Transformed by trauma

A longitudinal study of posttraumatic stress, growth and perceived event centrality among youths and emerging adults after the terrorist attack on Utøya island

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MY ROLE IN THE UTØYA STUDY

Before I commenced on my PhD project, I worked as a research assistant/researcher in the Utøya study for four years. Because I was a member of the project group from the very beginning, I was fortunate enough to be involved in all aspects of the study: From the initial discussions on the development and planning of the project, including the ethical and methodological considerations (e.g., the timing of the study, the data collection format, and the selection of the instruments), to the practical implementation of the study, including the planning and execution of the training seminars for the interviewers, and providing help and guidance to the interviewers throughout the data collection phase. Importantly, I also got to conduct several interviews with both survivors and their caregivers' at all three waves. Finally, I authored/co-authored a number of scientific papers, book chapters, and summary reports.

SUMMARY

Background: Terrorist attacks have become a severe and concerning threat to societies worldwide. We need knowledge about how people who are directly affected by such events react and important predictors for their responses. To date, most research has focused on negative consequences, such as posttraumatic stress disorder (PTSD). However, a growing body of research suggests that many people also report positive personal changes in their struggle to cope with a potentially traumatizing event, referred to as post-traumatic growth (PTG). Because most research on PTG is based on self-report, some have questioned the validity of the construct. Additionally, knowledge about the cognitive processes behind PTG is scarce. A relatively new construct, 'event centrality' (i.e., the degree to which people perceive a traumatic event to be a central part of their identity and life story), has been hypothesized to play a crucial role in the development of both PTSD and PTG.

Objective: The overarching aim of this thesis was to increase knowledge about self-perceived negative and positive post-trauma changes among people directly exposed to a terrorist attack. More specifically, I wanted to investigate the level of event centrality among young survivors of terrorism, and examine the concurrent and longitudinal association between their perceived centrality and PTSD symptomatology. I also wanted to test the hypothesis that event centrality acts as a mediator on the causal pathway between peritraumatic reactions and later PTG. Finally, I aimed to investigate whether positive post-trauma change is translated into observable action.

Method: The data used in this thesis are drawn from a comprehensive longitudinal interview study on the survivors of the terrorist attack on Utøya island on the 22nd of July, 2011, and their caregivers. Participants were interviewed face-to-face at three different time-points: 4-5 months (T1), 14-15 months (T2), and 30-32 months (T3) after the attack. The analytical methods applied were: Cross-lagged panel model, causal mediation analysis, and thematic analysis.

Results: The survivors reported high levels of event centrality, suggesting that the terrorist attack had become an important part of their identity and personal narrative. The study results confirmed earlier findings of a positive concurrent association between centrality and PTSD. However, contrary to the dominating hypothesis in the field, we found that PTSD symptoms prospectively predicted level of event centrality, but not vice versa (when initial levels were controlled for). Almost all the survivors reported experiencing (at least some) PTG, particularly

increased personal strength and a new appreciation of life. We found a positive association between survivors' level of self-reported PTG, peritraumatic reactions, and perceptions of centrality. However, the hypothesis that level of centrality can explain the relationship between initial reactions to trauma and subsequent PTG was not supported. A majority of the caregivers reported that they had noticed positive changes in their children after the terrorist attack on Utøya island, and the growth dimensions they described align with the findings in the existing PTG literature (i.e., relational growth, personal growth, and a new philosophy of life).

Conclusion: The study findings suggest that targeting and reducing trauma survivors' perception of the traumatic event as a central component of their identity and life story does not necessarily reduce their prospective levels of PTSD symptoms. Peritraumatic reactions and perceptions of centrality may help explain individual differences in trauma survivors' level of PTG. However, we did not find perceived event centrality to be a significant mediator between initial reactions to trauma and subsequent self-reported growth. The caregivers' descriptions of growth suggest that post-trauma positive change can be translated into observable action and the rich examples of positive behavioral changes support the validity of the PTG construct.

Future directions: Focusing on the temporal dimension (i.e., 'anticipated' vs. 'retrospectively evaluated' centrality), as well as centrality valence, may help us get a better understanding of the potential longitudinal association between perceived centrality and PTSD/PTG. A new aspect of centrality introduced in this work, namely *externally imposed centrality*, could also be a fruitful area for future research.

LIST OF PAPERS

Paper I

Glad, K. A., Czajkowski, N. O., Dyb, G., & Hafstad, G. S. (2020). Cross-lagged association between symptoms of posttraumatic stress disorder and perceived centrality of a terrorist attack. *Clinical Psychological Science,8*(2), 295-305.

