Physically Injured Survivors of Terror

Posttraumatic stress reactions, somatic complaints, and experiences with
early psychosocial hospital care after the 2011 Utøya attack

Dissertation for the degree of PhD

by

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A generation that had gone to school on a horse-drawn streetcar now stood under the open sky in a countryside in which nothing remained unchanged but the clouds, and beneath these clouds, in a field of force of destructive torrents and explosions, was the tiny, fragile human body.

Walter Benjamin (Illuminations: Essays and Reflections)

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To my friends, thank you for still being here, although I have been much too much in my head during parts of this work. A special thanks goes to my bees, you know who you are, for following my moves and sharing the music with me. To my children's wonderful grandparents, your help in looking after my precious ones in times of heavy workload has been the best gift. To my children, thank you for asking me what I actually do when I go to work. It is an important question. And, finally, my deepest thanks go to my dear Lars, who has been in this with me all along the way. Your roles have been many, sometimes that of a supportive husband, sometimes that of a discussant partner and sometimes that of a hard-working single parent. My work is also your work.

While you're tremblin', that's when the magic happens, and the stars gather by your side.

Beyoncé Giselle Knowles-Carter ("Spirit", 2019)

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Summary

After traumatic mass events, physically injured survivors constitute a vulnerable group that may struggle with sequelae from their injuries in addition to high levels of psychological distress. This dissertation focuses on how mental and somatic health problems develop in injured mass trauma survivors, and how we can provide adequate early psychosocial care in the hospital for the most severely injured survivors.

The development of posttraumatic stress reactions (PTSR) and somatic complaints was studied in two different groups of injured survivors (hospitalized and non-hospitalized compared to non-injured) after the 2011 Utøya attack in Norway. In addition, hospitalized survivors' experiences with early psychosocial care in the hospital were explored qualitatively.

In brief, both hospitalized and non-hospitalized survivors developed particularly high levels of health complaints. Peri-traumatic exposure seemed to contribute to a heightened level of PTSR. Further, PTSR contributed to a substantial proportion of the somatic complaints developed among the non-hospitalized injured survivors, however, this mechanism did not play a significant role among hospitalized survivors. The hospitalized survivors highlighted certain aspects of the psychosocial hospital care that were then analyzed and organized into six categories: *Engaging in the trauma narrative*; *Understanding the trauma reminders*; *Bringing back normalcy*; *Being there*; *Supporting confidence*; *Instilling trust*.

In conclusion, survivors of mass trauma with injuries ranging from minor to severe may need special attention from health care services regarding both mental and somatic health problems. In hospitals treating injured survivors after a traumatic mass event, psychosocial care including both trauma-focused interventions and commonplace actions and conversations may be powerful in mitigating the survivors' early distress and meeting their essential emotional needs.

List of papers

Paper I:

Bugge, I., Dyb, G., Stensland, S. Ø., Ekeberg Ø., Wentzel-Larsen, T., Diseth, T. H.
Physical injury and posttraumatic stress reactions: A study of the survivors of the 2011 shooting massacre on Utøya Island, Norway.
J Psychosom Res. 2015 Nov; 79(5):384–90.
DOI: 10.1016/j.jpsychores.2015.09.005. Epub Sep 18 2015.

Paper II:

Bugge, I., Dyb, G., Stensland, S. Ø., Ekeberg, Ø., Wentzel-Larsen, T., Diseth. T. H.
Physical injury and somatic complaints: The mediating role of posttraumatic stress symptoms in young survivors of a terror attack.
J Trauma Stress. 2017 Jun; 30(3):229–236.
DOI: 10.1002/jts.22191. Epub May 27 2017.

Paper III:

Bugge, I., Jensen, T. K., Nilsen, L. G., Ekeberg, Ø., Dyb, G., Diseth, T. H.
Psychosocial care for hospitalized young survivors after the terror attack on Utøya Island: A qualitative study of the survivors' experiences.
Injury. 2019 Jan; 50(1):197–204.
DOI: 10.1016/j.injury.2018.10.024. Epub Oct 22 2018.

Abbreviations

ACME	Average causal mediation effect
ADE	Average direct effect
AIS	Abbreviated injury scale
ANOVA	Analysis of variance
ASD	Acute stress disorder
ASDS	Acute stress disorder symptoms
CBT	Cognitive behavioral therapy
CQR	Consensual qualitative research
CSI-24	Children's somatization inventory
CSSI-8	Children's somatic symptoms inventory-8
D-E-F	Distress-emotional support-family system
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
EMDR	Eye movement desensitization and reprocessing
HSD	Honest significant difference
IPA	Interpretative phenomenological analysis
ISS	Injury severity score
ISTSS	International society for traumatic stress studies
NKVTS	Norwegian center for violence and traumatic stress studies
OUS	Oslo university hospital
PFA	Psychological first aid
PTSD	Posttraumatic stress disorder
PTSR	Posttraumatic stress reactions
PTSS	Posttraumatic stress symptoms
S-BUP	Department of child and adolescent mental health in hospital

The origin of the project

One peaceful summer day in 2011, Friday the 22nd of July, Norway was hit by two devastating terrorist attacks. A man, dressed as a police officer, detonated a bomb outside the Oslo government building and then entered a political summer camp for adolescents and young adults at Utøya Island one hour's drive outside Oslo. Heavily armed, he hunted down and targeted the camp participants. The perpetrator killed 77 people, eight in the bomb attack and 69 in the Utøya shooting attack. In total, more than 150 victims sustained physical injuries. Ten survivors from the bomb attack and 33 survivors from the Utøya attack were hospitalized due to physical injuries at Oslo University Hospital (OUS) and at local hospitals situated near Utøya Island (Vestre Viken Hospital Trust).

Since 2008, I had been working as a child and adolescent psychiatrist at OUS, Department of Child and Adolescent Mental Health in Hospital (S-BUP). Through my daily work, I had met medically ill or injured children and adolescents struggling with how to live with their compromised bodies. Being at work during the critical days in July 2011, I became part of the psychosocial crisis team that was mobilized to handle the extraordinary situation. The psychiatrists, psychologists, nurses, and social workers in the team contributed to providing psychosocial care for the hospitalized youths and their families. We sought to offer empathetic and practical support with a focus on rebuilding the feeling of safety and stabilization of affects and arousal. The team also provided support and supervision to the regular health care personnel. For me, many questions arose subsequently: Was our support helpful? What was important for the youths in this profoundly stressful situation? Would they cope with their challenges of distress and grief, and how would the psychological and physical trauma affect their health over time?

Trond H. Diseth, who took part in organizing the psychosocial support in the hospital, and I applied for funding of this doctoral dissertation focusing on the physically injured survivors of the Utøya shooting attack. The project was developed as a part of the Utøya study led by principal investigator Grete Dyb at the Norwegian Centre for Violence and Traumatic Stress Studies (NKVTS). From August 2013, I started my PhD project and took part in the Utøya project group at NKVTS contributing to the conduction of the study. The Faculty of Medicine, University of Oslo, appointed three supervisors: Professor Trond H. Diseth (main supervisor), Professor Øivind Ekeberg, and Professor Grete Dyb.

1 Introduction

After terrorist attacks, physically injured survivors constitute a vulnerable group as they, in addition to high levels of psychological distress (Neria, DiGrande, & Adams, 2011), may struggle with sequelae from their injuries. The purpose of this dissertation was to contribute to the current knowledge on how mental and somatic health problems develop for this group of victims and to expand our understanding of how we can provide adequate psychosocial care for the most severely injured survivors in the hospital.

1.1 Terrorist attacks

The definition of a terrorist attack is debated. The National Consortium for the Study of Terrorism and Responses to Terrorism currently defines terrorism as “the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion or intimidation” (National Consortium for the Study of Terrorism and Responses to Terrorism (START), 2016). Pertaining to such a definition, terrorist attacks aim to affect masses of people, and not only those physically targeted. By striking innocent people in their everyday flow of life, acts of terror create fear, distort humans’ assumptions about the world they live in, and may contribute to changing human behavior. Such attacks represent a major problem in many parts of the world. In 2014, until now the deadliest year worldwide, 93 countries were struck by terrorist attacks resulting in more than 30,000 deaths and thousands of injured survivors (Institute for Economics & Peace, 2018). Most of the deaths occurred in the war-torn countries of Iraq, Afghanistan, and Syria in addition to Nigeria and Pakistan. Although less frequently struck, the western world has also seen a number of attacks over recent decades, and the USA airplane crashes of September 11, 2001 changed the relevance of terror in the west. Several subsequent attacks in Europe (Madrid 2004, Beslan 2004, London 2005, Paris 2015, and Nice 2016 among many others) and the recent two Christchurch Mosque shootings in New Zealand have contributed to this change.

Over the last few decades, particularly the USA has seen a high number of extremely violent mass shootings not explicitly conceptualized as terror but as acts of violence emerging from personal problems such as mental health disease and social problems. From 2009 until now, there have been over 200 mass shootings in the USA (Everytown for Gun Safety, 2019), among them the 2017 Las Vegas shooting resulting in hundreds of casualties. Many of these

devastating shooting attacks have been carried out in schools, such as the Sandy Hook Elementary School shooting in 2012, killing and injuring children and adolescents.

1.2 Physical injury

Physical injury is commonly defined as “damage to the body produced by energy exchanges that have relatively sudden discernible effects” (Langley & Brenner, 2004). This definition of injury implies both a causative event (injury mechanism) and resulting pathology. Physical damage of bodily tissue may naturally involve a range of short- or long-term health-related problems ranging from minor complaints to severe medical conditions potentially leading to altered functioning and reduced quality of life.

In many terrorist attacks, masses of people are targeted with forceful means of violence such as bombs or guns, causing panic and chaos. In such situations, the number of physically injured survivors is often substantial. After the terrorist attacks of September 11, 2001, for instance, the number of injured was reported to be 9000 (Lowell et al., 2018). As injuries from a terrorist attack may be sustained by a range of mechanisms, such as being hit by gunshot bullets or from falling while escaping, the resulting pathology often varies substantially (Gargano, Gershon, & Brackbill, 2016). Injuries may include multiple life-threatening gunshot wounds, but also uncomplicated fractures and minor bruises. Accordingly, the level of health care required may range from hospitalization in trauma care units providing highly specialized medical care to treatment in outpatient clinics or treatment at the scene. Further, being physically attacked may also result in psychological reactions as such an experience may evoke deep fear and threaten a person’s existence and well-being.

Current knowledge about injured trauma survivors has largely emerged from studies on hospital samples exposed to various traumatic events involving injury, many of them traffic accidents. Comprehensive information from hospital records, for example injury mechanism, type, severity, and treatments, is often available in addition to interview data. Such studies have provided the field with comprehensive knowledge on hospitalized trauma victims’ physical and mental health, levels of functioning, quality of life and survivors’ own experiences with the hospital care (Davydow, Katon, & Zatzick, 2009; Jenewein, Wittmann, Moergeli, Creutzig, & Schnyder, 2009; Kassam-Adams, Marsac, Hildenbrand, & Winston, 2013; Kendrick et al., 2018; Martin-Herz, Zatzick, & McMahon, 2012; Ogilvie, Foster, McCloughen, & Curtis, 2015b; van Delft-Schreurs et al., 2017; Zatzick, Russo, & Katon,

2003). Little is known about how less severely injured victims not admitted to hospital are coping after traumatic events. From research on highly exposed survivors of traumatic mass events such as terrorist attacks, the prerequisites for studying the role of injury as a risk factor for health problems are somewhat different. These studies often include large samples of victims, both injured and non-injured. Such studies have contributed to a growing body of evidence pointing at trauma-sustained injury as a risk factor for development of health problems such as posttraumatic stress disorder (PTSD), depression, and somatic health problems (Brackbill, Cone, Farfel, & Stellman, 2014; Grieger, Waldrep, Lovasz, & Ursano, 2005; Lowell et al., 2018). Unfortunately, information about levels of injury is commonly absent in such studies.

Taken together, studies on hospital samples of traumatic injury survivors provide extensive knowledge on the impact of severe injuries for a range of health-related problems, while there is a particular lack of knowledge on how non-hospitalized injured trauma survivors are impacted by their trauma.

1.3 Posttraumatic stress reactions (PTSR)

In this dissertation, the term “posttraumatic stress reactions” is used for the level of reactions included in the diagnosis of PTSD, *Diagnostic and Statistical Manual of Mental Disorders (DSM)* (American Psychiatric Association, 2000). PTSD was included in the manual for the first time in 1980. Since then, the diagnostic criteria for PTSD have been revised several times with the latest update in 2013: *DSM-5*. We use the *DSM* version relevant at the time of the Utøya attack: *DSM-IV* (American Psychiatric Association, 2000). According to the *DSM-IV*, the reactions consist of a constellation of perceived trauma-related intrusions and avoidance in addition to alterations in arousal.

High levels of PTSR are seen in many trauma victims after a range of traumatic exposure. Reviews have reported a PTSD prevalence of 30–60% for adult and 30–40% for child mass trauma survivors (Galea, Nandi, & Vlahov, 2005; Shultz et al., 2014). Particularly high rates are often seen after interpersonal acts such as mass shootings, war, and domestic violence (Alisic, Zalta, et al., 2014; Orcutt, Miron, & Seligowski, 2014).

1.3.1 Models and predictors for the development of PTSD

Models including biological, psychological, and social factors have been proposed to understand the development of PTSD (Marsac et al., 2017). When exposed to a life-threatening experience, the body reacts with a cascade of acute biological stress responses. The sensory apparatus mediates activation of neural brain circuitries, where assessment of threat leads to activation of the hypothalamic-pituitary-adrenocortical (HPA) axis, the locus coeruleus, and the norepinephrine-sympathetic system (LC/NE) (A. Shalev, Liberzon, & Marmar, 2017). As a result, a complex interplay between hormones and neurotransmitters such as cortisol, catecholamines (adrenalin and noradrenalin) and endogenous opioids emerges, interplaying with bodily organs and genes (McEwen, 1998, 2018). Psychologically, fear reactions may contribute to hypervigilance and fuel persistence and exacerbation of physiological changes. Shattered and maladaptive cognitive appraisals (e.g., the world is not safe, my life is ruined, I am not able to do the same things as I used to etc.) and avoidant coping strategies (e.g., social withdrawal, resignation, substance abuse etc.) have been proposed as essential and intertwined phenomena accounting for a large proportion of PTSD (Ehlers & Clark, 2000; Marsac et al., 2016; Marsac, Kassam-Adams, Delahanty, Widaman, & Barakat, 2014; Stallard & Smith, 2007). Social factors, such as trauma history and social support, may also affect the development of PTSD (Kazak, 2006). Ultimately, failure to extinguish or down-regulate fear post trauma may result in heterogeneous bodily dysregulations potentially contributing to PTSD as well as a wide range of somatic complaints (Boscarino, 2004; Green & Kimerling, 2004; McEwen, 1998; McFarlane, 2010; Pacella, Hruska, & Delahanty, 2013; Silvani, Calandra-Buonaura, Dampney, & Cortelli, 2016; Ursano, Fullerton, Weisaeth, & Raphael, 2017).

Significant pre-trauma factors often found to predict high levels of PTSD are previous trauma, own and family psychiatric history, low socioeconomic status, female gender, and hereditary predispositions in addition to more disputed factors such as younger age and ethnic minority (Banerjee, Morrison, & Ressler, 2017; Brewin, 2005; Ozer, Best, Lipsey, & Weiss, 2003; A. Y. Shalev et al., 2019). Peri-traumatic risk factors such as trauma severity, perceived life threat, emotional responses, dissociation, and loss of loved ones have been demonstrated to be particularly strong predictors of PTSD (Brewin, 2005; Furr, Comer, Edmunds, & Kendall, 2010; Kahana, 2006; Ozer et al., 2003; Skogstad et al., 2014). Early psychological reactions including PTSD, elevated heart rate, lack of social support, ongoing life stressors, early maladaptive appraisals, and avoidant coping have been demonstrated as significant post-

trauma factors (Bisson, 2007; Brewin, 2005; Heron-Delaney, Kenardy, Charlton, & Matsuoka, 2013; Kassam-Adams et al., 2013; Marsac et al., 2017; Ozer et al., 2003; A. Y. Shalev et al., 2019). Specific to child samples, parents' PTSR seem to predict the child's PTSR (Langeland & Olff, 2008). In samples of survivors of traumatic injury, several injury-related factors have been assessed as potential predictors for PTSR. Injury severity, often measured by the Injury Severity Score (ISS) (Baker, O'Neill, Haddon, & Long, 1974) used in hospitals, has frequently proved to predict neither acute nor persistent PTSR (Alisic, Jongmans, van Wesel, & Kleber, 2011; Brosbe, Hoefling, & Faust, 2011; Copes et al., 1988; Cox, Kenardy, & Hendrikz, 2008; Heron-Delaney et al., 2013; Kassam-Adams et al., 2013; Langeland & Olff, 2008; O'Donnell, Creamer, Bryant, Schnyder, & Shalev, 2003; Wiseman, Foster, & Curtis, 2013). Type and nature of injury are also factors often found not to predict PTSR (Brosbe et al., 2011; Langeland & Olff, 2008). However, some studies have demonstrated a significant effect of burns and severe brain injuries (Stoddard, Norman, Murphy, & Beardslee, 1989; Sturms et al., 2005). In a recently published review after hospitalization for traumatic injury, gunshots were reported as a risk factor for PTSD (Paredes Molina, Berry, Nielsen, & Winfield, 2018).

1.3.2 The role of sustained physical injury

Studies reporting on levels of PTSR among injured survivors of terrorist attacks or mass shootings are sparse. However, in studies after the 9/11 terrorist attacks, injured survivors presented relatively low resilience rates in addition to particularly high levels of PTSD, 26.1% and 29.7% in two different studies, during the six months following the event (Bonanno, Galea, Bucciarelli, & Vlahov, 2006; Galea et al., 2003). In another study, 38.0% of injured (and 10.6% of the non-injured) Lower Manhattan residents reported symptoms corresponding to PTSD 2–3 years after the attack (DiGrande et al., 2008). A study of Pentagon employees found a PTSD prevalence of 50% among injured survivors two years after the attack (Grieger et al., 2005). After 21 terrorist attacks in Europe between 1982 and 1987, high rates of PTSD were present in the hospitalized victims; 30.7% among those hospitalized > 7 days compared to 10.5% among the non-injured (time of assessment varied) (Abenhaim, Dab, & Salmi, 1992). Of the hospitalized survivors of the March 11 terrorist attack in Madrid, 35.7%, 34.1%, and 28.6% reported symptoms corresponding to PTSD after one, six, and 12 months, respectively (Conejo-Galindo et al., 2008). Studies on hospital samples sustaining gunshot injuries have demonstrated high proportions of stress reactions. In

one study, 25% reported severe acute stress disorder symptoms (ASDS) (Hamrin, Jonker, & Scahill, 2004), and in another study, 39% and 42% reported severe intrusive thoughts and avoidance behavior, respectively, eight months post trauma (Greenspan & Kellermann, 2002). High levels of PTSR have also been found in survivors after natural disasters, wars, and accidental injury such as motor vehicle injuries. Six weeks after an earthquake in Taiwan, 43.2% of the injured victims reported symptoms corresponding to PTSD, compared to 19.4% among non-injured survivors (Hsu, Chong, Yang, & Yen, 2002). In a study of soldiers assessed on an average of 15.5 months after combat, 16.7% of the injured and 2.5% of the non-injured met the diagnostic criteria for PTSD (Koren, Norman, Cohen, Berman, & Klein, 2005). High, although varying, prevalences have also been reported in reviews and meta-analyses on posttraumatic stress in hospitalized accident survivors. In a review of adult road traffic crash survivors, prevalence estimates at one, three, six, and 12 months varied between 8–45%, 8–30%, 6–28%, and 7–26%, respectively (Heron-Delaney et al., 2013). A meta-analysis on youths with accidental injuries found a PTSD prevalence of 19.8% (Kahana, 2006), and a review of traffic-injured children reported that 10–36% experienced clinically significant early distress and that 10–35% of pediatric emergency patients developed PTSD (Langeland & Olff, 2008).

In line with some of the studies referred to above, reviews have stated that trauma-sustained physical injury is one of the most consistent predictors for the development and maintenance of PTSR after terrorist attacks (Galea et al., 2005; Lowell et al., 2018; Neria et al., 2011). It is worth noting, though, the number of studies referred to that included a measure of physical injury was somewhat small (Brackbill et al., 2009; Cone et al., 2015; DiGrande et al., 2008; Farfel et al., 2008; Grieger et al., 2005). Also, after other types of mass trauma, such as war and natural disasters, injury has consistently been associated with later PTSR (Dyster-Aas et al., 2012; Hsu et al., 2002; Koren et al., 2005; Kulka et al., 1990; Kuo, Wu, Ma, Chiu, & Chou, 2007). However, there is a lack of studies assessing the impact of injury after mass shootings (Shultz et al., 2014).

Several factors have been proposed to mediate the association between injury and later PTSR. Sequelae from injury, such as physical handicap, disfigurement, and pain, have proved to be associated with PTSR (Brennstuhl, Tarquinio, & Montel, 2015; Bryant, 2011; Desivilya, Gal, & Ayalon, 1996; Gold, Kant, & Kim, 2008; Langeland & Olff, 2008; O'Donnell et al., 2003; Rusch, Grunert, Sanger, Dzwierzynski, & Matloub, 2000). Although insufficiently

understood, such factors have been hypothesized to act as retrieval cues for the trauma and as factors possibly contributing to avoidant behavior, thereby promoting PTSR (Koren, Hemel, & Klein, 2006). For severely injured survivors, the early phase is often spent in an intensive care unit or in other hospital departments. Due to high levels of PTSR after hospitalization, potential traumatizing effects of hospital specific factors such as treatment procedures have been proposed. However, recent research has addressed methodological shortcomings in studies addressing such issues (McGiffin, Galatzer-Levy, & Bonanno, 2016). Biological factors associated with tissue damage and a possible mediating effect of heightened levels of fear have also been hypothesized to contribute to PTSR (Koren et al., 2006), however, limitedly investigated.

After human-made traumatic mass events such as terrorist attacks, in which the traumatic exposure may be particularly high, there have been few studies assessing in depth the relationship between injury and PTSR.

1.4 Somatic complaints

“Somatic” means relating to the body, as distinct from the mind (Oxford Dictionaries, 2019). The term “somatic complaints” may be considered problematic as it implicates that some complaints, such as those defined as mental health problems, are detached from the physical body. It is, however, outside the scope of this dissertation to elaborate on mind–body dualism. Somatic complaints include somewhat problematic bodily experiences such as pain, dizziness, palpitations, gut and respiratory tract problems, fatigue, sleep problems, motor and sensory problems, and may be part of, or not, defined medical disease.

High levels of somatic complaints as well as medical diagnoses are common in victims of a range of traumatic events including terrorist attacks. A heightened risk is related to multiple bodily systems such as the gastrointestinal, the cardiovascular, the musculoskeletal, the neuroendocrine, and the central nervous system (D'Andrea, Sharma, Zelechowski, & Spinazzola, 2011; Ford & Browning, 2014; Holman et al., 2008; Kugler, Bloom, Kaercher, Truax, & Storch, 2012; Wahlstrom, Michelsen, Schulman, Backheden, & Keskinen-Rosenqvist, 2013). Complaints may include increased heart rate, sleep problems, pain including headache, fatigue, nausea, and irritable bowel syndrome (Afari et al., 2014; D'Andrea et al., 2011; Pat-Horenczyk et al., 2007; Stensland, Dyb, Thoresen, Wentzel-Larsen, & Zwart, 2013; Stensland, Zwart, Wentzel-Larsen, & Dyb, 2018; Trout, Nimgade, Mueller,

Hall, & Earnest, 2002). However, due to great diversity in study designs, it is difficult to draw general conclusions on the prevalence of somatic complaints after trauma (van den Berg, Grievink, Yzermans, & Lebret, 2005).

1.4.1 Models and predictors for the development of somatic complaints

Complaints may develop due to a range of etiologically active mediating factors. Models including both bottom-up and top-down mechanisms have been suggested (Defrin, Lahav, & Solomon, 2017). Bottom-up influences generally pertain to the cascade of consequences triggered by peripheral tissue damage, such as the experience of pain due to nociceptive stimuli. Further, top-down mechanisms often pertain to emotional, cognitive, behavioral, and environmental factors fueling the centrally activated systemic stress responses described under *1.3.1 Models and predictors for the development of PTSD*. Accordingly, high levels of somatic complaints are commonly seen among physically injured as well as among physically non-injured trauma victims.

Predictors for somatic complaints after trauma are increasingly studied, though to a less extent than risk factors for mental health outcomes such as PTSD. A review from 2005 on physical symptoms after disasters identified female gender and high physical damage (the exact meaning of the concept was unclear to the author of this dissertation) as significant risk factors. However, the underlying evidence was sparse, and the authors highlighted the need for studies focusing on risk factors for physical symptoms (van den Berg et al., 2005). In a study of injured survivors of multiple trauma, participation in society was found to predict better self-assessed physical health status two years after the trauma (Soberg, Finset, Roise, & Bautz-Holter, 2012). Several studies have assessed risk factors for pain. In a review on victims of military- and terror-related injuries, genetic, psychological, immunological, and sleep-related factors in addition to allostatic load and female sex were identified as predictors of chronic pain (George, Elman, Becerra, Berg, & Borsook, 2016). In studies on survivors of traumatic injury, physical complaints, unemployment, or low educational level prior to injury, PTSD (further elaborated on below) and depression have been identified as risk factors for later pain (Holmes et al., 2010; Jenewein et al., 2009; Ramchand, Marshall, Schell, & Jaycox, 2008; van Delft-Schreurs et al., 2017; Zatzick et al., 2008). Further, the predictive value of clinical measures of injury severity, such as ISS, have been investigated in a few studies, but the findings differ and are inconclusive (Greenspan & Kellermann, 2002; van Delft-Schreurs et al., 2017; Zatzick et al., 2003). A dose-response relationship has been found between

number of injury types and later medical diagnoses (Alper, Yu, Stellman, & Brackbill, 2017; Brackbill et al., 2014). Further, initial pain levels and pain control, injuries to the brain, spinal cord, lower extremities, and longer hospitalization have been found to predict poorer self-reported physical health (Holmes et al., 2010; Ramchand et al., 2008; Soberg et al., 2012; Toft, Moller, & Laursen, 2010; van Delft-Schreurs et al., 2017).

1.4.2 The role of sustained physical injury

Due to the limited number of studies and diversities in design, conclusions on rates of somatic complaints among injured trauma survivors are difficult to draw. However, high levels of pain are commonly found among injured survivors after traumatic events such as war and partner violence (George et al., 2016; Wuest et al., 2010). In a longitudinal study conducted on injured accident survivors, the fraction of participants reporting moderate or severe pain was 38% at both five days and at 12 months post trauma (Jenewein et al., 2009). Further, in a study of military veterans, 35.8% of the chronic pain conditions were attributable to an identifiable injury (Gironda, Clark, Massengale, & Walker, 2006).

Despite, or perhaps due to, the plausible relationship between injury and somatic health, this association has been limitedly, although increasingly, investigated after traumatic events (Afari et al., 2014; Brackbill et al., 2014; Pacella et al., 2013; van den Berg et al., 2005; Wachen et al., 2013). Studies after the September 11 attacks demonstrated a significant association between sustained injury and various outcomes of physical health (Alper et al., 2017; Brackbill et al., 2019; Brackbill et al., 2014). In a study conducted on survivors after the Oklahoma City bombing, hospitalized survivors reported chronic pain three times more often than persons treated by physicians and nine times more often than non-injured persons (Shariat, Mallonee, Kruger, Farmer, & North, 1999). Further, in two studies after the 2004 Indian Ocean tsunami, survivors with sustained injury had an increased risk for reporting physical symptoms at 12 and 14 months post trauma when compared to non-injured survivors (Isaranuwatthai, Coyte, McKenzie, & Noh, 2013; Keskinen-Rosenqvist, Michelsen, Schulman, & Wahlstrom, 2011). Contrarily, in other studies after the tsunami, other natural disasters, and an accidental explosion, sustained injury was not significantly associated with reported later somatic symptoms (Marres, Leenen, de Vries, Mulder, & Vermetten, 2011; North, Kawasaki, Spitznagel, & Hong, 2004; Zhang, Zhang, Zhu, Du, & Zhang, 2015).

There are several potential mediating pathways making injury a natural risk factor for later somatic complaints. Due to damage of bodily tissue, physical injury may cause pain and functional loss related to the site and degree of injury (George et al., 2016; Giordano, Bader, Richmond, & Polomano, 2018; Greenspan & Kellermann, 2002; Wuest et al., 2010). Also, several studies from the field of trauma surgery have demonstrated that tissue injury triggers systemic stress responses potentially inducing various somatic complaints (Desborough, 2000). Further, physical injury may result in somatic complaints through a range of plausible behavioral and psychological mechanisms such as reduced mobility and participation in social life, increased smoking and medication use, poor sleep, and depression (Brackbill et al., 2014; George et al., 2016; Grieger et al., 2006; Karacabey, 2005; Lewis et al., 2019; Polinder et al., 2010; Soberg et al., 2012).

1.4.3 The role of posttraumatic stress reactions

A substantial amount of research has demonstrated a significant association between PTSR and higher levels of various adverse physical health outcomes after trauma including traumatic injury (Afari et al., 2014; Pacella et al., 2013; Zatzick et al., 2003). Such outcomes may include both defined medical illnesses and subjectively reported somatic health complaints related to multiple bodily organs (Green & Kimerling, 2004; Koenen et al., 2017; Lee et al., 2018). PTSD was early on hypothesized to mediate the relationship between trauma exposure and physical health (Schnurr & Jankowski, 1999), and biological, psychological, and behavioral mechanisms have been proposed to be involved (Koenen et al., 2017; Schnurr & Green, 2004). However, inferences on direction and causality have been limited due to the lack of longitudinal studies (Afari et al., 2014; Gupta, 2013), and the particular exposure of sustained injury has been poorly studied in mediation analyses.

Taken together, there is an overall lack of research assessing risk factors for somatic complaints after trauma. Physical injury is a plausible risk factor, however, limitedly investigated. Further, since a consistent association between injury and later PTSR has been demonstrated after trauma, PTSR may be hypothesized as an important mediating factor between injury and later somatic complaints. However, this particular pathway has been poorly investigated in previous research.

1.5 *Early psychosocial trauma care*

The concept of “psychosocial care” is rooted in the biopsychosocial model originally proposed by George L. Engel (Engel, 1977), aiming to integrate the psychosocial-, that is, psychological and social factors, with the biomedical approach. “Care” may be defined as “the provision of what is necessary for the health, welfare, maintenance and protection of someone or something” (Oxford Dictionaries, 2019). “Early,” in the post-trauma context, is often defined as within three months after the traumatic event (International Society for Traumatic Stress Studies, 2019), however, different time frames have been used (Kassam-Adams et al., 2013).

