholars and a public who question Norway's military contributions both in Afghanistan and in other international military missions. What justifies spending considerable time, money, and human resources to conduct studies such as those presented in this thesis? In addressing this question, it is important to remember that the decision to send Norwegian military personnel to Afghanistan was made by a democratically elected majority. It is healthy for a society to debate foreign policy and international engagements; however, this should not impede on our obligations to care for the personnel that serve on our behalf. Thus, I would argue that the Norwegian society has a moral obligation to the veterans, regardless of political opinions, to expend resources in the care of veterans who already suffer, and on research that may improve the care of active duty personnel and future veterans. The current thesis has hopefully made some contributions towards fulfilling this societal obligation.

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# Paper I



## Measuring Psychological Change After Trauma: Psychometric Properties of a New Bi-Directional Scale

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**Objective:** The current scientific measures of posttraumatic changes in the wake of major stressors have mostly been unidirectional. This study is an attempt to develop a scale that will capture the continuum of positive to negative psychological changes after trauma. **Method:** Forty-five statements were presented to a veteran sample ( $N = 4,053$ ) with the request to report for each item their experiences of negative, positive, or no posttraumatic changes as a result of their deployment to Afghanistan. **Results:** Principal component analysis brought out 4 dimensions; 26 nonoverlapping items that had correlations above .40 were selected for the final version of the scale. The 4 dimensions were given the following designations: Self-Confidence, Interpersonal Involvement, Awareness, and Social Adaptability. Most veterans reported positive changes (36.8–80.8%) whereas a minority reported negative changes (4.5–22.0%). The total scale score correlated negatively with measures of depression, anxiety, sleep disorders, and posttraumatic stress symptoms. **Conclusion:** The posttraumatic change scale (PTCS) demonstrated acceptable psychometric properties and captured the range from negative to positive posttraumatic changes after major stress. Contrary to several previous studies, positive posttraumatic change, as measured by the PTCS, was not associated with increased symptoms of psychopathology. This underscores the heterogeneity of psychological responses to traumatic events.

**Keywords:** posttraumatic growth, trauma, principal component analysis, posttraumatic change scale, military

The notion that major stressors can produce specific psychological changes is not new; it has its roots in classical literature, religion, and philosophical traditions such as existentialism (Frankl, 1963; Hanh, 1998; Nietzsche, 1885/2003). Most research literature has focused on the negative psychological effects of trauma, such as posttraumatic stress disorder. However, many

studies have documented that positive posttraumatic change, or posttraumatic growth, is a common occurrence (Calhoun & Tedeschi, 2014; Helgeson, Reynolds, & Tomich, 2006; Linley & Joseph, 2004; Park & Helgeson, 2006). Prospective studies support the validity of these observations (Peterson & Seligman, 2003). In the research literature, concepts such as posttraumatic growth, stress-related growth, adversarial growth, perceived benefits, thriving, and benefit finding have been introduced to capture such changes (Helgeson et al., 2006; Linley & Joseph, 2004; Park, Cohen, & Murch, 1996; Tedeschi & Calhoun, 1996). These concepts are usually derived from inventories attempting to capture varieties of posttraumatic changes and growth that may happen in, for example, the personal domain, relational domain, and existential domain.

The associations between posttraumatic growth and distress are not yet fully understood (Armeli, Gunthert, & Cohen, 2001; Blix, Birke-land, Hansen, & Heir, 2016; Cheng, Wong, & Tsang, 2006; Helgeson et al., 2006; Hobfoll et al., 2007; Linley & Joseph, 2004; Moore, Varra, Michael, & Simpson, 2010). Studies on the relationship between posttraumatic growth and distress have yielded mixed results (Linley & Joseph, 2004). Some studies have demonstrated positive correlations between reports of positive posttraumatic growth and psychological distress (Blix et al., 2016; Holgersen, Boe, Klöckner,

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Weisæth, & Holen, 2010; Johnson et al., 2009; Zoellner & Maercker, 2006). This, perhaps counterintuitive, finding has prompted several theoretical explanations. It has been suggested that posttraumatic growth results from “the struggle with a traumatic event” (Calhoun, Cann, Tedeschi, & McMillan, 2000). Others have suggested that the correlation indicates, in part, a kind of self-deception or pseudogrowth (Maercker & Zoellner, 2004). Moreover, some studies regard posttraumatic distress and posttraumatic growth as related but distinct phenomena (Solomon & Dekel, 2007).

The Posttraumatic Growth Index (PTGI; Tedeschi & Calhoun, 1996) and the Stress-Related Growth Scale (SRGS; Park et al., 1996) are frequently used instruments when measuring posttraumatic growth. However, these instruments only allow participants to report positive changes. Some researchers have suggested that participants should generally be given the option to report both positive and negative posttraumatic changes, not solely positive changes; the assumption is that it would give a more comprehensive description of the posttraumatic experience (Armeli et al., 2001; Cheng et al., 2006). Several studies have utilized response options of this kind to measure psychological changes after trauma (Baker et al., 2008; Frazier, Conlon, & Glaser, 2001; Marshall, Frazier, Frankfurt, & Kuijer, 2015).

The aim of the current study was to develop a scale that would include negative-change, positive-change, and “no-change” reports on several psychological issues in the aftermath of traumatic incidents. Furthermore, we wanted to examine the validity of the scale by exploring its correlations with psychological distress and how the posttraumatic changes were affected by the degree of trauma exposure.

## Method

### Participants

The study used data from a cross-sectional, postdeployment examination carried out during the spring of 2012. All Norwegian military personnel deployed to Afghanistan between late 2001 and the end of 2011 were invited to participate. A total of 7,155 personnel of both sexes were identified to fit this requirement by the Recruiting Department of the Norwegian Armed Forces. Of the 7,155 invited personnel, 4,225 (59%) responded: 1,931 (46%) of them by mail and 2,294 (54%) on the Web. Of the returned responses, 172 were either incomplete or active refusals. The nonresponders, uncompleted responses, and active refusals totaled 3,102 persons. In all, 4,053 individuals delivered fully completed questionnaires, giving a final response rate of 56.7%. Demographic characteristics of the participants and the nonresponders are reported in Table 1. In the first step, 1,000 of the responders were randomly assigned to a sample for model development of the posttraumatic change scale (PTCS), whereas in the second step the remaining sample ( $N = 3,053$ ) was utilized for a confirmatory factor analysis (CFA) of the model.

### Procedure

The identified personnel received a mailed invitation to take part in the study by completing an enclosed 20-page questionnaire. The respondents could either return the paper version by mail or complete a web-based version. An incentive to all responders was a lottery of three sport watches. The data collection phase lasted 13

Table 1  
*Demographic Characteristics of Participants and Nonresponders in a Sample of Norwegian Afghanistan Veterans ( $N = 7,115$ )*

Demographic	Participants (%)	Nonresponders (%)
Gender (female)	8.3	5.3
Gender (male)	91.7	94.7
Marital status (married)	31.0	31.5
Age (years)		
20–30	32.2	40.5
30–40	38.4	34.5
40–50	21.8	16.5
50+	8.3	8.5
Employment status		
Unemployed	4.5	4.2
Employed in the military	47.0	46.5
Long-term disabled	2.2	2.5
<i>N</i>	4,053 (56.7%)	3,102 (43.3%)

weeks, from February 20 to May 24, 2012, and included two reminders for those who did not respond.

The survey data were stored and extracted from the Norwegian Armed Forces Health Registry and the Norwegian Labor and Welfare Administrations (NAV), which provides researchers anonymous data. All participants gave written informed consent. Study procedures, collection, storing, and distribution of data were done in accordance with the existing legislation regulating the Norwegian Armed Forces Health Registry. The collection of health information about the nonresponders was approved by the Regional Committee for Medicine and Health Research Ethics of South-East Norway.

### Item Generation and Response Options

A literature review on the potential positive and negative effects of trauma and related theoretical considerations was done (e.g., Foa & Rothbaum, 1998; Janoff-Bulman, 1992; Park et al., 1996; Tedeschi & Calhoun, 1996). From this review, a pool of 45 nonleading items (statements) was generated.<sup>1</sup> The items aimed to capture pivotal aspects of the psychological outcome after exposure to traumatic stressors. Moreover, the items were phrased in such a way that respondents would give unbiased presentations of their issues; each item was given the format of “my social life is . . .” or “my trust in other people is . . .” To allow both negative and positive psychological consequences of exposure to traumatic incidents to appear in each item, these response options were included: 1 (*a lot worse/less than before*), 2 (*worse/less than before*), 3 (*same as before*), 4 (*better/more than before*), and 5 (*a lot better/more than before*). *Before* refers to before the serious experiences (if any) the respondents have been through during deployment. To ensure that the questionnaire was understood as intended, two groups of military veterans were asked to fill out a preliminary version and to give their feedback. The review of their responses resulted in minor rewordings before the 45 items were included in the survey.

### Additional Instruments

There were multiple inventories included in the Afghanistan 2012 survey. Of them, the Hospital Anxiety and Depression Scale

<sup>1</sup> The original version also included three items that tapped potentially pathological responses. These three items were not included in the analysis.

(HADS), Insomnia Severity Index (ISI), and posttraumatic symptom scale (PTSS) were selected for this study. Sample sum scores and Cronbach's  $\alpha$  of these measures are presented in Table 4.

**HADS.** The HADS contains 14 items and consists of two subscales: anxiety (HADS-A) and depression (HADS-D). Each item is rated on a scale from 0 to 3, giving a maximum score of 21 for anxiety and likewise for depression. For screening purposes, a sum score of 11 or higher on either subscale is considered to represent a "case" of psychological morbidity whereas scores of 8–10 represent "borderline" and 0–7 "normal" levels of distress (Zigmond & Snaith, 1983). The HADS is widely used as a brief self-rating instrument of anxiety and depression for dimensional and categorical aspects (case/noncase), and HADS has been frequently used both in epidemiological and specialist care studies (Zigmond & Snaith, 1983). HADS has been validated in Norwegian (Mykletun, Stordal, & Dahl, 2001).

**PTSS.** Concurrent posttraumatic stress symptoms were detected using PTSS, the 10-item Likert scale self-report version of a questionnaire developed in Norway (Holen, Sund, & Weisæth, 1983). The scale covers general stress manifestations such as sleep difficulties, irritability, depressed mood, and startle reactions in the past 7 days, with response options from 1 (*never/rarely*) to 7 (*very often*), giving a total score of 10–70. Sum scores of 35 and higher represent a likely case of posttraumatic stress symptoms.

**ISI.** The ISI (Bastien, Vallières, & Morin, 2001) is a seven-item self-report instrument capturing insomnia symptoms as well as the degree of concerns or distress caused by those symptoms. Each item has a 5-point Likert response format. Sum scores of 22–28 or higher are considered to represent clinical insomnia (severe) whereas scores of 15–21 represent clinical insomnia (moderate severity) and 8–14 subthreshold insomnia; finally, 0–7 represents no clinically significant insomnia (Morin, Belleville, Bélanger, & Ivers, 2011). The content of the ISI corresponds in part to the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (*DSM-IV*), diagnostic criteria for insomnia; it has good face validity and has displayed other excellent psychometric properties (Morin et al., 2011).

**Traumatic Exposure in Afghanistan.** The traumatic exposure index, made by the project group for the current study, consisted of questions about traumatic deployment experiences. The index consisted of 23 items covering combat exposure, hazardous environment, subjective death threat, and moral provocations. The items regarding moral provocations were based on a previous work on the traumatic potential of moral provocations (Litz et al., 2009). Each item had a 5-point Likert response format with response alternatives of 0 (*not experienced*), 1 (*experienced 1–2 times*), 2 (*experienced 3–12 times*), 3 (*experienced 13–50 times*), and 4 (*experienced 50+ times*). The range of this scale went from 0 to 48 ( $M = 10.17$ ,  $SD = 7.78$ ). This sample mean Traumatic Index score indicates that respondents in the current sample experienced, on average, 10 traumatic incidents.

## Data Analyses

The development of the current scale was undertaken in two steps. The first was done by using a randomized selection of 1,000 respondents for the model development to pare down the number of items. The second step utilized the remaining sample ( $N = 3,053$ ) to test the model fitness. A principal components analysis (PCA; Oblimin rotation) of the 45 items was carried

out in the development sample ( $N = 1,000$ ). The general recommendations are to include 10 respondents per item in the PCA (Gorsuch, 1983). We more than doubled this ratio in the development sample to maximize the probability of getting an optimal component solution. The component loadings were estimated freely (unconstrained model), and the number of components (exploratory factor analysis [EFA]) was determined by using the criterion of eigenvalue  $\geq 1$ . A main component loading of at least .40 and no loading above .40 on any other component was regarded as acceptable for the final item selection. This was followed by a scrutiny of the internal consistency to exclude any redundant items without compromising Cronbach's  $\alpha$  levels.

The remaining sample ( $N = 3,053$ ) was used in a CFA procedure of the 26 items that met these criteria. The CFA was conducted with the asymptotically distribution free method to examine the overall fit of the model. Error terms in the items were allowed to correlate. The indices derived were the comparative fit index (CFI) and the incremental fit index (IFI); in regards to both, values  $\geq .90$  were regarded as acceptable model fits. The root mean square error of approximation (RMSEA) values that are equal to or less than .05 indicate a good model fit.