Early psychosocial care after disasters includes a comprehensive range of strategies to meet victims’ basic needs, such as mitigating early distress and promoting health and functioning over time (Reifels et al., 2013). Currently applied strategies are largely based upon consensus-derived principles addressing psychosocial needs for disaster victims and guideline documents outlining overall models for delivery of care (Bisson et al., 2010; Hobfoll et al., 2007). Basic needs have been proposed to be rebuilding a psychological sense of safety, calming of emotions and bodily arousal, enhancing a sense of self-efficacy, promoting social connectedness, and instilling hope for the future (Hobfoll et al., 2007). “Psychological first aid” (PFA) is currently operationalized as a widely applied guide offering mental health and other disaster responders with a practical framework for providing psychosocial responses after disasters and terrorism (Brymer et al., 2006). The guide aims to reduce initial fear and promote adaptive functioning and coping through support from caring and compassionate caregivers (Reifels et al., 2013). The underlying research evidence for the effectiveness of the outlined principles and guidelines is, however, limited.

Over the last few decades, a steadily increasing body of studies, including studies on physically injured trauma survivors, has sought to assess the effect of defined interventions on specific outcomes such as PTSD and acute stress disorder (ASD). For *adult* traumatic injury survivors, one review study reported that early cognitive behavioral therapy (CBT) may prevent later PTSD, but that the effectiveness for the treatment of acute stress disorder (ASD) is unclear (Visser, Gosens, Den Oudsten, & De Vries, 2017). Further, a recent meta-analysis found that exposure- and CBT-based interventions had the greatest impact on posttraumatic stress symptoms (PTSS) within three months post injury, and that education-focused treatment had little effect (Giummarra, Lennox, Dali, Costa, & Gabbe, 2018). Regarding

pediatric injury survivors, one review study reported that universal interventions such as information and psychoeducation had modest preventive effect on PTSS, and that web-based means of delivery may provide for a wide reach (Kassam-Adams et al., 2013). Further, promising evidence was found for targeted interventions such as psychoeducation, promotion of coping strategies and safe exposure to trauma-related triggers, although no firm conclusions could be drawn due to the limited number of studies. Ultimately, for the treatment of PTSD among the same group, trauma-focused CBT showed the strongest evidence, however, its effectiveness regarding severe acute PTSS was reported as unclear.

Efforts have been made to sum up the research evidence for the effectiveness of defined early (defined as within the first three months post trauma) PTSD preventive and treatment interventions, and ISTSS (The International Society for Traumatic Stress studies) recently launched their updated guidelines (International Society for Traumatic Stress Studies, 2019). For *adults*, emerging evidence was reported for a preventive effect of single-session Group 512 PM (based on debriefing but supplemented with cohesion training exercises) and Eye Movement Desensitization and Reprocessing (EMDR), as well as for multiple-session Brief Dyadic Therapy and Self-guided Internet Based Interventions. Further, regarding early treatment interventions provided to adults with emerging PTSR, there is a standard recommendation for multiple-session CBT with a trauma focus, Cognitive Therapy, and EMDR. Stepped/Collaborative care is recommended as a low effect early treatment, and Internet-based Guided Self-help, Structured Writing Intervention, and administration of Hydrocortisone have confirmed emerging evidence as early treatment strategies. For *children and adolescents*, the guidelines reported less evidence for currently investigated interventions. However, there is emerging evidence for a preventive effect of Self-directed Online Psychoeducation for Caregivers and Children and for Self-directed Online Psychoeducation for Children. Notably, there is emerging evidence *not* to recommend Individual Psychological Debriefing. Regarding early treatment interventions for children and adolescents, there is insufficient evidence to recommend any psychological or pharmacological interventions. Due to limited evidence, no interventions were strongly recommended for either adults or children and adolescents

1.5.1 Early psychosocial trauma care in the hospital

For hospitalized trauma victims, the setting of the acute and early aftermath is substantially different from that of survivors returning to their homes. The phase spent in the

hospital has been addressed as part of the peri-trauma period, as, in addition to the psychological aspects of the traumatic event per se, there may be complex psychosocial challenges and needs related to the injuries and the hospital environment (Marsac et al., 2014; Ramsdell, Morrison, Kassam-Adams, & Marsac, 2016). Substantial efforts have been made to provide survivors of traumatic injury with a beneficial environment of care in the hospital. Based on an expert consensus process and on the available, yet limited, research evidence, key guidelines for trauma-informed care (TIC) in pediatric hospital wards have been distilled in the D-E-F (Distress-Emotional support-Family system) protocol (Stuber, Schneider, Kassam-Adams, Kazak, & Saxe, 2006). The protocol addresses how health care professionals can assess and help with distress (such as offering pain management, reducing procedure-related distress, asking about fears, and providing hope), emotional support and the family system, essential approaches in universal secondary preventive interventions (Kassam-Adams et al., 2013). Notably, TIC has not been widely incorporated in hospital settings for adults (Bruce et al., 2018; Skogstad, Hem, Sandvik, & Ekeberg, 2015).

Due to the complexity of the psychologically challenging situation for trauma survivors in hospital, it may be argued that intervention studies focusing on the effects of specific interventions do not address sufficiently the comprehensive picture of the victims' struggles and needs (O'Donnell, Bryant, Creamer, & Carty, 2008). To counteract restricted conclusions, that is, to better grasp the complexity of emotional aspects and understand what is important and helpful to hospitalized trauma victims, there is a need for qualitative studies exploring experiences from the hospital (Gooberman-Hill & Fox, 2011). Although they are few, some such studies, mostly studying survivors of accidental traumatic injury, have been carried out, reporting on issues such as processing of the traumatic experiences, negotiating the sense of safety and self, and distress related to medical procedures (Jay, 1996; Ogilvie et al., 2015b; Olive, 2017; Oyesanya, 2017; Ramsdell et al., 2016; Reisenhofer & Seibold, 2013; Sleney et al., 2014; Wiman, Wikblad, & Idvall, 2007; Wiseman, Foster, & Curtis, 2016). In some studies also, psychosocial hospital care for traumatic injury survivors has been qualitatively explored from the perspective of the family (Ogilvie, Foster, McCloughen, & Curtis, 2015a) and the staff (Alisic, Conroy, Magyar, Babl, & O'Donnell, 2014).

For injured victims of intentional trauma, such as terrorist attacks, particular challenges may be encountered, such as their basic sense of safety and trust having been shattered (Jiang, Webster, Robinson, Kassam-Adams, & Richmond, 2018). Questions such as

“is the world fundamentally changed and cruel” or “can I be safe any place” may affect the relationship between the victims and the hospital staff and how the psychosocial care is perceived. To grasp these victims’ challenges and to provide the field with extended knowledge on how to support them with good psychosocial care in the hospital, there is a need for assessing these victims’ experiences. To the best of the author’s knowledge, no qualitative studies have been conducted on injured victims’ experiences with the psychosocial care in hospital after an intentional traumatic mass event such as a terrorist attack.

1.5.2 The therapeutic potential of the commonplace

It has been argued that a lack of explicit theoretical engagement in medical qualitative research may limit our possibilities for developing new knowledge (Malterud, 2016). To expand the current understanding of survivors’ emotional needs and psychosocial care after trauma, theory from adjacent fields of research may offer valuable conceptual frameworks.

In a sociological study of emotions, identity, and therapeutic change in a treatment center for drug abusers, Skatvedt found that commonplace, seemingly trivial, and superficial interaction between staff and clients constituted powerful labelling situations contributing to healing and new narratives of selves (Skatvedt & Schou, 2010)¹. The theoretical perspectives applied by Skatvedt build on social interactionist theorists such as Erving Goffman, Howard Becker, and Johan Asplund, among others, underpinning how identity and the self are constructed through social interaction. Goffman holds that everyday togetherness may have a symbolic character, confirming the identities and selves of the participants in a situation. Goffman offers an opportunity to see seemingly meaningless interaction as rich in meaning and value for the participants (Skatvedt & Schou, 2010). Becker’s labelling theory holds that people may be labelled as deviants through interaction with important and powerful representatives of the normal. As in this perspective one *is* not a deviant, one rather becomes one through social interaction, Skatvedt argues that the opposite, “normal”, is also something that one becomes through social interaction, through a labelling process. Asplund is engaged with social responsivity: interaction characterized by spontaneity and improvisation. From this perspective, social responsiveness pertains to when humans act and see each other as

¹ The cited paper presents results from a doctoral study written in Norwegian (Skatvedt, 2008).

concrete individuals and not as abstract role figures. Such interaction may be particularly powerful in emotionally moving the participants in the interaction (Skatvedt & Schou, 2010).

Trauma victims, and arguably severely injured victims in particular, may struggle with psychological issues including questions related to identity and belonging (Hobfoll et al., 2007; O'Donnell et al., 2008). How such issues may be accounted for in a clinical hospital setting has been only limitedly explored. The introduction of the empirical study and the theoretical perspectives briefly outlined above may provide for an opportunity to make meaning out of how commonplace and seemingly trivial interactions between trauma victims and hospital staff may be therapeutic regarding such issues, contributing to expanded knowledge on what may be powerful therapeutic elements of psychosocial care for trauma victims.

1.6 The Utøya attack

In Oslo, Norway, on the 22nd of July 2011, one man put into action two devastating attacks killing 77 people and injuring even more. In the first attack, the perpetrator left a self-made bomb outside the main government building in Oslo. Without any warning, the powerful bomb exploded at 3.25 p.m., killing eight people. The perpetrator immediately left for Utøya Island situated one hour's drive outside the city, which at the time was the location of a summer camp hosted by the Norwegian Labour Party's youth organization. Armed with guns and dressed as a police officer, he reached the island, where he explained that he had been sent by the police to protect the youths at the camp after the bomb explosion in Oslo. He then started hunting down and shooting at the 564 isolated adolescents and young adults on the island. The atrocity of the attack, starting without warning in a peaceful environment and with the intention of killing as many innocent young people as possible, was amplified by several factors. The cynical actions of the perpetrator represented extreme brutality and caused comprehensive suffering for the youths staying at the island. Fighting for their lives, the youths tried to escape by running and hiding in the hilly terrain of the 10.6-hectare island. They had to navigate according to the constantly moving sounds of the assailant's shotgun by running through the woods, jumping down cliffs at the sea-side, and hiding in small and natural cavities. Many were school-aged adolescents and young adults and many knew each other. Many clustered in groups, and many lost close friends, boy- and girlfriends, or family members. They had poor chances to escape from the island due to the cold water surrounding them and the distance of a minimum of 550 meters to the mainland. Nevertheless, many tried

to escape by swimming, and most of them survived. Moreover, the fact that the terrorist was disguised as a policeman left the survivors in a prolonged state of fear and mistrust, and consequently the youths did not know whether to rely on the rescue teams that eventually began arriving at the island. At 6.27 p.m., one hour and 20 minutes after the beginning of the shooting, the police arrested the perpetrator. Sixty-nine young lives were lost at Utøya Island.

During and in the acute aftermath of the attack, the victims were evacuated to the mainland by boats. A local meeting point, Sundvollen Hotel, was designated to gather all the victims in order to meet their acute psychosocial needs and to unite them with their families before returning to their homes. Most of the survivors left Sundvollen Hotel within the first 24 hours (B. I. Gaarder, 2011). To meet the need for acute medical triage, local and specialized prehospital personnel were placed at the mainland where the youths disembarked (Sollid et al., 2012). The physical injuries were caused by gunshots and by the hazardous escape from the perpetrator, and they varied from life threatening to minor (C. Gaarder et al., 2012; Sollid et al., 2012; Waage, Poole, & Thorgersen, 2013). Survivors with minor injuries, such as uncomplicated wounds and minor fractures, were treated at the scene or in outpatient clinics and then sent back home (Sollid et al., 2012; Waage et al., 2013). Injured survivors with potentially moderate to severe injuries were admitted to hospital as inpatients where they received surgical and medical care and stayed for days or weeks. The recordings of the patient flow in the initial phase of the evacuation has been described as incomplete (Sollid et al., 2012), leaving the total number of injured survivors infested with uncertainty. The number of hospitalized survivors with physical injuries after the Utøya attack was 33.

The young survivors after the Utøya attack came from all over the country, and after the stay at Sundvollen Hotel, those not hospitalized left for home with their close ones. During the first days after the attack, the Norwegian authorities received feedback suggesting that the survivors' psychosocial needs were not satisfactorily met by the health care system (Dyb, Jensen, Glad, Nygaard, & Thoresen, 2014). By the July 28, the Norwegian Centre for Violence and Traumatic Stress Studies contributed to developing a national strategy for proactive psychosocial outreach that was implemented for the health and social services by the Directorate of Health. Research on how the early outreach plan worked out has demonstrated significant differences between regions regarding the percentage contacted by the local crisis team, assigned contact person, and needs for health care services met in addition to unsatisfactory differences in content and quality of the provided assistance (Haga,

Stene, Wentzel-Larsen, Thoresen, & Dyb, 2015; Stene & Dyb, 2015; Wistrom, Stene, & Dyb, 2016). For those hospitalized, the first days and weeks appeared rather different with regard to the psychosocial care provided. In the hospital, nurses and physicians who were specialized in the treatment and care of severely injured patients continuously surrounded the youths. Due to the extreme nature of the incident and the many injured survivors, psychosocial health care workers such as psychologists, psychiatrists, psychiatric nurses, and social workers complemented the regular staff (Ekeberg et al., 2014). Their main task was to provide information, strengthen the youths' sense of safety, and help with the stabilization of affects, in addition to supporting relatives and supervising the regular staff.

1.7 Aims

The overall aim of this dissertation was to develop knowledge on post-terrorist attack health and early psychosocial care among injured survivors by studying the Utøya terrorist attack in Norway 2011.

Paper I: We aimed to investigate the relationship between physical injury (hospitalized, non-hospitalized, and none) and PTSD among survivors, adjusting for potential sociodemographic, psychosocial, and peri-traumatic risk factors.

Paper II: We aimed to explore the association between injury (hospitalized, non-hospitalized, and none) and long-term somatic complaints among survivors. It was hypothesized that PTSD would act as a mediator on the causal pathway between sustained injury and somatic complaints.

Paper III: We aimed to investigate physically injured terrorist attack survivors' experiences with early psychosocial care and needs in the hospital. Specifically, we aimed to gain a broader understanding of what may be helpful through in-depth qualitative exploration of the survivors' own experiences.

2 Methods

2.1 Design

The papers included in this dissertation applied data yielded from interviews conducted by the Utøya study (the Norwegian Centre for Violence and Traumatic Stress studies) and from hospital records (Oslo University Hospital and Vestre Viken Hospital Trust). The Utøya study observed a cohort of survivors from the shooting attack at Utøya on July 22, 2011 (T0) longitudinally over three time points: T1 (4–5 months after the attack), T2 (14–15 months after the attack), and T3 (30–31 months after the attack). At T2, the study was opened to new participants, that is, non-participants at T1, while participation at T3 was restricted to those who had participated either at T1 or T2 or both. A main task of the Utøya study was to assess various aspects of the survivors' health and functioning, and a face-to-face interview was conducted at all three time points to obtain comprehensive data.

In the current dissertation, the nature of the research question posed in each paper led to the applied method.

Table 1: Methodological overview of the Papers I-III

	Paper I	Paper II	Paper III
Participants	325	255	17
Data source	Structured interview and hospital records	Structured interview and hospital records	Semi-structured interview and hospital records
Interview data collected from;	T1 and T2	T1 and T2	T3
Methods	Statistical analyses	Statistical analyses	Qualitative analyses

2.2 Procedures

The Utøya project group at the Norwegian Centre for Violence and Traumatic Stress Studies initiated the Utøya study shortly after the shooting attack. The Norwegian Directorate of Health funded the study. The project group received a list from the Oslo police district with contact information on the 495 survivors who were present on Utøya Island during the

shooting. Recruitment was carried out by postal invitation letters and a subsequent telephone call. The participants were interviewed face to face at T1, T2, and T3, mainly in their homes. At T1, 95% of the interviews took place 4–5 months after the attack. At T2, 90% of the interviews took place 14–15 months after the attack. The interview manuals contained both structured parts providing quantitative data and semi-structured parts with open-ended questions providing qualitative data. The data contained information on the survivors' experiences and responses during and after the terror attack, and on background factors. The Regional Ethical Committee for Medical and Health Research Ethics in South-East Norway approved the study. Ethical considerations are elaborated on below.

2.3 *Participants*

For an overview of the recruitment process, see the flow chart below. For the total number of 355 participants in the Utøya study (Stene & Dyb, 2016), the mean age at the time of the attack was 19.3 years and 51.8% were males; 27 (7.6%) were hospitalized and 39 (11%) reported injury but were not hospitalized. Non-participants did not differ significantly from participants taking part in either T1 or T2 or both with respect to age, gender, geographical, region, or hospitalization (Stene & Dyb, 2016).

Figure 1: Flow-chart

2.4 Measures

Table 2 All measures included in the analyses conducted in Papers I and II

	Time of assessment	Included in paper	
		I	II
Outcome variables			
Posttraumatic stress reactions	T1	x	
Somatic complaints	T2		x
Mediator variable			
Posttraumatic stress reactions ²	T1		x
Exposure variable			
Physical injury	T0	x	x
Adjustment variables			
<i>Sociodemographic factors</i>	T1		
Age at time of attack		x	x
Sex		x	x
Ethnicity		x	x
Current family economy		x	
<i>Psychosocial background</i>	T2		
Interpersonal violence exposure		x	x
Provided psychiatric interventions		x	x
<i>Peri-traumatic exposure</i>			
Number of traumatic events		x	
Reactions		x	
Loss of a close person		x	

2.4.1 Posttraumatic stress reactions

Posttraumatic stress reactions represented the outcome variable in Paper I and the mediator variable in Paper II. PTSR over the past month were reported using the 20-item

² In Paper II we changed the labelling of the variable to posttraumatic stress symptoms to comply with the reviewers' requirements. However, the construction of the variable was the same as in Paper I. The term posttraumatic stress reactions (PTSR) is applied throughout this dissertation, also when reporting on Paper II.

University of California at Los Angeles PTSD Reaction Index (UCLA PTSD-RI) (Pynoos, Rodriguez, Steinberg, M., & Frederick, 1998; Steinberg, Brymer, Decker, & Pynoos, 2004). Intrusion (re-experiencing) was described by five items, avoidance by seven items, and arousal by five items. Every item was rated on a 5-point Likert scale (0 = *never*, 1 = *seldom*, 2 = *sometimes*, 3 = *often*, and 4 = *almost always*). Three reactions were covered by two alternative items, and the item with the highest score of the two was applied to calculate the total score. Hence, 17 items made up the total reaction scale score, corresponding to the DSM-IV criteria for PTSD (American Psychiatric Association, 2000). To ensure that the participants had as similar understandings of the scale levels as possible and augmented validity, they were presented with a frequency sheet indicating how many times during the previous month a reaction might have occurred to describe it as, for example, “often.” Thirteen valid items were required to compute the total score. No participants had missing values for more than two items, hence, a mean score for total PTSR was computed for all participants and applied in the analyses. Cronbach’s alpha was similar for the samples included in Papers I and II: 0.89.

Mean scores were computed for intrusion, avoidance, and arousal reactions for information. Cronbach’s alphas were the same for Papers I and II: 0.84, 0.70, and 0.76 for intrusion, avoidance, and arousal reactions, respectively. Also, the proportion of participants reporting reactions corresponding to “partial or full” PTSD was displayed for information in Paper I. Reactions experienced “often” and “almost always” were defined as clinical symptoms (Steinberg et al., 2004). Criterion B was considered satisfied with ≥ 1 clinical symptom, C with ≥ 3 symptoms, and D with ≥ 2 symptoms. Full PTSD diagnosis was based on satisfying criteria B, C, and D. Satisfying two criteria only was scored as partial PTSD (Steinberg et al., 2004).

2.4.2 Somatic complaints

Somatic complaints represented the outcome in Paper II. It was reported using an eight-item short version of the Children’s Somatization Inventory (CSI-24) (Walker, Beck, Garber, & Lambert, 2009): Children’s Somatic Symptoms Inventory-8 (CSSI-8). The participants were presented with a list of bodily complaints, and they were asked how much they had been bothered by each complaint during the last two weeks. Four items covered pain (head, lower back, stomach, and arms or legs) and four items covered other somatic complaints (faintness or dizziness, rapid heartbeat, nausea or gut problems, and a feeling of

weakness). To comply with another Norwegian population-based study, the original 5-point Likert scale was elaborated on; in the Utøya study each item had four reply alternatives: 1 = *not at all*, 2 = *a little*, 3 = *quite a lot*, and 4 = *a whole lot*. This elaboration was done in accordance with the authors of the CSSI-8. A half-rule was applied when constructing a scale score (the mean of the observed items if at least half of the items were observed). There were three missing values for one item only, and hence, a mean score for total somatic complaints was computed for all participants and applied in the analysis. Cronbach's alpha was 0.76.

2.4.3 Physical injury

Physical injury represented the exposure in Paper I and Paper II. In the acute aftermath of the attack, the survivors were triaged at the scene and were provided with medical care according to their needs. The categorization of the variable was constructed on the basis of this medical triage differentiating between minor injuries being treated in outpatient clinics and moderate-to-severe injuries being admitted to hospital as inpatients (Waage et al., 2013). Hospitalization was confirmed by the hospitals. In the interview manual, physical injury sustained during the attack was reported using the item "Were you physically injured and required medical help?" (0 = *no*, 1 = *yes*). The survivors who were hospitalized as inpatients and who reported physical injury were categorized as injured (hospitalized). The criterion for being categorized as injured (non-hospitalized) was reported injury and exclusion from hospitalization confirmed by the aforementioned hospital records. There were no missing values for this variable.

In order to describe the variable more precisely and explicitly, we changed the labelling of the categories when writing up Paper II. We should point out, though, the actual categorization of the variable remained the same. The labels were changed from "Severely injured," "Moderately injured," and "Not injured" in Paper I, to "Reported injury (hospitalized)," "Reported injury (non-hospitalized)," and "No reported injury," respectively, in Paper II. Throughout this dissertation, "hospitalized" and "non-hospitalized" will be used (instead of "severely" and "moderately"), also when reporting on Paper I.

2.4.4 Sociodemographic factors

Age at the time of the attack and *Gender* (male/female) were gained from lists declassified from the Oslo police district. Age was assessed as a continuous variable, and incorrect information on gender was corrected after self-reports at T1.

Non-Norwegian ethnicity was defined as reporting parents who were both born abroad. To minimize the number of incorrect and missing values, information was drawn both from the survivors' and the parents' manuals.

Current economic situation was rated on a 5-item scale ranging from 1 = *much better than that of most people*, to 5 = *much worse than that of most people*. Participants living alone reported on their own economic situation, and those living with their parents reported on their family's economic situation. The answers were dichotomized as "average or above that of most families/people" and "below that of most families/people."

2.4.5 Psychosocial background prior to July 22, 2011

Interpersonal violence exposure was measured screening for direct exposure to violence (beaten up or physically hurt), witnessing violence in close relations, sexual abuse, physical neglect, and bullying. A sum score of the five dichotomous items (0 = *no*, 1 = *yes*) was computed and ranged in three categories: 0, 1, and ≥ 2 types of violence.

Provided psychiatric interventions were measured with the items: "Did you obtain any help from psychiatric health services?" and "Did you receive any medication for depression, anxiety, or other psychological problems?" A sum score of the dichotomous items (0 = *no*, 1 = *yes*) was computed and ranged in three categories: 0, 1, and 2 types of interventions.

2.4.6 Peri-traumatic exposure

Number of traumatic events experienced during the attack was recorded applying an incident-specific checklist of 13 different potentially traumatic experiences. The 13 items were dichotomous ("No" or "Yes"): "Did you see the terrorist or hear his voice?", "Did you hide from or run from the terrorist?", "Did you hear people screaming?", "Did you smell gunfire or other distinct smells?", "Did you see someone being injured or killed?", "Did you hear someone being injured or killed?", "Did you see dead bodies?", "Did you touch dead bodies or injured people?", "Were you afraid of being seriously injured?", "Were you afraid

that you would die?”, “Did you see the terrorist pointing the gun at you or did you realize that he had shot at you?”, “Were you afraid that you would drown?” or “Did you feel threatened by the police?” The item “Did you hear gun shots?” was excluded from the sum score as it was experienced by all (Dyb, Jensen, Nygaard, et al., 2014). Applying a half-rule, a sum score that ranged from 0 to 13 was constructed by a count of the number of “yes” answers and applied in the analyses.

Reactions were recorded using six items on emotional, cognitive, and physiological reactions experienced during or immediately after the event: fear, helplessness, horror, confusion, feelings of unreality, and rapid heartbeat. The five first mentioned items were extracted from the UCLA PTSD-RI (Pynoos et al., 1998). Each item had five reply alternatives: 0 = *not experienced at all*, 1 = *a little*, 2 = *some*, 3 = *a lot*, and 4 = *experienced very much*. Using a half-rule, a mean score was calculated based on the six items and applied to the analyses (Dyb, Jensen, Nygaard, et al., 2014). Cronbach’s alpha was 0.61.

Loss of a close person was recorded with one item: “Was a close friend, girl/boyfriend, or family member killed?” (“No” or “Yes”).

2.4.7 Variables for descriptive information

Some variables were included as descriptive information only. In the interview manual, those who had answered “yes” on the aforementioned item “Were you physically injured and required medical help?” were asked the injury-related questions:

Peri-traumatic pain related to injury was rated applying a 10-point Visual Analog Scale with the end points 0 = “no pain at all” and 10 = “the most extreme pain you can imagine.”

Posttraumatic injury sequelae included four items: “current scars,” “current pain,” “current change in appearance,” and “current restrained daily function” (0 = *no* and 1 = *yes*).

Information was also collected from hospital records:

Injury Severity Score (ISS) was reported as a mean score. ISS is a medical score of trauma (injury) severity used in hospital trauma settings and is a correlate corresponding with physical morbidity and mortality. The ISS is based upon the Abbreviated Injury Scale (AIS) classifying each injury in every body region (nine) according to its severity on a six-point

scale (Copes et al., 1988). To calculate the ISS, the body is divided into six regions. The highest AIS score in each of the three most severely injured ISS body regions are squared and added, yielding scores from one to 75. If any of the three scores is a six (“unsurvivable”), the score is automatically set at 75. Major trauma is commonly defined as an ISS score over 15 (Palmer, 2007).

2.5 *Qualitative interview*

At T3, we included a separate section of the interview manual containing a qualitative interview targeting the hospitalized survivors’ experiences with the psychosocial care in the hospital. The interviews were analyzed in Paper III. The qualitative interview has characteristics similar to those of a conversation as it is fundamentally interactional (Kvale, 1996; Moen & Middelthon, 2015). It is an inter-view, an occasion for data production and insight through an interchange of views and meaning-making, between two conversing persons (Kvale, 2008). From this perspective, knowledge is not extracted from the interviewees, but is co-constructed through an iterative process of reflection and articulation.

To guide the interviewers, we constructed a semi-structured interview guide (Kvale, 2008). This structure allows for a responsive and flexible dialogue guided by the interviewer. At the same time, the structure promotes an interview that stays close to and covers the topic of interest. Three psychologists and one psychiatrist (the first author of Paper III), who all were experienced in working with psychosocial issues for hospitalized youths, constructed the guide and conducted the interviews. The first author and one of the interviewers worked as a child psychiatrist and a psychologist, respectively, in the hospital after the shooting attack providing parts of the psychosocial care in focus for the study. However, neither of these interviewed their own patients. The interview schedule contained open-ended questions on the following topics³:

- 1) The youths’ experiences with psychosocial help and support from different kinds of health care workers in the hospital (nurses, physicians, psychologists, psychiatrists, or others): eliciting descriptions of how the help affected them during and after hospitalization.

³ See the appendix for a translated interview guide

- 2) The youths' views on possible improvements in early psychosocial hospital care for traumatized survivors.

The interviewers sought to engage in a mutual interaction and dialogue, facilitating the interviewees' exploration and articulation of their experiences. Verbal probes such as "Can you tell me more about that?", "How did that feel?", and "Can you give me an example?" were used to help the participants develop and continue their thoughts and making of meaning. With the interviewees' agreement, we audiotaped the full-length interviews. The length of the 17 interviews varied from five to 37 minutes.

2.6 Analyses

2.6.1 Papers I and II

Group differences for categorical variables were tested applying an exact Pearson's chi-squared (χ^2)-test. Student's t-test and analysis of variance (ANOVA) were used to test group differences for continuous variables (two and three groups, respectively). To adjust for multiple testing in post-hoc analyses, the Holm procedure was applied in the exact Pearson's chi-squared (χ^2)-tests and Tukey's honest significant difference (HSD) procedure in the ANOVAs. To assess group differences for the substantially skewed variable *peri-traumatic pain related to injury* included for information in Paper I, we used a permutation t-test. This test makes no distributional assumptions and tests whether the distribution of the variable is the same in both groups (Efron & Tibshirani, 1994).

In Paper I, unadjusted and adjusted multiple linear regression analyses were conducted to assess the contribution of physical injury to PTSR. To account for potential confounding factors, we tested three different adjusted models, each introducing an additional set of possible confounders. We checked multicollinearity by assessing the variance inflation factor, and as all variance inflation factors were ≤ 1.31 , multicollinearity was not an issue. The variables *Interpersonal violence exposure* and *Provided psychiatric interventions* were recorded at T2 with a total of $n = 255$ (participants taking part in both waves) participants in the complete case analyses. Therefore, multiple imputation methods with 200 imputed datasets were applied to reduce any possible effects of partial response bias. Complete case analyses were conducted for comparison, and the complete case analyses did not differ substantially from the analyses based on multiple imputation.

In Paper II, we applied causal mediation analysis to assess whether PTSR may be a mediator lying on the causal pathway between physical injury and somatic complaints (Imai, Keele, & Tingley, 2010). In the causal mediation analysis, the applied procedure can estimate the quantities of interest: the average causal mediation effect (ACME) and the average direct effect (ADE) (all effects not mediated through the mediator of interest) through using the framework of counterfactual (potential) outcomes (Hernan, 2004). The analysis also provides an estimate of the proportion of the total effect (the sum of the ACME and the ADE) that is mediated. To identify ACME and ADE, an essential, yet untestable assumption is made that there are no unmeasured exposure confounders after controlling for the observed pre-exposure covariates included (Imai, Keele, Tingley, & Yamamoto, 2011). To test the robustness of the results to potential violation of this assumption, the causal mediation analysis includes a sensitivity analysis (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014). The sensitivity analysis quantifies how much the untestable assumption must be violated for the conclusion to be reversed. In the mediation analysis, we made adjustments for *Age at the time of the attack*, *Gender*, *Ethnicity*, *Interpersonal violence exposure*, and *Provided psychiatric interventions*. Variables on *Peri-traumatic exposure* and *Current economic situation* were not included due to the temporal ambiguity of peri-traumatic exposure in relation to the sustained injury and the post-injury measurement of current economic situation.

All tests were two-tailed with a significance level of $p \leq 0.05$. Exact Pearson's chi-squared (χ^2)-tests, student's t-tests, ANOVAs, and unadjusted and adjusted multiple regression analyses were conducted using IBM SPSS Statistics version 22. The R version 3.1.2 (The R Foundation for Statistical Computing, Vienna, Austria) was used for the permutation t-test and the multicollinearity check, the R package *mice* for multiple imputations, and the R package *mediation* (4.1.2) for causal mediation analysis including sensitivity analysis.

2.6.2 Paper III

An independent transcriber transcribed the audiotaped interviews verbatim, and the transcriptions were imported into NVivo 11 for coding. NVivo is a qualitative data analysis computer software package that helps users organize and analyze unstructured data.

To gain an understanding of the meanings the youths made of their experiences, we conducted Interpretative Phenomenological Analysis (IPA). IPA relies on the theoretical

orientations of hermeneutics, phenomenology, and ideography (Pietkiewicz & Smith, 2014). The interpretative research processes are emphasized in IPA, and the researcher is considered to play an active part in the process. In the analysis, a two-stage interpretation process is applied where the researcher is trying to make sense of the participant making sense of her/his world. The phenomenological aspect of IPA implies an interest in human experiences, and the method aims to stay sensitive to the individual's personal perceptions. Further, the idiographic aspect refers to the engagement in single cases. The researcher explores every single case before producing any general statements or categories and may move between important categories exemplifying them by comparable and contrasting individual narratives (Pietkiewicz & Smith, 2014).

The author of this dissertation worked as a psychiatrist providing parts of the psychosocial care of interest for one of the participants in Paper III. Further, two of the authors of the paper (the last and the fourth) were involved in planning the same care. To counteract biasing in the interpretations of the data, we formed a research team (including two researchers not involved in the psychosocial care of interest) as suggested in the Consensual Qualitative Research (CQR) model. The model's use of a team of researchers arriving at consensus judgements may enhance the possibility of conveying the complexity of the data and that a diversity of analytical viewpoints are valued (Hill, 2015; Hill et al., 2005). Inspired by CQR, two of the authors of Paper III (the first and third) formed a primary analytic team, and the second author also read all the interviews and acted as a discussant in all parts of the analytic process. The fourth and the last authors formed a secondary team examining the first team's analysis to provide additional perspectives.

In accordance with the idiographic aspect of IPA, the members of the primary team initially read each interview case by case, taking notes. By an iterative process of reading, interpretative engagement, and re-reading, the notes were refined and condensed into categories case by case. The further process involved making sense of any connections between categories within each case, and then across cases. The primary team reached consensus on meaningful overarching and subordinate categories after reading the interviews, sharing their notes and re-reading and re-discussing the interviews. The second author of the paper participated frequently in the discussions. After also reading the interviews, the secondary team added to the primary team's analysis to provide complementary perspectives and to counteract group thinking. Throughout this first phase of the analytic process, the

researchers stayed as close and open-minded as possible to the data. During this process, we became aware of the emphasis many youths put on everyday conversation and seemingly ordinary interactions. Since IPA is concerned with acknowledging new or divergent issues in the data material (Smith & Osborn, 2015), and to increase the possibility of novel interpretations of what the youths unexpectedly emphasized, we brought our analyses into dialogue with perspectives from a sociological study of the potential of commonplace and informal interactions between staff and clients in a treatment center for drug abusers (Skatvedt & Schou, 2010)⁴. In this way, we became able to discern and make meaning of how seemingly trivial and common situations and conversations represented powerful moments in the youths' progress toward normalization and health. In this second analytic phase, the categories from the first phase were further condensed, ultimately resulting in three overarching and six related subordinate categories.

2.7 Ethical considerations

The overall objective of most research involving trauma survivors is generating knowledge benefitting future victims. While aiming for this legitimate objective, though, the research participants may find themselves in a deep struggle with their traumatic experiences and everyday life. To help researchers navigate sanely in such situations, essential and internationally acknowledged principles have been formulated. It is emphasized that the research objectives, such as generating useful knowledge, should be well weighed against the risks and burdens for the research participants (Chadwick, Ten Have, & Meslin, 2011; Newman, Risch, & Kassam-Adams, 2006; World Medical Association, 2019). Based on the provision of cautious attention to the participants' concerns, careful management of the interviewers, and secure handling of the data, the Utøya study was approved by the Regional Ethical Committee for Medical and Health Research Ethics in South-East Norway, 2011.

Among the group attending the summer camp on Utøya Island, there were many adolescents and some children. Newman has argued that seeing trauma survivors as a vulnerable group in general may not be meaningful (Newman & Kaloupek, 2009; Newman et al., 2006). However, subgroups, such as children, are traditionally seen as vulnerable

⁴ The cited paper presents results from a doctoral study written in Norwegian (Skatvedt, 2008).

(Chadwick et al., 2011). We therefore decided not to invite those under the age of 13 in our research.

The early post-trauma phase may be particularly demanding to victims. However, reflecting the need for knowledge about the early aftermath, the first wave of the Utøya study was conducted as early as feasible. To inform about the study and make an initial request, the survivors received an invitation letter prior to being contacted by telephone. The letter informed about the objectives of the study and how to avoid further contact. Subsequently, the potential participants received a telephone call from the interviewer supposed to interview them. Precise instructions were given for the telephone calls to secure a respectful and not too demanding inquiry.

The participants gave their informed written consent at the beginning of the interview for each data collection. They were informed that they could withdraw their consent at any time. The consent entailed information on topics covered during the interviews and the use of data extracted from hospital records. In line with Norwegian legislation, parental consent was obtained from parents of adolescents younger than 16 years of age and directly from all participants aged 16 years or older. The youths under the age of 18 were informed that if worrying information was revealed during the interview process, their parents could be contacted despite the more general confidentiality agreement signed by all interviewees.

In an interview situation, recalling traumatic memories may be deeply distressing. It has been reported that interviews represent a heavier burden to interviewees in terms of time spent and degree of upset than questionnaires. However, qualities relatable to the personal meeting may balance this out, and some studies carrying out interviews seem to have a more favorable cost-benefit balance than questionnaire-based studies (Newman & Kaloupek, 2009). Studies have demonstrated that most trauma research participants do not feel lasting harm and do not regret the participation, even if the research was conducted in the early aftermath (Kassam-Adams & Newman, 2005; Newman et al., 2006). In fact, both adult and child participants often consider participation to be positive and valuable, and many would participate in research again (Dyregrov, 2004; Fergus, Rabenhorst, Orcutt, & Valentiner, 2011; Kassam-Adams & Newman, 2005). Interestingly, in a study on trauma research interviews, the most emphasized reason for why the study was upsetting (remembering the past) was also the one most often cited as valuable (led to new insights) (Carlson et al., 2003). Further, it has been argued that victims' stories do belong in a shared consciousness; that the public owes to

the victims to listen to their experiences and acknowledge them as important (Becker-Blease & Freyd, 2006). In the Utøya study, high priority was given to mitigating distress during the interviews by empathetically meeting the participants' needs. To secure a safe interview environment, the participants were asked to choose the location, often resulting in the interviews being carried out in the participants' homes. Further, efforts were made to assign the same interviewer to the same participant in all three data collections. As the participants came from all over the country, the interviewers were mostly locally recruited health care workers with knowledge about the local health care system in addition to relevant professional experience (mainly psychologists and physicians). The interviewers were also trained specifically for the Utøya study. Their background and training were important to ensure careful attention to the participants' reactions during the interviews. All participants were asked if they had received the health care services they needed or experienced unmet needs, and suicidal risk assessment was made if necessary. When unmet needs for health care services were revealed, the interviewers facilitated contact with the appropriate resources.

Listening to victims' experiences and suffering may involve stressful emotions for the interviewers. Demanding situations may also arise, such as assessment of suicidal ideation. To prepare and support the interviewers in the Utøya study, seminars were organized before and after each data collection. Further, the interviewers were encouraged to contact the project administration throughout the periods of data collection to discuss their own reactions and questions. They were also instigated to work in teams and to not carry out more than two interviews per day. The staff members interviewing the severely injured survivors were particularly experienced in working with physically ill or injured persons.

In all research involving human subjects, data protection is crucial to maintain privacy and confidentiality. After the Utøya attack, massive attention from the whole nation including the mass media was drawn to the survivors and their families. Therefore, careful considerations were made to obtain privacy in the interview situation and to secure safe transference of the data. All data were kept at Services for Sensitive Data, an IT-platform complying with Norwegian regulations for data storage where to collect, store, and analyze sensitive data (University of Oslo, 2019). In Paper III, processing in-depth information on a small number of participants and hospital staff, particular attention to confidentiality was required. Audio tapes were transferred to the project group on encrypted data sticks. In the paper, names, ages, and places were concealed, and the pronouns she or her were used for all

quotes regardless of gender. We chose not to label the quotes with a vicarious identity as this would have enhanced the possibility of identifying the participants or staff involved.

3 Synopses of the papers I–III

Paper I

Objective: The objective of the study was to investigate the relationship between physical injury (hospitalized, non-hospitalized, and none) and posttraumatic stress reactions (PTSR) at 4–5 months after the attack in survivors of the terror attack at Utøya Island, Norway, July 22, 2011, adjusting for sociodemographic, psychosocial, and trauma-related risk factors.

Methods: Overall, 325 young survivors (47% women, mean age 19.4 years) were interviewed 4–5 months (T1) and 14–15 months (T2) after the attack. Variables concerning physical injury, PTSR (UCLA PTSD-RI scale, 0–4), peri-traumatic exposure, sociodemographic, and psychosocial background were measured. To evaluate the role of injury, multiple linear regression analyses were conducted.

Results: The physically injured ($n = 60$) reported higher levels of PTSR than did the non-injured. The difference was statistically significant between the non-hospitalized injured ($n = 37$, mean 1.9) and the non-injured survivors ($n = 265$, mean 1.5). No significant difference was found between the non-hospitalized and the hospitalized ($n = 23$, mean 1.8) injured survivors. In the full regression model including peri-traumatic exposure, the association between injury and PTSR was no longer significant. Traumatic exposure seemed to explain the high levels of PTSR among the non-hospitalized injured survivors.

Conclusion: Physical injury was associated with higher PTSR after the terror attack, possibly explained by peri-traumatic exposure. Non-hospitalized injured survivors may, like those hospitalized, exhibit high levels of PTSR, and this should be taken into account when targeting early psychosocial health care after terror.

Paper II

Objective: Physically injured trauma survivors may be at particularly high risk for later posttraumatic stress reactions (PTSR) and somatic complaints. However, the potential mediating role of PTSR linking injury to later somatic complaints has been poorly investigated.

Methods: In this study, survivors ($N = 255$) were interviewed at two time points after the terror attack on Utøya Island, Norway, in 2011. Assessments included injury sustained during the attack, PTSR (after 4 to 5 months), somatic complaints (after 14 to 15 months), and background factors. Causal mediation analysis was conducted to evaluate the potential mediating role of PTSR in linking injury to somatic complaints comparing two groups of injured survivors (hospitalized and non-hospitalized) with non-injured survivors.

Results: Injury was associated with long-term somatic complaints with significant differences between both groups of injured and the group of non-injured survivors. There was no significant difference between the two groups of injured survivors. For the non-hospitalized injured versus the non-injured survivors, the mediated pathway was statistically significant (average causal mediation effect; $ACME = 0.09$, $p = .028$, proportion mediated = 55.8%). For the hospitalized versus the non-injured survivors, the mediated pathway was not significant ($ACME = 0.04$, $p = .453$, proportion = 11.6%).

Conclusion: Injured survivors may exhibit particularly high levels of long-term multiple somatic complaints when compared to non-injured survivors. PTSR may play a significant mediating role in the development of somatic complaints among non-hospitalized injured trauma survivors compared to the non-injured. Health professionals meeting non-hospitalized injured terror survivors should be aware of this possible pathway to somatic complaints.

Paper III

Objective: The objective of the study was to explore hospitalized youths' experiences with psychosocial care in the hospital after the shooting on Utøya Island, Norway, in 2011.

Methods: Seventeen hospitalized youths were interviewed face to face 30–31 months after the attack. The interviews were analyzed using interpretative phenomenological analysis (IPA). The initial reading and coding of the interviews was carried out inductively.

Results: The youths highlighted the need for health care workers to embrace essential aspects of their past, present, and future. Therefore, three overarching categories emerged related to 1) Remembering the past, 2) Dealing with the present, and 3) Preparing for the future. For each overarching category, two related subcategories were identified: Past: *Engaging in the trauma narrative; Understanding the trauma reminders*; Present: *Bringing back normalcy; Being there*; and Future: *Supporting confidence; Instilling trust*. For the youths in the current study, talking with the hospital staff about their traumatic experiences was mostly perceived as positive and linked to various helpful self-defined outcomes. In addition to engaging in the trauma narrative, the staff needed to comprehend and address how the traumatic experiences and the hospitalization resulted in the survivors' extended fear and changed appraisals about the world and themselves. Having the time to stay physically and mentally close to the youths and engage in everyday interaction was central in rebuilding their sense of safety and restoring normalcy. The hospital staff played a significant role in strengthening the survivors' confidence in their own capabilities and trust in others. The different professionals in the hospital contributed to various aspects of psychosocial care, and both trauma-focused interventions and commonplace conversations and actions were emphasized as important and meaningful approaches.

4 Discussion

In this study, we found that the physically injured survivors represented a vulnerable group demonstrating a high risk for developing adverse health outcomes such as PTSR and somatic complaints. Notably, high levels of health problems were seen not only among the hospitalized survivors, but also among those with injuries at a level not requiring hospitalization. Investigating the relationship between trauma-sustained injury and PTSR, peri-traumatic exposure other than sustained physical injury seemed to contribute significantly to explaining the higher levels of PTSR among those with injuries not requiring hospitalization. To identify a possible target point in preventing the development of somatic health complaints among injured trauma survivors, we assessed PTSR as a mediating factor between injury and later somatic complaints. PTSR mediated a substantial proportion of the somatic complaints among the non-hospitalized injured survivors when compared to the non-injured. For the comparison between the hospitalized and the non-injured survivors, the mediated pathway did not contribute significantly to the development of somatic complaints; however, a significant direct effect pointing at other mechanisms was found. Recognizing the high risk of adverse health outcomes among injured survivors and the particular setting of being severely injured and hospitalized in the early aftermath after a terror attack, we also sought to contribute to broadened knowledge about the psychosocial care in the hospital setting. Studying the hospitalized youths' own experiences qualitatively, we found that interaction with the staff both involving a focus on the traumatic experiences and commonplace, seemingly trivial interactions were perceived as helpful. The analyses resulted in three overarching categories, each with two subordinate categories: 1) Remembering the past: *"Engaging in the trauma narrative"* and *"Understanding the trauma reminders"*; 2) Dealing with the present: *"Bringing back normalcy"* and *"Being there"*; and 3) Preparing for the future: *"Supporting confidence"* and *"Instilling trust"*.

4.1 Physical injury and posttraumatic stress reactions

The significant positive effect of sustained physical injury on later PTSR found in our study corresponds with findings from research after various potentially traumatic mass events such as terrorist attacks, natural disasters, and war (Adhikari Baral & K, 2019; Koren et al., 2005; Lowell et al., 2018; Neria et al., 2011). None of these studies includes findings from shooting attacks, though. To the best of the author's knowledge, this is the only study

investigating how PTSR may develop in two different groups of injured survivors, those in need of hospitalization and those not, after a traumatic human-made mass event.

4.1.1 Hospitalized survivors

In other studies after traumatic mass events, hospitalized survivors have been found to sustain significantly higher levels of PTSR than non-injured survivors (Abenhaim et al., 1992; Dyster-Aas et al., 2012), corresponding well with high, although varying, levels of PTSR in studies including hospitalized trauma survivors only (Lovstad et al., 2019; Skogstad et al., 2014). High levels of PTSR among hospitalized trauma survivors are plausible due to a range of factors such as high levels of perceived threat, sequela from the injuries such as pain, physical handicap, and disfigurement, and hospital treatment (Brennstuhl et al., 2015; Bryant, 2011; Desivilya et al., 1996; Gold et al., 2008; Koren et al., 2006; Langeland & Olff, 2008). In addition, early appraisals and coping may add to the development of PTSR for this group (Marsac et al., 2016). In the current study, we found no significant difference in PTSR between the hospitalized and the non-injured survivors, and the difference in PTSR between the two groups of injured survivors was small and not statistically significant. These findings were somewhat surprising, as we expected the hospitalized survivors, sustaining more severe injuries and having gone through a demanding early aftermath in the hospital, to display higher levels of PTSR (Dyster-Aas et al., 2012). Pertaining to the insignificant differences, small group sizes may have limited the possibility of detecting statistical significance. Further, pertaining to the small difference between the two injury groups, there may have been factors mitigating the development of PTSR among the hospitalized survivors in our study. Although not measured, the severely injured patients may have been unconscious after being injured, potentially lowering the peri-traumatic exposure. Also, early sedation may have contributed to protection from traumatic memories in the acute early aftermath. Further, in the hospital, the youths were immersed in a particular environment of medical and psychosocial care. Possibly, this environment contributed to lowering the level of early PTSR at 4–5 months by modulating early predictors for PTSR such as acute or early mental distress and pain, and trauma- and injury-related appraisals and coping.

4.1.2 Non-hospitalized survivors

After mass trauma, the number of casualties not requiring treatment in hospital may be high (Bloch et al., 2007). Nevertheless, there are hardly any studies reporting on health

outcomes among survivors with trauma-sustained injuries not requiring hospitalization. However, one study assessing injured survivors treated in outpatient clinics after the bombing of the government building in Oslo on July 22, 2011 found high levels of PRSR: 31% reported clinical levels of posttraumatic stress 10 months after the event, somewhat lower than among the non-hospitalized survivors in our study (Grimholt, Skogstad, Hafstad, Vallersnes, & Ekeberg, 2018). In a study of tsunami victims, Dyster-Aas et al. reported corresponding findings to the ones in our study, that is, that injury (non-hospitalized) predicted PTSD at both 14 and 36 months when compared to no injury (Dyster-Aas et al., 2012).

In our study, the level of peri-traumatic exposure, that is, the number of peri-traumatic events including loss of a close person was high among non-hospitalized injured survivors, plausibly contributing to PTSD in this group. Due to this finding, injury, also if it is minor or moderate and does not require hospitalization, may indicate that a victim of a mass trauma has been at the very center of the most dramatic scenes, involving high peri-traumatic exposure. Due to the lack of studies on non-hospitalized injured trauma victims, there is little knowledge on what may contribute to PTSD for this group, limiting the contextualization of the findings in the current study. However, in the tsunami study conducted by Dyster-Aas et al., injury (non-hospitalized) remained predictive of PTSD after adjusting for the loss of a close person and perceived peri-traumatic life threat (Dyster-Aas et al., 2012). In studies not differentiating on levels of injuries, findings diverge. Partly in line with our findings, a few studies have found a non-significant predictive value of injury (yes/no) after adjusting for factors such as peri-traumatic reactions, perceived life threat, and witnessing serious injuries and people dying (McDermott, Duffy, Percy, Fitzgerald, & Cole, 2013; Tucker, Pfefferbaum, Nixon, & Dickson, 2000). Other studies have found that injury (yes/no) significantly predicted PTSD after adjusting for factors such as loss, peri-traumatic events, or reactions (DiGrande, Neria, Brackbill, Pulliam, & Galea, 2011; DiGrande et al., 2008; Kuo et al., 2007; Pfefferbaum et al., 2001). Further, there are a number of factors other than peri-traumatic exposure that may contribute to heightened levels of PTSD for injured survivors not requiring hospitalization, although poorly studied in this group. As reported in our study, this group may also experience pain, scars, or disfigurement, possibly affecting PTSD. Interestingly, in the study conducted by Grimholt et al. assessing injured survivors treated in outpatient clinics after the bombing of the government building in Oslo on July 22, 2011, 50% reported visible

scars from their injuries, 10% reported changed appearance, and 26% reported injury-related pain ten months after the attack (Grimholt et al., 2018).

4.2 Physical injury and somatic complaints

The finding in our study that injured survivors sustained higher levels of later somatic complaints than the non-injured survivors did resonate with parts of the limited, yet growing, amount of research on somatic health problems among injured mass trauma survivors. Also, it corresponds with findings from other studies on injured survivors after the July 22nd attacks demonstrating high levels of various somatic health problems both among hospitalized and non-hospitalized injured survivors (Grimholt et al., 2018; Manum et al., 2019; Wisloff-Aase et al., 2019). In the long-term aftermath of the September 11, 2001 attacks, studies have reported positive significant associations between trauma-sustained injury and heart and respiratory disease and reported reduced physical health functioning (Alper et al., 2017; Brackbill et al., 2019; Brackbill et al., 2014). Both being caught in the dust cloud and distress from being injured contributed to respiratory disease for this group (Brackbill et al., 2014). After the Oklahoma City bombing in 1995 and the 2004 Indian Ocean tsunami, injured survivors reported heightened levels of multiple somatic symptoms such as pain and dizziness as well as medical diagnoses when compared to non-injured survivors 1.5–3 years post trauma (Isaranuwatthai et al., 2013; Shariat et al., 1999). On the other hand, other studies after the tsunami and other natural disasters found weak and insignificant associations between injury and later reported physical health complaints (Marres et al., 2011; North et al., 2004; van den Berg et al., 2009; Zhang et al., 2015). Interestingly, in a study six months after deployment, injured soldiers reported poorer overall physical health, however, not significantly higher levels of somatic symptoms, than did non-injured soldiers (Toblin et al., 2012).

In our study, we found somewhat higher, although not statistically significantly different, levels of total somatic complaints among those hospitalized than among those non-hospitalized. Notably, small groups restricting the statistical power may have limited the possibility for our study to detect statistically significant differences. Few studies have assessed the impact of different levels of injury on later physical health. However, corresponding to the findings in our study, Brackbill et al. (2019) revealed that injury of any category (low: no need for medical care, medium: need for supportive and rehabilitative care, and high: need for hospitalization or surgery) was associated with deteriorated reported

physical health functioning 15 years after the September 11 attacks (Brackbill et al., 2019). Brackbill et al. (2014) found that all injury categories (1, 2, and 3 or more injuries) were at increased risk for later heart and respiratory disease. Also, a dose-response relationship has been found between the level of required care and number of somatic symptoms and medical diagnoses, and between the number of injury types and later respiratory and heart disease (Alper et al., 2017; Brackbill et al., 2014; Shariat et al., 1999). In studies assessing the effect of injury severity measured by ISS, a correlate corresponding with physical morbidity and mortality after physical trauma, the effect on later somatic health varies but often does not predict later self-reported physical health outcomes (Greenspan & Kellermann, 2002; Lovstad et al., 2019; van Delft-Schreurs et al., 2017; Wisloff-Aase et al., 2019; Zatzick et al., 2003).

4.2.1 The mediating role of PTSR

There may be many mediating pathways linking injury to somatic health complaints. In our study, we found that PTSR mediated a substantial proportion of the developed somatic complaints when comparing *non-hospitalized* injured and non-injured survivors. Due to the overall lack of research data on trauma survivors sustaining injuries not requiring hospitalization, there is also a lack of research on potential mechanisms involved in the development of somatic health problems for this group in particular. However, one study after the September 11 attacks found that injury was associated with later chronic diseases and that the presence of co-morbid PTSD heightened this risk (Brackbill et al., 2014). The mediating role of PTSR in our study also corresponds with theories and findings from other studies, although they do not assess sustained physical injury. In a model proposing biological, psychological, and behavioral mechanisms, PTSD was early on hypothesized to mediate the relationship between trauma exposure and physical health (Koenen et al., 2017; Schnurr & Jankowski, 1999). Accordingly, higher levels of PTSR have been linked to neurobiological alterations, potentially resulting in a range of somatic complaints such as pain, rapid heartbeat, fatigue, gut problems, and faintness (Brennstuhl et al., 2015; Defrin et al., 2017; McFarlane, 2010). Also, psychological factors which often are comorbid with PTSR, such as depression, may act as mediators contributing to physical complaints (Lewis et al., 2019; Schnurr & Jankowski, 1999). Further, PTSR have been associated with behavioral risk factors such as substance abuse, inactivity, poor sleep, and altered appraisals of somatic symptoms, potentially amplifying experienced somatic health complaints (Adhikari Baral & K, 2019; Afari et al., 2014; Hall, Hoerster, & Yancy, 2015; Mysliwiec et al., 2018).

For the group of *hospitalized* survivors, when compared to the non-injured survivors in our study, the mediated pathway did not contribute significantly to the development of somatic complaints; however, a significant direct effect pointing at other mechanisms was found. When bodily tissue is damaged, complaints such as pain and loss of function related to the injured structures may naturally occur (George et al., 2016; Greenspan & Kellermann, 2002). Early pain may fuel a cascade of neurobiological and psychological responses potentially contributing to more pain over time (Giordano et al., 2018). Also, destruction of bodily tissue may, independently of psychological fear responses, induce dysregulations of the systemic stress responses contributing to a broad range of somatic complaints (Desborough, 2000). Injury-induced functional loss causing immobilization may also lead to somatic complaints (George et al., 2016; Karacabey, 2005). Further, psychological factors such as depression (Grieger et al., 2006; Lewis et al., 2019) and altered behavior such as increased smoking and medication use, lack of exercise (Brackbill et al., 2014; Polinder et al., 2010), poorer sleep (George 2016), and less participation in social life (Soberg et al., 2012) may also play important roles in mediating the association between injury and later somatic health. Plausibly, such mechanisms play a particularly significant role for severely injured survivors admitted to hospital, potentially out-ruling the effect of PTSR.

4.3 Injury as a marker of health complaints

Due to the findings in our study and earlier research, we believe that injury may be a clinically useful marker of particularly high levels of adverse health outcomes after mass trauma. Injuries stand out, that is, they are often visible or at least noticeable for the injured person herself. Also, injured trauma survivors commonly need acute medical care for their injuries, and hence these persons are often in early contact with health care personnel. After traumas, hospitalized survivors are in general acknowledged as particularly vulnerable to adverse health outcomes and are therefore often provided with extended psychosocial care, as was the case after the July 22nd attacks in Oslo (Ekeberg et al., 2014; C. Gaarder et al., 2012). Interestingly though, in another study after the Utøya attack, 36.7% of the injured survivors who were not admitted to hospital reported unmet needs for physical health problems while none of the hospitalized injured survivors reported such needs (Stene, Wentzel-Larsen, & Dyb, 2016). This finding was, however, contrary to findings in another study after the attack, reporting unmet health care needs also for hospitalized survivors (Manum et al., 2019). Notably, the findings from the current study indicate that when injured trauma victims search

for health care, health care staff should be aware that also those with minor and moderate injuries are at increased risk for developing psychological and somatic health complaints.

4.4 Early psychosocial care in the hospital

After trauma involving masses of people, some of the most severely injured survivors will spend their first days and weeks in hospital. In earlier research, some aspects of the hospital environment have been addressed as contributing to poorer mental health (McGiffin et al., 2016). However, a potentially protective effect of a hospital stay (Malt, 1988) and the hospital environment as a unique arena for providing preventive psychosocial care after trauma have also been proposed (Marsac et al., 2014). In our study, some elements in the hospital context such as medical procedures and the staff's uniforms reminding the youths of the perpetrator, seemed to add to the fear induced by the attack. Nevertheless, the hospital appeared to be an environment in which essential psychosocial needs could be met and a process toward healing could be initiated through interaction with a comprehensive system of professional care.

The youths' descriptions of care implicitly seemed to highlight two essential needs: the need for rebuilding the sense of safety and the need for restoring and confirming aspects of one's own identity. To meet these needs, a range of psychosocial health care approaches, including interaction seldom being explicitly emphasized as healing in the trauma literature, were perceived as helpful.

4.4.1 The feeling of safety

The need for rebuilding the sense of safety has been identified as essential to survivors of traumatic events in previous trauma literature (Hobfoll et al., 2007). To the youths in our study, interventions focusing on processing the traumatic experiences and how these experiences were kept alive through trauma reminders in the hospital seemed important in re-establishing the feeling of safety. There is limited empirical evidence on how trauma survivors perceive talking about their traumatic experiences in the acute and very early post-trauma phase. In our study, many of the youths expressed that going through what happened in this phase was positive, providing for a range of helpful outcomes such as meaning-making and understanding trauma reminders and unhelpful thoughts ultimately contributing to rebuilding the sense of safety. Making meaning of the traumatic experiences has been

emphasized in earlier qualitative studies of trauma victims, however, neither of these studies addressed injured survivors' experiences from the very early aftermath (Foster, Young, Mitchell, Van, & Curtis, 2017; Ogilvie, McCloughen, Curtis, & Foster, 2012). Also, talking about the stressful experiences has been connected to revealing and correcting unhelpful trauma-related appraisals and potentially contributing to mitigating the development of PTSR (Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Notably, certain conditions such as being met in an empathetic and calming manner with time to listen seemed important for the youths in our study, while encounters strengthening the feeling of being a victim or being particular, were described in negative terms.

In the early post-trauma phase, trauma reminders may fuel ongoing fear and stress responses (Ehlers & Clark, 2000). In our study, being explained in a sensitive manner why experiences such as hearing thunder triggered fear, was linked to rebuilding the feeling of safety, while solely being told that nothing dangerous was going on and not being sensitive to the youth's own perceptions and questions, was reported as upsetting. Psychoeducative approaches helping to identify possible reminders and clarifying the difference between the actual traumatic event and post-trauma reminders are part of acknowledged trauma interventions (Brymer et al., 2006; Cohen, Mannarino, & Deblinger, 2016). In our study, as also highlighted in previous trauma literature, what emerged as trauma reminders in the hospital was not obvious, underpinning the need for health care workers to be sensitive to trauma survivors' own experiences and thoughts.

Also related to rebuilding the feeling of safety, some of the youths in our study highlighted two aspects of the psychosocial care less explicitly addressing the traumatic experiences. First, the importance of being physically close to the staff was essential (Jay, 1996). The need for being attached to other human beings and its calming effect in times of crisis is deeply human and also acknowledged as fundamentally important after trauma (Hobfoll et al., 2007). In our study, some of the youths underpinned the need for being more or less continuously surrounded by the staff. Secondly, there seemed to be a close link between the feeling of safety and viewing the world as normal, that is, as it used to be before the attack. After major trauma, victims' assumptions about their surroundings may be heavily shattered, and maladaptive appraisals may affect their behavior and mental health (Ehlers & Clark, 2000). In our study, trivial talk with the staff such as being reminded about television series, talking about the food, and just being in an environment of friendly and caring persons

was emphasized and linked to rebuilding a view of the world as normal, thereby rebuilding the sense of safety.