To quantify and compare the valence distribution of the posttraumatic change scores on the PTCS, the sample ( $N = 4,053$ ) was split into three groups based on the participants' individual arithmetic mean scores: the negative-change group, the positive-change group, and the no-change group. The mid score on the PTCS, representing no change, is 3. A narrow inclusion interval for the no-change group was chosen. The negative-change group consisted of respondents with mean total scores of 1–2.99 ( $n = 326$ ). The positive-change group consisted of respondent with mean total scores of 3.1–5 ( $n = 3,255$ ). The no-change group consisted of respondents with mean total scores between 2.99 and 3.1 ( $n = 445$ ). Very few respondents (<2%), scored both 1 and 5 on different items on the PTCS; therefore, no mixed-change group was made.

The frequency distribution of negative change, positive change, and no change were calculated for each dimension and for the total scale to find the percentage of respondents reporting negative change, positive change, and no change on the measure. We then proceeded to analyze how the PTCS was associated with psychological distress by computing bivariate correlations between the four dimensions as well as the total score in relation to the HADS-A, HADS-D, PTSS, and ISI scores. Pearson correlations were calculated between the dimension scores as well as total PTCS score and measures of psychological distress.

Analyses of variance (ANOVAs) with post hoc Bonferroni tests were undertaken with HADS-A, HADS-D, PTSS, and ISI scores as dependent variables. Levene's test of homogeneity of variance was significant for all ANOVAs. Accordingly, Welch's  $F$  is reported. Moreover, an ANOVA with post hoc Bonferroni test was undertaken to compare the groups, with experienced traumatic incidents as the dependent variable.

The tests were made both on the dimensional- and total-scale levels. Because of the large sample size, a conservative significance level was chosen. In all relevant analyses,  $p$  values less than .01 were regarded as significant.

## Results

### PCA

The PCA in the first step produced five dimensions with eigenvalues greater than 1, of which four dimensions were retained as having utility. These four dimensions accounted for 40.33% of the common variance ( $N = 1,000$ ). After excluding items on the basis of their component loading and redundancy, the measure was pared down to 26 items. The four dimensions were labeled Self-Confidence (Dimension I, eight items), Interpersonal Involvement (Dimension II, six items), Awareness (Dimension III, six items) and Social Adaptability (Dimension IV, six items) based on the semantic content of the various clusters of items. The component loadings of the selected items and the respective Cronbach's  $\alpha$  values of the dimensions are displayed in Table 2.

### CFA Procedure

The CFA was conducted on the 26 items with the asymptotically distribution-free method to examine the overall fit of the current model ( $N = 3,053$ ). The CFA for the four-factor solution gave the

following results:  $SB \chi^2_{246} = 812.530, p < .01$ ; CFI = .922; Tucker-Lewis index (TLI) = .913; RMSEA = .039 (confidence interval [CI] .036–.042), which indicates a good factor solution. To contrast the four-factor solution, a CFA was undertaken with a one-factor solution. This gave the following results:  $SB \chi^2_{252} = 1,757.704, p < .001$ ; CFI = .793; TLI = .774; RMSEA = .063 (CI .060–.065), which indicates that the four-factor solution was better than the one-factor solution.

### Posttraumatic Change Frequency Analysis

The vast majority of the participants reported positive changes on the total scale (80.8%), 11.1% reported no change, and 8.1% reported negative changes after deployment. On the dimension levels, there was a more mixed response pattern, in particular on the Interpersonal Involvement dimension (see Table 3).

### Correlations With Psychological Distress

Bivariate correlations found a significant negative correlation between both total PTCS score and the four dimensions in relation

Table 2  
Factor Loadings of Final 26 Items and Internal Consistency of PTSC in the Afghanistan Veteran Sample ( $N = 1,000$ )

PTSC-dimensions	Factor loadings				$\alpha$
	I	II	III	IV	
Dimension I: Self-Confidence (27.47% of total variance)					
Q1. My ability to manage stress is	.74				
Q2. I handle demanding situations	.79				
Q3. My mental strength is	.65				
Q4. My capacity for work is	.59				
Q5. I trust myself	.67				
Q6. I feel confident that I can handle unexpected situations	.76				
Q7. My ability to make my own decisions	.71				
Q8. I am proud of myself	.57				
Internal consistency					.89
Dimension II: Interpersonal Involvement (additional 5.78% of total variance)					
Q9. I give of myself when I am with others		.48			
Q10. I am involved in activities outside of work/studies		.53			
Q11. My contact with other people in general is		.66			
Q12. My ability to be emotionally close to other people is		.46			
Q13. My trust in other people is		.50			
Q14. My social life is		.66			
Internal consistency					.73
Dimension III: Awareness (additional 3.90% of total variance)					
Q15. I live in accordance to my inner values			.50		
Q16. I have valuable views on life, which I share with others			.55		
Q17. I weigh the positive aspects of existence			.51		
Q18. I appreciate life			.57		
Q19. I am conscious of my priorities in life			.50		
Q20. I enjoy the little moments			.52		
Internal consistency					.79
Dimension IV: Social Adaptability (additional 3.18% of total variance)					
Q21. I accept the way things develop				.41	
Q22. I am overbearing toward other people				.62	
Q23. My ability to listen to other people is				.57	
Q24. As a person I am humble				.58	
Q25. I provide care to other people				.41	
Q26. My tolerance towards other people is				.64	
Internal consistency					.70

*Note.* Items with component loading of at least .40 and with less than .40 on other components were selected. Loadings and proportions of variance reported are from a PCA and Oblimin rotation with Kaiser normalization of the original item pool (excluding three items, all of them from the Self-Confidence dimension, because of semantic similarities to other items in the dimension).

Table 3  
*Percentage Distribution of No Change, Negative Change, and Positive Posttraumatic Change Reported in the Afghanistan Veteran Sample (N = 4,053)*

PTCS	No change (%)	Negative change (%)	Positive change (%)
Dimension I: Self-Confidence	21.3	5.7	73.0
Dimension II: Interpersonal involvement	41.2	22.0	36.8
Dimension III: Awareness	20.3	4.5	75.2
Dimension IV: Social adaptability	39.6	11.1	49.3
Total Posttraumatic Change Scale	11.1	8.1	80.8

to HADS-A, HADS-D, and ISI (see Table 4). There was no significant correlation between PTSS and the total PTCS score or with the dimensions Awareness and Social Adaptability. The Self-Confidence dimension showed a weak yet significant positive correlation with the PTSS. The Interpersonal Involvement dimension had consistently negative correlations with all symptom measures.

#### Distress Among Negative-, Positive-, and No-Change Respondents

Post hoc ANOVA analyses with Bonferroni's correction were conducted to compare the degree of psychological distress (ISI, HADS-A, HADS-D, and PTSS) among negative-, positive-, and no-posttraumatic-change respondents on a dimension- and total-scale level. The degree of psychological distress differed significantly between the groups. The difference between the no-change and positive-change groups was modest whereas the difference between the negative-change group and the other two groups was substantial (see Table 5).

The negative-change respondents scored significantly higher on posttraumatic stress symptoms, insomnia, anxiety, and depressive symptoms compared with the respondents reporting positive and no change. The positive-change respondents scored significantly higher than no-change respondents primarily on measures of posttraumatic stress symptoms and anxiety, with the exception of the Social Adaptability dimension, in which positive-change respondents also reported an increased depression score compared with the no-change respondents. There was a significant correlation

between respondents reporting negative change on the PTCS and posttraumatic stress symptoms, anxiety, sleep disorder, and depression. Respondents who reported a positive change displayed moderate symptoms of primarily posttraumatic stress symptoms and anxiety symptoms. Finally, the no-change respondents reported low levels of symptoms on all measures (see Table 5).

#### Impact of Traumatic Exposure

A one-way ANOVA was conducted to compare the degree of traumatic exposure among the negative-change, positive-change, and no-change groups at a total-scale level. Traumatic exposure was measured by the traumatic exposure index. There was a significant effect of traumatic exposure in regards to the respondents PTCS score (Welch's  $F(2, 573.36) = 49.83, p < .001$ ). Post hoc comparisons indicated that the mean degree of traumatic exposure significantly differed ( $p < .001$ ) between the no-change respondents ( $M = 7.09, SD = 6.82$ ) and negative-change respondents ( $M = 11.78, SD = 8.83$ ) and the positive-change respondents ( $M = 10.43, SD = 7.69$ ). In contrast, the negative-change respondents and positive-change respondents did not significantly differ in regards to traumatic exposure.

#### Discussion

Psychological changes that may occur after traumatic experiences were grouped into the following four dimensions: Self-Confidence, Interpersonal Involvement, Awareness, and Social Adaptability. All four dimensions showed a good model fit and

Table 4  
*Sample Sum Scores on Measures of Psychological Distress (PTSS, HADS-A, HADS-D, and ISI), and Bivariate Correlations Between Separate PTCS Dimensions and the PTCS Total-Scale Scores in Relation to the Distress Measures (N = 4,053)*

Dimensions	PTSS	HADS-A	HADS-D	ISI
Sample sum scores and Cronbach's $\alpha$ of measures of psychological distress in the sample				
Sample sum scores	16.94 ( $SD = 8.82$ )	2.91 ( $SD = 2.78$ )	1.76 ( $SD = 2.41$ )	3.67 ( $SD = 3.98$ )
Cronbach's $\alpha$	.90	.77	.78	.89
PTCS dimension and total scale bivariate correlations with distress				
Dimension I: Self-Confidence	.048**	-.104**	-.201**	-.151**
Dimension II: Interpersonal Involvement	-.248**	-.280**	-.494**	-.310**
Dimension III: Awareness	.027	-.117**	-.262**	-.167**
Dimension IV: Social Adaptability	-.023	-.092**	-.190**	-.123**
Total PTCS	-.040	-.174**	-.339**	-.226**

Note. Dimension Pearson correlations significance (two-tailed) with symptom scales.

\*\*  $p < .01$ .



**Table 5**  
*One-Way ANOVA with Bonferroni Post Hoc Group Comparison of Negative-Change, Positive-Change, and No-Change Respondents in the Afghanistan Veteran Sample (N = 4,053)*

Distress measure	<i>M</i> ( $\pm$ <i>SD</i> ) Negative change (Group 1; <i>n</i> = 223)	<i>M</i> ( $\pm$ <i>SD</i> ) Pos. change (Group 2; <i>n</i> = 2,872)	<i>M</i> ( $\pm$ <i>SD</i> ) No change (Group 3; <i>n</i> = 828)	One-way ANOVA Welch's <i>F</i>	Post hoc test (Bonferroni)		
					Group comparison	Mean difference	<i>p</i>
Dimension I: Self-Confidence							
ISI	8.43 ( $\pm$ 5.67)	3.45 ( $\pm$ 3.70)	3.20 ( $\pm$ 3.60)	$F(2, 530.32) = 87.29$ $p < .001$	1 vs. 2	5.00	<.001
					1 vs. 3	5.23	<.001
					2 vs. 3	0.25	.30
HADS-A	6.79 ( $\pm$ 3.90)	2.83 ( $\pm$ 2.52)	2.27 ( $\pm$ 2.52)	$F(2, 532.82) = 136.00$ $p < .001$	1 vs. 2	3.96	<.001
					1 vs. 3	4.52	<.001
					2 vs. 3	0.55	<.001
HADS-D	6.05 ( $\pm$ 4.13)	1.58 ( $\pm$ 2.04)	1.35 ( $\pm$ 1.96)	$F(2, 526.48) = 137.29$ $p < .001$	1 vs. 2	4.48	<.001
					1 vs. 3	4.71	<.001
					2 vs. 3	0.23	.02
PTSS	25.21 ( $\pm$ 13.43)	17.13 ( $\pm$ 8.48)	14.09 ( $\pm$ 6.78)	$F(2, 543.89) = 108.00$ $p < .001$	1 vs. 2	8.08	<.001
					1 vs. 3	11.12	<.001
					2 vs. 3	3.03	<.001
Dimension II: Interpersonal Involvement							
ISI	6.00 ( $\pm$ 5.01)	3.07 ( $\pm$ 3.38)	2.97 ( $\pm$ 3.45)	$F(2, 2044.43) = 137.42$ $p < .001$	1 vs. 2	2.91	<.001
					1 vs. 3	3.02	<.001
					2 vs. 3	0.11	1.00
HADS-A	4.64 ( $\pm$ 3.35)	2.74 ( $\pm$ 2.49)	2.19 ( $\pm$ 2.28)	$F(2, 2066.19) = 189.45$ $p < .001$	1 vs. 2	1.90	<.001
					1 vs. 3	2.45	<.001
					2 vs. 3	0.55	<.001
HADS-D	4.00 ( $\pm$ 3.37)	1.18 ( $\pm$ 1.62)	1.15 ( $\pm$ 1.67)	$F(2, 1956.67) = 291.75$ $p < .001$	1 vs. 2	2.79	<.001
					1 vs. 3	2.83	<.001
					2 vs. 3	0.07	1.00
PTSS	22.49 ( $\pm$ 11.14)	16.43 ( $\pm$ 7.93)	14.43 ( $\pm$ 6.63)	$F(2, 2011.77) = 197.73$ $p < .001$	1 vs. 2	6.06	<.001
					1 vs. 3	8.06	<.001
					2 vs. 3	2.00	<.001
Dimension III: Awareness							
ISI	8.89 ( $\pm$ 5.78)	3.44 ( $\pm$ 3.69)	3.40 ( $\pm$ 3.77)	$F(2, 429.82) = 78.72$ $p < .001$	1 vs. 2	5.46	<.001
					1 vs. 3	5.49	<.001
					2 vs. 3	0.03	.15
HADS-A	6.95 ( $\pm$ 3.90)	2.79 ( $\pm$ 2.53)	2.56 ( $\pm$ 2.71)	$F(2, 432.23) = 105.02$ $p < .001$	1 vs. 2	4.16	<.001
					1 vs. 3	4.39	<.001
					2 vs. 3	0.24	.07
HADS-D	6.98 ( $\pm$ 3.98)	1.51 ( $\pm$ 2.00)	1.61 ( $\pm$ 2.13)	$F(2, 426.67) = 167.99$ $p < .001$	1 vs. 2	5.46	<.001
					1 vs. 3	5.36	<.001
					2 vs. 3	-0.10	.66
PTSS	26.55 ( $\pm$ 13.73)	16.99 ( $\pm$ 8.47)	14.61 ( $\pm$ 7.16)	$F(2, 437.64) = 81.41$ $p < .001$	1 vs. 2	9.56	<.001
					1 vs. 3	11.94	<.001
					2 vs. 3	2.38	<.001
Dimension IV: Social Adaptability							
ISI	6.32 ( $\pm$ 5.25)	3.49 ( $\pm$ 3.71)	3.16 ( $\pm$ 3.61)	$F(2, 1137.53) = 70.85$ $p < .001$	1 vs. 2	2.83	<.001
					1 vs. 3	3.16	<.001
					2 vs. 3	0.34	.03