4.4.2 The sense of the self

After trauma, survivors' appraisals about themselves may be changed (Ehlers & Clark, 2000), and the need for being regarded, both by others, but also by oneself, as normal persons and not solely as trauma survivors, has been emphasized in earlier studies after traumatic injury (Ogilvie, Foster, McCloughen, & Curtis, 2016; Ogilvie et al., 2012). According to the situation the youths in our study found themselves in, suddenly being victims of a deeply traumatizing experience in addition to sustaining severe injuries, questions connected to identity and their own capacities were naturally aroused. Descriptions like "(...) and there was some kind of miserable (staff) entering the room and looking at me, as if I was a psycho-case" caught our interest as they seemed to represent negatively loaded and important moments to the youths. Such descriptions appeared to point to the need for being accepted as a person more than a trauma victim and normal rather than a deviant. Similarly, other descriptions such as that about being hugged by a nurse and crying together with her, underpinned the need for sharing emotions, thereby feeling less alone and not as an outsider. Here, interaction with the staff not encompassing other than ordinary talk and togetherness appeared to be powerful in helping the youths and their views of themselves toward normalcy. Further, some youths' experiences of being explicitly acknowledged by the staff seemed to represent emotional moments strengthening their beliefs in own resources. Rebuilding the sense of self-efficacy, that is, the sense of control over, and belief in, positive outcomes in life, has been identified as a fundamental need after trauma (Hobfoll et al., 2007).

4.4.3 The therapeutic potential of the commonplace

In the current study, some moments and aspects of the psychosocial care were highlighted although they seemed trivial, informal, and not performed with a clear intention to provide healing. Descriptions of being hugged and washed, and talking about trivial things such as a television series and food appeared to represent powerful and emotionally moving moments to the youths. Interestingly, in a qualitative study interviewing nurses in an emergency department, the participants reported that the psychosocial care they provided generally stemmed from their empathetic instincts rather than from evidence-based training (Alisic, Conroy, et al., 2014). To understand and interpret the importance of the seemingly

trivial interaction highlighted by the youths in our study, we used Skatvedt's study of the therapeutic potential in commonplace interactions between clients and staff at a treatment center for drug abusers in the analytical process. Skatvedt, building on social interaction theorists such as Erving Goffman, Johan Asplund, and Howard Becker, describes how small interpersonal acts may represent important labelling situations, having the power to communicate messages of identity and belonging (Skatvedt & Schou, 2010). In our study, when a nurse talked about a television series, this was apparently an important moment to the youth, transferring implicit messages of normalcy. Goffman, arguing that commonplace human interaction is rich in meaning and symbolic power, offered us with an opportunity to acknowledge the study participants' descriptions of seemingly trivial interaction as rich in implicit meaning and as powerful in their healing processes. Further, Skatvedt claims, in line with Asplund's theory of social responsiveness, that the power of human interaction may be strengthened when the interaction is informal and steps outside of what is expected due to stereotypical roles. In spontaneous interaction, responsive to what happens in the moment, the participants in a situation can be emotionally moved (Skatvedt & Schou, 2010). We ask if, when being spontaneously hugged by a nurse or talked to about everyday concerns, such moments were perceived as powerful, as the youths felt recognized as a person among other persons, not a trauma survivor or a patient. As formulated by Skatvedt, being looked at and recognized outside "the clinical gaze" may have strengthened the symbolic power in what was said to the youths in our study (Skatvedt & Schou, 2010). Building on Becker, Skatvedt holds that as people may be labelled as deviants through interaction with important and powerful representatives of the normal, the normal is also something that one may reach through social interaction, through a labelling process, with important others. After major trauma, such as after the Utøya attack, victims', and maybe particularly physically injured victims', ideas about themselves are often challenged and changed. Due to the emphasis put on certain moments of interaction in our study, such as that about being acknowledged as resourceful by a doctor, we believe that in the hospital, the staff may be such important others, having the power to move and restructure trauma victims' stories about themselves.

4.5 Methodological considerations

4.5.1 Papers I and II

Reliability

In the current study, seminars to guide the interviewers in how to approach the interview manual were held to augment *inter-rater reliability*, that is, the degree of agreement between raters or interviewers in their appraisals (Gwet, 2014). It was, however, inevitable that the different interviewers conducted the interviews somewhat differently. To investigate *internal consistency reliability*, that is, consistency across items within the same test, Cronbach's alphas for all sum scores were computed (Osburn, 2000). For the outcome variables, PTSR, and somatic complaints, the internal consistencies, as measured with Cronbach's alphas, were good.

Internal validity

Confounding is systematic bias of the estimated effect of an exposure on an outcome due to the presence of a common cause (or a proxy for a cause) of the exposure and the outcome (Kirkwood & Sterne, 2010). To reduce confounding, potential confounding factors may be adjusted for in the statistical analyses. In the current study, adjustment factors were included according to their potential effect on injury, PTSR, and somatic complaints. The adjustment for "current family economy" in Paper I is disputable, due to its post-exposure measurement. It was, however, included as a proxy for the pre-trauma family economic situation. Also, the full regression analysis in Paper I included adjustment for peri-traumatic exposure factors. However, the confounding role of peri-traumatic exposure is disputable due to its temporal ambiguity in relation to sustained injury. Due to the crucial requirement in causal mediation analysis that pre-exposure covariates only may be adjusted for (Imai et al., 2011), current family economy and peri-traumatic exposure were not included in the statistical analysis applied in Paper II. Being a possible confounder, the lack of pre-exposure measures of somatic health may represent a limitation in this study, and particularly for the analysis in Paper II.

Selection bias may occur due to systematic differences between the study participants and the population of interest inducing differences between the estimated association among those selected and those eligible (Hernan, Hernandez-Diaz, & Robins, 2004). Biased

recruitment and biased attrition may contribute to selection bias. Unlike confounding, selection bias cannot be adjusted for in the analyses. However, maximizing response rates may counteract selection bias. In the Utøya study, strategies to secure recruitment and counteract attrition were carefully planned to secure as high a participation rate as possible. In the current study, the participation rates were 66% (participants at T1) and 52% (participants at both T1 and T2) in Papers I and II, respectively. Considering the high-impact trauma and the early conducting of the first study wave, the participation rate was considered satisfactory. A substantial minority, though, did not participate, possibly representing a selection bias. However, non-responders did not differ significantly compared to those who participated in one or more study waves with respect to age, gender, geographical region or, of note, hospitalization (Stene & Dyb, 2016). With respect to the two outcomes in Paper I and II, PTSR and somatic complaints, these variables were not available in the non-responders.

Partial response bias may occur when respondents have missing values on some variables. In particular, in Paper I “Interpersonal violence exposure” and “Provided psychiatric interventions” were recorded at T2, leaving a substantial amount of missing data. To reduce the effect of partial response, multiple imputation was performed. In the regression analyses, complete case analyses did not differ substantially from the analyses based on multiple imputations.

Information bias refers to measurement error in the variables applied in the analyses. Such bias is described as systematic when the variable is consistently wrongly measured in a particular direction, often due to an identifiable source.

Physical injury (hospitalized, non-hospitalized, and none) represented the exposure variable and was based on self-reports. To strengthen the validity of the distinction between the two injury categories, hospitalization was confirmed by information from hospital records. However, bias of the injury variable may have occurred due to its contemporary measurement with PTSR, possibly systematically biasing the report of injury and affecting the distinction between injured (non-hospitalized) and non-injured. Although there is a lack of validation studies, it may be argued that physical injury (yes or no) is not particularly prone to such measurement error. Also independently of PTSR, retrospective reporting of trauma exposure such as injury may be prone to recall bias. However, a validation study of retrospective self-reported injury found perfect (100%) agreement of the retrospective and prospective records of sustained injury (yes or no) (Gabbe, Finch, Bennell, & Wajswelner, 2003). In the

preliminary work with our study, attempts were made to provide a more objective differentiation between the non-hospitalized injured survivors and the non-injured survivors by the use of registry-based data. However, registry-based data turned out to be prone to several limitations. In brief, a complex acute aftermath made it difficult to trace information on those with injuries not requiring hospitalization. Presumably, some were treated at the scene and then went home with no or not localizable health information. Presumably also, some went directly home, and were treated after a period of time. Minor injuries were also treated at a range of different outpatient clinics, and health registries do not include information from all these. Therefore, a self-reported measure of injury was preferred, although infested with the uncertainties commonly related to self-reported data.

The outcome and mediator variables, PTSR, and somatic complaints (CSSI-8), were included as continuous measures in order to avoid arbitrary cutoffs and to retain as much information as possible (Royston, Altman, & Sauerbrei, 2006). Applied on American samples, the UCLA PTSD-RI has demonstrated good psychometric properties with an estimated sensitivity of 0.93 and specificity of 0.87 (Steinberg et al., 2004). For information only, levels of clinical PTSD were reported in Paper I. Notably, whereas most instruments use an intensity or frequency score of ≥ 2 to determine a “clinical” posttraumatic stress disorder symptom, the UCLA PTSD-RI uses a frequency score of ≥ 3 , potentially increasing the risk of under-diagnosis. The UCLA PTSD-RI has not been validated in adult or Norwegian samples, leaving the validity of the instrument with some uncertainty in our study. However, the measure has previously been used in Norwegian studies showing good psychometric properties (Jensen, Dyb, & Nygaard, 2009). Although there is no published validation study on CSSI-8, a yet-unpublished validation study concluded that it showed good psychometric properties and is suitable as a brief dimensional measure of multiple somatic complaints among youths (personal communication with L. Walker in 2016). Being based on self-reports, the measures of PTSR and somatic complaints were also prone to measurement errors such as being affected by other contemporarily measured variables, and by recall bias.

To sum up, confounding and bias challenge the internal validity of conclusions in this dissertation. As addressed above, methodological efforts were made to mitigate these challenges. However, all associations must be considered with caution, and strict conclusions on causality are not possible.

External validity

External validity refers to whether the results may be generalizable to populations outside the study sample (Rothman, 2012). Intended traumatic events such as terror attacks tend to bring about a higher prevalence of PTSR than non-intended (Ursano et al., 2017). As the type of trauma exposure may affect outcomes, the findings in the current dissertation may be most applicable to populations being exposed to similar events such as human-made mass trauma. However, human-made mass trauma may implicate large variations in exposure. For instance, it may be argued that being hit by a bomb represents a lower level of traumatic exposure than being hunted over a period of time, as was the case in the Utøya attack. Mass shootings in which victims are trapped and cannot escape may be most comparable. In the current dissertation, age may have varied more than in some studies after for instance school shootings, in which the age of the included participants may be more restricted to certain age levels. On the other hand, age may have varied less in our study than in studies conducted after disasters affecting whole communities. Despite the specific characteristics of the samples included in the current dissertation, it is plausible that the results may be generalizable also to other trauma populations. Knowing that age and ethnicity may interfere with post-trauma reactions, the conclusion may be most applicable to samples consisting of young victims situated in the western world.

4.5.2 Paper III

In the following, I will address some main methodological issues in Paper III by referring to four questions addressing key epistemic values in qualitative research (Moen & Middelthon, 2015).

Was the study transparent?

This question pertains to being explicit about methodological choices and documenting thoroughly the analytic process in order for others to be able to assess the study quality.

Throughout the research process, we aimed to make explicit methodological choices and we took measures to augment the transparency of the study by standardizing and documenting procedures. The choice of the qualitative study design was undertaken to correspond with the aim of the study, which was to broaden the understanding of trauma survivors' psychosocial needs and psychosocial care in the hospital from the perspective of

survivors themselves. The interviewers used the same interview guide and were trained to secure a common understanding of the included items and themes. The interviews were audiotaped. In writing up the paper, efforts were made to make clear what was an interviewee's statement and what was an interpretation by the researcher (Flick, 2018). Also, in order for others to be able to assess the study process, we sought to explain and document thoroughly the main methodological choices and turns and the analytical process in the paper. However, some important methodological aspects, such as the reason for the timing of the interviews, were not sufficiently outlined. In the Utøya study, many issues needed to be covered. In brief, reactions and symptoms were prioritized at the earlier time-points and views on the help and support was explored at T3. Also, at that time-point all hospitalized survivors were eligible for being interviewed.

Was the researcher positioned to understand?

Moen and Middelthon claim that this question is relatable to the question of *validity* in research applying statistical methods. The insight and understanding the researcher may reach is dependent on the degree to which she is positioned, or positions herself, to understand and learn. Positioning, as described by Moen and Middelthon, may be challenged by a range of methodological issues (Moen & Middelthon, 2015).

The qualitative research tradition is preoccupied with meaning, and it is made explicit that both the informants' and the researchers' interpretations of a phenomenon go into a co-production of knowledge (Pietkiewicz & Smith, 2014). In such processes, a certain empathetic closeness, but also a productive analytical distance from the study participants and the phenomena in focus, are required (Moen & Middelthon, 2015). Subjectivity is not regarded as a limitation in qualitative research, but rather as a factor playing its natural role in the knowledge production. Close engagement with the field generates experiences and insights that are drawn on in the analytic process. In our study, the majority (all except one) of the interviewers and the co-authors were psychologists and psychiatrists anchored in the clinical and research trauma field. Due to the researchers' backgrounds, there is reason to believe that empathetic commitment characterized the interviewing and the analytic process. However, these backgrounds both enabled and restricted what the researchers identified as important as well as their interpretations. Being rooted in the trauma field may have provided for the possibility of generating useful and clinically applicable knowledge. On the other hand, perspectives outside the conventions of the trauma field may have been overlooked. To

counteract this, explicit theoretical perspectives from outside the trauma field were applied in the analytic process. Further, the first, the fourth, and the last author were involved in providing the psychosocial care in focus for the study. This provided for an interest in conducting the study and an in-depth understanding of the setting. On the other hand, it may have directed the attention toward descriptions that highlighted positive psychosocial aspects of the hospital stay and led interpretations in a direction favorable to the provided care. To compensate for such bias, the analytical process was guided by elements from the Consensual Qualitative Model, promoting the use of research teams as described in more detail in the paper and below (Hill, 2015).

Regarding challenges related to the study design, the timing of the interviews, three years after the studied hospital stay, naturally influenced the way the informants remembered and added meaning to their experiences. Over time, memories and appraisals will naturally change and mature. However, previous research has demonstrated that situations infested with a certain level of distress, such as a peri-traumatic phase, promote one's recollection of the situation (Siegel, 2015). It is difficult to determine how time may have affected the interviewees' memories and how they interpreted them in our study. If we had interviewed the youths shortly after their experiences, their memories would maybe have been more explicit while also influenced by their early post-trauma emotional state. Interviewing them some time after, provided for reflections taking into account broader perspectives from their lives after the dramatic early aftermath. Further, as described in the paper, the length of the interviews varied substantially. When conducting interviews with open-ended questions, the length of the interview depends not only on the interviewer and on the posed questions, but also on the person being interviewed. Some of our informants were rich in words and interested in reflecting on their experiences, while others were unhappy about opening up about themselves. The interviewers were primed to encourage the interviewees to give rich descriptions. However, due to personal and contextual factors, this was not always attainable.

Was the study positioned to transcend perspectives?

As Moen and Middelthon claim, this question is, to some extent, parallel to what is addressed by the concept of *reliability*, or reproducibility, in quantitative research. In qualitative research, the researchers, as well as the informants, are important participants in the knowledge production. Although the subjectivity of these co-producers of knowledge are

accepted and valued as legitimate in the knowledge production, the researchers should strive to arrive at understandings that transcend singular perspectives.

In our study, efforts were made to reach a multitude of both informants' and researchers' perspectives. We strived for a complexity in views in the population as a whole, rather than looking for a comprehensive analysis of a singular case, two different approaches both acknowledged in interpretative phenomenological analysis (Pietkiewicz & Smith, 2014). During the analytic process, we first engaged in the experiences of each single case. Subsequently, we compared across cases aiming to identify both similar and contrasting perspectives. The analytic process resulted in themes that seemed to be relevant across cases. All interviewers were somewhat inexperienced with interviewing for research purposes. They seemed to stay close to the interview guide, possibly limiting the complexity of perspectives. In order to transcend the researchers' singular perspectives, elements from consensual qualitative research were integrated throughout the research process. Two research teams were formed, both engaging in the examination and analysis of the data, discussing with each other, and integrating a multitude of perspectives and consensually arriving at common understandings. Notably, one of the team members was a political scientist, which contributed to perspectives from outside the health related trauma field.

Was the study positioned to produce knowledge and insight that is portable?

Producing knowledge applicable to contexts and groups beyond those studied is essential in qualitative as well as quantitative research. In quantitative research, the term *generalizability* is often used. Descriptions and analyses in addition to explicit theoretical engagement are essential to making the insight from qualitative studies portable (Moen & Middelthon, 2015).

In the first analytical phase, aiming at producing clinically relevant and useful knowledge, we tried to stay as open minded, that is, not explicitly guided by theoretical frameworks, and as close to the empirical data as possible taking into consideration our embeddedness in the trauma field. However, studies without explicit theoretical commitment tend to fail in transcending what is already known (Malterud, 2016). In a second phase, therefore, our analyses were guided by the findings and the underlying theoretical assumptions from a sociological study, "The potential of the commonplace," of interaction between clients and staff in a treatment center for drug abusers (Skatvedt & Schou, 2010).

The study is embedded in theoretical perspectives from theorists such as Goffman, Becker, and Asplund, underpinning how identity and selves are constructed through social interaction. Using this framework enabled us to identify when, and add meaning to how, apparently trivial togetherness constituted powerful moments in the youths' progress toward health and normalization (Malterud, 2016). Qualitative research is to various degrees committed to theoretical elaboration. Our study, being founded in the pragmatic field of medical practice and the tradition of generating clinically applicable knowledge, did not aim at elaborating on and developing theory (Malterud, 2016). However, we believe that including Skatvedt's study in the analytic process may have contributed to strengthening the portability of the findings in our study as the underlying framework addresses basic interpersonal mechanisms applicable to many settings involving human interaction.

5 Main conclusions

After mass trauma such as terrorist attacks, physically injured survivors constitute a vulnerable group as they may struggle with high levels of both mental and somatic health problems. More specifically, survivors with various levels of injury, ranging from minor, (requiring treatment at the scene or in out-patient clinics) to severe (requiring advanced medical care), may be prone to developing particularly high levels of posttraumatic stress reactions (PTSR) and somatic complaints. Many mechanisms are involved in the evolution of health problems among injured trauma survivors. Peri-traumatic exposure may play an important role in the development of PTSR. Further, in the development of somatic complaints, PTSR may represent an essential mechanism for survivors with less severe injuries in particular, while other mechanisms may be more important among those with more severe injuries. For injured trauma survivors admitted to hospital, the early post-trauma phase may be particularly difficult due to specific challenges related to injuries and the clinical context. However, in a hospital, trauma survivors' distress can also be mitigated and essential emotional needs can be met by health care professionals employing various psychosocial care approaches. Both trauma-focused interventions and commonplace actions and conversations may be powerful in helping these survivors regaining health and normalcy.

6 Main clinical and future research implications

6.1 *Clinical implications*

1. Physical injury may be a clinically useful marker of potentially high levels of posttraumatic stress reactions and somatic complaints after traumatic mass events. In addition to providing the required medical health care, cautious mental health care follow-up should be provided for both hospitalized and non-hospitalized injured survivors.
2. As physically injured trauma survivors may experience both somatic and mental health complaints, a broad perspective including biological, psychological and social factors should be applied when providing health care for this group.
3. To provide better early psychosocial support, hospitals treating injured survivors should provide trauma-focused care and in addition better utilize the therapeutic power of commonplace interactions.

6.2 *Future research implications*

1. Future studies after mass trauma should address how a wide range of injuries, ranging from minor to severe, may affect various aspects of health development.
2. Future trauma research needs to assess models addressing target points for intervention. In particular, models including mechanisms contributing to poorer health among injured trauma survivors should be assessed.
3. In research after mass trauma, efforts should be made to develop and apply measures of injury which do not rely solely on self-reports, but also on more objective data, such as data extracted from clinical databases.
4. Commonplace interactions in post-trauma settings of care should be studied more deeply in order to better understand their healing potential.
5. To complement knowledge generated by quantitative methods, future research after mass trauma could benefit from applying qualitative methods to a greater extent.

Further, qualitative trauma research may benefit from more explicit theoretical engagement.

6. Knowledge production within the trauma research field may benefit from commitment to interdisciplinary collaborations.

7 References

- Abenham, L., Dab, W., & Salmi, L. R. (1992). Study of civilian victims of terrorist attacks (France 1982–1987). *J Clin Epidemiol*, 45(2), 103–109.
- Adhikari Baral, I., & K, C. B. (2019). Post traumatic stress disorder and coping strategies among adult survivors of earthquake, Nepal. *BMC Psychiatry*, 19(1), 118. doi:10.1186/s12888-019-2090-y
- Afari, N., Ahumada, S. M., Wright, L. J., Mostoufi, S., Golnari, G., Reis, V., & Cuneo, J. G. (2014). Psychological trauma and functional somatic syndromes: a systematic review and meta-analysis. *Psychosom Med*, 76(1), 2–11. doi:10.1097/psy.0000000000000010
- Alisic, E., Conroy, R., Magyar, J., Babl, F. E., & O'Donnell, M. L. (2014). Psychosocial care for seriously injured children and their families: a qualitative study among emergency department nurses and physicians. *Injury*, 45(9), 1452–1458. doi:10.1016/j.injury.2014.02.015
- Alisic, E., Jongmans, M. J., van Wesel, F., & Kleber, R. J. (2011). Building child trauma theory from longitudinal studies: a meta-analysis. *Clin Psychol Rev*, 31(5), 736–747. doi:10.1016/j.cpr.2011.03.001
- Alisic, E., Zalta, A. K., van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: meta-analysis. *Br J Psychiatry*, 204, 335–340. doi:10.1192/bjp.bp.113.131227
- Alper, H. E., Yu, S., Stellman, S. D., & Brackbill, R. M. (2017). Injury, intense dust exposure, and chronic disease among survivors of the World Trade Center terrorist attacks of September 11, 2001. *Inj Epidemiol*, 4(1), 17. doi:10.1186/s40621-017-0115-x
- American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4, Text Revision Ed.). Washington: APA.
- Baker, S. P., O'Neill, B., Haddon, W., Jr., & Long, W. B. (1974). The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *J Trauma*, 14(3), 187–196.
- Banerjee, S. B., Morrison, F. G., & Ressler, K. J. (2017). Genetic approaches for the study of PTSD: Advances and challenges. *Neurosci Lett*, 649, 139–146. doi:10.1016/j.neulet.2017.02.058
- Becker-Blease, K. A., & Freyd, J. J. (2006). Research participants telling the truth about their lives: The ethics of asking and not asking about abuse. *Am Psychol*, 61(3), 218–226. doi:10.1037/0003-066x.61.3.218
- Bisson, J. I. (2007). Post-traumatic stress disorder. *Occup Med (Lond)*, 57(6), 399–403. doi:10.1093/occmed/kqm069
- Bisson, J. I., Tavakoly, B., Witteveen, A. B., Ajdukovic, D., Jehel, L., Johansen, V. J., . . . Olff, M. (2010). TENTS guidelines: development of post-disaster psychosocial care guidelines through a Delphi process. *Br J Psychiatry*, 196(1), 69–74. doi:10.1192/bjp.bp.109.066266

- Bloch, Y. H., Leiba, A., Veaacnin, N., Paizer, Y., Schwartz, D., Kraskas, A., . . . Bar-Dayana, Y. (2007). Managing mild casualties in mass-casualty incidents: lessons learned from an aborted terrorist attack. *Prehosp Disaster Med*, 22(3), 181–185.
- Bonanno, G. A., Galea, S., Bucciarelli, A., & Vlahov, D. (2006). Psychological resilience after disaster: New York City in the aftermath of the September 11th terrorist attack. *Psychol Sci*, 17(3), 181–186. doi:10.1111/j.1467-9280.2006.01682.x
- Boscarino, J. A. (2004). Posttraumatic stress disorder and physical illness: results from clinical and epidemiologic studies. *Ann N Y Acad Sci*, 1032, 141–153. doi:10.1196/annals.1314.011
- Brackbill, R. M., Alper, H. E., Frazier, P., Gargano, L. M., Jacobson, M. H., & Solomon, A. (2019). An Assessment of Long-Term Physical and Emotional Quality of Life of Persons Injured on 9/11/2001. *Int J Environ Res Public Health*, 16(6). doi:10.3390/ijerph16061054
- Brackbill, R. M., Cone, J. E., Farfel, M. R., & Stellman, S. D. (2014). Chronic physical health consequences of being injured during the terrorist attacks on World Trade Center on September 11, 2001. *Am J Epidemiol*, 179(9), 1076–1085. doi:10.1093/aje/kwu022
- Brackbill, R. M., Hadler, J. L., DiGrande, L., Ekenga, C. C., Farfel, M. R., Friedman, S., . . . Thorpe, L. E. (2009). Asthma and posttraumatic stress symptoms 5 to 6 years following exposure to the World Trade Center terrorist attack. *Jama*, 302(5), 502–516. doi:10.1001/jama.2009.1121
- Brennstuhl, M. J., Tarquinio, C., & Montel, S. (2015). Chronic Pain and PTSD: Evolving Views on Their Comorbidity. *Perspect Psychiatr Care*, 51(4), 295–304. doi:10.1111/ppc.12093
- Brewin, C. R. (2005). Risk factor effect sizes in PTSD: what this means for intervention. *J Trauma Dissociation*, 6(2), 123–130. doi:10.1300/J229v06n02_11
- Brosbe, M. S., Hoeffling, K., & Faust, J. (2011). Predicting posttraumatic stress following pediatric injury: a systematic review. *J Pediatr Psychol*, 36(6), 718–729. doi:10.1093/jpepsy/jsq115
- Bruce, M. M., Kassam-Adams, N., Rogers, M., Anderson, K. M., Sluys, K. P., & Richmond, T. S. (2018). Trauma Providers' Knowledge, Views, and Practice of Trauma-Informed Care. *J Trauma Nurs*, 25(2), 131–138. doi:10.1097/jtn.0000000000000356
- Bryant, R. A. (2011). Mental disorders and traumatic injury. *Depress Anxiety*, 28(2), 99–102. doi:10.1002/da.20786
- Brymer, M., Jacobs, A., Layne, C., Pynoos, R., Ruzek, J., Steinberg, A., & al., e. (2006). Psychological First Aid Field Operations Guide. In N. C. T. S. N. a. N. C. f. PTSD (Ed.), (2nd Ed.).
- Carlson, E. B., Newman, E., Daniels, J. W., Armstrong, J., Roth, D., & Loewenstein, R. (2003). Distress in response to and perceived usefulness of trauma research interviews. *J Trauma & Dissociation*, 4(2), 131–142.
- Chadwick, R., Ten Have, H., & Meslin, E. M. (2011). *The SAGE Handbook of Health Care Ethics*: Sage Publications.
- Cohen, J. A., Mannarino, A. P., & Deblinger, E. (2016). *Treating Trauma and Traumatic Grief in Children and Adolescents*: Guilford Publications.