(table continues)

Table 5 (continued)

Distress measure	<i>M</i> ( $\pm$ <i>SD</i> ) Negative change (Group 1; <i>n</i> = 223)	<i>M</i> ( $\pm$ <i>SD</i> ) Pos. change (Group 2; <i>n</i> = 2,872)	<i>M</i> ( $\pm$ <i>SD</i> ) No change (Group 3; <i>n</i> = 828)	One-way ANOVA Welch's <i>F</i>	Post hoc test (Bonferroni)		
					Group comparison	Mean difference	<i>p</i>
HADS-A	5.01 ( $\pm$ 3.55)	2.99 ( $\pm$ 2.62)	2.29 ( $\pm$ 2.42)	$F(2, 1147.79) = 125.55$ $p < .001$	1 vs. 2	2.03	<.001
					1 vs. 3	2.72	<.001
					2 vs. 3	0.69	<.001
HADS-D	4.07 ( $\pm$ 3.65)	1.62 ( $\pm$ 2.12)	1.33 ( $\pm$ 1.95)	$F(2, 1109.34) = 117.39$ $p < .001$	1 vs. 2	2.45	<.001
					1 vs. 3	2.75	<.001
					2 vs. 3	0.29	<.001
PTSS	23.27 ( $\pm$ 11.53)	17.42 ( $\pm$ 8.68)	14.55 ( $\pm$ 6.90)	$F(2, 1141.84) = 148.14$ $p < .001$	1 vs. 2	5.85	<.001
					1 vs. 3	8.72	<.001
					2 vs. 3	2.87	<.001
PTCS total							
ISI	7.79 ( $\pm$ 5.56)	3.36 ( $\pm$ 3.61)	2.99 ( $\pm$ 3.44)	$F(2, 565.50) = 102.50$ $p < .001$	1 vs. 2	4.43	<.001
					1 vs. 3	4.48	<.001
					2 vs. 3	0.36	.19
HADS-A	6.25 ( $\pm$ 3.86)	2.72 ( $\pm$ 2.47)	2.05 ( $\pm$ 2.39)	$F(2, 572.90) = 151.74$ $p < .001$	1 vs. 2	3.53	<.001
					1 vs. 3	4.20	<.001
					2 vs. 3	0.67	<.001
HADS-D	5.62 ( $\pm$ 3.90)	1.45 ( $\pm$ 1.92)	1.36 ( $\pm$ 1.96)	$F(2, 558.96) = 181.66$ $p < .001$	1 vs. 2	4.16	<.001
					1 vs. 3	4.26	<.001
					2 vs. 3	0.09	1.00
PTSS	24.79 ( $\pm$ 12.80)	16.63 ( $\pm$ 8.22)	13.39 ( $\pm$ 5.87)	$F(2, 610.20) = 127.90$ $p < .001$	1 vs. 2	8.15	<.001
					1 vs. 3	11.41	<.001
					2 vs. 3	3.25	<.001

satisfying psychometric properties. The term *posttraumatic change scale* (PTCS) was chosen to describe this bidirectional scale that is expected to reflect more adequately the whole range of psychological changes after exposure to major stressors. The response distribution indicates that the experience of a positive posttraumatic change is quite common, but a substantial minority report negative changes or no changes. Positive posttraumatic change on the PTCS was found to correlate negatively with psychological distress. The respondents were on average exposed to 10 incidents involving traumatic stress. The results suggest that the degree of traumatic exposure influenced posttraumatic change reports—either in the positive or negative direction—rather than reports of no change.

There are some similarities and important differences between the PTCS and commonly used measures of posttraumatic growth. The dimension structure shows parallels to the PTGI (Tedeschi & Calhoun, 1996). However, the dimensions Spiritual Change and New Possibilities did not emerge in our analyses. The characteristics of this sample and more general cultural differences may have influenced this find (Shakespeare-Finch, Smith, Gow, Embelton, & Baird, 2003).

An important difference when comparing the current measure to the PTGI and the SRGS (Park et al., 1996) is that the latter measures allow only positive posttraumatic changes to be reported. The PTCS provides the respondents with the opportunity to report negative, positive, and no posttraumatic changes in relation to neutral statements and may display more accurately the outcome

of exposure to major stressors. Ultimately, this can also have influenced the factor structure of the measure.

The current study found 80.8% of the sample to report positive changes. This is in line with prior research (Linley & Joseph, 2004). However, several studies have questioned the reliability of retrospective self-reported posttraumatic positive changes. The argument is that the perceived positive changes after trauma may represent genuine and illusory changes, the latter serving a palliative function (Zoellner & Maercker, 2006; Frazier et al., 2009). Our finding does not rule out this possibility. However, we did not find a positive correlation between reported positive changes and psychological distress, which supports the notion that genuine posttraumatic changes have been reported. The participants' military training, aiming to establish a degree of preparedness toward combat-related traumatic events, may give some explanation of the high degree of positive change. Moreover, the change reports are more differentiated when looking at individual PTCS dimensions; a substantial minority (22.0%) reported negative changes on Interpersonal Involvement. Compared with the other dimensions, the positive-change rate here was relatively low (36.8%). In our view, these points increase the chances of genuine positive changes to have been reported.

Multiple past studies have demonstrated mixed findings regarding the relationship between psychological distress and posttraumatic change, and it is still unclear how these dimensions interact (Blix et al., 2016; Holgersen et al., 2010; Johnson et al., 2009;

Moore et al., 2010; Solomon & Dekel, 2007; Zoellner & Maercker, 2006). Separately and together, the PTCS dimensions consistently displayed negative correlations with symptom measures of anxiety, depression, and insomnia. The only exception was the manifestations of posttraumatic stress; this measure showed a negative correlation with the Interpersonal Involvement dimension and a weak, but significant, positive correlation with the Self-Confidence dimension. However, the total PTCS score shows no correlation with the posttraumatic stress symptoms, and it reveals negative correlations with anxiety, depression, and insomnia. A possible explanation for the current results may be that the items in the PTCS were stated in a nonleading or neutral manner; thus, they reduced the chances of having the respondents report illusory changes. The latter is often associated with positive correlations between positive changes and high levels of distress (Frazier et al., 2009; Zoellner & Maercker, 2006). In contrast, both the PTGI and the SRGS present items only in a positive-worded manner, which may produce a major response bias toward reports of illusory changes (Park & Lechner, 2006; Tomich & Helgeson, 2004).

The bidirectional nature of the PTCS allowed the identification of three particular patterns of posttraumatic change among the respondents: no change, negative change, and positive change. The results suggest that the positive-change group had significantly higher scores than the no-change group both on the traumatic exposure index and on some measures of distress. This indicates that a significant amount of traumatic stress exposure may be required to instigate processes toward positive changes (Dekel, Ein-Dor, & Solomon, 2012). The no-change group probably did not experience sufficient traumatic events to initiate positive changes. However, the negative-change respondents reported a high exposure to traumatic stressors, and overall they displayed high symptom levels on all distress measures. It is important to note that the positive-change respondents did not differ significantly from the negative-change respondents in regards to the degree of traumatic exposure but rather in displaying significantly lower levels of concurrent psychological distress. These results indicate a curvilinear association between negative change and distress, which is consistent with previous findings for military veterans (Moore et al., 2010). Moreover, the results may indicate differences in how the stress exposures have been processed, perhaps because of personality or in the available social support and psychosocial follow-up or both (Harvey et al., 2012). The results emphasize that exposure to major stressors may frequently, but not always, elicit positive posttraumatic changes in combination with low levels of distress. This partly supports claims that distress and positive posttraumatic change can occur at the same time (Park & Lechner, 2006) and adds to the notion that positive change may be the outcome of having wrestled with the traumatic experiences (Tedeschi, Calhoun, & Cann, 2007).

### Limitations

There are several limitations to the current study. The respondents could reply either per mail or in a web solution. The difference in response modality may have affected our data. However, some studies have shown that the response modality does not critically influence the data quality (Gosling, Vazire, Srivastava, & John, 2004).

It is important to note that the sample is predominantly male (91.7%), and the gender bias may have influenced the results. A gender-balanced population merits further research because previous studies have found gender to be an important factor in posttraumatic change and psychopathological development (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010).

The differentiating among negative-, positive-, and no-change respondents was not based on validated score ranges for inclusion into the respective groups but rather strict mean response scores. This can be a limitation in the current study.

The sample consisted entirely of selected and trained military personnel. The respondents' preparedness may reduce the generalizability of the findings to the general population and can to some extent explain the high levels of positive posttraumatic change. Traumatic stress and posttraumatic changes are related to the awareness and controllability of traumatic events (Schnurr, Rosenberg, & Friedman, 1993).

Moreover, the respondents may have passed through various developmental phases in regards to posttraumatic psychological change, psychological distress, and in how their combat experiences are remembered; this may have influenced the current results (McNally, 2005). The cross-sectional design does not capture such changes. Furthermore, this study only reports current psychological distress in relation to psychological change. Because we do not know the participants' stress responses at the time of exposure, this study cannot answer how acute stress responses relate to later psychological changes.

These limitations notwithstanding, the current study illustrates an alternative way of investigating the posttraumatic changes after major stress. In part, PTCS eliminates some of the criticisms raised against the prevalent measures of posttraumatic changes. It holds merit in that our study is based on a large and data-rich sample—large enough to allow a random sample division for the two-tiered development of the instrument. Positive changes measured on the PTCS are largely negatively associated with psychological distress, and the results may allow further clarification of mechanisms involved in psychological changes after trauma.

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Received July 18, 2016  
Revision received January 23, 2017  
Accepted March 13, 2017 ■

## Paper II



## Danger- and non-danger-based stressors and their relations to posttraumatic deprecation or growth in Norwegian veterans deployed to Afghanistan

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### ABSTRACT

**Objective:** This study aimed to explore how exposure to danger-based and non-danger-based stressors may influence personal changes in veterans ( $N = 4053$ ) after deployment to Afghanistan.

**Method:** Twelve war zone related traumatic events were used to form two stressor categories. The non-danger-based category included two stressor types: Moral Challenges and Witnessing, and the danger-based category included one type: Personal Threat. Thus, three stressor types were explored in relation to self-reported personal changes after war zone stressor exposure, e.g. negative changes labelled posttraumatic deprecation, positive changes labelled posttraumatic growth or no major change. Furthermore, the relationship between the stressor types and reported levels of distress were explored.

**Results:** The two non-danger-based stressor types, Moral Challenges ( $p < .001$ ) and Witnessing ( $p < .001$ ), were both significantly more associated with deprecation rather than growth, when compared to Personal Threat. Moreover, the non-danger-based stressors were significantly associated with a rise in posttraumatic stress symptoms, as well as a rise in symptoms of depression, anxiety and insomnia ( $p < .001$ ). In contrast, exposure to the danger-based stressor was only significantly associated with a rise in the posttraumatic stress symptoms in the current model ( $p < .001$ ). Reports of no-change were significantly associated with low degrees of exposure to all the three stressor types ( $p < .001$ ).

**Conclusion:** The current study highlights the special adverse effects of non-danger-based stressors. Our findings show that they are more associated with posttraumatic deprecation rather than with growth. This underscores the heterogeneity of responses to traumatic events and adds to the current knowledge about the impact of various stressor types.

### Estresores basados en peligro y estresores no basados en peligro y sus relaciones con declive postraumático o crecimiento postraumático en veteranos noruegos desplazados a Afganistán

**Objetivo:** El objetivo del estudio fue explorar cómo la exposición a estresores basados en peligro y a estresores no basados en peligro puede influenciar cambios personales en veteranos ( $N = 4053$ ) luego de ser desplazados a Afganistán.

**Métodos:** Doce eventos traumáticos relacionados a zonas de guerra se usaron para elaborar dos categorías de estresores. La categoría de estresores no basados en peligro incluyó a dos tipos: Desafíos Morales y Ser Testigo. La categoría de estresores basados en peligro incluyó un tipo: Amenaza Personal. Consecuentemente, se exploró la relación de tres tipos de estresores con los cambios personales auto reportados luego de la exposición a estresores de zona de guerra; así, los cambios negativos fueron etiquetados como 'declive postraumático', y los cambios positivos como 'crecimiento postraumático' o como 'sin cambio significativo'. Adicionalmente, se exploró la relación entre los tipos de estresores y los niveles reportados de sufrimiento.

**Resultados:** Los dos tipos de estresores no basados en peligro, Desafíos Morales ( $p < .001$ ) y Ser Testigo ( $p < .001$ ) estuvieron significativamente más asociados a declive que a crecimiento, cuando fueron comparados con Amenaza Personal. Asimismo, los estresores no basados en peligro estuvieron significativamente asociados a un incremento en síntomas de estrés postraumático, así como a un incremento en síntomas de depresión, ansiedad e insomnio ( $p < .001$ ). En contraste, la exposición a estresores basados en peligro estuvo únicamente asociada de manera significativa a un incremento de síntomas de estrés postraumático según el modelo actual ( $p < .001$ ). Los reportes de no haber experimentado un cambio estuvieron asociados significativamente a bajos niveles de exposición a los tres tipos de estresores ( $p < .001$ ).

### ARTICLE HISTORY

Received 1 December 2018  
Revised 11 March 2019  
Accepted 14 March 2019

### KEYWORDS

Posttraumatic growth;  
posttraumatic stress;  
military; trauma; moral  
injury; veterans

### PALABRAS CLAVE

Crecimiento Postraumático;  
Estrés Postraumático;  
militares; trauma; daño  
moral; veteranos

### 关键词

创伤后成长, 创伤后应  
激, 军事, 创伤, 道德创  
伤, 退伍军人

### HIGHLIGHTS

- Danger-based trauma is closely linked to posttraumatic growth.
- Non-danger-based trauma is mostly linked to posttraumatic deprecation.
- Non-danger-based trauma is associated with a broader range of distress symptoms after exposure.

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**Conclusiones:** El presente estudio resalta los efectos adversos particulares de los estresores no basados en peligro; nuestros hallazgos muestran que están más asociados con declive postraumático que con crecimiento postraumático. Esto enfatiza la heterogeneidad de las repuestas ante eventos traumáticos y añade información sobre el impacto de los diferentes tipos de estresores al conocimiento actual.

### 派遣至阿富汗的挪威退伍军人中危险和非危险应激源及其与创伤后损伤或成长的关系

**目的:** 本研究旨在探讨在被派遣到阿富汗后, 退伍军人 ( $N = 4053$ ) 在暴露于危险和非危险性的应激源中可能出现的个人变化。

**方法:** 挑选了12个与战区相关的创伤事件分类为两个应激源类别。非危险应激源的类别包括两种子类: 道德挑战和目击; 危险性应激源的类别包括个人威胁。因此, 本研究旨在探讨暴露于这三种应激源之后个体自我报告的变化, 包括: 负面变化 (称为‘创伤后损伤’, Posttraumatic Deprecation) 或者积极变化 (称为‘创伤后成长’), 或者没有重大变化。此外, 本研究也探讨了应激源类型与报告的痛苦程度之间的关系。

**结果:** 与个人威胁相比, 两种非危险性的应激源类型道德挑战 ( $p < .001$ ) 和见证 ( $p < .001$ ) 与创伤后损伤 (而非创伤后成长) 显著地更相关。此外, 非危险性应激源与创伤后应激症状以及抑郁、焦虑和失眠症状的升高显著相关 ( $p < .001$ )。相反, 在本模型中, 暴露于危险性的应激源仅与创伤后应激症状的升高显著相关 ( $p < .001$ )。报告没有经历变化与所有三种应激源类型的低暴露程度有显著相关 ( $p < .001$ )。

**结论:** 目前的研究强调了非危险性应激源的特殊负面反应: 本研究结果表明, 它们与创伤后损伤有关, 而与创伤后成长无关。这强调了对创伤事件反应的异质性, 并增加了对各种应激源类型影响的了解。

Traditionally, the focus of traumatic stress research has been on fear-based events consisting of danger and horror, as exemplified by Norris (1990, 1992). She suggested that traumatic stress consists of ‘violent encounters with nature, technology, or humankind’ (Norris, 1992, p. 409). Such stressors are often referred to as personal life threats (Shea, Presseau, Finley, Reddy, & Spofford, 2017; Xue et al., 2015). In many traumatic situations, however, peritraumatic fear may not be present, and the threat to life or body may not be the most stressful part of the incident (Shakespeare-Finch & Armstrong, 2010; Yehuda, Southwick, & Giller, 1992). Sensory impressions of death or major suffering of others by seeing, hearing, touching or smelling can in itself be traumatic. This type of trauma is commonly referred to as Witnessing stressors (Carson et al., 2000; Dryden, 2012; Fontana, Rosenheck, & Brett, 1992; Pietrzak, Whealin, Stotzer, Goldstein, & Southwick, 2011; Stein et al., 2012). Moreover, Witnessing stressors can also include learning about the death or injury of someone close (Stein et al., 2012). A typical example from the conflict in Afghanistan is witnessing the aftermath of a terrorist attack on a civilian target.

Some experiences involving human maliciousness, can also be traumatizing, without a life-threat or danger. Instead, the most stressful aspect may rather involve major provocations of the individual’s values and morality. Such moral stressors have been defined as ‘perpetrating, failing to prevent, bearing witness to, or learning about acts that transgress deeply held moral beliefs and expectations’ (Litz et al., 2009, p. 700). Being involved in actions resulting in civilian casualties due to collateral damage is one example of a moral stressor. Distinctions that are more general

have also been made, categorizing incidents involving personal threat as Danger-Based Stress, and moral stressors as well as witnessing incidents together as Non-Danger-Based Stress (Ramage et al., 2015).

Neuro-imaging studies have indicated that danger-based and non-danger-based stressors activate quite different locations in the brain. Ramage et al. (2015) found that only danger-based stressors elicited increased metabolic activity in the fear circuitry involving the amygdalae. In contrast, the non-danger-based stressors increased the metabolism in the precuneus, a part of the medial parietal cortex involved in episodic memory and self-processing operations (Cavanna & Trimble, 2006). This divergence in location with regards to the neural activities may suggest differences in how the brain is processing danger- and non-danger-based stressors; the finding underscores the relevance of exploring the differences between the two (Norrholm & Jovanovic, 2010). Furthermore, several studies suggest that various types of traumatic stressors may produce different symptomatic outcomes. Generally, danger-based stressors are associated with a hyperarousal symptom cluster, while non-danger-based stressors seem associated rather with a depression symptom cluster (Pietrzak et al., 2011; Ramage et al., 2015; Shea et al., 2017; Stein et al., 2012). Moreover, non-danger-based stressors may precipitate more posttraumatic distress than the danger-based stressors (Litz et al., 2009; Nash et al., 2010; Ramage et al., 2015).

Exposure to major stressors tend to be disruptive and lead to negative psychological developments in individuals (Norris, 1992; Ozer, Best, Lipsey, & Weiss, 2003; Yehuda et al., 1992). However, a

growing body of research also indicates that many individuals report positive psychological developments, such as greater personal strength or closer relationships, after such stressors (Linley & Joseph, 2004). Positive psychological development after exposure to trauma has been referred to by labels such as posttraumatic growth (PTG), stress-related growth, benefit finding and posttraumatic change (Helgeson, Reynolds, & Tomich, 2006; Park & Helgeson, 2006; Tedeschi & Calhoun, 1996). However, concerns have been raised about the most common ways of operationalizing such concepts, as several studies found that self-reported growth was closely associated with high levels of distress and psychopathology (e.g. Frazier, Conlon, & Glaser, 2001; Holgersen, Boe, & Holen, 2010; Taylor & Armor, 1996).

One reason for this may be that prevalent instruments, such as the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) and Stress-Related Growth Scale (Park, Cohen, & Murch, 1996), only allow the respondents to report positive developments. It has been proposed that this may produce a major response bias toward reports of illusory changes (Park & Helgeson, 2006). In recent advances, however, both negative, positive or no change can be reported on each item (Marshall, Frazier, Frankfurt, & Kuijer, 2015; Nordstrand, Hjemdal, Holen, Reichelt, & Bøe, 2017). When using this format, positive developments have been found to correlate negatively with psychological distress (Nordstrand et al., 2017). Negative developments represent posttraumatic deprecation, increased distress and even other kinds of psychopathology, while positive posttraumatic development imply growth (PTG) unlinked to psychopathology and distress (Livneh, McMahon, & Rumrill, 2018). No change, on the other hand, can be indicative of either insufficient traumatic exposure to initiate any posttraumatic development or to resilience (Ozer et al., 2003; Tedeschi & Calhoun, 2004). The assumption is that bi-directional response options reduce the risk of capturing pseudo-growth associated with high levels of distress (Armeli, Gunthert, & Cohen, 2001; Cheng, Wong, & Tsang, 2006; Livneh et al., 2018). This approach may also add to the current understanding of aetiology, diagnostic classification and treatment after trauma (Karanci & Acarturk, 2005; Maguen, Vogt, King, King, & Litz, 2006; Steenkamp, Litz, Hoge, & Marmar, 2015).

In this study we wanted to explore war zone stressors categorized as danger-based stressors and non-danger-based stressors, the latter divided into Moral Challenges and Witnessing. The aim was to explore the links between these three types of stressors and the posttraumatic outcome in terms of the subsequent development towards deprecation, growth or no posttraumatic change, and also their associations with posttraumatic distress and personal changes. Specifically, we hypothesized that non-danger-based

stressors would contribute more towards higher levels of psychological distress.

## 1. Methods

### 1.1. Participants

The study used data from a cross-sectional, post-deployment survey carried out during the spring of 2012. All Norwegian military personnel deployed to Afghanistan between late 2001 and the end of 2011 were invited to participate. A total of 7155 male and female personnel were identified by the Recruiting Department of the Norwegian Armed Forces to fit the requirements. Of the invited personnel, 4225 (59%) responded in total: 1931 (46%) by mail and 2294 (54%) on the web. Twenty-nine respondents answered both by mail and on the web. In these 29 cases, duplicates were removed to retain only one survey response per person. Of the responses, 172 (2.4%) were either incomplete or active refusals. The non-responders plus those with incomplete responses and active refusals amounted to 3102 (43.3%) persons. In all, 4053 individuals returned fully completed questionnaires, resulting in a final response rate of 56.7%. Table 1 shows the demographic characteristics of the participants and the non-responders.

### 1.2. Procedure

The identified personnel received an invitation by mail to take part in the study by completing a 20-page questionnaire. The respondents could either return a paper version by mail or complete the questionnaire in a digital format on the web. A responder incentive was offered; the participants were included in a lottery of three sport watches. The data collection phase lasted 13 weeks, from 20 February to 24 May 2012 and included two reminders to those who did not respond.

**Table 1.** Demographic characteristics of participants (56.7%) and non-responders (43.3%) of Norwegian Afghanistan veterans ( $N = 7155$ ) by numbers and percentage.

	Participants $N = 4053$ (%)	Non- Responders $N = 3012$ (%)
Biological Sex (female)*	336 (8.3)	164 (5.3)
Biological Sex (male)	3717 (91.7)	2938 (94.7)
Post Deployment Marital status (married)	1256 (31.0)	977 (31.5)
Deployment Age (years)*		
20–30	1305 (32.2)	1256 (40.5)
30–40	1528 (37.7)	1070 (34.5)
40–50	884 (21.8)	512 (16.5)
50+	336 (8.3)	264 (8.5)
Employment status (Post Deployment)		
Unemployed	182 (4.5)	130 (4.2)
Employed in the military	1905 (47.0)	1442 (46.5)
Long-term disabled	89 (2.2)	78 (2.5)

Note. Chi-square test, \* Significant discrepancy ( $p < .005$ ) between responders and non-responders. Age registered at beginning of deployment.

The survey data was stored and extracted from the Norwegian Armed Forces Health Registry and the Norwegian Labor and Welfare Administrations (NAV). The researchers only had access to anonymous data. All participants had given written informed consent to participate. All procedures, data collection, storing and distribution of data were made in accordance with the existing legislation regulating the Norwegian Armed Forces Health Registry. Additional anonymous collection of health information about the non-responders was approved by the Regional Committee for Medicine and Health Research Ethics of South-East Norway.

### 1.3. Measures

#### 1.3.1. War zone stressors

The project group for the Afghanistan 2012 Survey developed a traumatic exposure index for the survey. At the outset, it consisted of 23 items of typical traumatic events that were likely to occur during deployment. Based on literature reviews (Breslau & Davis, 1987; Fontana et al., 1992; Jordan, Eisen, Bolton, Nash, & Litz, 2017; Litz et al., 2009; Shea et al., 2017; Stein et al., 2012; Vogt, Proctor, King, King, & Vasterling, 2008), we selected a set of items that covered danger-based or non-danger-based stressors (Ramage et al., 2015). The danger-based stressors were related to Personal Threat incidents, while the non-danger-based stressors consisted of Moral Challenges (Litz et al., 2009; Stein et al., 2012) and Witnessing incidents (Green, Grace, Lindy, Gleser, & Leonard, 1990). Items that did not fit any of the three target stressor categories were omitted, which reduced the number of items for this study from 23 to 12. Each item was rated by the respondent on a 5-point Likert scale based on their frequency of exposures. The response options were: 0 = 'not experienced'; 1 = 'experienced 1–2 times'; 2 = 'experienced 3–12 times'; 3 = 'experienced 13–50 times'; and 4 = 'experienced 50+ times'. An individual sum exposure score was

calculated for all three target stressor types, giving sum scores of 0–20 (Personal Threat, 4 items), 0–15 (Moral Challenges, 3 items) and 0–25 (Witnessing, 5 items) for every respondent. In the analyses, the exposure scores related to each of the three target stressors were treated as continuous variables, and they were labelled Personal Threat ( $M = 1.32$ ,  $SD = 1.86$ ), Moral Challenges ( $M = .98$ ,  $SD = 1.43$ ) and Witnessing ( $M = 2.60$ ,  $SD = 2.38$ ). Bivariate correlations between the trauma types Personal Threat and Witnessing ( $r = .446$ ,  $p < .001$ ), between Personal Threat and Moral Challenges ( $r = .245$ ,  $p < .001$ ), and between Moral Challenges and Witnessing ( $r = .397$ ,  $p < .001$ ) were significant. The correlation coefficients indicated weak to moderate covariance between the stressor types. The mean exposure score for all the 12 items was 4.9 ( $SD = 4.38$ ), and 10.8% of the sample had been exposed to all three stressor categories, either simultaneously or on separate occasions.