- Cone, J. E., Li, J., Kornblith, E., Gocheva, V., Stellman, S. D., Shaikh, A., . . . Bowler, R. M. (2015). Chronic probable PTSD in police responders in the World Trade Center health registry ten to eleven years after 9/11. *Am J Ind Med*, 58(5), 483–493. doi:10.1002/ajim.22446
- Conejo-Galindo, J., Medina, O., Fraguas, D., Teran, S., Sainz-Corton, E., & Arango, C. (2008). Psychopathological sequelae of the 11 March terrorist attacks in Madrid : an epidemiological study of victims treated in a hospital. *Eur Arch Psychiatry Clin Neurosci*, 258(1), 28–34. doi:10.1007/s00406-007-0758-7
- Copes, W. S., Champion, H. R., Sacco, W. J., Lawnick, M. M., Keast, S. L., & Bain, L. W. (1988). The Injury Severity Score Revisited. *J Trauma*, 28(1), 69–77.
- Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2008). A meta-analysis of risk factors that predict psychopathology following accidental trauma. *J Spec Pediatr Nurs*, 13(2), 98–110. doi:10.1111/j.1744-6155.2008.00141.x
- D'Andrea, W., Sharma, R., Zelechowski, A. D., & Spinazzola, J. (2011). Physical health problems after single trauma exposure: when stress takes root in the body. *J Am Psychiatr Nurses Assoc*, 17(6), 378–392. doi:10.1177/1078390311425187
- Davydow, D. S., Katon, W. J., & Zatzick, D. F. (2009). Psychiatric morbidity and functional impairments in survivors of burns, traumatic injuries, and ICU stays for other critical illnesses: a review of the literature. *Int Rev Psychiatry*, 21(6), 531–538. doi:10.3109/09540260903343877
- Defrin, R., Lahav, Y., & Solomon, Z. (2017). Dysfunctional Pain Modulation in Torture Survivors: The Mediating Effect of PTSD. *J Pain*, 18(1), 1–10. doi:10.1016/j.jpain.2016.09.005
- Desborough, J. P. (2000). The stress response to trauma and surgery. *Br J Anaesth*, 85(1), 109–117. doi:10.1093/bja/85.1.109
- Desivilya, H. S., Gal, R., & Ayalon, O. (1996). Extent of victimization, traumatic stress symptoms, and adjustment of terrorist assault survivors: a long-term follow-up. *J Trauma Stress*, 9(4), 881–889.
- DiGrande, L., Neria, Y., Brackbill, R. M., Pulliam, P., & Galea, S. (2011). Long-term posttraumatic stress symptoms among 3,271 civilian survivors of the September 11, 2001, terrorist attacks on the World Trade Center. *Am J Epidemiol*, 173(3), 271–281. doi:10.1093/aje/kwq372
- DiGrande, L., Perrin, M. A., Thorpe, L. E., Thalji, L., Murphy, J., Wu, D., . . . Brackbill, R. M. (2008). Posttraumatic stress symptoms, PTSD, and risk factors among lower Manhattan residents 2–3 years after the September 11, 2001 terrorist attacks. *J Trauma Stress*, 21(3), 264–273. doi:10.1002/jts.20345
- Dyb, G., Jensen, T., Glad, K. A., Nygaard, E., & Thoresen, S. (2014). Early outreach to survivors of the shootings in Norway on the 22nd of July 2011. *Eur J Psychotraumatol*, 5. doi:10.3402/ejpt.v5.23523
- Dyb, G., Jensen, T. K., Nygaard, E., Ekeberg, O., Diseth, T. H., Wentzel-Larsen, T., & Thoresen, S. (2014). Post-traumatic stress reactions in survivors of the 2011 massacre on Utøya Island, Norway. *Br J Psychiatry*, 204, 361–367. doi:10.1192/bjp.bp.113.133157

- Dyregrov, K. (2004). Bereaved parents' experience of research participation. *Soc Sci Med*, 58(2), 391–400.
- Dyster-Aas, J., Arnberg, F. K., Lindam, A., Johannesson, K. B., Lundin, T., & Michel, P. O. (2012). Impact of physical injury on mental health after the 2004 Southeast Asia tsunami. *Nord J Psychiatry*, 66(3), 203–208. doi:10.3109/08039488.2011.621975
- Efron, B., & Tibshirani, R. J. (1994). *An Introduction to the Bootstrap*: Taylor & Francis.
- Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behav Res Ther*, 38(4), 319–345.
- Ekeberg, Ø., Diseth, T. H., Small, T., Skogstad, L., Eide, E., & Bjartveit, M. (2014). Psykososiale tiltak i sykehus etter terrorhandlingene 22.7.2011 [Psychosocial interventions in hospital after the terrorist acts 22.7.2011]. *Norsk tidsskrift for palliativ medisin*, 31(1), 31–34.
- Engel, G. L. (1977). The need for a new medical model: a challenge for biomedicine. *Science*, 196(4286), 129–136.
- Everytown for Gun Safety. (2019). White Swan Shootings Appear to Be the 11th Mass Shooting of 2019. Retrieved from <https://everytown.org/press/white-swan-shootings-appear-to-be-the-11th-mass-shooting-of-2019/>
- Farfel, M., DiGrande, L., Brackbill, R., Prann, A., Cone, J., Friedman, S., . . . Thorpe, L. (2008). An overview of 9/11 experiences and respiratory and mental health conditions among World Trade Center Health Registry enrollees. *J Urban Health*, 85(6), 880–909. doi:10.1007/s11524-008-9317-4
- Fergus, T. A., Rabenhorst, M. M., Orcutt, H. K., & Valentiner, D. P. (2011). Reactions to trauma research among women recently exposed to a campus shooting. *J Trauma Stress*, 24(5), 596–600. doi:10.1002/jts.20682
- Flick, U. (2018). *An Introduction to Qualitative Research*. London: Sage publications ltd.
- Ford, J. L., & Browning, C. R. (2014). Effects of exposure to violence with a weapon during adolescence on adult hypertension. *Ann Epidemiol*, 24(3), 193–198. doi:10.1016/j.annepidem.2013.12.004
- Foster, K., Young, A., Mitchell, R., Van, C., & Curtis, K. (2017). Experiences and needs of parents of critically injured children during the acute hospital phase: A qualitative investigation. *Injury*, 48(1), 114–120. doi:10.1016/j.injury.2016.09.034
- Furr, J. M., Comer, J. S., Edmunds, J. M., & Kendall, P. C. (2010). Disasters and youth: a meta-analytic examination of posttraumatic stress. *J Consult Clin Psychol*, 78(6), 765–780. doi:10.1037/a0021482
- Gaarder, B. I. (2011). [How to meet the unthinkable--Utoya 22 July 2011]. *Tidsskr Nor Laegeforen*, 131(18), 1746. doi:10.4045/tidsskr.11.0966
- Gaarder, C., Jorgensen, J., Kolstadbraaten, K. M., Isaksen, K. S., Skattum, J., Rimstad, R., . . . Naess, P. A. (2012). The twin terrorist attacks in Norway on July 22, 2011: the trauma center response. *J Trauma Acute Care Surg*, 73(1), 269–275. doi:10.1097/TA.0b013e31825a787f
- Gabbe, B. J., Finch, C. F., Bennell, K. L., & Wajswelner, H. (2003). How valid is a self reported 12 month sports injury history? *Br J Sports Med*, 37(6), 545–547. doi:10.1136/bjsm.37.6.545

- Galea, S., Nandi, A., & Vlahov, D. (2005). The epidemiology of post-traumatic stress disorder after disasters. *Epidemiol Rev*, 27, 78–91. doi:10.1093/epirev/mxi003
- Galea, S., Vlahov, D., Resnick, H., Ahern, J., Susser, E., Gold, J., . . . Kilpatrick, D. (2003). Trends of probable post-traumatic stress disorder in New York City after the September 11 terrorist attacks. *Am J Epidemiol*, 158(6), 514-524.
- Gargano, L. M., Gershon, R. R., & Brackbill, R. M. (2016). Quality of Life of Persons Injured on 9/11: Qualitative Analysis from the World Trade Center Health Registry. *PLoS Curr*, 8. doi:10.1371/currents.dis.7c70f66c1e6c5f41b43c797cb2a04793
- George, E., Elman, I., Becerra, L., Berg, S., & Borsook, D. (2016). Pain in an era of armed conflicts: Prevention and treatment for warfighters and civilian casualties. *Prog Neurobiol*, 141, 25–44. doi:10.1016/j.pneurobio.2016.04.002
- Giordano, N. A., Bader, C., Richmond, T. S., & Polomano, R. C. (2018). Complexity of the Relationships of Pain, Posttraumatic Stress, and Depression in Combat-Injured Populations: An Integrative Review to Inform Evidence-Based Practice. *Worldviews Evid Based Nurs*, 15(2), 113–126. doi:10.1111/wvn.12274
- Gironda, R. J., Clark, M. E., Massengale, J. P., & Walker, R. L. (2006). Pain among veterans of Operations Enduring Freedom and Iraqi Freedom. *Pain Med*, 7(4), 339–343. doi:10.1111/j.1526-4637.2006.00146.x
- Giummarra, M. J., Lennox, A., Dali, G., Costa, B., & Gabbe, B. J. (2018). Early psychological interventions for posttraumatic stress, depression and anxiety after traumatic injury: A systematic review and meta-analysis. *Clin Psychol Rev*, 62, 11–36. doi:10.1016/j.cpr.2018.05.001
- Gold, J. I., Kant, A. J., & Kim, S. H. (2008). The impact of unintentional pediatric trauma: a review of pain, acute stress, and posttraumatic stress. *J Pediatr Nurs*, 23(2), 81–91. doi:10.1016/j.pedn.2007.08.005
- Gooberman-Hill, R., & Fox, R. (2011). What can qualitative approaches bring to trauma outcome research? *Injury*, 42(4), 321–323. doi:10.1016/j.injury.2011.01.021
- Green, B. L., & Kimerling, R. (2004). Trauma, posttraumatic stress disorder, and health status. In P. P. Schnurr & B. L. Green (Eds.), *Trauma and Health: Physical Health Consequences of Exposure to Extreme Stress*. Washington, DC: American Psychological Association.
- Greenspan, A. I., & Kellermann, A. L. (2002). Physical and psychological outcomes 8 months after serious gunshot injury. *J Trauma*, 53(4), 709–716. doi:10.1097/01.ta.0000022350.03761.f8
- Grieger, T. A., Cozza, S. J., Ursano, R. J., Hoge, C., Martinez, P. E., Engel, C. C., & Wain, H. J. (2006). Posttraumatic stress disorder and depression in battle-injured soldiers. *Am J Psychiatry*, 163(10), 1777–1783; quiz 1860. doi:10.1176/appi.ajp.163.10.1777
- Grieger, T. A., Waldrep, D. A., Lovasz, M. M., & Ursano, R. J. (2005). Follow-up of Pentagon employees two years after the terrorist attack of September 11, 2001. *Psychiatr Serv*, 56(11), 1374–1378. doi:10.1176/appi.ps.56.11.1374
- Grimholt, T. K., Skogstad, L., Hafstad, G. S., Vallersnes, O. M., & Ekeberg, O. (2018). [July 22, 2011 psychological reactions in patients at the accident and emergency department in Oslo]. *Tidsskr Nor Laegeforen*, 138(11). doi:10.4045/tidsskr.17.0132

- Gupta, M. A. (2013). Review of somatic symptoms in post-traumatic stress disorder. *Int Rev Psychiatry*, 25(1), 86–99. doi:10.3109/09540261.2012.736367
- Gwet, K. L. (2014). *Handbook of Inter-rater Reliability: The Definitive Guide to Measuring the Extent of Agreement Among Raters*: Advanced Analytics, LLC.
- Haga, J. M., Stene, L. E., Wentzel-Larsen, T., Thoresen, S., & Dyb, G. (2015). Early postdisaster health outreach to modern families: a cross-sectional study. *BMJ Open*, 5(12), e009402. doi:10.1136/bmjopen-2015-009402
- Hall, K. S., Hoerster, K. D., & Yancy, W. S., Jr. (2015). Post-traumatic stress disorder, physical activity, and eating behaviors. *Epidemiol Rev*, 37, 103–115. doi:10.1093/epirev/mxu011
- Hamrin, V., Jonker, B., & Scahill, L. (2004). Acute stress disorder symptoms in gunshot-injured youth. *J Child and Adolescent Psychiatric Nursing*, 17(4), 161–172.
- Hernan, M. A. (2004). A definition of causal effect for epidemiological research. *J Epidemiol Commun H*, 58(4), 265–271. doi:10.1136/jech.2002.006361
- Hernan, M. A., Hernandez-Diaz, S., & Robins, J. M. (2004). A structural approach to selection bias. *Epidemiology*, 15(5), 615–625.
- Heron-Delaney, M., Kenardy, J., Charlton, E., & Matsuoka, Y. (2013). A systematic review of predictors of posttraumatic stress disorder (PTSD) for adult road traffic crash survivors. *Injury*, 44(11), 1413–1422. doi:10.1016/j.injury.2013.07.011
- Hill, C. E. (2015). Consensual qualitative research (CQR): Methods for conducting psychotherapy research. In *Psychotherapy Research* (pp. 485–499): Springer.
- Hill, C. E., Knox, S., Thompson, B. J., Williams, E. N., Hess, S. A., & Ladany, N. (2005). Consensual qualitative research: An update. *J Couns Psychol*, 52(2), 196.
- Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., . . . Ursano, R. J. (2007). Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*, 70(4), 283–315; discussion 316–269. doi:10.1521/psyc.2007.70.4.283
- Holman, E. A., Silver, R. C., Poulin, M., Andersen, J., Gil-Rivas, V., & McIntosh, D. N. (2008). Terrorism, acute stress, and cardiovascular health: a 3-year national study following the September 11th attacks. *Arch Gen Psychiatry*, 65(1), 73–80. doi:10.1001/archgenpsychiatry.2007.6
- Holmes, A., Williamson, O., Hogg, M., Arnold, C., Prosser, A., Clements, J., . . . O'Donnell, M. (2010). Predictors of pain 12 months after serious injury. *Pain Med*, 11(11), 1599–1611. doi:10.1111/j.1526-4637.2010.00955.x
- Hsu, C. C., Chong, M. Y., Yang, P., & Yen, C. F. (2002). Posttraumatic stress disorder among adolescent earthquake victims in Taiwan. *J Am Acad Child Adolesc Psychiatry*, 41(7), 875–881. doi:10.1097/00004583-200207000-00022
- Imai, K., Keele, L., & Tingley, D. (2010). A general approach to causal mediation analysis. *Psychol Methods*, 15(4), 309–334. doi:10.1037/a0020761
- Imai, K., Keele, L., Tingley, D., & Yamamoto, T. (2011). Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies. *Am Polit Sci Rev*, 765–789.

- Institute for Economics & Peace. (2018). *Global Terrorism Index 2018: Measuring the impact of terrorism Report number: IEP Report 63*. Retrieved from <http://visionofhumanity.org/app/uploads/2018/12/Global-Terrorism-Index-2018-1.pdf>.
- International Society for Traumatic Stress Studies (2019). New ISTSS Prevention and Treatment Guidelines. Retrieved from https://www.istss.org/getattachment/Treating-Trauma/New-ISTSS-Prevention-and-Treatment-Guidelines/ISTSS_PreventionTreatmentGuidelines_FNL-March-19-2019.pdf.aspx
- Isaranuwatthai, W., Coyte, P. C., McKenzie, K., & Noh, S. (2013). Impact of the 2004 tsunami on self-reported physical health in Thailand for the subsequent 2 years. *Am J Public Health, 103*(11), 2063–2070. doi:10.2105/ajph.2013.301248
- Jay, R. (1996). Reassuring and reducing anxiety in seriously injured patients: a study of accident and emergency interventions. *Accid Emerg Nurs, 4*(3), 125–131.
- Jenewein, J., Wittmann, L., Moergeli, H., Creutzig, J., & Schnyder, U. (2009). Mutual influence of posttraumatic stress disorder symptoms and chronic pain among injured accident survivors: a longitudinal study. *J Trauma Stress, 22*(6), 540–548. doi:10.1002/jts.20453
- Jensen, T. K., Dyb, G., & Nygaard, E. (2009). A longitudinal study of posttraumatic stress reactions in Norwegian children and adolescents exposed to the 2004 tsunami. *Arch Pediatr Adolesc Med, 163*(9), 856–861. doi:10.1001/archpediatrics.2009.151
- Jiang, T., Webster, J. L., Robinson, A., Kassam-Adams, N., & Richmond, T. S. (2018). Emotional responses to unintentional and intentional traumatic injuries among urban black men: A qualitative study. *Injury, 49*(5), 983–989. doi:10.1016/j.injury.2017.12.002
- Kahana, S. Y. F., Norah C.; Youngstrom, Eric A.; Drotar, D. (2006). Posttraumatic stress in youth experiencing illnesses and injuries: An exploratory meta-analysis. *Traumatology, 12*(2), 148–161. doi:<http://dx.doi.org/10.1177/1534765606294562>
- Karacabey, K. (2005). Effect of regular exercise on health and disease. *Neuro Endocrinol Lett, 26*(5), 617–623.
- Kassam-Adams, N., Marsac, M. L., Hildenbrand, A., & Winston, F. (2013). Posttraumatic stress following pediatric injury: update on diagnosis, risk factors, and intervention. *JAMA Pediatr, 167*(12), 1158–1165. doi:10.1001/jamapediatrics.2013.2741
- Kassam-Adams, N., & Newman, E. (2005). Child and parent reactions to participation in clinical research. *Gen Hosp Psychiatry, 27*(1), 29–35. doi:10.1016/j.genhosppsych.2004.08.007
- Kazak, A. E. (2006). Pediatric Psychosocial Preventative Health Model (PPPHM): Research, practice, and collaboration in pediatric family systems medicine. *Fam Sys Health, 24*(4), 381.
- Kendrick, D., Baker, R., Hill, T., Beckett, K., Coupland, C., Kellezi, B., . . . Morriss, R. (2018). Early risk factors for depression, anxiety and post-traumatic distress after hospital admission for unintentional injury: Multicentre cohort study. *J Psychosom Res, 112*, 15–24. doi:10.1016/j.jpsychores.2018.06.008
- Keskinen-Rosenqvist, R., Michelsen, H., Schulman, A., & Wahlstrom, L. (2011). Physical symptoms 14 months after a natural disaster in individuals with or without injury are

- associated with different types of exposure. *J Psychosom Res*, 71(3), 180–187. doi:10.1016/j.jpsychores.2011.01.015
- Kirkwood, B. R., & Sterne, J. A. (2010). *Essential Medical Statistics*: John Wiley & Sons.
- Koenen, K. C., Sumner, J. A., Gilsanz, P., Glymour, M. M., Ratanatharathorn, A., Rimm, E. B., . . . Kubzansky, L. D. (2017). Post-traumatic stress disorder and cardiometabolic disease: improving causal inference to inform practice. *Psychol Med*, 47(2), 209–225. doi:10.1017/s0033291716002294
- Koren, D., Hemel, D., & Klein, E. (2006). Injury increases the risk for PTSD: an examination of potential neurobiological and psychological mediators. *CNS Spectr*, 11(8), 616–624. doi:10.1017/S1092852900013675
- Koren, D., Norman, D., Cohen, A., Berman, J., & Klein, E. M. (2005). Increased PTSD risk with combat-related injury: a matched comparison study of injured and uninjured soldiers experiencing the same combat events. *Am J Psychiatry*, 162(2), 276–282. doi:10.1176/appi.ajp.162.2.276
- Kugler, B. B., Bloom, M., Kaercher, L. B., Truax, T. V., & Storch, E. A. (2012). Somatic symptoms in traumatized children and adolescents. *Child Psychiat Hum Dev*, 43(5), 661–673. doi:10.1007/s10578-012-0289-y
- Kulka, R., Schlenger, W., Fairbank, J., Hough, R., Jordan, B., Marmar, C., & Weiss, D. (1990). *Trauma and the Vietnam War Generation: Report of Findings from the National Vietnam Veterans Readjustment Study*. New York: Brunner/Mazel.
- Kuo, H. W., Wu, S. J., Ma, T. C., Chiu, M. C., & Chou, S. Y. (2007). Posttraumatic symptoms were worst among quake victims with injuries following the Chi-chi quake in Taiwan. *J Psychosom Res*, 62(4), 495–500. doi:10.1016/j.jpsychores.2004.11.012
- Kvale, S. (1996). *Interviews. An Introduction to Qualitative Research Interviewing*. London: Sage publications.
- Kvale, S. (2008). *Doing Interviews*: Sage.
- Langeland, W., & Olff, M. (2008). Psychobiology of posttraumatic stress disorder in pediatric injury patients: a review of the literature. *Neurosci Biobehav Rev*, 32(1), 161–174. doi:10.1016/j.neubiorev.2007.07.002
- Langley, J., & Brenner, R. (2004). What is an injury? *Inj Prev*, 10(2), 69–71.
- Lee, S. Y., Finkelstein-Fox, L., Park, C. L., Mazure, C. M., Huedo-Medina, T. B., & Hoff, R. (2018). Bidirectionality of Pain Interference and PTSD Symptoms in Military Veterans: Does Injury Status Moderate Effects? *Pain Med*. doi:10.1093/pm/pny133
- Lewis, S. J., Arseneault, L., Caspi, A., Fisher, H. L., Matthews, T., Moffitt, T. E., . . . Danese, A. (2019). The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. *Lancet Psychiat*, 6(3), 247–256. doi:10.1016/s2215-0366(19)30031-8
- Lovstad, M., Manum, G., Wisloff-Aase, K., Hafstad, G. S., Raeder, J., Larsen, I., . . . Schanke, A. K. (2019). Persons injured in the 2011 terror attacks in Norway – Relationship between post-traumatic stress symptoms, emotional distress, fatigue, sleep, and pain outcomes, and medical and psychosocial factors. *Disabil Rehabil*, 1–9. doi:10.1080/09638288.2019.1585489

- Lowell, A., Suarez-Jimenez, B., Helpman, L., Zhu, X., Durosky, A., Hilburn, A., . . . Neria, Y. (2018). 9/11-related PTSD among highly exposed populations: a systematic review 15 years after the attack. *Psychol Med*, 48(4), 537–553. doi:10.1017/s0033291717002033
- Malt, U. (1988). The long-term psychiatric consequences of accidental injury. A longitudinal study of 107 adults. *Br J Psychiatry*, 153, 810–818.
- Malterud, K. (2016). Theory and interpretation in qualitative studies from general practice: Why and how? *Scand J Public Health*, 44(2), 120–129. doi:10.1177/1403494815621181
- Manum, G., Lovstad, M., Wisloff-Aase, K., Raeder, J., Schanke, A. K., Larsen, I., . . . Stanghelle, J. K. (2019). Clinical characteristics and physical functioning in persons hospitalized following the Norwegian terror attacks in July 2011: A follow up study. *J Rehabil Med*, 51(3), 225–233. doi:10.2340/16501977-2521
- Marres, G. M., Leenen, L. P., de Vries, J., Mulder, P. G., & Vermetten, E. (2011). Disaster-related injury and predictors of health complaints after exposure to a natural disaster: an online survey. *BMJ Open*, 1(2), e000248. doi:10.1136/bmjopen-2011-000248
- Marsac, M. L., Ciesla, J., Barakat, L. P., Hildenbrand, A. K., Delahanty, D. L., Widaman, K., . . . Kassam-Adams, N. (2016). The role of appraisals and coping in predicting posttraumatic stress following pediatric injury. *Psychol Trauma*, 8(4), 495–503. doi:10.1037/tra0000116
- Marsac, M. L., Kassam-Adams, N., Delahanty, D. L., Ciesla, J., Weiss, D., Widaman, K. F., & Barakat, L. P. (2017). An initial application of a biopsychosocial framework to predict posttraumatic stress following pediatric injury. *Health Psychol*, 36(8), 787–796. doi:10.1037/hea0000508
- Marsac, M. L., Kassam-Adams, N., Delahanty, D. L., Widaman, K. F., & Barakat, L. P. (2014). Posttraumatic stress following acute medical trauma in children: a proposed model of bio-psycho-social processes during the peri-trauma period. *Clin Child Fam Psychol Rev*, 17(4), 399–411. doi:10.1007/s10567-014-0174-2
- Martin-Herz, S. P., Zatzick, D. F., & McMahon, R. J. (2012). Health-related quality of life in children and adolescents following traumatic injury: a review. *Clin Child Fam Psychol Rev*, 15(3), 192–214. doi:10.1007/s10567-012-0115-x
- McDermott, M., Duffy, M., Percy, A., Fitzgerald, M., & Cole, C. (2013). A school based study of psychological disturbance in children following the Omagh bomb. *Child Adolesc Psychiatry Ment Health*, 7(1), 36. doi:10.1186/1753-2000-7-36
- McEwen, B. S. (1998). Stress, adaptation, and disease. Allostasis and allostatic load. *Ann N Y Acad Sci*, 840, 33–44.
- McEwen, B. S. (2018). From serendipity to clinical relevance: How clinical psychology and neuroscience converged to illuminate psychoneuroendocrinology. *Psychoneuroendocrino*. doi:10.1016/j.psyneuen.2018.09.011
- McFarlane, A. C. (2010). The long-term costs of traumatic stress: intertwined physical and psychological consequences. *World Psychiatry*, 9(1), 3–10.
- McGiffin, J. N., Galatzer-Levy, I. R., & Bonanno, G. A. (2016). Is the intensive care unit traumatic? What we know and don't know about the intensive care unit and posttraumatic stress responses. *Rehabil Psychol*, 61(2), 120–131. doi:10.1037/rep0000073

- Moen, K., & Middelthon, A. (2015). Qualitative research methods. In *Research in Medical and Biological Sciences: From Planning and Preparation to Grant Application and Publication*. London: Elsevier.
- Mysliwiec, V., Brock, M. S., Creamer, J. L., O'Reilly, B. M., Germain, A., & Roth, B. J. (2018). Trauma associated sleep disorder: A parasomnia induced by trauma. *Sleep Med Rev*, 37, 94–104. doi:10.1016/j.smr.2017.01.004
- National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2016). *Global Terrorism Database, World Map: 45 Years of Terrorism*. Retrieved from <https://www.start.umd.edu/gtd>.
- Neria, Y., DiGrande, L., & Adams, B. G. (2011). Posttraumatic stress disorder following the September 11, 2001, terrorist attacks: a review of the literature among highly exposed populations. *Am Psychol*, 66(6), 429–446. doi:10.1037/a0024791
- Newman, E., & Kaloupek, D. (2009). Overview of research addressing ethical dimensions of participation in traumatic stress studies: autonomy and beneficence. *J Trauma Stress*, 22(6), 595–602. doi:10.1002/jts.20465
- Newman, E., Risch, E., & Kassam-Adams, N. (2006). Ethical issues in trauma-related research: a review. *J Empir Res Hum Res Ethics*, 1(3), 29–46. doi:10.1525/jer.2006.1.3.29
- North, C. S., Kawasaki, A., Spitznagel, E. L., & Hong, B. A. (2004). The course of PTSD, major depression, substance abuse, and somatization after a natural disaster. *J Nerv Ment Dis*, 192(12), 823–829.
- O'Donnell, M. L., Bryant, R. A., Creamer, M., & Carty, J. (2008). Mental health following traumatic injury: toward a health system model of early psychological intervention. *Clin Psychol Rev*, 28(3), 387–406. doi:10.1016/j.cpr.2007.07.008
- O'Donnell, M. L., Creamer, M., Bryant, R. A., Schnyder, U., & Shalev, A. (2003). Posttraumatic disorders following injury: an empirical and methodological review. *Clin Psychol Rev*, 23(4), 587–603.
- Ogilvie, R., Foster, K., McCloughen, A., & Curtis, K. (2015a). Family members' experience of providing support for young people with traumatic physical injury during the acute hospital phase of care: A qualitative study. *Injury*, 46(9), 1834–1840. doi:10.1016/j.injury.2015.03.030
- Ogilvie, R., Foster, K., McCloughen, A., & Curtis, K. (2015b). Young peoples' experience and self-management in the six months following major injury: A qualitative study. *Injury*, 46(9), 1841–1847. doi:10.1016/j.injury.2015.05.036
- Ogilvie, R., Foster, K., McCloughen, A., & Curtis, K. (2016). The injury trajectory for young people 16–24 years in the six months following injury: A mixed methods study. *Injury*, 47(9), 1966–1974. doi:10.1016/j.injury.2016.04.037
- Ogilvie, R., McCloughen, A., Curtis, K., & Foster, K. (2012). The experience of surviving life-threatening injury: a qualitative synthesis. *Int Nurs Rev*, 59(3), 312–320. doi:10.1111/j.1466-7657.2012.00993.x
- Olive, P. (2017). First contact: acute stress reactions and experiences of emergency department consultations following an incident of intimate partner violence. *J Clin Nurs*, 26(15–16), 2317–2327. doi:10.1111/jocn.13311

- Orcutt, H. K., Miron, L. R., & Seligowski, A. V. (2014). *Impact of Mass Shootings on Individual Adjustment*: National Center for PTSD.
- Osburn, H. G. (2000). Coefficient alpha and related internal consistency reliability coefficients. *Psychol Methods*, 5(3), 343–355.
- Oxford Dictionaries. (2019). In *Oxford Dictionaries*.
- Oyesanya, T. (2017). The experience of patients with ABI and their families during the hospital stay: A systematic review of qualitative literature. *Brain Inj*, 31(2), 151–173. doi:10.1080/02699052.2016.1225987
- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychol Bull*, 129(1), 52–73.
- Pacella, M. L., Hruska, B., & Delahanty, D. L. (2013). The physical health consequences of PTSD and PTSD symptoms: a meta-analytic review. *J Anxiety Disord*, 27(1), 33–46. doi:10.1016/j.janxdis.2012.08.004
- Palmer, C. (2007). Major Trauma and the Injury Severity Score - Where Should We Set the Bar? *Annu Proc Assoc Adv Automot Med*, 51, 13–29.
- Paredes Molina, C. S., Berry, S., Nielsen, A., & Winfield, R. (2018). PTSD in civilian populations after hospitalization following traumatic injury: A comprehensive review. *Am J Surg*, 216(4), 745–753. doi:10.1016/j.amjsurg.2018.07.035
- Pat-Horenczyk, R., Abramovitz, R., Peled, O., Brom, D., Daie, A., & Chemtob, C. M. (2007). Adolescent exposure to recurrent terrorism in Israel: posttraumatic distress and functional impairment. *Am J Orthopsychiatry*, 77(1), 76–85. doi:10.1037/0002-9432.77.1.76
- Pfefferbaum, B., North, C. S., Flynn, B. W., Ursano, R. J., McCoy, G., DeMartino, R., . . . Norwood, A. E. (2001). The emotional impact of injury following an international terrorist incident. *Public Health Rev*, 29(2–4), 271–280.
- Pietkiewicz, I., & Smith, J. A. (2014). A practical guide to using interpretative phenomenological analysis in qualitative research psychology. *Psychological Journal*, 20(1), 7–14.
- Polinder, S., Haagsma, J. A., Belt, E., Lyons, R. A., Erasmus, V., Lund, J., & van Beeck, E. F. (2010). A systematic review of studies measuring health-related quality of life of general injury populations. *BMC Public Health*, 10, 783. doi:10.1186/1471-2458-10-783
- Pynoos, R. S., Rodriguez, N., Steinberg, A. M., M., S., & Frederick, C. (1998). *UCLA PTSD Index for DSM-IV*: University of California.
- Ramchand, R., Marshall, G. N., Schell, T. L., & Jaycox, L. H. (2008). Posttraumatic distress and physical functioning: a longitudinal study of injured survivors of community violence. *J Consult Clin Psychol*, 76(4), 668–676. doi:10.1037/0022-006x.76.4.668
- Ramsdell, K. D., Morrison, M., Kassam-Adams, N., & Marsac, M. L. (2016). A Qualitative Analysis of Children’s Emotional Reactions during Hospitalization Following Injury. *J Trauma Nurs*, 23(4), 194–201. doi:10.1097/jtn.0000000000000217
- Reifels, L., Pietrantonio, L., Prati, G., Kim, Y., Kilpatrick, D. G., Dyb, G., . . . O’Donnell, M. (2013). Lessons learned about psychosocial responses to disaster and mass trauma: an international perspective. *Eur J Psychotraumatol*, 4. doi:10.3402/ejpt.v4i0.22897

- Reisenhofer, S., & Seibold, C. (2013). Emergency healthcare experiences of women living with intimate partner violence. *J Clin Nurs*, 22(15–16), 2253–2263. doi:10.1111/j.1365-2702.2012.04311.x
- Rothman, K. J. (2012). *Epidemiology: An Introduction*: Oxford university press.
- Royston, P., Altman, D. G., & Sauerbrei, W. (2006). Dichotomizing continuous predictors in multiple regression: a bad idea. *Stat Med*, 25(1), 127–141. doi:10.1002/sim.2331
- Rusch, M. D., Grunert, B. K., Sanger, J. R., Dzwierzynski, W. W., & Matloub, H. S. (2000). Psychological adjustment in children after traumatic disfiguring injuries: a 12-month follow-up. *Plast Reconstr Surg*, 106(7), 1451–1458; discussion 1459–1460.
- Schnurr, P. P., & Green, B. L. (2004). Understanding relationships among trauma, posttraumatic stress disorder, and health outcomes. In P. P. Schnurr & B. L. Green (Eds.), *Trauma and Health: Physical Consequences of Exposure to Extreme Stress*. Washington, DC: American Psychological Association.
- Schnurr, P. P., & Jankowski, M. K. (1999). Physical health and post-traumatic stress disorder: review and synthesis. *Semin Clin Neuropsychiatry*, 4(4), 295–304. doi:10.153/scnp00400295
- Shalev, A., Liberzon, I., & Marmar, C. (2017). Post-Traumatic Stress Disorder. *N Engl J Med*, 376(25), 2459–2469. doi:10.1056/NEJMra1612499
- Shalev, A. Y., Gevonden, M., Ratanatharathorn, A., Laska, E., van der Mei, W. F., Qi, W., . . . Koenen, K. C. (2019). Estimating the risk of PTSD in recent trauma survivors: results of the International Consortium to Predict PTSD (ICPP). *World Psychiatry*, 18(1), 77–87. doi:10.1002/wps.20608
- Shariat, S., Mallonee, S., Kruger, E., Farmer, K., & North, C. (1999). A prospective study of long-term health outcomes among Oklahoma City bombing survivors. *J Okla State Med Assoc*, 92(4), 178–186.
- Shultz, J. M., Thoresen, S., Flynn, B. W., Muschert, G. W., Shaw, J. A., Espinel, Z., . . . Cohen, A. M. (2014). Multiple vantage points on the mental health effects of mass shootings. *Curr Psychiatry Rep*, 16(9), 469. doi:10.1007/s11920-014-0469-5
- Siegel, D. J. (2015). *The Developing Mind: How Relationships and the Brain Interact to Shape Who We Are*: Guilford Publications.
- Silvani, A., Calandra-Buonaura, G., Dampney, R. A., & Cortelli, P. (2016). Brain-heart interactions: physiology and clinical implications. *Philos Trans A Math Phys Eng Sci*, 374(2067). doi:10.1098/rsta.2015.0181
- Skatvedt, A. (2008). *Alminnelighetens potensial. En sosiologisk studie av følelser, identitet og terapeutisk endring*. University of Oslo,
- Skatvedt, A., & Schou, K. C. (2010). The potential of the commonplace: A sociological study of emotions, identity and therapeutic change. *Scand J Public Health*, 38(5 Suppl), 81–87. doi:10.1177/1403494810382814
- Skogstad, L., Hem, E., Sandvik, L., & Ekeberg, O. (2015). Nurse-led psychological intervention after physical traumas: a randomized controlled trial. *J Clin Med Res*, 7(5), 339–347. doi:10.14740/jocmr2082w