The three target stressor variables were not mutually exclusive; we assumed that some events could involve multiple stressor types. The items subsumed under each stressor type and the related frequencies of exposed persons and their percentages are presented in Table 2.

#### 1.4. Posttraumatic development: depreciation, growth or no change

Group placement was dependent upon the kind of posttraumatic development that each participant reported, and was made by means of the Posttraumatic Change Scale (PTCS). The instrument contains 26 items ( $M = 3.28$ ,  $SD = .34$ ,  $\alpha = .91$ ). Each item is phrased in an unbiased manner with a format like, e.g. 'My social life is ...' or 'My trust in other people is ...'. Each item is rated on a 5-point Likert scale. The response options are: 1 = a lot worse/less than before; 2 = worse/less than before; 3 = same as

**Table 2.** Frequencies and percentage of those who reported 'Exposed' to Personal Threat, Witnessing and Moral Challenges. The 12 war zone stressor items are included from a sample of Norwegian Afghanistan veterans ( $N = 4053$ ).

War Zone Stressors Items	Exposed $n$ (%)
<b>Personal Threat</b>	<b>2005 (49.7)</b>
Wounded or injured in combat	110 (2.7)
Attacked by enemies	1802 (45.0)
Surrounded or ambushed by enemies	818 (20.4)
Experienced moment I thought I would die	836 (20.8)
<b>Witnessing</b>	<b>3056 (77.6)</b>
Seen, processed or handled dead bodies or body parts	1503 (37.5)
Know someone seriously injured or killed	1956 (48.8)
Witnessed brutality towards civilians, captured enemies, or prisoners	746 (18.6)
Seen innocent victims of war	2210 (55.4)
Seen fellow soldier being seriously injured or killed	572 (14.3)
<b>Moral Challenges</b>	<b>1830 (45.9)</b>
Seen morally reprehensible occurrences	1697 (42.4)
Did or participated in morally reprehensible occurrences	446 (11.1)
Failed to act on something I in retrospect think I should have done	503 (12.6)

Note. Individual respondents may report multiple stressors. Exposed = Experienced at least once.

before; 4 = better/more than before; and 5 = a lot better/more than before exposure to the war zone stressors, if any, during the deployment. This format allows the respondent to indicate the direction of her or his posttraumatic development towards deprecation (DG), growth (GG) or no-change (NG).

With this placement method, the sample ( $N = 4053$ ) was divided into three groups based on the participants' individual arithmetic mean on the PTCS (total). The DG consisted of respondents with a mean PTCS score of 1 through 2.99, the GG of respondents with mean scores of 3.1 through 5, and the NG of respondents with mean scores between 2.99 and 3.1. The mid-score on the PTCS, representing no change, is 3. This narrow inclusion interval for the NG was chosen to avoid categorizing modest deprecation or growth as no change. Very few respondents (< 2%) scored both 1 and 5 on different items on the PTCS. Therefore, no mixed development group was included.

### 1.5. Posttraumatic characteristics of personal changes

The PTCS has four sub-dimensions: Self-Confidence (8 items,  $M = 3.45$ ,  $SD = .51$ ,  $\alpha = .89$ ), Interpersonal Involvement (6 items,  $M = 3.0$ ,  $SD = .37$ ,  $\alpha = .73$ ), Awareness (6 items,  $M = 3.4$ ,  $SD = .459$ ,  $\alpha = .79$ ) and Social Adaptability (6 items,  $M = 3.20$ ,  $SD = .35$ ,  $\alpha = .70$ ). By self-reports, the sub-dimensions capture the various psychological characteristics of the posttraumatic changes manifesting in the aftermath of stressor exposure. The Self-Confidence sub-dimension relates to trust in one self, while the Interpersonal Involvement sub-dimension relates to trust in others. The Awareness sub-dimension relates to appreciation of life and inner values, while the Social Adaptability sub-dimension relates to social strategies and function. All four sub-dimensions have demonstrated a good model fit and satisfying psychometric properties (Nordstrand et al., 2017). The associations between group placement and personal changes on the four PTCS sub-dimensions scores were explored. This produced DG, GG and NG values on all four sub-dimensions for each participant to be included in the analyses.

### 1.6. Measures of psychological distress measures

The following measures captured the levels of distress: anxiety, depression and insomnia. In addition, the PTSS was used as a measure of the posttraumatic stress symptom load.

*Hospital Anxiety and Depression Scale (HADS)*: The HADS contains 14 items and consists of two subscales: anxiety (7 items; HADS-A [ $M = 2.91$ ,  $SD = 2.78$ ,  $\alpha = .77$ ]) and depression (7 items; HADS-D [ $M = 1.76$ ,  $SD = 2.41$ ,  $\alpha = .78$ ]). Each item is rated

on a scale from 0 to 3, giving a maximum score of 21 for anxiety and depression alike. For screening purposes, a sum score of 11 or higher on either subscale are generally considered to represent a 'case' of psychopathology, while scores of 8–10 represent 'borderline' and 0–7 signifies 'normal' levels of distress (Zigmond & Snaith, 1983). The HADS has been widely used as a brief self-rating instrument of anxiety and depression both for dimensional and categorical detection (case/non-case). Furthermore, HADS has been frequently used in both epidemiological and specialist care studies (Zigmond & Snaith, 1983). Moreover, HADS has been validated in a Norwegian population (Mykletun, Stordal, & Dahl, 2001).

*Insomnia Severity Index (ISI)*: The ISI (Bastien, Vallières, & Morin, 2001) is a 7-item self-report instrument capturing insomnia symptoms, as well as the degree of concerns or distress caused by those symptoms. Disturbed sleep is commonly reported after trauma; it may interfere with fear extinction and thus compromise trauma recovery (Kobayashi, Boarts, & Delahanty, 2007). Each item has a 5-point Likert response format. Total sum scores of 22–28 or higher are considered to represent severe clinical insomnia, scores of 15–21 represent moderate clinical insomnia (moderate severity), 8–14 subthreshold insomnia, and 0–7 represent no clinically significant insomnia ( $M = 3.67$ ,  $SD = 3.98$ ,  $\alpha = .89$ ) (Morin, Belleville, Bélanger, & Ivers, 2011). In part, the content of the ISI corresponds to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) diagnostic criteria for insomnia. The ISI has good face validity and excellent psychometric properties (Morin et al., 2011). The sum score will be referred to as the ISI (total) score.

*Posttraumatic Symptom Scale (PTSS)*: Concurrent posttraumatic stress symptoms were detected using the 10-item self-report version of PTSS; this questionnaire was developed in Norway in relation to the North Sea Oil Rig Disaster (Holen, Sund, & Weisæth, 1983). In this version, each item is rated on a 7-point Likert scale. The scale covers general stress manifestations such as sleep difficulties, irritability, depressed mood and startle reactions in the past seven days. The response options go from 1 = never/rarely to 7 = very often, giving a potential total sum score range from 10 to 70. Total sum scores of 35 or higher represent a likely case of psychopathological posttraumatic stress symptoms ( $M = 16.94$ ,  $SD = 8.82$ ,  $\alpha = .90$ ). The total sum score is referred to as the PTSS (total) score.

### 1.7. Data analysis

The frequency distribution of the stressor items was calculated, reflecting the respondents' stressor exposure on the item and variable level, i.e. Personal

Threat, Moral Challenges and Witnessing. A simultaneous multivariate multiple linear regression (Stevens, 2002) was conducted to examine the relative contribution of Personal Threat, Moral Challenges and Witnessing in predicting reports of psychological distress on four outcome measures (PTSS, HADS-A, HADS-D and ISI). Two circumstantial variables were included as covariates in this analysis. The first was the total number of deployments for each person. This was included to control for the potential disruptive, non-traumatic effects of deployment, such as the absence from family and a regular social life, the burden on intimate relationships, physical constraints and work load. The second covariate was the elapsed time in years from the last deployment until participation in the study, and was included to control for variation in the length of time since the respondents were exposed to the war zone stressors when completing the survey. The relative importance of the covariates and stressor variables in the model were compared using the standardized regression coefficients; the  $\beta$  weights.

Divergent effects of the various stressor types were investigated by analyses of variance (ANOVA) with post hoc Bonferroni corrections. The development groups derived from the PTCS (total) score and the four PTCS (sub-dimension) scores, i.e. deprecation group, growth group and no-change group, were entered as the dependent variables in separate one-way ANOVAs. Between-group comparisons were made for all five sets of developmental groups. Levene's test of homogeneity of variance was significant for all ANOVAs. Accordingly, Welch's  $F$  is

reported. When deciding the appropriate significant  $p$ -value for the current study, several aspects relevant for the analysis and the sample size of our study were considered (Dixon, 1998). The current study is based on a large sample ( $N = 4053$ ). Thus, a conservative significance level of .001 was chosen in the relevant analyses.

## 2. Results

### 2.1. Was zone stressors and distress

The relationships between the war zone stressors and the symptom measures are presented in Table 3. Exposure to Personal Threat, Moral Challenges and Witnessing explained a significant amount of the variance in all the outcomes; the types of stressors were all significant predictors of the posttraumatic stress symptoms in the model, as expressed by the PTSS (total) score. In contrast, only Moral Challenges and Witnessing were significant predictors of the distress measures – anxiety, depression and insomnia, as measured respectively by the HADS-A, HADS-D and ISI scores. Neither the number of deployments, nor time since last deployment, proved to be significant in the equation as predictors for any of the psychological distress measures. Collinearity diagnostics did not indicate the presence of multicollinearity in any of the regression analyses (Coakes, 2005; Hair, Anderson, Tatham, & Black, 1998). Tolerance values ranged from 0.74 to 0.94, variance inflation factors from 1.06 to 1.43, and condition indices from 1.00 to 4.05. No step showed two or more coefficients accounting for < .90 of the variance.

**Table 3.** Multivariate multiple linear regression of exposure scores from three war zone stressors: Personal Threat, Witnessing and Moral Challenges, and also the persons' number of deployments and time since last deployment as the independent variables in relation to the psychological distress scales: PTSS, HADS-A, HADS-D and ISI as the dependent variables.

Variables	$B$	$SE$	$\beta$	$R^2$
PTSS [ $F(5, 3886) = 144.987, p < .001$ ]				.157***
Personal Threat	.756	.079	.160***	
Witnessing	.657	.066	.176***	
Moral Challenges	1.206	.100	.195***	
Time Since Last Deployment	-.048	.055	-.013	
Number of Deployments	-.240	.079	-.046	
HADS-A [ $F(5, 3886) = 36.606, p < .001$ ]				.045***
Personal Threat	.067	.027	.045	
Witnessing	.081	.022	.069***	
Moral Challenges	.302	.034	.155***	
Time Since Last Deployment	.014	.018	.012	
Number of Deployments	-.059	.027	-.036	
HADS-D [ $F(5, 3886) = 34.886, p < .001$ ]				.043***
Personal Threat	.041	.023	.032	
Witnessing	.069	.019	.067***	
Moral Challenges	.269	.029	.159***	
Time Since Last Deployment	.000	.016	-.001	
Number of Deployments	-.014	.023	-.010	
ISI [ $F(5, 3886) = 18.935, p < .001$ ]				.024***
Personal Threat	-.024	.038	-.011	
Witnessing	.129	.032	.077***	
Moral Challenges	.311	.048	.112***	
Time Since Last Deployment	-.021	.026	-.013	
Number of Deployments	-.081	.038	-.035	

Note. Post-Traumatic Symptom Scale (PTSS); Hospital Anxiety and Depression Rating Scale (HADS-A, HADS-D); Insomnia Severity Index (ISI). <> Exposure score Sig. \*\*\*  $p < .001$  with distress scale.



## 2.2. War zone stressors and posttraumatic development

The associations between the different war zone stressors and the reported posttraumatic development in terms of depreciation, growth or no change are shown in Table 4. The three outcome groups reflect the overall direction of the veteran's subsequent posttraumatic development based on the PTCS (total) scores: the depreciation group (DG;  $N = 326$ , 8.0%), the growth group (GG;  $N = 3,255$ , 80.3%) and the no-change group (NG;  $N = 445$ , 11.0%). Incomplete responses accounted for a small number of participants (Missing;  $N = 27$ , 0.7%).

Analyses revealed that exposure to Personal Threat did not significantly differentiate between those who reported posttraumatic depreciation and those who reported posttraumatic growth. In contrast, exposure to the non-danger-based stressor types, i.e. Witnessing and Moral Challenges, were significantly higher among respondents reporting posttraumatic depreciation, compared to those reporting posttraumatic growth.

Regarding the characteristics of posttraumatic change as captured by the PTCS sub-dimensions, the findings were mixed (Table 4). On the sub-dimensions Interpersonal Involvement and Social Adaptability, exposure to all three war zone stressor types were significantly more associated with depreciation rather than growth. By contrast, reports of growth or depreciation on the Self-Confidence sub-dimension were not significantly different in regard to exposure scores of any of the stressor types. Of note, on the sub-dimension Awareness, we find that those who reported depreciation were significantly more exposed to Moral Challenges and Witnessing than those who reported growth, however, there was no difference in relation to the exposure to Personal Threat.

Respondents with no posttraumatic change were significantly less exposed to any of the three stressor types when compared to those who reported posttraumatic depreciation or growth. This was the case both for the three outcome groups derived from the PTCS (total) score, and in regard to the characteristics of posttraumatic change as derived from the PTCS (sub-dimension) scores (Table 4).

## 3. Discussion

The current study demonstrates that stressor types differ in their associations with the subsequent posttraumatic development of the veterans, i.e. towards depreciation, growth or no change, a stressor-response link is found. Importantly, exposure to moral challenges and witnessing death and suffering are more prevalent among veterans who report posttraumatic

depreciation, compared to those veterans who report growth. In line with previous findings, a certain exposure load seems required to result in posttraumatic depreciation or growth (Dekel, Ein-Dor, & Solomon, 2012). Those reporting lower exposure to war zone stressors also report less posttraumatic distress in the wake of deployment.

Both danger-based and non-danger-based types of stressors are associated with posttraumatic stress symptoms. However, the findings suggest that exposure to non-danger-based stressors may have a broader impact on the symptom expression than exposure to danger. This is comparable to recent studies investigating the impact of different stressor types (Shea et al., 2017). In the current sample, morally challenging incidents and witnessing the death and suffering of others seem to be more associated with distress in terms of anxiety, depression and insomnia than fear-based situations are. The time elapsed since the last deployment to Afghanistan seems not to affect psychological distress in our model, indicating that the effects of exposure are not temporally dependent. This is contrary to some previous findings, where time since trauma has emerged as a significant predictor of the effect sizes for depression (Helgeson et al., 2006).

Measures of posttraumatic depreciation and growth are commonly broken down into different characteristics (sub-dimensions) of personal changes (Helgeson et al., 2006). In the current study, depreciation and growth was measured along four such sub-dimensions, and this gives some information on the pattern of posttraumatic changes in the sample. The study finds that 80.3% of the sample reports some degree of growth; this is comparable to previous findings (Linley & Joseph, 2004). Moreover, the danger-based stressors are primarily linked to positive changes in characteristics such as higher self-confidence and increased awareness of life-values, as well as appreciation of life. Similar effects have been identified in other studies (Maguen et al., 2006). Previous research suggests that an individual's sense of predictability and controllability during the traumatic situation is important for the posttraumatic outcome (Başoğlu et al., 2005). Both the preparedness and the available social support in the military units may help to facilitate growth rather than adverse effects of danger.

Posttraumatic depreciation was reported by 8.0% of the sample, and non-danger-based stressors appear to be more linked to such depreciation. This demonstrated association adds to the current knowledge on this issue, even though the mechanisms by which it occurs are not clear from the results. However, previous studies have found that non-danger-based stressors have strong correlations with guilt, shame and symptoms of depression (Jordan et al., 2017; Norrholm & Jovanovic, 2010; Ramage et al., 2015). A central dimension of

**Table 4.** One-way ANOVA with Bonferroni post hoc group comparison of exposure scores from war zone stressors in relation to the depreciation group, the growth group and the no change group in the Norwegian Afghanistan veterans ( $N = 4053$ ).

War Zone Stressors	Mean Depreciation Group	Mean Growth Group	Mean No Change Group	One-way ANOVA Weldt's $F$	Post Hoc Test (Bonferroni)	
					Group comp.	Mean diff.
<b>Sub-Dimension I: Self-Confidence</b>						
Personal Threat	$M[1.28(\pm 1.83)]$	$M[1.49(\pm 1.96)]$	$M[.73(\pm 1.38)]$	$F(2, 3965) = 56.21 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.30 <.001 <.001
Moral Challenges	$M[1.34(\pm 1.82)]$	$M[1.04(\pm 1.45)]$	$M[.67(\pm 1.17)]$	$F(2, 3969) = 30.34 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.007 <.001 <.001
Witnessing	$M[3.16(\pm 2.74)]$	$M[2.75(\pm 2.38)]$	$M[1.97(\pm 2.16)]$	$F(2, 3946) = 42.47 p < .001$	1 vs 0 -1 vs 1 -1 vs 0 1 vs 0	.037 <.001 <.001 <.001
$n$	228	2939	857			
<b>Sub-Dimension II: Interpersonal Involvement</b>						
Personal Threat	$M[1.87(\pm 2.19)]$	$M[1.39(\pm 1.87)]$	$M[.95(\pm 1.58)]$	$F(2, 3970) = 72.21 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Moral Challenges	$M[1.46(\pm 1.74)]$	$M[1.00(\pm 1.41)]$	$M[.70(\pm 1.17)]$	$F(2, 3974) = 83.22 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Witnessing	$M[3.43(\pm 2.69)]$	$M[2.64(\pm 2.30)]$	$M[2.14(\pm 2.15)]$	$F(2, 3950) = 87.05 p < .001$	1 vs 0 -1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001 <.001
$n$	886	1486	1663			
<b>Sub-Dimension III: Awareness</b>						
Personal Threat	$M[1.56(\pm 1.91)]$	$M[1.40(\pm 1.91)]$	$M[.99(\pm 1.68)]$	$F(2, 3966) = 16.73 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.79 <.001 <.001
Moral Challenges	$M[1.79(\pm 1.92)]$	$M[1.01(\pm 1.42)]$	$M[.70(\pm 1.25)]$	$F(2, 3970) = 45.90 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Witnessing	$M[3.55(\pm 2.77)]$	$M[2.70(\pm 2.34)]$	$M[2.07(\pm 2.24)]$	$F(2, 3946) = 36.80 p < .001$	1 vs 0 -1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001 <.001
$n$	182	3028	815			
<b>Sub-Dimension IV: Social Adaptability</b>						
Personal Threat	$M[1.85(\pm 2.18)]$	$M[1.45(\pm 1.87)]$	$M[.99(\pm 1.71)]$	$F(2, 3971) = 47.32 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Moral Challenges	$M[1.54(\pm 1.77)]$	$M[1.08(\pm 1.46)]$	$M[.69(\pm 1.20)]$	$F(2, 3975) = 73.08 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Witnessing	$M[3.36(\pm 2.65)]$	$M[2.82(\pm 2.36)]$	$M[2.12(\pm 2.24)]$	$F(2, 3950) = 65.25 p < .001$	1 vs 0 -1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001 <.001
$n$	449	1990	1596			
<b>Posttraumatic Change Scale Total</b>						
						.70 <.001

(Continued)

Table 4. (Continued).

War Zone Stressors	Mean Deprecation Group			Mean Growth Group			Mean No Change Group			One-way ANOVA Welch's F	Post Hoc Test (Bonferroni)		
	M[1.45(±1.92)]	M[1.46(±1.85)]	M[1.38(±1.90)]	M[1.38(±1.90)]	M[.98(±1.40)]	M[.60(±1.13)]	M[.80(±1.48)]	Group comp.	Mean diff.		p		
Personal Threat									$F(2, 3967) = 19.18 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.07 .65 .57	1.00 <.001 <.001	
Moral Challenges									$F(2, 3971) = 34.21 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.48 .86 .38	<.001 <.001 <.001	
Witnessing									$F(2, 3947) = 31.63 p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.66 1.36 .70	<.001 <.001 <.001	
N	326		3255	445									

Note. Between-group comparisons (Bonferroni post-hoc test): significant at  $p < .001$ . Non-significant between-group comparison presented in bold.

deprecation appears to be negative interpersonal changes, such as diminished ability to trust others, and a reduced capacity for emotional closeness with other people. Shame and guilt may be components of such changes. One possibility is that shame related to non-danger-based incidents, such as being involved in morally transgressive actions, increases the barriers to disclose these experiences to others (Gray et al., 2012; Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009). In turn, this may sway the posttraumatic development in the direction of posttraumatic deprecation rather than towards growth (Tedeschi & McNally, 2011). In contrast, veterans who have been exposed to life-threatening situations may socially have less reticence to disclose their experiences and, thereby, may be more open to get support from colleagues, family and mental health professionals (DeViva et al., 2016; Möller-Leimkühler, 2002). Studies have found that military veterans often fear negative reactions when talking about their war zone experiences (Guay, Billette, & Marchand, 2006). Possibly, this may be particularly salient in relation to non-danger-based traumas (Nash et al., 2010). Disclosing traumas related to witnessing or moral issues could put veterans at risk of social stigma and negative social responses (Ullman & Filipas, 2001), and increase their reticence towards seeking social support (Lepore & Revenson, 2006), which is regarded as important in fostering posttraumatic growth (Tedeschi & McNally, 2011; Valentiner, Holahan, & Moos, 1994). Importantly, the role of shame and social stigma as mediators between exposure to the various stressor types and posttraumatic deprecation or growth is not fully understood. Future studies investigating these post-traumatic mechanisms seem warranted.

The current study may have implications for the interventions and follow-up of individuals exposed to stressors such as moral challenges and witnessing. Given that the mainstream understanding of PTSD, so far, is primarily centred on the danger-based aspects of the stressors, there may be a risk that individuals exposed to non-danger-based incidents are being identified to a lesser degree and, therefore, they may be given less attention and support. Our findings highlight the relevance of expanding the scope of what constitutes traumatic stressors and the potential consequences of such experiences. Concentrating solely on the danger-related criteria of the PTSD diagnosis will restrict the view of traumatization, and limit the support of people exposed to other variants of trauma.

### 3.1. Future directions

The current study is based on cross-sectional data. Future research that examines the temporal progression of reactions to the different types of stressors is needed,



both in terms of long-term development of PTSD and depression, as well as posttraumatic deprecation and growth. This could bolster causal inferences and determine the direction of the associations we identified. One testable hypothesis is that Moral Challenges, Witnessing and Personal Threat incidents instigate divergent longitudinal trajectories in regard to these phenomena. Furthermore, in light of the controversy concerning early psychological intervention after trauma exposure (Everly & Mitchell, 2000), it would be fruitful to investigate if a trauma specific intervention strategy could increase the effectiveness of such efforts. There are efforts aimed at developing interventions tailored to manage non-danger-based experiences (Litz, Lebowitz, Gray, & Nash, 2017), and the current results add legitimacy to such endeavours. Finally, the role of shame, guilt and depression in the development of posttraumatic deprecation is not fully understood. Previous studies have pointed to the links between such feelings and non-danger-based stressors (Jordan et al., 2017; Nash et al., 2010). Understanding the mechanisms by which non-danger-based stressors influence posttraumatic development towards deprecation rather than growth merits further research, and could have important clinical implications.

### 3.2. Limitations

There are several limitations in the current study. Importantly, the sample is predominantly male (91.7%), and the gender bias may have influenced the results. Previous studies have found that females report more posttraumatic growth after trauma than males, and this may have influenced the stressor-response links we identified (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010). The data presented are based on short-form self-report measures. Females and older veterans had a significantly higher response rate than the males in general and the younger veterans; this is to be considered when interpreting the results. Due to the large sample size in the current study, we were not able to collect anamnestic data, nor conduct diagnostic interviews. Moreover, the cross-sectional design of the current study does not capture such self-reported changes over time and caution is required in inferring potential relations between stressors and the subsequent responses.


This sample consisted entirely of selected and well-trained military personnel. The respondents' preparedness is likely to reduce the generalizability of the findings to the general population. This may in part explain why danger-based stressors seems to have less negative impact in the sample compared to non-danger-based stress. Of note, we did not control for potential additive effects of exposure to multiple trauma types in the individual respondents. Such occurrences may have influenced post trauma outcomes, and this is a limitation in the current study.

Finally, although the reported pattern of associations between stressor types and measures of distress are significant, the explained variance regarding some scales were small, particularly for insomnia ( $R^2 = .024$ ,  $p < .001$ ). However, significant associations with a low  $R^2$  in a large sample, as in our current study, can still provide important information on data trends particularly when studying psychological phenomena (Figueiredo Filho, Júnior, & Rocha, 2011). In addition, the current results are comparable to previous findings (Shea et al., 2017; Stein et al., 2012), which also indicate that the associations between our predictors and response variables are valid.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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# Paper III



Social Support and Disclosure of War Zone Experiences After Deployment to  
Afghanistan – Implications for Posttraumatic Deprecation or Growth.

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## Abstract

**Objective:** This study explores social support and personal barriers towards disclosing war related traumatic experiences and how the two are associated with veterans' posttraumatic development after deployment to Afghanistan.

**Method:** A trauma-exposed sample was selected from Norwegian Afghanistan veterans ( $N = 3,465$ ). Inclusion was based on self-reported exposure to one or more of twelve typical traumatic war zone events; they covered danger-based and non-dangers based stressors. Veterans' number of close friends and the quality of their support network were used as measures of their structural and functional social support. In four linear regression analyses, structural and functional social support, as well as personal barriers to disclose traumatic experiences were examined in relation to what characterized the veterans' posttraumatic development towards PTSD, PTG or no change.

**Results:** Both structural social support ( $p < .001$ ) and functional social support ( $p < .001$ ) were associated with PTG after war-related stressors. Barriers to disclose trauma was found to be associated with PTSD ( $p < .001$ ). However, in a regression model including structural social support, functional social support and personal barriers to disclose traumatic experiences, the personal barriers appeared no longer to be significantly associated with reports of PTSD.

**Conclusion:** High levels of structural and functional social support seem to promote PTG. Importantly, this study also indicates that while personal barriers to share traumatic experiences is associated with PTSD, social support appears to buffer against this negative influence. If veterans report good social support, such barriers are no longer associated with PTSD.