- Skogstad, L., Toien, K., Hem, E., Ranhoff, A. H., Sandvik, L., & Ekeberg, O. (2014). Psychological distress after physical injury: a one-year follow-up study of conscious hospitalised patients. *Injury*, 45(1), 289–298. doi:10.1016/j.injury.2012.10.001
- Sleney, J., Christie, N., Earthy, S., Lyons, R. A., Kendrick, D., & Towner, E. (2014). Improving recovery – Learning from patients’ experiences after injury: a qualitative study. *Injury*, 45(1), 312–319. doi:10.1016/j.injury.2012.12.025
- Smith, J. A., & Osborn, M. (2015). Interpretative phenomenological analysis. In J. A. Smith (Ed.), *Qualitative Psychology. A Practical Guide to Research Methods* (3rd Ed., pp. 25–53). London: Sage publications.
- Soberg, H. L., Finset, A., Roise, O., & Bautz-Holter, E. (2012). The trajectory of physical and mental health from injury to 5 years after multiple trauma: a prospective, longitudinal cohort study. *Arch Phys Med Rehabil*, 93(5), 765–774. doi:10.1016/j.apmr.2011.08.050
- Sollid, S. J., Rimstad, R., Rehn, M., Nakstad, A. R., Tomlinson, A. E., Strand, T., . . . Sandberg, M. (2012). Oslo government district bombing and Utøya Island shooting July 22, 2011: the immediate prehospital emergency medical service response. *Scand J Trauma Resusc Emerg Med*, 20, 3. doi:10.1186/1757-7241-20-3
- Stallard, P., & Smith, E. (2007). Appraisals and cognitive coping styles associated with chronic post-traumatic symptoms in child road traffic accident survivors. *J Child Psychol Psychiatry*, 48(2), 194–201. doi:10.1111/j.1469-7610.2006.01692.x
- Steinberg, A. M., Brymer, M. J., Decker, K. B., & Pynoos, R. S. (2004). The University of California at Los Angeles Post-traumatic Stress Disorder Reaction Index. *Curr Psychiatry Rep*, 6(2), 96–100. doi:10.1007/s11920-004-0048-2
- Stene, L. E., & Dyb, G. (2015). Health service utilization after terrorism: a longitudinal study of survivors of the 2011 Utoya attack in Norway. *BMC Health Serv Res*, 15, 158. doi:10.1186/s12913-015-0811-6
- Stene, L. E., & Dyb, G. (2016). Research participation after terrorism: an open cohort study of survivors and parents after the 2011 Utoya attack in Norway. *BMC Res Notes*, 9(1), 57. doi:10.1186/s13104-016-1873-1
- Stene, L. E., Wentzel-Larsen, T., & Dyb, G. (2016). Healthcare Needs, Experiences and Satisfaction after Terrorism: A Longitudinal Study of Survivors from the Utoya Attack. *Front Psychol*, 7, 1809. doi:10.3389/fpsyg.2016.01809
- Stensland, S. O., Dyb, G., Thoresen, S., Wentzel-Larsen, T., & Zwart, J. A. (2013). Potentially traumatic interpersonal events, psychological distress and recurrent headache in a population-based cohort of adolescents: the HUNT study. *BMJ Open*, 3(7). doi:10.1136/bmjopen-2013-002997
- Stensland, S. O., Zwart, J. A., Wentzel-Larsen, T., & Dyb, G. (2018). The headache of terror: A matched cohort study of adolescents from the Utoya and the HUNT Study. *Neurology*, 90(2), e111-e118. doi:10.1212/wnl.0000000000004805
- Stoddard, F. J., Norman, D. K., Murphy, J. M., & Beardslee, W. R. (1989). Psychiatric outcome of burned children and adolescents. *J Am Acad Child Adolesc Psychiatry*, 28(4), 589–595. doi:10.1097/00004583-198907000-00020
- Stuber, M. L., Schneider, S., Kassam-Adams, N., Kazak, A. E., & Saxe, G. (2006). The medical traumatic stress toolkit. *CNS Spectr*, 11(2), 137–142.

- Sturms, L. M., van der Sluis, C. K., Stewart, R. E., Groothoff, J. W., ten Duis, H. J., & Eisma, W. H. (2005). A prospective study on paediatric traffic injuries: health-related quality of life and post-traumatic stress. *Clin Rehabil*, 19(3), 312–322. doi:10.1191/0269215505cr867oa
- Tingley, D., Yamamoto, T., Hirose, K., Keele, L., & Imai, K. (2014). Mediation: R Package for Causal Mediation Analysis. 2014, 59(5), 38. doi:10.18637/jss.v059.i05
- Toblin, R. L., Riviere, L. A., Thomas, J. L., Adler, A. B., Kok, B. C., & Hoge, C. W. (2012). Grief and physical health outcomes in U.S. soldiers returning from combat. *J Affect Disord*, 136(3), 469–475. doi:10.1016/j.jad.2011.10.048
- Toft, A. M., Moller, H., & Laursen, B. (2010). The years after an injury: long-term consequences of injury on self-rated health. *J Trauma*, 69(1), 26–30. doi:10.1097/TA.0b013e3181d3cbf2
- Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clin Psychol Rev*, 32(2), 122–138. doi:10.1016/j.cpr.2011.12.001
- Trout, D., Nimgade, A., Mueller, C., Hall, R., & Earnest, G. S. (2002). Health effects and occupational exposures among office workers near the World Trade Center disaster site. *J Occup Environ Med*, 44(7), 601–605.
- Tucker, P., Pfefferbaum, B., Nixon, S. J., & Dickson, W. (2000). Predictors of post-traumatic stress symptoms in Oklahoma City: exposure, social support, peri-traumatic responses. *J Behav Health Serv Res*, 27(4), 406–416.
- University of Oslo. (2019). About TSD. Retrieved from <https://www.uio.no/english/services/it/research/sensitive-data/about/index.html>
- Ursano, R. J., Fullerton, C. S., Weisaeth, L., & Raphael, B. (2017). *Textbook of Disaster Psychiatry*: Cambridge university press.
- van Delft-Schreurs, C., van Son, M. A. C., de Jongh, M. A. C., Lansink, K. W. W., de Vries, J., & Verhofstad, M. H. J. (2017). The relationship between physical and psychological complaints and quality of life in severely injured patients. *Injury*, 48(9), 1978–1984. doi:10.1016/j.injury.2017.05.007
- van den Berg, B., Grievink, L., Yzermans, J., & Lebet, E. (2005). Medically unexplained physical symptoms in the aftermath of disasters. *Epidemiol Rev*, 27, 92–106. doi:10.1093/epirev/mxi001
- van den Berg, B., Yzermans, C. J., van der Velden, P. G., Stellato, R. K., Brunekreef, B., Lebet, E., & Grievink, L. (2009). Risk factors for unexplained symptoms after a disaster: a five-year longitudinal study in general practice. *Psychosomatics*, 50(1), 69–77. doi:10.1176/appi.psy.50.1.69
- Visser, E., Gosens, T., Den Oudsten, B. L., & De Vries, J. (2017). The course, prediction, and treatment of acute and posttraumatic stress in trauma patients: A systematic review. *J Trauma Acute Care Surg*, 82(6), 1158–1183. doi:10.1097/ta.0000000000001447
- Waage, S., Poole, J. C., & Thorgersen, E. B. (2013). Rural hospital mass casualty response to a terrorist shooting spree. *Br J Surg*, 100(9), 1198–1204. doi:10.1002/bjs.9203
- Wachen, J. S., Shipherd, J. C., Suvak, M., Vogt, D., King, L. A., & King, D. W. (2013). Posttraumatic stress symptomatology as a mediator of the relationship between

- warzone exposure and physical health symptoms in men and women. *J Trauma Stress*, 26(3), 319–328. doi:10.1002/jts.21818
- Wahlstrom, L., Michelsen, H., Schulman, A., Backheden, M., & Keskinen-Rosenqvist, R. (2013). Longitudinal course of physical and psychological symptoms after a natural disaster. *Eur J Psychotraumatol*, 4. doi:10.3402/ejpt.v4i0.21892
- Walker, L. S., Beck, J. E., Garber, J., & Lambert, W. (2009). Children's Somatization Inventory: psychometric properties of the revised form (CSI-24). *J Pediatr Psychol*, 34(4), 430–440. doi:10.1093/jpepsy/jsn093
- Wiman, E., Wikblad, K., & Idvall, E. (2007). Trauma patients' encounters with the team in the emergency department--a qualitative study. *Int J Nurs Stud*, 44(5), 714–722. doi:10.1016/j.ijnurstu.2006.01.014
- Wiseman, T., Foster, K., & Curtis, K. (2013). Mental health following traumatic physical injury: an integrative literature review. *Injury*, 44(11), 1383–1390. doi:10.1016/j.injury.2012.02.015
- Wiseman, T., Foster, K., & Curtis, K. (2016). The experience of emotional wellbeing for patients with physical injury: A qualitative follow-up study. *Injury*, 47(9), 1983–1989. doi:10.1016/j.injury.2016.03.021
- Wisloff-Aase, K., Raeder, J., Manum, G., Lovstad, M., Schanke, A. K., Dyb, G., . . . Stanghelle, J. K. (2019). Chronic pain among the hospitalized patients after the 22 July 2011 terror attacks in Oslo and at Utøya Island. *Acta Anaesthesiol Scand*. doi:10.1111/aas.13373
- Wistrom, E. D., Stene, L. E., & Dyb, G. (2016). Following the Utøya attack – who received early assistance? *Tidsskr Nor Laegeforen*, 136(14–15), 1223–1226. doi:10.4045/tidsskr.15.0691
- World Medical Association. (2019). WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects. Retrieved from <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>
- Wuest, J., Ford-Gilboe, M., Merritt-Gray, M., Wilk, P., Campbell, J. C., Lent, B., . . . Smye, V. (2010). Pathways of chronic pain in survivors of intimate partner violence. *J Womens Health (Larchmt)*, 19(9), 1665–1674. doi:10.1089/jwh.2009.1856
- Zatzick, D. F., Jurkovich, G. J., Fan, M. Y., Grossman, D., Russo, J., Katon, W., & Rivara, F. P. (2008). Association between posttraumatic stress and depressive symptoms and functional outcomes in adolescents followed up longitudinally after injury hospitalization. *Arch Pediatr Adolesc Med*, 162(7), 642–648. doi:10.1001/archpedi.162.7.642
- Zatzick, D. F., Russo, J. E., & Katon, W. (2003). Somatic, posttraumatic stress, and depressive symptoms among injured patients treated in trauma surgery. *Psychosomatics*, 44(6), 479–484. doi:10.1176/appi.psy.44.6.479
- Zhang, Y., Zhang, J., Zhu, S., Du, C., & Zhang, W. (2015). Prevalence and Predictors of Somatic Symptoms among Child and Adolescents with Probable Posttraumatic Stress Disorder: A Cross-Sectional Study Conducted in 21 Primary and Secondary Schools after an Earthquake. *PLoS One*, 10(9), e0137101. doi:10.1371/journal.pone.0137101

8 Papers I–III

Physical injury and posttraumatic stress reactions. A study of the survivors of the 2011 shooting massacre on Utøya Island, Norway

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ABSTRACT

Objective: The objective of the study was to investigate the relationship between physical injury (no, moderate and severe) and posttraumatic stress reactions (PTSR) at 4–5 months after the attack in survivors of the terror attack at Utøya Island, Norway, 22 July 2011, adjusting for sociodemographic, psychosocial and trauma-related factors.

Methods: Overall, 325 young survivors (47% women, mean age 19.4 years) were interviewed 4–5 months (T1) and 14–15 months (T2) after the attack. Variables concerning physical injury, PTSR (UCLA PTSD-RI scale, 0–4), peritraumatic exposure, sociodemographic and psychosocial backgrounds were measured. To evaluate the role of injury, multiple linear regression analyses were conducted.

Results: The physically injured ($n = 60$) reported higher levels of PTSR than did the non-injured. The difference was statistically significant between the moderately injured ($n = 37$, mean 1.9) and the non-injured ($n = 265$, mean 1.5). No significant differences were found between the moderately and the severely ($n = 23$, mean 1.8) injured. Higher levels of peritraumatic events, peritraumatic reactions and loss of close, female sex and non-Norwegian ethnicity were significantly related to higher levels of PTSR in the full regression model.

Conclusion: Physical injury was associated with higher PTSR after the terror attack. Moderately injured survivors may, as those severely injured, exhibit high levels of PTSR, and this should be taken into account when targeting early psychosocial health care after terror.

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Introduction

Physical injury contributes substantially to the global burden of disease, particularly among adolescents and young adults [1]. A growing amount of research indicates that physically injured survivors exhibit higher levels of posttraumatic stress reactions (PTSR) than do non-injured survivors after traumatic mass events [2,3]. A substantial number of studies have been conducted on clinical samples of mostly severely injured survivors of traffic accidents. These studies indicate that the degree of injury based on a clinical assessment of type, bodily location

and severity is not significantly associated with posttraumatic stress [4,5].

However, knowledge is sparse concerning how PTSR may be distributed among coarser categories of injury degree describing survivors with a broad variety of injury levels. Furthermore, there are few studies on the factors that may explain the elevated levels of PTSR among injured survivors compared with non-injured survivors, and the findings are disputed [6–8]. Therefore, when experiencing traumatic mass incidents resulting in physical injuries of all degrees, the aforementioned research does not supply health workers and decision-makers with sufficient information to target adequate psychosocial interventions for the different groups of injured survivors.

Information gained from the mass shooting at Utøya Island might help to reduce this knowledge gap. The current study investigated how the degree of injury, including no, moderate and severe injury,

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would be associated with PTSR 4–5 months after the attack, after adjusting for plausible confounding factors.

The terror attack

On 22 July 2011, Norway experienced two terrorist attacks. One man dressed as a policeman left a bomb outside the main government building in Oslo. The bomb exploded and killed eight people. Ten injured survivors were admitted to the hospital, and many were treated in a casualty clinic [9]. The perpetrator then left for Utøya Island outside the city, which at the time was hosting a summer camp for the Norwegian Labor Party's youth organization. Armed with a gun, he pursued and targeted the 564 isolated adolescents and young adults before he was arrested. During the attack at Utøya Island, 69 were killed, 35 were hospitalized and many more were treated for physical injuries outside the hospital. The atrocity of the shooting attack was amplified by several factors: The youths were hunted for 1 h and 20 min with little chance to escape from the island due to the cold water surrounding them and the distance of a minimum of 550 m to the mainland; they witnessed extreme brutality as they tried to escape and hide, often in groups; many of the youths knew each other and lost close friends, boy- and girlfriends or family members. Moreover, the fact that the terrorist was disguised as a policeman left the survivors in a prolonged state of fear because they did not know whether to trust the rescue teams that subsequently arrived at the island.

The objective of the study

The objective of this study was to investigate the relationship between injury (no, moderate and severe) and posttraumatic stress reactions in survivors of the terror attack on Utøya Island, Norway, 22 July 2011, after adjusting for sociodemographic, psychosocial and trauma-related factors.

Methods

The present study is an observational study of survivors from the terror attack at the Utøya Island in Norway, 22 July 2011 using data from the Utøya Study conducted by the Norwegian Centre for Violence and Traumatic stress studies. In the aftermath of the terror attack, 495 survivors were registered by the police. Three months after the attack, the 490 survivors aged 13 or older were invited to participate in the first part (T1) of the Utøya Study. Most (95%) interviews at T1 took place in November and December 2011, 4–5 months after the attack. A second part (T2) took place 14–15 months after the attack, and the same 490 survivors were invited to participate. The participants were mainly interviewed face-to-face at home. Health personnel, including psychologists or psychiatrists trained in interviewing traumatized youths and adults, performed the semi-structured interviews. The interviewers were also trained specifically for this interview. In accordance with Norwegian Law, the study was based on the written consent of all participants aged 16 years or older and from the parents of individuals younger than 16 years of age, and it was approved by the Norwegian Regional Committee for Medical and Health Research Ethics. In addition to allowing the use of the data from the interviews, the consent entailed access to hospital journals. Prospective needs for health services revealed by the interviews were assessed; if needed, the interviewers facilitated contact with adequate resources.

Participants

Of the 490 invited, 165 could not be reached or declined to participate, and 325 (66%) accepted and were subsequently interviewed at T1. At T2, 285 (58%) survivors were interviewed, and 255 participated at both T1 and T2. The participation rate among the severely injured corresponded well with the overall response rate. There were no

significant differences in sex or age between participants and non-participants at T1 or T2 [10,11].

The physical injuries among survivors ranged from bruises to broken legs, hypothermia or stray shots to life-threatening bullet-inflicted wounds. The survivors were triaged at the scene, either on the mainland shore or on the island after police gained control of the premises, and were assigned medical care according to their needs. The treatments ranged from out of hospital care for the moderately injured ($n = 37$) to hospitalization for the more severely physically injured ($n = 23$).

Measurements

Sociodemographic factors and psychosocial background

Sociodemographic factors were assessed at T1 (See Fig. 1). Non-Norwegian origin was defined as having parents who were both born abroad. A previous study of the Utøya population showed that non-Norwegian origin was a risk factor for developing posttraumatic stress reactions [11]. Current economic situation was rated on a 5-item scale ranging from much better than that of most people = 1, to much worse than that of most people = 5. Participants living alone reported on their own economic situation, and those living with their parents reported on their family's economic situation. The answers were dichotomized as 'average or above that of most families/people' and 'below that of most families/people' [12].

Information on psychosocial background was provided at T2 and described by asking for experiences of interpersonal violence and provided psychiatric interventions prior to 22 July 2011 [13]. Regarding exposure to interpersonal violence, we screened for direct exposure to violence, witnessing violence between close others, sexual abuse, physical neglect and bullying. These factors are well known to render individuals vulnerable when it comes to developing later posttraumatic stress [14,15]. A sum score of the dichotomous items ('no' = 0, 'yes' = 1) was computed and ranged from 0 through 1 to 2 or more events. Two items covered previously provided psychiatric interventions: 'Did you obtain any help from psychiatric health services?' and 'Did you receive any medications for depression, anxiety or other psychological problems?' A sum score of the dichotomous items ('no' = 0, 'yes' = 1) was computed ranging from 0 through 1 to 2 provided interventions.

Posttraumatic stress reactions

Posttraumatic stress reactions over the past month were measured at T1 using the 20-item University of California at Los Angeles PTSD Reaction Index (PTSD-RI) [16,17]. Five items describe intrusion (re-experiencing), seven items describe avoidance and five items describe increased arousal. Every item was rated on a 5-point Likert scale (never = 0, seldom = 1, sometimes = 2, often = 3, almost always = 4). Three reactions had two alternative formulations, and the

Fig. 1. Time between the attack and the various measurements.

formulation with the highest score of the two was applied to calculate the total score. Hence, 17 items made up the total reaction scale score, corresponding to the DSM-IV-TR criteria for PTSD [18]. There were no missing values for any item within this scale. In the current study, the mean scores for total posttraumatic stress reactions were computed and applied in the analyses. Cronbach's alpha was 0.89 for the total score. Mean scores were also computed for intrusion, avoidance and arousal reactions, with Cronbach's alphas of 0.84, 0.70 and 0.76, respectively. We used the diagnostic criteria for PTSD to define levels of clinical PTSD. Reactions experienced 'often' or 'almost always' were defined as clinical symptoms. Meeting symptom criteria B (intrusion), C (avoidance) and D (arousal) was scored as 'full' PTSD. 'Partial' PTSD was defined by meeting only two of the symptom criteria.

Physical injury

Medical triage during rescue and treatment in the aftermath of the terror served as the foundation for the categorizations of the degree of injury in this study. The survivors who were hospitalized due to physical injury in the immediate aftermath of the massacre were categorized as 'severely injured'. Verification of hospitalization was drawn from hospital records. The criterion for being 'moderately injured' was answering 'yes' on the item 'Were you physically injured and required medical help?' and at the same time being excluded from the 'severely injured group' by the aforementioned verification of hospitalization. The criterion for being categorized as 'not injured' was answering 'no' on the described item. There were no missing values for this variable. Further, only those who had been injured were asked at T1 about current sequelae related to their injury, including 'visible scars', 'pain', 'change in appearance' and 'restrained daily function' ('No' or 'Yes'). Still, some participants in the 'no injury' group were erroneously given the questions about current sequelae, and their answers were coded as 'no'.

Peritraumatic exposure

Peritraumatic exposure before being rescued was recorded at T1. A checklist of 13 different types of incident-specific potentially traumatic events was developed. Items were dichotomous and worded such as, 'Did you see the terrorist or hear his voice?', 'Did you hear people screaming?' or 'Did you touch dead bodies or injured people?' ('No' or 'Yes'). A sum score that ranged from 0 to 13 was constructed as a count of the number of 'yes' answers [11]. Peritraumatic reactions, defined as emotional and physiological reactions during or immediately after the event, were recorded using six items that were rated from not experienced at all = 0 to experienced very much = 4. Five of the items recording emotional reactions were extracted from the UCLA PTSD-RI [16], and the sixth item recorded sustained palpitations. A mean score was calculated based on the six items [11]. The loss of close was recorded with one item: 'Was a close friend, girl-/boyfriend or family member killed?' ('No' or 'Yes'). The physically injured were asked to rate their peritraumatic pain related to injury on a 10 point Visual Analog Scale, with the end points 'no pain at all' = 0 and 'the most extreme pain you can imagine' = 10.

Statistical analyses

Exact Pearson's χ^2 -tests were used to assess group differences for categorical variables, and ANOVA and Student's t-tests for continuous variables. Tukey's HSD procedure in ANOVAs and the Holm procedure in other analyses were used to adjust for multiple testing in post hoc analyses. A permutation t-test was performed for the substantially skewed variable 'peritraumatic pain related to injury'. Permutation tests make no distributional assumptions and test whether the variable has the same distribution in the two groups [19]. A half-rule was applied when constructing scale scores (based on the mean of the observed items if at least half of the items were observed) except for the outcome

scale score where 13 of the 17 total items had to be observed. However, no participants had more than two missing items in the calculation of mean or sum scores.

The associations between degree of injury and posttraumatic stress reactions were examined in unadjusted and adjusted multiple linear regression analyses, attempting to assess the contribution of physical injury itself to posttraumatic stress reactions. In the partly adjusted model 1, adjustments were made for variables on sociodemography (Age, Sex, Ethnicity and Family economy). In the partly adjusted model 2, additional adjustments were made for psychosocial background prior to the attack (Interpersonal violence exposure and Provided psychiatric interventions). In the fully adjusted model, additional adjustments were made for peritraumatic exposure (Number of traumatic events, Reactions and Loss of close). Multicollinearity was checked by variance inflation factor, using complete cases. Variables pertaining to experienced interpersonal violence and provided psychiatric services prior to 22 July 2011 were recorded at T2 with a total of $n = 255$ participants in the complete case analyses; therefore, multiple imputation methods with 200 imputed datasets were used to reduce possible effects of selection biases. Complete case analyses were conducted for comparisons.

All tests were two-tailed, with a significance level of $p \leq 0.05$. Statistical analyses were performed using IBM SPSS statistics version 22 in combination with R (The R Foundation for Statistical Computing, Vienna, Austria) for the permutation t-test and the R package mice for multiple imputation.

Results

The survivors' mean age was 19.4 years (SD 4.6) at the time of the shooting: 153 (47%) were females and 172 (53%) were males (Table 1). The majority was ethnic Norwegians; 12% were of non-Norwegian origin, and 22% reported having a current economy below average.

A substantial minority (19%) of the survivors was physically injured during the attack: 23 (7%) were severely injured and required hospitalization and 37 (11%) were moderately injured and required other medical help. No significant differences were found between the groups of injured in terms of sociodemographic variables or for prior exposure to interpersonal violence. Regarding the psychiatric interventions provided prior to 22 July 2011, significant overall differences were found with a p value of 0.024; however, when adjusting for multiple testing, no significant post-hoc pairwise differences were found.

The moderately injured participants reported a significantly higher level of total posttraumatic stress reactions than did the non-injured (Table 2). The discrepancy between moderately injured and non-injured was statistically significant for intrusion and arousal but not for avoidance reactions. There was no significant difference between the severely and moderately injured. All groups experienced a high number of traumatic events (mean 8.2–9.7). The injured survivors experienced more traumatic events and loss of close ones than did those who were not injured. The discrepancy was statistically significant for the moderately versus the non-injured. No significant differences were found in the peritraumatic reactions between any of the groups. The severely injured participants reported significantly higher levels of peritraumatic pain related to the injury, current visible scars and change in appearance compared with the moderately injured.

In the unadjusted regression analyses (Table 3), injury, higher levels of peritraumatic events, higher levels of peritraumatic reactions, loss of close, female sex, non-Norwegian ethnicity, pretrauma interpersonal violence and pretrauma provided psychiatric interventions were all significantly associated with higher levels of posttraumatic stress reactions. In the multiple linear regression analysis adjusting for sociodemographic factors (partly adjusted model 1), physical injury remained significantly associated with higher levels of PTSR with an overall p value of 0.022. More specifically, the difference was significant

Table 1
Sociodemographic characteristics and psychosocial background by degree of physical injury.

Variables		All N (%)/ Mean (SD)	Severely injured N (%)/ Mean (SD)	Moderately injured N (%)/ Mean (SD)	Not Injured N (%)/ Mean (SD)	p value
	N	n = 325	n = 23	n = 37	n = 265	
Sociodemographic factors						
Age	325	19.4 (4.6)	18.5 (2.6)	19.8 (4.2)	19.4 (4.8)	0.568
Women	325	153 (47.1)	15 (65.2)	16 (43.2)	122 (46.0)	0.185
Non Norwegian ethnicity	321	39 (12.1)	4 (17.4)	8 (22.2)	27 (10.3)	0.085
Current economy below average	316	68 (21.5)	7 (31.8)	10 (27.8)	51 (19.8)	0.256
Psychosocial background prior to July 22, 2011						
Interpersonal violence exposure	247 ^a					0.729
No		109 (44.3)	8 (44.4)	11 (42.3)	90 (44.3)	
1 type of event		78 (31.7)	4 (22.2)	7 (26.9)	67 (33.0)	
≥2 type of events		59 (24.0)	6 (33.3)	8 (30.8)	46 (22.7)	
Provided psychiatric interventions	249 ^a					0.024 ^b
No		181 (72.7)	11 (61.1)	16 (59.3)	154 (75.5)	
1 type of intervention		57 (22.9)	7 (38.9)	7 (25.9)	43 (21.1)	
2 types of intervention		11 (4.4)	0	4 (14.8)	7 (3.4)	

^a Variable from T2, total responders N = 255.^b No significant post-hoc p values when adjusting for multiple testing.

for the category moderate injury vs. no injury. After adjusting for exposure to interpersonal violence and provided psychiatric interventions prior to 22 July 2011 (partly adjusted model 2), the association between injury and PTSR attenuated. In this model, the overall p value of 0.056 indicated a marginally non-significant association and the p value for the category moderate vs. no injury was 0.021. In the full model adjusted for sociodemographic, psychosocial (pretrauma interpersonal violence and provided psychiatric interventions) and peritraumatic exposure (traumatic events, reactions and loss of close) variables, the association between injury and PTSR was not significant.

Higher levels of peritraumatic events, peritraumatic reactions and loss of close, female sex and non-Norwegian ethnicity were significantly related to higher levels of posttraumatic stress reactions in the full model.

In the multiple regression analyses, complete case analyses did not differ substantially from the analyses based on multiple imputations.

In all of the adjusted models, all variance inflation factors were ≤ 1.31 ; thus, multicollinearity was not an issue.

Discussion

Physical injury sustained on Utøya Island on 22 July 2011 was associated with higher levels of posttraumatic stress reactions (PTSR) 4–5 months later. In particular, those moderately injured exhibited significantly higher levels of total PTSR compared with the non-injured. The injured survivors experienced particularly high levels of peritraumatic events and loss of close, which may explain their high levels of posttraumatic stress reactions.

Knowledge about the association between physical injury and PTSR after mass shooting attacks is sparse [20]. Few studies have been conducted and the sample sizes are generally small. However, one study evaluating victims 17 years after a terrorist high-school shooting attack

Table 2
Posttraumatic stress reactions, peritraumatic exposure, posttraumatic injury sequelae by degree of physical injury.

Variables		All N (%)/ Mean (SD)	Severely injured (S) N (%)/ Mean (SD)	Moderately injured (M) N (%)/ Mean (SD)	Not injured (N) N (%)/ Mean (SD)	Overall p value	Post hoc tests
	N	n = 325	n = 23	n = 37	n = 265		
<i>Posttraumatic stress reactions</i>							
Posttraumatic stress reactions over the last month (0–4)	325						
Total posttraumatic stress reactions		1.6 (0.7)	1.8 (0.8)	1.9 (0.7)	1.5 (0.7)	0.004	M > N
Intrusion reactions		1.5 (0.9)	1.8 (1.0)	2.0 (0.9)	1.4 (0.9)	<0.001	M > N
Avoidance reactions		1.2 (0.7)	1.2 (0.7)	1.3 (0.6)	1.2 (0.7)	0.578	–
Arousal reactions		2.2 (0.9)	2.6 (0.8)	2.6 (0.9)	2.1 (0.9)	0.002	M > N ^a
Posttraumatic stress disorder (partial or full)		153 (47.1)	14 (60.9)	23 (62.2)	116 (43.8)	0.046	– ^b
<i>Peritraumatic exposure</i>							
Number of traumatic events (0–13)	325	8.4 (2.2)	9.0 (2.4)	9.7 (1.9)	8.2 (2.2)	0.001	M > N
Reactions (0–4)	325	2.9 (0.8)	3.0 (0.7)	3.1 (0.6)	2.9 (0.8)	0.342	–
Loss of close	322	240 (74.5)	19 (82.6)	35 (94.6)	186 (71.0)	0.005	M > N
Pain related to injury (0–10) ^{c,d,e}	317	0.5 (1.8)	5.3 (3.0)	1.9 (2.8)	–	<0.001	–
<i>Posttraumatic injury sequelae</i>							
Current scars ^{c,e}	322	35 (10.9)	21 (91.3)	14 (41.2)	–	<0.001	–
Current pain ^{c,e}	323	35 (10.8)	14 (60.9)	21 (60.0)	–	1.000	–
Current change in appearance ^{c,e}	322	20 (6.2)	15 (65.2)	5 (14.7)	–	<0.001	–
Current restrained daily function ^{c,e}	322	33 (10.2)	14 (60.9)	19 (55.9)	–	0.788	–

^a In addition, the post-hoc p value for S > N was 0.051.^b The post-hoc p value for M > N was 0.052.^c If answered 'No' to 'Did you get physically injured with a need for medical help?', the variable answer has been coded as 'No'.^d Unambiguously skewed variable, applied permutation t-test (100,000 permutations).^e Test performed for comparison between the two groups of injured only.

Table 3
Posttraumatic stress reactions in relation to degree of injury, peritraumatic exposure, sociodemographic factors and psychosocial background.^{a,b}

	Regression coefficients (beta), 95% CIs and p values							
	Posttraumatic stress reactions							
	Unadjusted model	p	Partly adjusted model 1 ^c	p	Partly adjusted model 2 ^d	p	Fully adjusted model ^e	p
<i>Degree of injury</i>								
Overall p value		0.003		0.022		0.056		0.524
Moderately vs. not injured	0.37 [0.12, 0.61]	0.003	0.30 [0.08, 0.53]	0.008	0.27 [0.04, 0.49]	0.021	0.12 [−0.09, 0.33]	0.268
Severely vs. not injured	0.29 [−0.01, 0.59]	0.062	0.13 [−0.14, 0.41]	0.346	0.12 [−0.16, 0.40]	0.391	0.05 [−0.21, 0.31]	0.709
Severely vs. moderately injured	−0.08 [−0.45, 0.29]	0.667	−0.17 [−0.51, 0.17]	0.317	−0.15 [−0.48, 0.19]	0.401	−0.07 [−0.38, 0.24]	0.651
<i>Peritraumatic exposure</i>								
Number of traumatic events	0.10 [0.06, 0.13]	<0.001					0.04 [0.01, 0.07]	0.014
Reactions	0.35 [0.26, 0.44]	<0.001					0.24 [0.16, 0.33]	<0.001
Loss of close	0.32 [0.14, 0.50]	<0.001					0.23 [0.08, 0.38]	0.003
<i>Sociodemographic factors</i>								
Age	−0.02 [−0.03, 0.00]	0.072	−0.02 [−0.03, −0.00]	0.042	−0.02 [−0.04, −0.00]	0.016	−0.01 [−0.03, 0.00]	0.053
Sex	0.41 [0.26, 0.56]	<0.001	0.44 [0.30, 0.58]	<0.001	0.44 [0.30, 0.58]	<0.001	0.36 [0.23, 0.49]	<0.001
Ethnicity	0.62 [0.39, 0.85]	<0.001	0.67 [0.45, 0.89]	<0.001	0.66 [0.43, 0.88]	<0.001	0.55 [0.35, 0.76]	<0.001
Family economy	0.16 [−0.03, 0.35]	0.104	0.07 [−0.10, 0.25]	0.421	0.06 [−0.12, 0.24]	0.501	0.02 [−0.14, 0.19]	0.794
<i>Psychosocial background prior to July 22, 2011</i>								
Interpersonal violence exposure								
Overall p value		0.021				0.166		0.169
1 type of event	0.10 [−0.10, 0.30]	0.320			0.15 [−0.04, 0.34]	0.123	0.09 [−0.08, 0.26]	0.303
2 or more types of events	0.30 [0.09, 0.51]	0.006			0.17 [−0.03, 0.38]	0.100	0.18 [−0.01, 0.37]	0.067
Provided psychiatric interventions								
Overall p value		0.040				0.200		0.156
1 type of intervention	0.17 [−0.03, 0.38]	0.094			0.09 [−0.10, 0.29]	0.345	0.12 [−0.06, 0.31]	0.182
2 types of intervention	0.43 [0.02, 0.84]	0.038			0.32 [−0.06, 0.70]	0.097	0.28 [−0.07, 0.63]	0.113

^a Reference category for categorical variables: degree of injury, described in table; loss of close, no loss of close; sex, male; ethnicity, Norwegian origin; family economy, family economy same as or above average; interpersonal violence exposure, no types of interpersonal violence exposure; provided psychiatric interventions, no types of provided psychiatric interventions.

^b Linear regression analyses with multiple imputation.

^c Adjusted R² for adjusted model 1: 0.201.

^d Adjusted R² for adjusted model 2: 0.222.

^e Adjusted R² for fully adjusted model: 0.344.

in Israel demonstrated that those who were severely injured had significantly higher levels of PTSD than did those who had moderate or no injuries [21]. Due to the sparse research on mass shootings, our findings must be compared with findings from research on other types of traumatic events. Reviews on mental health after the 9/11 terrorist attacks described event-related physical injury as one of the most consistently documented correlates of PTSD [3,22]. Similarly, another study after the bombing in Oklahoma City in 1995 found a clear association between injury and higher levels of PTSD [6]. Further, studies of Vietnam veterans have found two- to three-fold higher rates of PTSD among wounded soldiers than among the unwounded [23]. A matched comparison study of injured and non-injured soldiers with similar combat exposure found that the odds of developing PTSD were explicitly higher among the injured [24]. Physical injury also has been found as a risk factor for higher posttraumatic stress after natural disasters both among adolescents and adults [25,26].

When studying the impact of physical injury on levels of PTSD, the characteristics of the physical injury degree variable are of great importance [27]. Significantly, Green stated in 1994 that when including injured survivors only, the degree of injury tends not to be significantly related to posttraumatic stress, whereas associations are more likely to be demonstrated when some subjects are not injured [27]. A substantial amount of later research has focused on the association between degree of injury (“the injury severity score” (ISS)) and levels of PTSD in clinical samples of injured only [28]. The results are disputed, but, consistent with Green (1994), a majority of these studies did not find a significant association [4,5,29]. The findings in the current study also support Green's assertion.

Among studies that included both non-injured and injured persons categorized by severity, one study of victims after terrorist attacks in France between 1982 and 1987 found that the prevalence of PTSD was

significantly higher among the severely injured than among the non-injured, and no significant difference was found when comparing the moderately and non-injured survivors. There was no pairwise comparison between severely and moderately injured. However, the mean number of posttraumatic stress reactions in the study steadily increased with higher degree of injury. Notably, both the severely and the moderately injured had been hospitalized (>7 days and 1–7 days, respectively), and all others were defined as not injured; hence, the injury variable differed substantially from that in our study [30]. Another study investigated 1501 survivors of the 2004 Southeast Asia tsunami [8]. The injury variable in this study is comparable to that in our study: severely (inpatient hospitalized), lightly (self-reported injury, but not inpatient hospitalized) or non-injured (no self-reported injury). Significantly higher levels of posttraumatic stress reactions were found both for severely injured compared with non-injured survivors and for lightly injured compared with non-injured survivors at both 14 and 36 months after the disaster. There was no report on a pairwise comparison between severely and lightly injured for PTSD; however, the severely injured exhibited the highest levels of posttraumatic stress. These findings are in agreement with the findings in the current study, which suggest that those who are moderately injured are vulnerable to developing posttraumatic stress compared with non-injured survivors. The insignificant difference between severely injured and non-injured in our study may be due to a small group of severely injured.

In the adjusted analyses, attempts were made to assess the extent to which injury itself accounted for higher levels of PTSD when adjusting for other plausible factors. The findings suggest that higher levels of PTSD are better explained by higher levels of peritraumatic exposure, i.e., number of traumatic events, reactions and loss, than by injury in itself. In accordance with former studies [31], the fact that the injured

survivors exhibited higher levels of these exposure factors may explain their high levels of PTSR. Our findings suggest that injury, regardless of severity, can be considered an indicator of high degree of centrality to the most dramatic scenes and thereby high levels of exposure. In line with our findings, other researchers have found non-persistent significant associations between injury and PTSR after adjusting for perceived threat, with the latter remaining a significant predictor [6,7]. In contrast, the study of the 2004 tsunami survivors found a consistent significant relationship between injury and PTSR when adjusting for the loss of family members and perceived life threat [8]. Other studies have also found significant associations after adjusting for loss, peritraumatic events or peritraumatic reactions [26,32–34]. Knowing the extreme exposure in our sample, one may hypothesize that in the early phase, peritraumatic exposure may represent strong predictors of PTSR, possibly overruling the initial effect of injury, but that over time, the adverse sequelae from injury, such as pain and scars, may represent a stronger contribution [35].

The current study encompasses a relatively large group of highly exposed adolescents, and all participants experienced the same type of traumatic event. The study was performed in an early phase and may therefore add to the sparse knowledge on early mental health consequences after terror. Because of the challenging early aftermath, the survivors may be reluctant to participate in research. However, the response rate was considered satisfactory (66%). Change of school and residence mainly impeded recruitment [11]. The response rate for the group of severely injured did not differ significantly from the overall response rate. The non-responders did not differ significantly from the responders in age and sex [10,11] and this was also the case for the subgroup of severely injured. The proportion of missing data was low. The study applied a comprehensive range of measures on demographic, psychosocial and exposure variables. Regarding the injury variable, the distinction between severe and moderate injury was confirmed by medical records, thereby augmenting the reliability of self-reports. Grading injury by hospitalization is clinically meaningful because it is based on the regular triage of somatic injury at the scene. The interview design strengthens the study. The PTSD-RI is a clinically applicable, comprehensive and validated instrument for assessing PTSR in adolescents [17].

Regarding limitations, a substantial minority did not take part in the study. This may represent a selection bias. Moreover, variables on peritraumatic exposure and psychosocial background prior to the attack were based on retrospective self-reports and may therefore be vulnerable to recall biases [36]. Early psychosocial health care after the attack may have varied among the groups of severely, moderately and not injured survivors. Specifically, the most severely injured received particularly extensive care during their hospital stay [9,37], possibly confounding the results and leading to an attenuation of the differences in PTSR levels between the groups. Unfortunately, we were not able to adjust for the differences in early psychosocial health care due to lack of valid information. Small groups may have diminished the ability to detect significant findings in the study.

Clinical implications

The findings in this study suggest that focusing on physical injury may be one important and clinically meaningful way of detecting survivors with particularly high levels of peritraumatic exposure and who are, therefore, at a high risk of posttraumatic stress reactions after traumatic mass events such as terror attacks. The findings also contribute to nuance how posttraumatic stress reactions may be differentially distributed among the injured and, in particular, to expand our focus also to include moderately injured survivors who may, as those severely injured, exhibit high levels of PTSR. The latter implies an augmented focus on early psychosocial assessment and treatment of all injured survivors after terror attacks.

Conclusion

Physical injury was associated with posttraumatic stress reactions 4–5 months after the terror attacks at Utøya on July 22, 2011. The level of symptoms did not differ significantly between the moderately and severely injured.

Conflict of interests

The authors have no competing interests to report.

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References

- [1] C.J. Murray, T. Vos, R. Lozano, M. Naghavi, A.D. Flaxman, C. Michaud, et al., Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the global burden of disease study 2010, *Lancet* 380 (9859) (2012) 2197–2223.
- [2] G.A. Bonanno, S. Galea, A. Bucciarelli, D. Vlahov, Psychological resilience after disaster: New York City in the aftermath of the September 11th terrorist attack, *Psychol. Sci.* 17 (3) (2006) 181–186.
- [3] Y. Neria, L. DiGrande, B.G. Adams, Posttraumatic stress disorder following the September 11, 2001 terrorist attacks: a review of the literature among highly exposed populations, *Am. Psychol.* 66 (6) (2011) 429–446.
- [4] W. Langeland, M. Olff, Psychobiology of posttraumatic stress disorder in pediatric injury patients: a review of the literature, *Neurosci. Biobehav. Rev.* 32 (1) (2008) 161–174.
- [5] M. Heron-Delaney, J. Kenardy, E. Charlton, Y. Matsuoka, A systematic review of predictors of posttraumatic stress disorder (PTSD) for adult road traffic crash survivors, *Injury* 44 (11) (2013) 1413–1422.
- [6] P. Tucker, B. Pfefferbaum, S.J. Nixon, W. Dickson, Predictors of post-traumatic stress symptoms in Oklahoma City: exposure, social support, peri-traumatic responses, *J. Behav. Health Serv. Res.* 27 (4) (2000) 406–416.
- [7] M. McDermott, M. Duffy, A. Percy, M. Fitzgerald, C. Cole, A school based study of psychological disturbance in children following the Omagh bomb, *Child Adolesc. Psychiatry Ment. Health* 7 (1) (2013) 36.
- [8] J. Dyster-Aas, F.K. Arnberg, A. Lindam, K.B. Johannesson, T. Lundin, P.O. Michel, Impact of physical injury on mental health after the 2004 Southeast Asia tsunami, *Nord. J. Psychiatry* 66 (3) (2012) 203–208.
- [9] C. Gaarder, J. Jorgensen, K.M. Kolstadbraaten, K.S. Isaksen, J. Skattum, R. Rimstad, et al., The twin terrorist attacks in Norway on July 22, 2011: the trauma center response, *J. Trauma Acute Care Surg.* 73 (1) (2012) 269–275.
- [10] L.E. Stene, G. Dyb, Research Participation After Terrorism. An Open Cohort Study of Survivors and Parents After the 2011 Utøya Attack in Norway, 2015 (submitted for publication).
- [11] G. Dyb, T.K. Jensen, E. Nygaard, O. Ekeberg, T.H. Diseth, T. Wentzel-Larsen, et al., Post-traumatic stress reactions in survivors of the 2011 massacre on Utøya Island, Norway, *Br. J. Psychiatry* 204 (2014) 361–367.
- [12] E. Goodman, B. Huang, T. Schafer-Kalkhoff, N.E. Adler, Perceived socioeconomic status: a new type of identity that influences adolescents' self-rated health, *J. Adolesc. Health* 41 (5) (2007) 479–487.
- [13] E. Alisic, A.K. Zalta, F. van Wesel, S.E. Larsen, G.S. Hafstad, K. Hassanpour, et al., Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: meta-analysis, *Br. J. Psychiatry* 204 (2014) 335–340.
- [14] J.D. Ford, J.D. Elhai, D.F. Connor, B.C. Frueh, Poly-victimization and risk of posttraumatic, depressive, and substance use disorders and involvement in delinquency in a national sample of adolescents, *J. Adolesc. Health* 46 (6) (2010) 545–552.
- [15] R. Gilbert, C.S. Widom, K. Browne, D. Fergusson, E. Webb, S. Janson, Burden and consequences of child maltreatment in high-income countries, *Lancet* 373 (9657) (2009) 68–81.
- [16] R.S. Pynoos, N. Rodriguez, A.M. Steinberg, M. S. C. Frederick, UCLA PTSD Index for DSM-IV, University of California, 1998.
- [17] A.M. Steinberg, M.J. Brymer, K.B. Decker, R.S. Pynoos, The University of California at Los Angeles post-traumatic stress disorder reaction index, *Curr. Psychiatry Rep.* 6 (2) (2004) 96–100.
- [18] American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, 4 Text Revision ed. APA, Washington, 2000.
- [19] B. Efron, R.J. Tibshirani, An Introduction to the Bootstrap, Taylor & Francis, 1994.
- [20] L.C. Wilson, Mass shootings: a meta-analysis of the dose–response relationship, *J. Trauma. Stress.* 27 (6) (2014) 631–638.

- [21] H.S. Desivilya, R. Gal, O. Ayalon, Extent of victimization, traumatic stress symptoms, and adjustment of terrorist assault survivors: a long-term follow-up, *J. Trauma. Stress.* 9 (4) (1996) 881–889.
- [22] S.E. Perlman, S. Friedman, S. Galea, H.P. Nair, M. Eros-Sarnyai, S.D. Stellman, et al., Short-term and medium-term health effects of 9/11, *Lancet* 378 (9794) (2011) 925–934.
- [23] R. Kulka, W. Schlenger, J. Fairbank, R. Hough, B. Jordan, C. Marmar, et al., *Trauma and the Vietnam War Generation: Report of Findings from the National Vietnam Veterans Readjustment Study*, Brunner/Mazel, New York, 1990.
- [24] D. Koren, D. Norman, A. Cohen, J. Berman, E.M. Klein, Increased PTSD risk with combat-related injury: a matched comparison study of injured and uninjured soldiers experiencing the same combat events, *Am. J. Psychiatry* 162 (2) (2005) 276–282.
- [25] C.C. Hsu, M.Y. Chong, P. Yang, C.F. Yen, Posttraumatic stress disorder among adolescent earthquake victims in Taiwan, *J. Am. Acad. Child Adolesc. Psychiatry* 41 (7) (2002) 875–881.
- [26] H.W. Kuo, S.J. Wu, T.C. Ma, M.C. Chiu, S.Y. Chou, Posttraumatic symptoms were worst among quake victims with injuries following the Chi-chi quake in Taiwan, *J. Psychosom. Res.* 62 (4) (2007) 495–500.
- [27] B.L. Green, Psychosocial research in traumatic stress: an update, *J. Trauma. Stress.* 7 (3) (1994) 341–362.
- [28] S.P. Baker, B. O'Neill, W. Haddon Jr., W.B. Long, The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care, *J. Trauma* 14 (3) (1974) 187–196.
- [29] C.M. Cox, J.A. Kenardy, J.K. Hendrikz, A meta-analysis of risk factors that predict psychopathology following accidental trauma, *J. Spec. Pediatr. Nurs.* 13 (2) (2008) 98–110.
- [30] L. Abenheim, W. Dab, L.R. Salmi, Study of civilian victims of terrorist attacks (France 1982–1987), *J. Clin. Epidemiol.* 45 (2) (1992) 103–109.
- [31] L.R. Miron, H.K. Orcutt, M.J. Kumpula, Differential predictors of transient stress versus posttraumatic stress disorder: evaluating risk following targeted mass violence, *Behav. Ther.* 45 (6) (2014) 791–805.
- [32] B. Pfefferbaum, C.S. North, B.W. Flynn, R.J. Ursano, G. McCoy, R. DeMartino, et al., The emotional impact of injury following an international terrorist incident, *Public Health Rev.* 29 (2–4) (2001) 271–280.
- [33] L. DiGrande, Y. Neria, R.M. Brackbill, P. Pulliam, S. Galea, Long-term posttraumatic stress symptoms among 3271 civilian survivors of the September 11, 2001, terrorist attacks on the World Trade Center, *Am. J. Epidemiol.* 173 (3) (2011) 271–281.
- [34] L. DiGrande, M.A. Perrin, L.E. Thorpe, L. Thalji, J. Murphy, D. Wu, et al., Posttraumatic stress symptoms, PTSD, and risk factors among lower Manhattan residents 2–3 years after the September 11, 2001 terrorist attacks, *J. Trauma. Stress.* 21 (3) (2008) 264–273.
- [35] D. Koren, D. Hemel, E. Klein, Injury increases the risk for PTSD: an examination of potential neurobiological and psychological mediators, *CNS Spectr.* 11 (8) (2006) 616–624.
- [36] J. Hardt, M. Rutter, Validity of adult retrospective reports of adverse childhood experiences: review of the evidence, *J. Child Psychol. Psychiatry* 45 (2) (2004) 260–273.
- [37] Ø. Ekeberg, T.H. Diseth, T. Small, L. Skogstad, E. Eide, M. Bjartveit, Psykososiale tiltak i sykehus etter terrorhandlingene 22.7.2011 (Psychosocial interventions in hospital after the terrorist acts 22.7.2011), *Nor. Tidsskr. Palliat. Med.* 31 (1) (2014) 31–34.

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Psychosocial care for hospitalized young survivors after the terror attack on Utøya Island: A qualitative study of the survivors' experiences

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ABSTRACT

Objective: The objective of the study was to explore hospitalized youths' experiences with psychosocial care in the hospital after the shooting on Utøya Island, Norway, in 2011.

Methods: 17 hospitalized youths were interviewed face-to-face 30–31 months after the attack. The interviews were analysed using interpretative phenomenological analysis (IPA). The initial reading and coding of the interviews was carried out inductively. To explore the emphasis placed on everyday conversation and ordinary interaction detected during the initial reading, the text was re-read while bearing in mind concepts from the research field of sociology concerning the therapeutic potential in commonplace conversations and situations.

Results: The youths highlighted the need for health care workers to embrace essential aspects of their past, present and future. Therefore, three overarching categories emerged related to 1) Remembering the past, 2) Dealing with the present and 3) Preparing for the future. For each temporal category, two related subcategories were identified: Past: *Engaging in the trauma narrative; Understanding the trauma reminders*; Present: *Bringing back normalcy; Being there*; Future: *Supporting confidence; Instilling trust*.

Conclusions: For the youths in the current study, talking with the hospital staff about their traumatic experiences was mostly perceived as positive and linked to various helpful outcomes. In addition to engaging in the trauma narrative, the staff needed to comprehend and address how the traumatic experiences and the hospitalization resulted in the survivors' extended fear and changed appraisals about the world and themselves. Having the time to stay physically and mentally close to the youths and engage in everyday interaction was crucial in rebuilding their sense of safety and bringing back normalcy. The hospital staff played a significant role in strengthening the survivors' confidence in own capabilities and trust in others. The different professionals in the hospital contributed to various aspects of psychosocial care, and both trauma-focused interventions and commonplace conversations and actions were emphasized as important and meaningful approaches.

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Introduction

Terror attacks are violent and traumatic events constituting major threats to survivors' health. Severe psychological distress is

common, and many also experience physical harm and may require hospitalization [1–3]. Physically injured survivors exhibit particularly high levels of distress [4,5]. The hospital setting may also be psychologically demanding due to clinical procedures such as surgery or having needles or scans [6].

Severe early psychological distress has been found to predict the development of later posttraumatic stress symptoms (PTSS) and disability in both paediatric and adult samples after traumatic injury [7,8]. Therefore, adequate support in the early phase is important and may help prevent the development of

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PTSS. However, there is a lack of evidence concerning the effects of early interventions. Based on theoretical models and empirical findings from related research fields, Hobfoll and colleagues published a consensus document describing five essential elements for promoting psychosocial health and functioning in the early phase after mass traumas: rebuilding a psychological sense of safety, calming emotions and bodily arousal, enhancing a sense of self-efficacy, i.e. the sense of control over positive outcomes in life, promoting social connectedness and instilling hope for the future [9]. To promote trauma-informed psychosocial care after mass traumas in general, as well as in specific settings such as hospitals, guidelines for clinical practice have been developed [10–12]. Such guidelines are designed as practical strategies aimed at supporting the work of first responders and staff, and their main focus is to reduce initial fear and promote adaptive functioning and coping over time. Despite the widespread recognition of Hobfoll's principles and the use of guidelines in trauma-informed care, the underlying research evidence is limited [11,13]. For both adult and paediatric samples of survivors with traumatic injuries, there is a lack of knowledge about the impact of early interventions [7,8]. There is also a need for research that can broaden our understanding of patients' needs and provide knowledge about specific settings for care [14].

For hospitalized survivors of traumatic events, the early aftermath is particularly demanding. Complex challenges related to psychosocial needs and care may arise as a result of the traumatic event, injuries and the hospital stay itself. It has been argued that assessing the effect of specific interventions is not sufficient to address this broad spectrum of challenges [15]. One way to bring the field forward is to qualitatively explore survivors' perspectives on their own experiences [16,17]. A few studies on survivors' hospital experiences have been published, and issues such as processing the traumatic experiences, supporting the sense of safety and rebuilding a sense of normalcy have been elaborated on [18–21]. To our knowledge, no studies have investigated survivors' experiences with psychosocial care in hospital after terror attacks.

In this paper, we seek to better understand how hospital professionals can respond to the acute psychosocial needs of severely traumatized survivors by interviewing hospitalized youths exposed to the 2011 mass shooting attack at Utøya Island in Norway. At Utøya, a man disguised as a police officer attacked the Norwegian Labour Youth's summer camp. Heavily armed, he pursued and targeted the 564 youths for about one and a half hours before he was arrested. A total of 69 people were killed, and 32 survivors were hospitalized due to physical injuries [22]. In the hospital, the youths were met by nurses and physicians who were specialized in the treatment and care of severely injured patients. Due to the extreme nature of the incident, the regular staff was assisted by psychosocial health care workers such as psychologists, psychiatrists, psychiatric nurses and social workers. Their main task was to provide information, strengthen the youths' sense of safety and help with the stabilisation of affects, in addition to supporting relatives and supervising the regular health personnel [23].

Aim of the study

The aim of this study was to gain more knowledge of how physically injured survivors experience psychosocial care in the hospital after traumatic events. Specifically, we aimed to gain a broader understanding of what may help severely injured survivors after a major mass trauma through the examination of survivors' experiences with hospital care after the shooting attack on Utøya Island.

Methods

The data is derived from an open cohort study conducted to explore the experiences and reactions of survivors and their parents after the shooting attack on Utøya Island 2011 [1]. Quantitative and qualitative data were collected at three time-points; T1, T2 and T3 (4–5, 14–15 and 30–31 months after the attack, respectively). In the current study, we analysed qualitative data from interviews with hospitalized injured survivors conducted at T3. All participants had been discharged from the hospital by this time-point.

Recruitment and participants

The 27 hospitalized youths who participated in either the first or the second wave of the Utøya study were invited to participate at T3. A total of 17 agreed to be interviewed; the mean age at the time of the attack was 19 years (standard deviation = 2) and 77% were female. Sixteen of the 17 participants allowed access to their hospital records; thirteen were treated for severe bullet wounds, mainly located in the truncus, two were also treated for bullet wounds causing mild traumatic brain injuries, and three were treated for fractures. The mean injury severity score (ISS) was 18 (standard deviation = 11). ISS is a clinical score of injury severity ranging from 1 to 75. Major trauma is commonly defined by an ISS score over 15 [24].

Interviews

A semi-structured interview guide was developed and contained the following main topics:

- 1) The youths' experiences with psychosocial help and support from different kinds of health care workers in the hospital (nurses, physicians, psychologists, psychiatrists or others): eliciting descriptions of how the help impacted them during and after hospitalization.
- 2) The youths' views on possible improvements in early psychosocial hospital care for traumatized survivors.

A group of three psychologists and one psychiatrist (the first author) trained at interviewing traumatized youths conducted the interviews.

Ethics

The study was based on the written consent of all participants aged 16 years or older and from the parents of individuals younger than 16 years of age. The face-to-face interviews took place in the participants' homes. When a need for further health services was discovered, the interviewers facilitated contact with the appropriate resources. Ethical approval was gained from the Regional Committees for Medical and Health Research Ethics.

Analyses

The interviews were audiotaped and transcribed verbatim and imported into NVivo 11 for coding. The length of the interviews varied from 5 to 37 min.

Since we were interested in the youths' own perspectives on their experiences in the hospital setting, interpretative phenomenological analysis (IPA) was used [25,26]. IPA consists of three core features. Firstly, it is phenomenological; it is intended to explore peoples' experiences, in particular, significant events in which the everyday flow of life is altered. Secondly, IPA is interpretative; the researcher tries to make sense of how the participant makes sense

of his/her life (double hermeneutics). Thirdly, IPA is ideographic; it analyses in detail the case at hand and how a particular subject is making sense of his/her situation. In the analysis, the researcher first “stays close” to the data and the participants’ accounts, and then “steps back” and interprets these accounts.

The initial analysis of the interviews was informed by the authors’ clinical experience working with traumatized youths and by knowledge from the trauma research field. During the analytic process, the youths’ emphasis on everyday conversation and seemingly ordinary actions, such as being hugged or washed, caught our attention. To inform the further analysis and increase the possibility of interpretations pushing the field forward from what is already known, we introduced perspectives from adjacent fields of research. In a sociological study conducted at a treatment centre for drug abusers, researchers investigated the therapeutic potential of the commonplace and informal interaction between staff and clients such as conversations about common every-day issues and joining for a smoke outside [27]¹. Their findings show how such seemingly ordinary interactions may be therapeutic and contribute to healing by strengthening feelings of identity, normalcy and belonging. This research represented a conceptual framework that enabled us to identify when and how apparently trivial, superficial and common situations and conversations seemed to constitute powerful moments in the youths’ progress towards normalization and health.

Two of the authors (the fourth and the last) were involved in planning the psychosocial care in the hospital after the Utøya 2011 attack. The first author worked as a psychiatrist in the hospital during the same period, and carried out some aspects of the psychosocial care for one of the 17 participants in this study. This was helpful in the planning of the study and the analysis because these authors knew the context the youths were reporting from. However, this could also create biased interpretations of the interviews. Inspired by the Consensual Qualitative Research model [29], a research team was therefore organized in order to enhance validity and counteract group thinking and researcher bias. Two of the five team members (the first and third authors) formed the primary analytic team. Consensus on themes was obtained after repeated rounds of independent reading, sharing of notes and discussion, then re-reading and re-discussing the interviews. The second author also read all interviews independently and acted as a discussant in the analyses. The last two group members (the fourth and last authors) then examined the team’s analyses to check for consistency and soundness case by case and across cases after reading all interviews.

Results

While care is provided to assist with the here and now, the youths highlighted the need for health care workers to embrace essential aspects of their past, present and future. Therefore, the analyses resulted in three overarching categories underpinning temporality within the descriptions of psychosocial care. We coded and labelled six subordinate categories related to the overarching categories: [1] Remembering the past: *Engaging in the trauma narrative, Understanding the trauma reminders* [2] Dealing with the present: *Bringing back normalcy, Being there* [3] Preparing for the future: *Supporting confidence, Instilling trust*.

In the presentation of results, each overarching category is given with its subordinate categories and selected quotes. The categories are formed in line with methodological recommendations for IPA

requiring at least three participants contributing to each category. To ensure confidentiality, names, ages and places are concealed. To further reduce traceability, we use the pronouns *she* or *her* for all quotes regardless of gender.

Remembering the past

The youths were admitted to the hospital immediately after the attack. Although they were safe in the hospital, their traumatic experiences were still vivid. Memories from the attack, trauma-related thoughts and fear were still in the foreground and played a role in how they perceived their needs and the care they received.

Engaging in the trauma narrative

Several youths emphasized the staff’s role in helping them talk about what had happened. They explained how talking through the trauma contributed to meaning-making and acceptance of their experience. One girl explained:

And we often went through the whole story, I told my story several times, to work through it. (. . .) I think it was really helpful (. . .) and eventually it helped me to obtain a kind of understanding.

Another girl highlighted how talking helped her realize she was safe:

I think maybe it helped me, not to forget it, but to understand that what happened a few hours ago will not happen within the next hour. (. . .) I became more aware that it happened a few hours ago, it’s over now. It will not happen again (. . .) I wasn’t afraid that it would happen again, sort of. She assured me that it was over, and that I didn’t need to be afraid anymore. I think that really helped.