*Keywords:* Posttraumatic growth, posttraumatic stress, military, trauma, moral injury, veterans, social support, social barriers

Posttraumatic psychological suffering is traditionally understood as the typical response to overwhelming psychic trauma manifesting as posttraumatic stress disorder (PTSD) (Norris, 1992). However, in recent decades other psychological responses to trauma, such as a positive development, has been demonstrated to be within the possible range of outcomes after major stressors (Linley & Joseph, 2004). Moreover, the influence of the social context on the post-trauma trajectory after trauma is widely recognized (Yehuda, McFarlane, & Psychother, 1995; Brewin, Andrews, & Valentine, 2000). The availability of persons to lean on, perceptions of support in the social environment, and finally, the personal barriers or reticence to share the traumatic experiences, have been demonstrated to interact in relation to the posttraumatic development (Shalev, Peri, Canetti, & Schreiber, 1996; Tedeschi & Calhoun, 2004). However, the relative contributions of these social factors in the posttraumatic development is not clear.

Social support has been conceptualized in various ways. In broad strokes, the term has been defined as an individual's perception of the availability and quality of helpful social interactions, and the feeling of being cared for, respected, understood and included (Cobb, 1976). This definition emphasizes the *perceptions* of social support, rather than actual *received* support (Uchino, Bowen, Carlisle, & Birmingham, 2012). Studies have found that the perceptions of social support consistently have a positive influence after exposure to major stressors, while received social support is a less reliable measure (Helgeson, 1993; Cohen, Underwood, & Gottlieb, 2000; Bolger & Amarel, 2007). Cobb's (1976) definition points to two distinct aspects of social support, they are commonly labelled as functional and structural social support (Cohen & Syme, 1985). In this paper, we will utilize his approach to social support.

Structural social support usually refers to the network of supportive people available to the exposed individuals after trauma. Often, this is assessed numerically by counting the number of close relationships a person has (Wills & Fegan, 2001). In contrast, functional social support is



understood as the qualitative degree of support available from the social resources of the exposed person (Wills & Fegan, 2001); this is often assessed by asking people to evaluate their network's capacities for understanding, willingness to listen, care, etc.

In addition to mental suffering, research has demonstrated that exposure to traumatic stressors may also lead to a positive psychological development (Linley & Joseph, 2004). The most common label for this phenomenon is posttraumatic growth (PTG) (Tedeschi & Calhoun, 1996). However, several studies have called into question the quality of common psychological growth measures because high correlations have repeatedly been found between a considerable burden of posttraumatic symptoms and reported PTG (Taylor & Armor, 1996; Frazier, Conlon, & Glaser, 2001; Holgersen, Boe, & Holen, 2010).

Recent developments in gauging growth after trauma have aimed to bypass the problem of the high associations between posttraumatic distress and PTG. In this recent approach, the respondents have the options to report both negative and positive developments. Thus, the concept of posttraumatic deprecation (PTD) is introduced in addition to PTG (Marshall, Frazier, Frankfurt, & Kuijer, 2015; Nordstrand, Hjemdal, Holen, Reichelt, & Bøe, 2017; Boals, & Schuler, 2018). Usually, PTG and PTD manifest in a personal domain, a relational domain and in an extensional domain (Baker, Kelly, Calhoun, Cann, & Tedeschi, 2008; Livneh, McMahon, & Rumrill, 2018). The three domains parallel the negative alterations seen in persons with posttraumatic stress disorder, i.e., altered perception of self, altered perception in relations to others, and altered perception of the world and meaning (Janoff-Bulman, 1992; Foa & Rothbaum, 1998).

Several studies have demonstrated that social support promotes PTG after exposure to major stressors (Park, Cohen, & Murch, 1996; Nolen-Hoeksema & Davis, 1999; Maguen, Vogt, King, King, & Litz, 2006; Pietrzak, Russo, Ling, & Southwick, 2011). The cognitive processing

theory of PTG (Tedeschi & Calhoun, 2004) suggests that the social context facilitates emotional and cognitive processing, and also, it offers new perspectives on the traumatic experiences. Moreover, it states that disclosure of trauma and distressing emotions is an important promoter of PTG. Likewise, several studies have pointed to the adverse effects of personal barriers or reticence to disclose traumatic experiences (Foa & Kozak, 1991; Lepore, 2001; Lepore & Revenson, 2006; Mueller, Moergeli, & Maercker, 2008; Thoresen, Jensen, Wentzel-Larsen, & Dyb, 2014). Nevertheless, how personal barriers and social support may interact in relation to PTG is not yet well understood. Will a supportive network contribute toward PTG also when the person does not share the traumatic experiences? Or may reticence to divulge such experiences disrupt the benefits of social support and possibly contribute towards PTSD?

The current study aimed to investigate the relative links of social support and personal barriers to disclose traumatic experiences in relation to veterans' posttraumatic development after exposure to major stressors. We hypothesized that structural and functional social support, i.e., the number of close friends and the perceived quality of social support would be significant predictors of PTG, while personal barriers to disclose traumatic experiences would predict PTSD.

## **Methods**

### **Participants and Study Design**

The current paper is based on data from a post-deployment survey carried out in the spring of 2012. All Norwegian military personnel deployed to Afghanistan between late 2001 and the end of 2011 were invited to participate. The study was cross-sectional and retrospective. A relevant total of 7,155 personnel of both sexes were identified by the Recruiting Department of the Norwegian Armed Forces. Of the 7,155 invited personnel, 4,225 (59%) responded, 1,931 (46%) of them by mail and 2,294 (54%) on the web. One hundred and seventy-two of the returned responses were either incomplete or refusals. The non-responders included those with

uncompleted responses or active refusals; they accounted for a total of 3,102 veterans. In all, 4,053 veterans returned fully completed questionnaires, giving a final response rate of 56.7%. A comparison of the demographic characteristics of the responders and the non-responders revealed that females and older veterans had a significantly higher response rates. Further descriptions of the demographic characteristics of responders and non-responders have been published elsewhere (Nordstrand et al., 2017).

### **Procedure**

The identified personnel received written invitations to complete a 20-page questionnaire, either on paper, by mail or on a web-page. An incentive to respond was participation in a lottery of three sport watches. The data collection phase lasted thirteen weeks, from the 20th of February to the 24th of May 2012 and included two reminders. For the current study, respondents who reported exposure to potentially traumatic war zone stressors ( $N = 3,465$ ) were identified and included in the final sample for further analyses.

The survey data was stored and extracted from the Norwegian Armed Forces Health Registry and the Norwegian Labor and Welfare Administrations (NAV), both provide researchers with only anonymous data. Even so, all participants gave written informed consent. Study procedures, collection, storing and distribution of the data were made in accordance with the existing legislation regulating the Norwegian Armed Forces Health registry. The collection of health information about the non-responders was approved by the Regional Committee for Medicine and Health Research Ethics of South-East Norway.

### **Functional and Structural Social Support**

The measure of social support was adapted from an inventory (Oslo 3 Support Scale) developed by the Norwegian Institute of Public Health (NIPH) for use in European health surveys (Nosikov & Gudex, 2003). The inventory captures perceptions of functional and

structural social support; it has good predictive validity in relation to mental health outcomes, and it has demonstrated high utility in large surveys (Dowrick et al., 1998). Minor changes in the wording of some items were required to adjust them to the post deployment context of the veterans e.g. *“In the time after deployment, I have had access to people who can support me if I have problems”*. Moreover, two items were added; they were related to functional social support from family members. The questionnaire also includes questions about the veterans’ number of close confidants, their sense of care, and the interest and support from friends, family and others. The participants were asked to rate each item on a 5-point Likert response format with these response options: 1 – “Completely Disagree”; 2 – “Disagree Somewhat”; 3 – “Neither Or”; 4 – “Agree Somewhat”; 5 – “Completely Agree”. The five items indicating functional social support gives a potential sum score between 5 to 25. The obtained reliability of the items in the current study ( $M = 18.53$ ,  $SD = 3.15$ ,  $\alpha = .66$ ) is consistent with previous studies (Dalgard et al., 2006; Dalgard, 2008).

The following one item indicated structural social support: *“How many people are so close to you that you could count on them for support if you had substantial personal problems?”*. The item had a 5-point Likert response format with these response options: 1 – “none”; 2 – “one”; 3 – “two”; 4 – “three to five”; 5 – “six or more”, giving sum scores of 1 to 5. The average structural support score was 4.04 ( $SD = .88$ ) in the current sample. Structural and functional social support were two separate variables the analyses.

### **Personal Barriers to Disclose**

The project group for the Afghanistan 2012 survey developed this variable based on reviews of relevant literature about personal barriers to share war zone experiences (Lepore & Ituarte, 1999; Ullman & Filipas, 2001; Frattaroli, 2006; Guay, Billette, & Marchand, 2006; Litz, 2007; Nash & Figley, 2007). Respondents were asked to relate to their service in Afghanistan and

rate the following three items; (1) *“I experienced incidents in Afghanistan which I have not been able to tell others about, even those closest to me”*; (2) *“I have/ had problems that I am not able to share with family or friends”*; and (3) *“There is no one at home who is able to understand what I have experienced”*. Each of the three items had a 5-point Likert response format with the following response options: 1 – “Completely Disagree”; 2 – “Disagree Somewhat”; 3 – “Either Or”; 4 – “Agree Somewhat”; 5 – “Completely Agree”. This variable gauging Personal Barriers to disclose traumatic experiences from Afghanistan had a potential sum score with a potential range from 3 to 15 ( $M = 7.2$ ,  $SD = 2.72$ ,  $\alpha = .60$ ) in this study.

#### **Traumatic Exposure Index**

A 12 item traumatic exposure index (Nordstrand, Bøe, Holen, Reichelt, Gjerstad, & Hjemdal, 2019) identified veterans who had been stressor exposed ( $N = 3,465$ ). The criteria for the inclusion were reports of involvement in one or more of 12 typical war-related stressors. The 12-item index covers events related to personal threats, morally challenging situations, and the witnessing of suffering and/or death of others ( $M = 5.7$ ,  $SD = 4.22$ ,  $\alpha = .76$ ). The war-stressors covered by the 12 items of the index in the current study are comparable to those included in similar measures of military traumatic stress exposure (Stein et al., 2012; Ramage et al., 2015). Each item is rated on a 5-point Likert scale, indicating the frequency of exposures to the war-stressor in question. The response options were 0 - “not experienced”; 1 - “experienced 1-2 times”; 2 - “experienced 3-12 times”; 3 - “experienced 13-50 times”, and 4 - “experienced 50+ times”. A previous study (Nordstrand et al., 2019) found that this traumatic exposure index correlated significantly with measures of psychological distress. This is taken as an indication of satisfying construct validity.

#### **Posttraumatic Development (PTCS)**

The posttraumatic development of the veterans towards PTSD, PTG or no change were assessed by the Posttraumatic Change Scale (PTCS). The scale has previously demonstrated satisfying psychometric properties (Nordstrand et al., 2017), and contains 26 items ( $M = 3.3$ ,  $SD = .35$ ,  $\alpha = .91$ ). Items are phrased in an unbiased manner to increase the likelihood of authentic change reports. The given format of each item is, e.g., “My social life is...” or “My trust in other people is...” with the following response options: 1; a lot worse/less than before, 2; worse/less than before, 3; same as before, 4; better/more than before, and 5; a lot better/more than before. “Before” refers to prior to the traumatic exposure during deployment.

The PTCS is a bi-directional scale that captures reported negative (PTD) and positive (PTG) psychological developments after exposure to traumatic stressors on a continuum. The mid-score is 3 on the PTCS and represents no change. A mean score of 1 – 2.99 indicates PTD, while a mean score of 3.1 – 5 indicates PTG. In the regression analyses, the regression coefficients are reflected in the  $\beta$ . A negative  $\beta$  value is taken to indicate PTD. Likewise, a positive  $\beta$  value is used to indicate PTG.

Moreover, the PTCS can also measure posttraumatic developments in more detail, i.e., in four sub-dimensions of the scale. They have been labelled *Self-Confidence*, *Interpersonal Involvement*, *Awareness* and *Social Adaptability*. The current study used only the total PTCS score, and it did not involve the sub-dimensional scores in the analyses. Further descriptions of the sub-dimensions and their associations have been published elsewhere (Nordstrand et al., 2017, 2019).

### **Demographics**

We utilized the demographic variables age and cohabitation as covariates in the regression analyses in order to control for these factors. They have previously been identified as potential confounders with regard to trauma outcomes (Schaefer & Moos, 1998; Simon, 2002;

Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003; Helgeson, Reynolds, & Tomich, 2006). Due to the large gender bias in the current sample (91.7% males), we with did not control for biological sex. Age was entered as a continuous variable. In the current study, all respondents living with a partner, i.e., both those married and unmarried were categorized as cohabitants in a dummy variable.

### **Data Analysis**

The analyses were carried out using the statistical software package SPSS, version 25.0 for Windows. We conducted four separate linear regression analyses to identify predictors of the posttraumatic development, towards PTD, PTG or no change. The analyses explored whether the personal barriers to disclose trauma, structural social support and functional social support were significantly associated either inversely or positively with PTCS scores in the regression equations. Age was entered in the first step, and cohabitation in the second step of all the regression analyses. The four separate analyses used the following variable/variables in the third step, respectively: 1) personal barrier to disclose, 2) structural social support, 3) functional social support, and finally, 4) all three variables together. The last analysis with all three variables explored the relative predictive values in relation to the posttraumatic development as measured by the PTCS, in the direction of PTD or PTG. A correlation matrix displayed the bivariate relationships between the variables (Table 1). The tests of collinearity (i.e., tolerance and VIF) were all within acceptable limits, the assumption of not getting into multicollinearity was met (Hair, Anderson, Tatham, & Black, 1998; Coakes, 2005).