When asked about the impact of retelling what had happened, this youth said that she felt unsure of whether the attack was actually over, and, therefore, if she could feel safe. The health care worker was able to discover this and to assist her by listening to her story and related fears. Further, as the youth below explained, failing to seize this opportunity could hinder important corrections and the mending of misconceptions:

No one talked to me about new facts that could have made the world appear safer. For one month I thought there were five terrorists because no one told me that they knew there was only one, no one talked to me about what advances had been made in the investigation. In my head, there was only bang, bang, bang. And that was my last experience. I was certain that there were ten people shooting because there were so many shots, and it was a long time before I found out how it had really been.

Notably, none of the youths described talking through the traumatic experiences as stressful. However, one survivor did not want to share her experiences fearing the staff’s disbelief, and the administration of sedative medication seemed to contribute to this fear:

After a while I said that I have seen at least ten dead people, and there are for sure many more, I would guess almost eighty, thinking of all those I saw getting randomly shot and all those I saw dead. And then I remember very well that they shot that kind of thing into my cannula, that kind of sedative medication, and I thought “they don’t believe me anyway, they will believe I am totally crazy if I speak now and tell about what I have seen, so it’s better to keep quiet.”

By talking to health care providers, the youths could avoid sharing some of the horrible details with those close to them, thereby protecting them from further suffering:

¹ The paper presents results from a doctoral study written in Norwegian language [28]. Skatvedt A. Alminnelighetens potensial. En sosiologisk studie av følelser, identitet og terapeutisk endring: University of Oslo; 2008.

I think it was most useful just to talk about it and to tell what had happened. Because the more times I got to talk about it, the easier it was for me to accept. (. . .) And that I didn't have to tell my mom about it ten times, that she maybe heard about it only eight times (laughter) instead. Because it wasn't that easy for her to listen in the same way as for the psychologist who could endure listening. In that way, the nurses were really ok, you could tell them the most terrible things and it didn't bother them.

However, for these disclosures to be helpful, several youths emphasized that the staff had to have time to listen to their stories and be compassionate:

The other nurses and doctors also asked what had happened, but they didn't have the time to listen to me (. . .) while she had the time to listen, and she asked, if I told her something, "yes, and what happened then?" that she appeared interested in what I said, and that she showed me, in a way, that she cared.

The staff's emotional capacity to handle the horrific details of what had happened was also important:

But then we came to (place) and there was some kind of miserable mental health care worker entering the room and looking at me, as if I were a "psycho-case." (. . .) She tried talking with me, but she felt so bad about what had happened (. . .) it was almost a burden having her there (. . .) and then I told her a little bit of what had happened, and she thought it was so horrible. I felt she came because she was curious.

The mental health care worker's expression of horror made this youth feel like she was abnormal, a feeling that seemed to make her uncomfortable, thereby disturbing the development of a potentially therapeutic relationship.

Understanding the trauma reminders

Many youths described how certain situations within the hospital environment triggered fearful thoughts and emotions by reminding them of experiences from the terror attack. Unsurprisingly, therefore, the youths were concerned by how these reminders and moments of fear were understood and met by the staff:

I wasn't sure if I could feel safe anywhere, but they were really good at making me feel safe in the hospital. And when we had a thunderstorm, for instance, that they would immediately run over to me explaining that it was nothing but thunder. They explained and made sure that I wouldn't be scared and they listened to what I had to say.

This youth appreciated the active engagement of the nurses. Being listened to and receiving normalising explanations of the reminders and how they may trigger responses made many youths feel safe and understood. However, the contextualisation and normalisation of such responses needs to be done with sensitivity:

I remember one nurse that was supposed to help me, and I was afraid of sounds all the time, and then she said, "just think that if no one else is afraid, then there is nothing to be afraid of." In my head that wasn't logical at all, because that was exactly what had happened the last time that had happened, so for me it was like, "are you a complete idiot? That is why I got into this! No one was afraid and then all of a sudden and out of the blue I was shot." (. . .) maybe if they had asked me properly, like, why do you think this is dangerous? Then I would have explained, then they could have provided a logical explanation for why it couldn't be like that.

Here, being told that she should not be afraid because no one else was afraid appeared illogical and unhelpful, as only hours

before she had experienced a sudden disaster in a peaceful environment. She seemed provoked by the nurse's lack of understanding and her response that did not align with what the youth considered helpful.

What constitutes a trauma reminder may not be apparent, again underscoring the need for staff to know about the particular experiences of their patients. The following quote demonstrates how a combination of traumatic experiences and threatening hospital procedures may trigger comprehensive fear, and it illustrates how detrimental a lack of knowledge and understanding of the nature of trauma reminders may be:

And when, in addition, I thought that everyone wearing a uniform was a fake person, then it became like that for all information, I thought it was all a lie for a very, very long time (. . .) in the beginning I was operated on almost every second day, and there was very little information on what they would do, and then I thought that every time I was sedated they would kill me because they weren't real (. . .). One time I was going into a MR machine for examination, I got all . . . and then it is written in my medical records that I got some kind of attack or flashback or something, because then I shouted things like "I know that you are going to kill me", or something like that. And then they sort of forced me into the machine.

Dealing with the present

The youths not only talked about how their trauma experiences needed to be addressed and understood, but also about being cared for in ways that helped them overcome and cope with current needs. In these descriptions, they emphasized aspects of care that are potentially relevant to all patients. However, although these needs may be construed as commonplace, their meaning needs to be interpreted within the context of traumatization.

Bringing back normalcy

Several youths emphasized the importance of everyday conversation as they seemed to contribute to a sense of normalcy. The content of these conversations reminded them of times free of threat, demonstrating to the youths that the world was still the same as it was before the horrific event:

I just thought it was really, really useful that they talked about other things, that made me understand that the world still had some parts that were the same as before (. . .). Because I woke up and thought that the world was different, that the world was totally cruel. I didn't recognize my own world or any people in it. So it really helped (. . .) the first time she just talked about a television series that she had been watching or something, and then I sort of remembered that there were still television series, that one could still laugh at them, that they were still part of the world.

For this youth, returning to the idea of the world as a safe place was crucial in the process of regaining a sense of safety. She almost seemed trapped by the memories of her traumatic experience and by the unfamiliar hospital context, and she needed to somehow break free and reconnect to a positive view of the world. Talking about and even laughing at ordinary things, such as a television series, represented a reconnecting link which provided implicit information that the world was still intact and safe.

Everyday conversations could also be a way of coping with intrusive thoughts, providing some acute relief:

Then I just had to lie there, so it was nice just to talk with someone, about anything. I had some conversations about porridge, I remember. So that was nice (. . .) just to make the

time pass and my thoughts stop spinning around Utøya and in a more normal setting, even if the setting you're in is abnormal.

Ordinary conversation was also linked to other features promoting positive feelings and wellbeing:

Well, there were some female nurses there that, just talking to me and talking to my family, and joking around with (name) and making her laugh and that kind of thing. Just that did that a lot.

The significance of humour and laughter needs to be understood in the context of the extreme situation encompassing comprehensive damage and tragedy. Seeing those close to her laughing again seemed to comfort her as laughter signaled optimism and positivity and represented the world as it used to be and could be again.

Being there

As presented above, many of the youths focused on aspects of care related to verbal communication, including how their traumatic experiences were received and responded to and the significance of ordinary conversation. Importantly, however, the descriptions also contained opinions on the presence of staff without reference to what was said.

For these young survivors, the feeling of being unsafe was not easily overcome, and their descriptions underpinned the importance of the more or less continuous presence of others:

She made sure that there was always someone with me, so if she, for example, had to go to the restroom, she asked another nurse if she could stay with me, and she kind of asked my aunt if it was ok that she left, and I felt that she was really responsible, or made sure . . . I kind of felt that she looked after me.

The nurses played a significant role in strengthening the feeling of safety. This was related to their availability and flexibility when interacting with youths with continuous and fluctuating emotional states and needs. Further, some survivors described more in-depth aspects of non-verbal care:

. . . and I woke up after the surgery, I woke up just laughing and laughing. My mom wasn't there, but I felt as if there were a lot of mothers there, because they were kind of with food and all that . . . and I remember one of them washing my feet, because I had been running in mud and stuff like that, my nails were all dirty, and they were, it was just so cosy and lovely that right there I don't think that I thought that much about what I had gone through. They just made us, at least me, feel very safe and good.

This youth highlighted the importance of explicit acts of compassion and touch in strengthening her sense of safety. The nurses were described as motherly figures, reminding us that mechanisms of human attachment are activated and essential in stressful situations.

To feel others' suffering to some degree, and to be able to express that empathy, is essential to the provision of compassionate help. Some youths elaborated on how the health care workers expressed their feelings:

In any case, I wasn't able to answer, and what they asked about kind of felt so trivial anyway, and even if I tried to answer, I couldn't do it. So what I felt was really liberating, that really helped, was when that nurse who stayed with me started crying herself (. . .) and then she just laid down beside me and just hugged me, and then I started crying. (. . .) She kind of stood right next to my bed, and then she laid her upper body against me and held me and cried herself. And then I thought that this is one of those few people that understand. So I felt a bit safer, I felt less alone.

It may be that such deeply human and "ordinary" compassionate acts such as crying and hugging, although not common in interactions between health care workers and their patients, represented an indispensable key to acknowledging and addressing the youth's state of immense fear and sadness in this situation.

However, as described below, compassion may also result in emotional expressions affecting victims negatively:

I think that the more sensational things are, the more one needs things to be normal. At least I would have needed that people behaved normally. That the staff behaved normally (. . .) that I didn't have to feel that I had gone through the worst, worst, worst all the time.

This youth seemed to ask for expressions of "normalcy" so that she could liberate herself from the restrictive identity of being a victim of the worst thing that could ever happen.

Preparing for the future

As presented above, the continuous role of the traumatic event, the prolonged sense of fear and experiences with how these issues were addressed were central topics for the youths. In addition, they discussed how the staff contributed to strengthening their confidence and hope for the future. The hospital stay was implicitly depicted not only as an arena for processing actual and ongoing psychological issues, but also as a "greenhouse" which could provide the opportunity to prepare for the future under beneficial conditions.

Supporting confidence

Several descriptions concerned the staff's role in strengthening the youths' confidence through explicit acknowledgement and encouragement:

I got it in writing that I was resourceful. I want to frame that paper.

For this young survivor who had been physically and psychologically worn down, being told that she was still capable and "up and about" seemed to have a strong symbolic power which had a significant impact on a young mind under intense reorganization. This youth took us deeper into her perspectives on encouragement:

I didn't feel capable in that situation, because my body didn't function, so I needed help with everything all the time, and I couldn't even go to the toilet myself, and everything people said to me was positive, about how brave I was, or things that had to do with the attack. And then I remember that what really helped was that she (a nurse) was very good at telling me almost every day something that was good about myself, for instance, that he said, "you are very good at understanding other people, you are good at seeing other people", or "you are good at" Yes, such things that had to do with ME that maybe made me maintain some self-worth, that wasn't tied to, kind of, surviving.

After such a dramatic event, attention was naturally drawn to the most striking aspects of the attack scenes and how some youths managed to survive. This youth reminded us, however, of the importance of the everyday "real" her, who she was before the attack and who she still wanted to be.

In addition to general acknowledgment, positive, albeit demanding, support in focusing on more specific goals and tasks seemed important in establishing confidence and belief in control over one's own life:

I was injured, but at the same time an individual they had to listen to and for whom they did everything they could to save. I

felt that in comparison to family and friends dropping by and who were more like “poor you,” they were more kind of “ok, we will work this out” and “you have to do this and that” and they were a little more strict and “now you’ve got to get up and exercise”.

... and the environment was really positive, even if things were like shit, there was a lot of focus on what I had to do and what kind of things I could manage and ... like completely normal things.

Confidence does not rely solely on others’ statements and behaviours. Some descriptions elaborated on how the survivors’ agency may have strengthened belief in their own capabilities:

I started writing a blog, partly because I was so tired of all the questions, and it took a lot of energy to answer every single time, for example answering their questions about what happened or that kind of thing. So then I found out that it was better to just write a text like I did and so people could read that, and I didn’t have to answer every single question all the time. That was actually quite useful. And for me, it was convenient, even if I was criticized (by a doctor), that I couldn’t write about my injuries and so on. And that was why we were at odds, because I was over sixteen years old, so it’s my decision if I want to make public my own medical history, as long as I don’t kind of pull other people into it. But it worked out really well for me, yes to protect myself.

This youth seemed to relate the decision of establishing a blog in spite of objections from staff to being grown-up and a feeling of taking control of her own life. To grasp the symbolic power of such actions in this situation, it is important to recognize that they were not seen as conventional, neither by the survivors nor the staff, meaning that they were not acceptable in the hospital setting. Carrying out these ordinary unordinary actions may have contributed to this youth gaining a sense of herself as a person who could stand up for own needs and being capable of doing what was good for her.

Instilling trust

Being pursued and shot at by another person affected the youths’ capacity to trust others. Given its crucial role in social life after discharge from hospital, the regaining of trust was naturally a concern:

That it was a good experience for me staying in the hospital, made it less threatening to leave it (...). That they kind of cared, and helped me to understand that other people also care. That it wasn’t dangerous or unsafe to stay in the hospital, made it less scary to go to another hospital, or to go to a shopping centre, or to go to a place with people.

For this youth, the hospital was a place where she could start rebuilding her capacity to trust others. Although the hospital represented a particular world, different from everyday life in many aspects, experiences in this setting were transferrable to life outside the hospital. The hospital appeared to function as a microenvironment encompassing both the clinical and the commonplace, and although they were strangers, the health care workers contributed to mending the youths’ shattered inner representations of other human beings.

In addition to rebuilding general trust in the world outside the hospital, re-establishing trusting relationships through interaction with staff was emphasized:

And it was helpful as it was the first place I said things aloud. And at the same time having to trust people, because that was something I’ve had some problems with. But in that situation you didn’t have a choice, you just had to trust the people around

you, and maybe that made it easier for me to trust people again afterwards.

Some were also concerned with the significance of being put in contact with specific groups of professionals. Positive early contact with health care workers addressing psychosocial issues may have facilitated access to later help or treatment:

It was the first time I had talked to a psychologist, and I had a good feeling about psychologists afterwards when I got out of the hospital.

Overall, the youths seemed to view the hospital as an arena where trust could be regained and strengthened. Just being in close and positive contact with the staff seemed to release and strengthen the capacity to trust others again.

Discussion

The surroundings in which survivors spend the early aftermath after traumas vary, and different settings involve different premises for the provision of psychosocial care. It is crucial to understand specific aspects of the different settings and take into account victims’ experiences when developing psychosocial care. After being brought to safety, most survivors of the Utøya attack returned to their homes and the people closest to them. For the youths in our study, the first hours, days and weeks were spent in a hospital. Shortly after being rescued from the island, these youths found themselves in an unfamiliar clinical environment, closely and continuously surrounded by professional health care workers providing a wide range of care and clinical treatments. Some aspects of psychosocial care seemed to benefit from the characteristics of the hospital setting, while others were challenged.

Earlier research suggests that going through major traumas may change how victims perceive the world [30,31]. The current study demonstrated how the unfamiliar and clinical hospital environment represented an additional challenge to the youths’ perceptions of their surroundings. Firstly, procedures and equipment activated severe fear, even those that did not constitute obvious trauma reminders. Their unfamiliar nature, evoking the traumatic experiences of being bodily invaded and attacked, turned them into powerful triggers of distress. Hypervigilance is often seen after traumas and is defined as part of the clinical diagnosis of posttraumatic stress disorder [32]. Our study contributes to current knowledge by illustrating how hypervigilance after trauma may interplay with the hospital context inducing aggravated fear. The staff that understood this and acknowledged the origin of these exaggerated fears, and were sensitive in their efforts to contextualize and normalize reactions, were described as important in the youths’ healing processes. Secondly, the youths emphasized that their beliefs about the world as a safe place and other people as trustworthy were shattered. Their beliefs were not only challenged by the horrific and intentional violence, but also by waking up in an unfamiliar clinical environment, surrounded by strangers. Hobfoll connects the restoration of shattered beliefs to the strengthening of the feeling of safety and the rebuilding of hope [9]. Accordingly, the youths were explicit about the need to adjust their beliefs to feel safe. Interestingly, laughing or talking about well-known television series or food was emphasized as helpful in recognizing that the world was still safe, and ordinary interaction with the staff seemed to contribute to rebuilding trust in others. The role of interactions which simply focus on ordinary human togetherness and conversation in reinforcing the perception of the world as normal and trustworthy may seem obvious. Nevertheless, this aspect of care is poorly addressed in trauma research. In developing psychosocial care after traumas, the perspective of the “potential

of the commonplace" [27] may be helpful in contributing to normalcy and healing. Our findings indicate that approaching traumatized survivors with both clinical and everyday conversation can help them process a range of changed perceptions about the world and their surroundings.

Further, descriptions of the importance of being acknowledged and supported in feeling capable, made us aware of how the youths' perceptions of themselves were challenged. Accordingly, research has indicated that a weakened sense of control over, and belief in, positive outcomes in life, described by Hobfoll as self-efficacy, is often seen after traumas [9,11,18]. In our study, emphasis was put on being acknowledged as a valuable person independent of one's behaviour in the face of the traumatic event, that is, value connected to the ordinary self. The need for validation and being seen as 'normal' both by health professionals and by survivors themselves is also highlighted in earlier studies [17,21]. Research on patient culture in acute care hospitals has argued that patients seek *ordinariness* as their condition is *not ordinary* and as their future membership in the world of the ordinary is at stake [33].² Along the same line of reasoning, Skatvedt claims that in the process of reaching normalcy, the commonplace interactions between staff and clients may serve as powerful labelling situations which allow for the creation of new identities unconnected to deviance and degraded selves [27]. For the youths in our study, as trauma survivors in addition to being severely injured and hospitalized, reconnecting their self-perception to the ordinary seemed to be of fundamental importance in the acute aftermath of the trauma.

Due to the comprehensive system of care, being hospitalized implied that each youth was closely and more or less continuously surrounded by others. Being socially connected is obviously fundamental in regaining health after trauma as it enables support such as understanding and acceptance from others in addition to support in the sharing of traumatic experiences and normalization of reactions [9,11]. The findings in our study highlighted the perceived presence of such support within the hospital setting and contribute to an extended understanding of its impact after a deeply traumatic experience. In addition, the youths emphasized the link between being close to the staff and the rebuilding of their sense of safety. This finding was supported in another study of injury survivors' experiences in an emergency department, where the importance of having someone close was repeatedly stressed and linked to coping with feelings of loneliness and fear [19]. In spite of being an environment at times described as busy [18] and with the potential to induce aggravated anxiety, it seems that the hospital with its close social structures aimed at providing support and care, may also contribute substantially to the trauma survivors' sense of safety.

A specific characteristic of the hospital setting is the environment consisting of various professionals contributing to different aspects of care. Having the time to be emotionally and practically available, and thereby representing continuity of care, made the nurses essential in strengthening the youths' sense of safety. The mental health care workers seemed to be important in another emphasized aspect of care; addressing the youth's trauma experience and related thoughts and fears. Processing the trauma narrative is a main focus in effective treatment strategies for prolonged symptoms of posttraumatic stress and may be seen as useful by trauma survivors [35]. However, it is unclear to what degree trauma narrative processing needs to be implemented as an early intervention strategy among injured school-age children and

youths [36,37]. Routine debriefing is not recommended, and the approach outlined in Psychological First Aid emphasizing the importance of not provoking additional distress, is considered best practice although sparsely informed by research [11–13]. Our study may contribute to the field illustrating how talking about what had happened mostly was perceived as positive, provided that the staff had time to listen and that the youths were met in ways which did not increase their anxiety and sense of otherness. Under these conditions, telling and talking was linked to various helpful outcomes such as; understanding what had happened and meaning-making, understanding trauma-reminders and their impact, discovering and altering unhelpful thoughts, as well as protecting loved ones from having to repeatedly listen to the horrifying story. These aspects are in accordance with findings in other studies on survivors and their parents after traumatic injury underlining the importance of meaning-making and protecting loved ones [17,20,38]. As also demonstrated in one of these studies, repeatedly having to share the trauma narrative for the purpose of informing the hospital staff was perceived as distressing [20]. Taken together with the findings in our study, this points to the importance of the context and the reasons for initiating conversations about trauma related issues emphasizing a sensitive approach where the needs of the victims are in focus.

As addressed above, professionalism influences which aspects of psychosocial care are utilised and how the care is carried out, and patients naturally have vivid expectations related to the various professional roles. Interestingly, Skatvedt claims that when a professional steps outside of what their client perceives as their stereotypical professional role, the symbolic power of what is said or done is strengthened [27]. In our study, this perspective helped us understand the way the nurses' authentic displays of emotion and ordinary care contributed to wellbeing and self-worth when combined with an understanding of the impact of trauma. Skatvedt claims that seemingly small acts may have the power to move people emotionally and communicate messages of identity and belonging, as was articulated by the youths in this study. We believe that the ordinary interactions within the clinical setting contributed to the youths' sense of participating and belonging in the world as normal people rather than just trauma survivors.

Ultimately, in line with earlier research, the nurses seemed to play a crucial role in providing helpful psychosocial care [19]. There was less emphasis on the work of mental health care workers and physicians, which was rather interesting due to the context of the extreme traumatic event and the physical injuries. We ask if the role of the commonplace may contribute to explaining the nurses' impact. Through displays of ordinary human togetherness, they demonstrated to the youths in this abnormal setting and moment in life, that the world was about to become safe again.

Implications for practice

- 1) For trauma survivors in hospital settings, talking about the traumatic experiences may be helpful for various reasons. However, this is contingent on the staffs' availability and their emotional capacity to endure others' suffering and listen empathetically. Pertaining to this, support and supervision of staff should be a prioritized task.
- 2) Hospital staff needs to be trauma-informed and comprehend and engage in how exposure to trauma and hospitalization may result in extended fear and changed appraisals about the world and the survivors' perceptions of themselves.
- 3) Taking the time to stay physically and mentally close to trauma survivors in hospital settings needs to be acknowledged as crucial in promoting the sense of safety.
- 4) Commonplace interaction may need to be acknowledged as a powerful element of psychosocial care for trauma survivors in

² For a more thorough elaboration on the theme, we recommend Album's book written in Norwegian language [34]. Album D. Nære fremmede: pasientkulturen i sykehus; Tano; 1996.

hospitals. Everyday conversation and actions may be helpful in strengthening survivors' sense of safety in addition to helping them attain normalcy, i.e. normalise their appraisals about the world and themselves.

- 5) In hospitals, the various professionals may contribute with a broad range of psychosocial care approaches. Trauma-focused interventions and commonplace interaction may complement each other and together provide trauma survivors with a beneficial environment of care.

Conflict of interest

No conflict of interest has been declared by any of the authors.

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References

- [1] Dyb G., Jensen TK, Nygaard E, Ekeberg O, Diseth TH, Wentzel-Larsen T, et al. Post-traumatic stress reactions in survivors of the 2011 massacre on Utøya Island, Norway. *Br J Psychiatry* 2014;204:361–7.
- [2] Perlman SE, Friedman S, Galea S, Nair HP, Eros-Sarnyai M, Stellman SD, et al. Short-term and medium-term health effects of 9/11. *Lancet* 2011;378(9794):925–34.
- [3] Bugge I, Dyb G, Stensland SO, Ekeberg O, Wentzel-Larsen T, et al. Physical injury and posttraumatic stress reactions. A study of the survivors of the 2011 shooting massacre on Utøya Island, Norway. *J Psychosom Res* 2015;79(5):384–90.
- [4] Neria Y, DiGrande L, Adams BG. Posttraumatic stress disorder following the September 11, 2001, terrorist attacks: a review of the literature among highly exposed populations. *Am Psychol* 2011;66(6):429–46.
- [5] Lowell A, Suarez-Jimenez B, Helpman L, Zhu X, Durosky A, Hilburn A, et al. 9/11-related PTSD among highly exposed populations: a systematic review 15 years after the attack. *Psychol Med* 2018;48(4):537–53.
- [6] Ramsdell KD, Morrison M, Kassam-Adams N, Marsac ML. A qualitative analysis of children's emotional reactions during hospitalization following injury. *J Trauma Nurs* 2016;23(4):194–201.
- [7] Visser E, Gosens T, Den Ouden BL, De Vries J. The course, prediction, and treatment of acute and posttraumatic stress in trauma patients: a systematic review. *J Trauma Acute Care Surg* 2017;82(6):1158–83.
- [8] Kassam-Adams N, Marsac ML, Hildenbrand A, Winston F. Posttraumatic stress following pediatric injury: update on diagnosis, risk factors, and intervention. *JAMA Pediatr* 2013;167(12):1158–65.
- [9] Hobfoll SE, Watson P, Bell CC, Bryant RA, Brymer MJ, Friedman MJ, et al. Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry* 2007;70(4):283–315 discussion 6–69.
- [10] Stuber ML, Schneider S, Kassam-Adams N, Kazak AE, Saxe G. The medical traumatic stress toolkit. *CNS Spectr* 2006;11(2):137–42.
- [11] Brymer M, Jacobs A, Layne C, Pynoos R, Ruzek J, Steinberg A, In: PTSD, NCTSNANCF, editors. Psychological first aid field operations guide. 2nd ed .
- [12] Phoenix Australia. Resources PTSD guidelines. Web site [Available from: <https://www.phoenixaustralia.org/resources/ptsd-guidelines/>].
- [13] Bisson JI. Early responding to traumatic events. *Br J Psychiatry* 2014;204:329–30.
- [14] Duckers ML. Five essential principles of post-disaster psychosocial care: looking back and forward with Stevan Hobfoll. *Eur J Psychotraumatol* 2013;4:.
- [15] O'Donnell ML, Bryant RA, Creamer M, Carty J. Mental health following traumatic injury: toward a health system model of early psychological intervention. *Clin Psychol Rev* 2008;28(3):387–406.
- [16] Malterud K. Theory and interpretation in qualitative studies from general practice: why and how? *Scand J Public Health* 2016;44(2):120–9.
- [17] Ogilvie R, McCloughen A, Curtis K, Foster K. The experience of surviving life-threatening injury: a qualitative synthesis. *Int Nurs Rev* 2012;59(3):312–20.
- [18] Sleney J, Christie N, Earthy S, Lyons RA, Kendrick D, Towner E. Improving recovery-Learning from patients' experiences after injury: a qualitative study. *Injury* 2014;45(1):312–9.
- [19] Jay R. Reassuring and reducing anxiety in seriously injured patients: a study of accident and emergency interventions. *Accid Emerg Nurs* 1996;4(3):125–31.
- [20] Ogilvie R, Foster K, McCloughen A, Curtis K. Young peoples' experience and self-management in the six months following major injury: a qualitative study. *Injury* 2015;46(9):1841–7.
- [21] Ogilvie R, Foster K, McCloughen A, Curtis K. The injury trajectory for young people 16–24 years in the six months following injury: a mixed methods study. *Injury* 2016;47(9):1966–74.
- [22] Bugge I, Dyb G, Stensland SO, Ekeberg O, Wentzel-Larsen T, et al. Physical injury and somatic complaints: the mediating role of posttraumatic stress symptoms in young survivors of a terror attack. *J Trauma Stress* 2017;30(3):229–36.
- [23] Ekeberg Ø, Diseth TH, Small T, Skogstad L, Eide E, Bjartveit M. Psykososiale tiltak i sykehus etter terrorhandlingene 22.7.2011 [Psychosocial interventions in hospital after the terrorist acts 22.7.2011]. *Norsk tidsskrift for palliativ medisin* 2014;31(1):31–4.
- [24] Palmer C. Major trauma and the injury severity score—where should we set the bar? *Annual Proceedings Association for the Advancement of Automotive Medicine* 2007;vol. 51:13–29.
- [25] Smith JA. Evaluating the contribution of interpretative phenomenological analysis. *Health Psychol Rev* 2011;5(1):9–27.
- [26] Pietkiewicz I, Smith JA. A practical guide to using interpretative phenomenological analysis in qualitative research psychology. *Psychol J* 2014;20(1):7–14.
- [27] Skatvedt A, Schou KC. The potential of the commonplace: A sociological study of emotions, identity and therapeutic change. *Scand J Public Health* 2010;38(5 Suppl):81–7.
- [28] Skatvedt A. Alminnelighetens potensial. En sosiologisk studie av følelser, identitet og terapeutisk endring. University of Oslo; 2008.
- [29] Hill CE. Consensual qualitative research (CQR): methods for conducting psychotherapy research. *Psychotherapy research*. Springer; 2015. p. 485–99.
- [30] Janoff-Bulman R. Shattered assumptions. 1992. New York: free Press Beck AT, Haigh EA Advances in cognitive theory and therapy: the generic cognitive model. *Annu Rev ClinPsychol*. 2014;10:1–24.
- [31] Glad KA, Hafstad GS, Jensen TK, Dyb G. A longitudinal study of psychological distress and exposure to trauma reminders after terrorism. *Psychological trauma : theory, research, practice and policy*. 2017;9(Suppl 1):145–52.
- [32] American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub; 2013.
- [33] Album D. Close strangers: patient-patient interaction rituals in acute care hospitals. *The contemporary Goffman*. . p. 352–72.
- [34] Album D. Nære fremmede: pasientkulturen i sykehus. Tano. 1996.
- [35] Dittmann I, Jensen TK. Giving a voice to traumatized youth-experiences with Trauma-Focused Cognitive Behavioral Therapy. *Child Abuse Negl* 2014;38(7):1221–30.
- [36] Kramer DN, Landolt MA. Early psychological intervention in accidentally injured children ages 2–16: a randomized controlled trial. *Eur J Psychotraumatol* 2014;5:.
- [37] Kramer DN, Landolt MA. Characteristics and efficacy of early psychological interventions in children and adolescents after single trauma: a meta-analysis. *Eur J Psychotraumatol* 2011;2:.
- [38] Foster K, Young A, Mitchell R, Van C, Curtis K. Experiences and needs of parents of critically injured children during the acute hospital phase: a qualitative investigation. *Injury* 2017;48(1):114–20.

9 Appendix: Semi-structured interview guide used in Paper III

This is an interview about your experiences with the help you received in the hospital regarding difficult emotions and thoughts.

1. Can you describe the most useful psychosocial support you received from the visiting psychiatrist/psychologist/social worker:
 - a. What was done?
 - b. In which ways did the support affect you?
 - c. Thinking back, how important do you think the support was to you 1) then and 2) now?
2. Can you describe the most useful psychosocial support you received from the nurses/doctors:
 - a. What was done?
 - b. In which ways did the support affect you?
 - c. Thinking back, how important do you think the support was to you 1) then and 2) now?
3. Regarding the psychosocial care in the hospital, is there anything that you *now* think should have been done differently?