### **Results**

Both higher age and personal barriers to disclose were found to have significant inverse correlations with PTCS scores in the bivariate analyses. In contrast, both structural and functional

social support display significant positive correlations with PTCS scores. Cohabitation was not significantly associated with PTCS scores in the current sample. See correlation matrix in Table 1.

Table 1

*Means, Standard Deviations and the intercorrelation matrix (Pearson) of PTCS scores together with continuous and dummy variables of veterans exposed to war-related stressors during deployment in Afghanistan (N = 3,465)*

	M	SD	1	2	3	4	5	6
1. PTCS	3.30	.35	.	.	.	.	.	.
2. Age	30.0	9.0	-.244***	.	.	.	.	.
3. Cohabitation	.70	.46	-.032	.170***	.	.	.	.
4. Structural Social Support	4.04	.88	.209***	-.104***	.029	.	.	.
5. Barrier to Disclose trauma	7.20	2.73	-.084***	-.069***	-.037	-.258***	.	.
6. Functional Social Support	18.53	3.16	.251***	-.129***	.006	.398***	-.348***	.

*Note.* Pearson correlations Significant (1-tailed) with posttraumatic development \*\*\* p < .001. Inverse correlation with PTCS indicates association with PTSD. Positive correlation with PTCS indicates association with PTG.

Table 2 presents the results from four linear regression analyses with the PTCS always as the dependent variable. In the first model (Model 3A; Table 2), higher age and personal barriers to disclose traumatic war-related experiences were both significant predictors of negative changes in the PTCS score. In the second model (Model 3B; Table 2), higher age and functional social support were significant predictors of negative and positive change in the PTCS scores, respectively. In the third model (Model 3C; Table 2), higher age and structural social support were significant predictors of a negative and a positive change in the PTCS score, respectively. In the fourth model (Model 3D; Table 2), higher age was a significant predictor of a negative change in the PTCS score, while both structural and functional social support were significant predictors of positive change in the PTCS score. In this model, barriers to disclosure trauma was not a significant predictor of change in the PTCS score.



Table 2

*Four Stepwise Linear Regression Models of Age and Cohabitation as well as Personal Barriers, Functional Social Support and Structural Social Support as predictors of the direction of PTCS score (dependent) in Afghanistan Veterans (N = 3,465)*

Step	Predictors	F-Change	df	B	SE	t	$\beta$	R <sup>2</sup>	$\Delta R^2$
1		216.69***	1,3989					.060	.060***
	Age			-.010	.001	-14.72	-.244***		
2		.32	1,3988					.060	.000
	Age			-.010	.001	-14.60	-.246***		
	Cohabitation			.007	.013	.562	.009		
3A		36.98***	1,3987					.070	.010***
	Age			-.010	.001	-15.03	-.253***		
	Cohabitation			.005	.013	.409	.007		
	Barrier to Disclose Trauma			-.013	.002	-6.08	-.101***		
3B		186.13***	1,3987					.109	.049***
	Age			-.009	.001	-13.06	-.216***		
	Cohabitation			.002	.013	.192	.003		
	Functional Social Support			.025	.002	13.64	.223***		
3C		128.34***	1,3981					.094	.034***
	Age			-.009	.001	-13.53	-.225***		
	Cohabitation			.000	.013	.035	.001		
	Structural Social Support			.075	.007	11.33	.186***		
3D		77.72***	3,3979					.120	.060***
	Age			-.008	.001	-12.64	-.210***		
	Cohabitation			-.001	.013	-.075	-.001		
	Structural Social Support			-.047	.007	6.54	.116***		
	Barrier to Disclose Trauma			-.001	.002	-.421	-.007		
	Functional Social Support			.020	.002	9.50	.175***		

Note. Sig. \*\*\* p < .001. Negative  $\beta$  values indicate posttraumatic deprecation (PTD). Positive  $\beta$  values indicate association with posttraumatic growth (PTG).

### Discussion

The study demonstrates that the perceptions of the available quantity and quality of social support, i.e., structural and functional social support, both contribute independently and significantly towards developing PTG after exposure to war zone stressors. This is in line with other studies finding social support to facilitate PTG (Tedeschi & Calhoun, 2004; Prati, &

Pietrantonio, 2009; Pietrzak et al., 2010). In contrast, personal barriers to disclose traumatic experiences to others contribute independently towards PTSD. When the veterans report good structural and functional social support, the negative effect of this barrier seems to dissipate. Having personal barriers to talk about war zone experiences can be disruptive, but in the context of a perceived supportive and available network, the veterans seem to benefit from this social support despite reticence to disclose their war-related experiences.

Previous studies have highlighted disclosure of traumatic experiences as beneficial to mental health (Schnurr et al., 2000; Hoyt, Renshaw, & Pasupathi, 2013). A proposed mechanism by which trauma disclosure has been regarded to be beneficial is related to the corrective influence on the trauma narratives provided by sharing, which can prompt adaptive self-perceptions (Nolen-Hoeksema & Davis, 1999; Crossley, 2000; Neimeyer, 2001; Currier, Lisman, Irene Harris, Tait, & Erbes, 2013). The cognitive processing theory of PTG (Tedeschi & Calhoun, 2004) claims that self-disclosure is a central element by which social support can generate positive posttraumatic developments.

The current results indicate that reticence may be disruptive; the findings partially support the cognitive processing theory in that disclosing trauma promotes PTG (Currier et al., 2013). However, our results also indicate that social support alone is important. The veterans need not necessarily involve in trauma disclosure to obtain PTG from social support, as long as they feel generally accepted by their social environment. However, high barriers to disclose war-related experiences and low levels of social support clearly seem to point in the direction of PTSD.

The current sample consisted entirely of military veterans. There may be a self-protective effect in having barriers to disclose traumatic war-zone experiences to their regular social and family network. In several ways, trauma-exposed military veterans are different from other trauma-exposed populations. Importantly, the nature of the war-related traumatic experiences can

be alienating and difficult to understand for civilians (Bolton, Litz, Glenn, Orsillo, & Roemer, 2002; Litz, 2007; Bryan & Morrow, 2011; Farnsworth, Drescher, Nieuwsma, Walseer, & Currier, 2014). Talking to civilian friends and family members about distressing war-zone experiences such as killing, atrocities, collateral damage and dehumanizing the enemy may result in a veteran being stigmatized, perhaps blamed, socially avoided or even ostracized (Guay et al., 2006). Thus, veterans are likely more vulnerable to social stigma and negative social responses if they disclose traumatic experiences. Moreover, veterans can be at increased risk of posttraumatic distress when sharing these experiences with others (Lepore & Helgeson, 1998; Ullman & Filipas, 2001; Lepore & Revenson, 2006). Previous studies have demonstrated that cultural norms concerning the disclosure of traumatic experiences influence the manner in which people engage and benefit from social support (Križan & Gibbons, 2014). These studies point to the risk of social stigma in some cultures associated with social support practices that involve sharing painful experiences and feelings with other. Accordingly, this line of thinking may partly be useful in understanding the current results.

Taylor and colleagues (2007) observed two distinct patterns of social contexts that they labelled explicit and implicit social support. Explicit social support is defined as social involvements that provide direct emotional and cognitive support to process specific traumatic events. In contrast, implicit social support is defined as “being in the company of close others or thinking about close others without disclosing or discussing one’s problems vis-à-vis specific stressful events” (Kim, Sherman, & Taylor, 2008, p. 522). Our results indicate that the veterans in our sample benefit from social support, also when they keep their barriers and do not share their traumatic experiences with others, provided they have good access to implicit social support.

People from collective cultures, such as some Asian societies, commonly utilize implicit social support (Križan & Gibbons, 2014). This is suggested to be connected to avoidance of

social stigma; because emotional expressions in these cultures may jeopardize social relationships (Kim, Sherman, Ko, & Taylor, 2006). Importantly, while people from an Asian cultural background seem to reliably benefit from implicit social support, individuals with Western backgrounds were in general found to benefit more from engaging in explicit social support (Kim et al., 2008). However, considering the potential social risks of disclosing war zone experiences to family members or other civilians, we may speculate that trauma-exposed military veterans may benefit from social support in the same way as in some Asian cultures.

In many cases, it may not be conducive for military veterans to share details of their war-zone experiences with their regular network (Guay et al., 2006). Social support without actual disclosure of traumatic war-related stressors, i.e., implicit social support may be an appropriate and possibly acceptable way of fostering posttraumatic growth in many veterans. If this is true, our findings have implications for the guidance to veterans about how to engage in social interaction after deployment. Pressuring veterans indiscriminately to disclose war-zone experiences may involve risks, and in some instances have unfortunate social consequences. Whether the veteran benefits from implicit social support rather than explicit sharing in their environment probably depends on the nature of their trauma experiences as well as the quality of their social network. Investigating how trauma experiences such as moral injury (Litz et al., 2009) may be different from life-threatening situations regarding social support, merits further study.

### **Limitations**

The sample consisted entirely of selected and well-trained military personnel, prepared for war-related traumatic exposures. Accordingly, the findings may not be fully generalizable to civilian populations. The gender distribution was rather skewed as the participants consisted predominantly of males (91.7%), which is typical of veteran samples. Females tend to report

more posttraumatic growth after trauma than males (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010), and the responsiveness to social support has also been found to be gender dependent (Orth-Gomer & Johnsen, 1987). The current analyses would perhaps have produced different outcomes in a gender balanced population.

Due to the large sample size, we were not able to collect anamnestic data, or conduct diagnostic interviews. The presented data are based on short-form self-report measures. They are subject to the limitations of the participants' ability to self-evaluate personal changes retroactively. The cross-sectional design does not capture changes over time, and caution is required when inferring potential relations between stressors and the subsequent responses. This is not unique to our study; it has been a reiterated criticism of research on PTSD and PTG.

We utilized an adapted version of the Oslo 3 Support Scale and constructed a new inventory for the current study to capture personal barriers in veterans to disclose trauma. It should be noted that no one of the two scales have been validated for use in military populations.

The explained variances of each regression model in the current study are relatively small. In other words, there are unknown variables, such as perhaps personality, that may explain a bigger part of the total variance. Personality inventories were not included in this study. However, significant associations with a low  $R^2$  in a large sample as in our study, can still provide important information, particularly when studying psychological phenomena (Figueiredo Filho, Júnior, & Rocha, 2011).

Finally, there was a variation in the length of time since the respondents were exposed to the war zone stressors and when they completed the survey. This time factor may have implications for the accuracy of the retrospective reporting, as well as for the processing of the traumatic war-related events during deployment (McNally, 2005). However, a previous study based on the same sample found that the time since deployment did not influence the relationship

between the traumatic exposures and the reported psychological distress (Nordstrand et al., 2019). This may indicate that the associations in the current study are not much temporally dependent.

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## **Supplemental Material**



## Appendix 1

### The Posttraumatic Change Scale

*Personal changes after a war zone deployment. Being involved in a natural catastrophe or other extremely stressful experiences, may for some lead to personal changes. Sometimes this may involve negative changes, however, people may also experience growth or positive changes after extremely stressful experiences. The participation in war often contains life-experience that makes such an impact on people. Please evaluate your own perceptions of the following:*

**To what degree have you noticed personal changes as a result of your experience/experiences in Afghanistan? Evaluate each statement below by marking the option that best describes your personal changes. Notice: Only mark one option per line.**

	<i>A lot worse / Less than before</i>	<i>Worse / Less than before</i>	<i>Same as before</i>	<i>Better / More than before</i>	<i>A lot better / More than before</i>
Q1: My ability to manage stress is...					
Q2: I handle demanding situations...					
Q3: My mental strength is...					
Q4: My capacity for work is...					
Q5: I trust myself...					
Q6: I feel confident I can handle unexpected situations...					
Q7: My ability to make my own decisions is...					
Q8: I am proud of myself...					
Q9: I give of myself when I am with others...					
Q10: I am involved in activities outside of work/studies...					
Q11: My contact with other people in general is...					
Q12: My ability to be emotionally close to other people is...					
Q13: My trust in other people is...					
Q14: My social life is...					



Q15: I Live in accordance to my inner values...					
Q16: I have valuable views on life, which I share with others...					
Q17: I see the positive aspects of existence...					
Q18: I appreciate life...					
Q19: I am conscious of my priorities in life...					
Q20: I enjoy the "little" moments in life...					
Q21: I accept the way things develop...					
Q22: I am overbearing towards other people...					
Q23: My ability to listen to other people is...					
Q24: As a person, I am humble...					
Q25: I provide care to other people...					
Q26: My tolerance towards other people is...					

## Appendix 2

Twelve item war zone traumatic stressor index used in papers II-III.

**Exposure to serious incidents. Did you experiences any of the following during your service in Afghanistan? Notice: Only mark one option per line.**

War Zone Incident(s)	No	1 – 2 Times	3 – 12 Times	13 – 50 Times	50 + Times
Wounded or injured in combat					
Attacked by enemies					
Surrounded or ambushed by enemies					
Experienced moment I thought I would die					
Seen, processed or handled dead bodies or body parts					
Know someone seriously injured or killed					
Witnessed brutality towards civilians, captured enemies, or prisoners					
Seen innocent victims of war					
Seen fellow soldier being seriously injured or killed					
Seen morally reprehensible occurrences					
Did or participated in morally reprehensible occurrences					
Failed to act on something I in retrospect think I should have done					