Paper II

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Paper III

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LIST OF TABLES AND FIGURES

ABBREVIATIONS

α	Cronbach's alpha
AUF	Arbeidernes ungdomsfylking (Norwegian Labor Party's youth organization)
CES	Centrality of Event Scale
CLPM	Cross-lagged panel model
DSM	Diagnostic and Statistical Manual of Mental Disorders
Mplus	Statistical software
NKVTS	Norwegian Centre for Violence and Traumatic Stress Studies
PTG	Posttraumatic growth
PTGI	Posttraumatic Growth Inventory
PTGI-SF	Posttraumatic Growth Inventory-Short Form
PTSD	Posttraumatic stress disorder
PTSD-RI	Posttraumatic Stress Disorder Reaction Index
RI-CLPM	Random intercepts cross-lagged panel model
SD	Standard deviation
SPSS	Statistical Package for the Social Science (statistical software)
T1	Wave one of the data collection, 4-5 months post-terror
T2	Wave two of the data collection, 14-15 months post-terror
T3	Wave three of the data collection, 30-32 months post-terror
UCLA	University of California, Los Angeles

1 INTRODUCTION

1.1 Rationale

Many people will experience a potentially traumatizing event at some point in their lives (Darves‐Bornoz et al., 2008). While the traumatic exposure itself may be relatively brief, the effects can last a lifetime. Trauma survivors may experience various forms of psychopathology, including posttraumatic stress disorder (PTSD), depression, disordered grief, and anxiety, but also personal growth (García-Vera, Sanz, & Gutiérrez, 2016; Lenferink, Nickerson, de Keijser, Smid, & Boelen, 2019; Tedeschi & Calhoun, 1996; Thabet, Thabet, & Vostanis, 2016). Knowledge about how people exposed to a potentially traumatizing event react, and important predictors for their responses, is imperative to our ability to develop and provide evidence-based services post-trauma. Such knowledge may also help the directly affected understand and accept their own reactions. While most research on psychological reactions to trauma has focused on its negative consequences, a growing body of research suggests that many people also report positive personal changes in their struggle to cope with a potentially traumatizing event. More knowledge about both positive and negative post-trauma reactions may contribute to a more comprehensive and nuanced picture of the consequences of trauma and potentially reduce the stigma associated with victimization. In the present thesis, I have studied reports of posttraumatic stress disorder (PTSD) symptomatology and posttraumatic growth (PTG) among youths and emerging adults in response to a terrorist attack. Furthermore, I have investigated the role of a relatively new construct, that has been hypothesized to predict both these forms of post-trauma reactions, namely event centrality (i.e., the degree to which people perceive a traumatic event as a central part of their identity and life story). This thesis is based on data from a comprehensive longitudinal interview study of survivors of the terrorist attack on Utøya island, Norway, on the 22nd of July, 2011, and their caregivers (Dyb et al., 2014).

1.2 Posttraumatic stress disorder (PTSD)

1.2.1 Clinical characteristics of PTSD

Though the concepts of trauma and stress have existed throughout the history of psychology, it was not until 1980, when the diagnosis of PTSD was described in the third edition of the *Diagnostic Statistical Manual of Mental Disorders* (DSM-III, American Psychiatric Association, 1980), that psychological distress following a traumatic event achieved formal status as a psychiatric disorder. This lent great impetus to research on traumatic stress, which

in turn resulted in marked advances in our understanding of the etiology, risk factors, neurobiology, and treatment of extreme trauma reactions (e.g., Brewin, 2001; Dalgleish, 2004; Foa & Rothbaum, 1998).

In the fourth edition of the DSM (DSM-IV-TR, American Psychiatric Association, 2000), PTSD encompassed six diagnostic criteria: The A-criterion included: (1) experiencing, witnessing, or being confronted with a traumatic event(s) that involves actual or threatened death or serious injury, or threat to the psychological integrity of one's self or others, and (2) intense subjective distress (i.e., fear, helplessness, or horror). The symptoms were clustered into three factors: Intrusion/re-experience of the traumatic event, including intrusive thoughts and images of the event, nightmares, and flashbacks (Criterion B), avoidance of stimuli associated with the trauma (Criterion C), and increased arousal, including sleep disturbances, poor concentration, exaggerated startle response, and irritability (Criterion D). To fulfill the diagnostic criteria for PTSD, these symptoms had to last for more than one month (Criteria E), and cause significant distress or impairment in functioning (Criteria F). In 2013, the most recent version of the DSM was released (i.e., DSM-5, American Psychiatric Association, 2013), however, because the Utøya study commenced two years prior to this release, symptoms of PTSD were assessed according to the diagnostic criteria of the DSM-IV-TR in the present thesis.

1.2.2 Trauma (dis)integrated

While PTSD is conceptually understood to be a consequence of exposure to a traumatizing event, the prevalence of exposure to such events is much higher than the prevalence of the disorder (Fitzgerald, Berntsen, & Broadbridge, 2016). For example, in the first year following exposure to a terrorist attack, PTSD has been reported among 12-39 % of those directly affected (for systematic reviews, see Dimaggio & Galea, 2006; García-Vera et al., 2016). Considerable effort (both empirical and theoretical) has been invested in understanding why some individuals suffer from post-trauma distress and others do not. In the literature, risk factors are typically classified into sociodemographic factors (e.g., sex), pretrauma factors (e.g., psychiatric history), peritrauma factors (e.g., severity, personal injury, life threat, confusion), and posttrauma factors (e.g., social support, attribution/appraisal) (for a review, see Tortella-Feliu et al., 2019).

One central hypothesis in psychological theories on the development and maintenance of PTSD is related to the degree to which the memory of the traumatic event is integrated into the survivors' autobiographical memory and world schema. The assumed mechanisms for the relationship between the trauma memory and post-trauma symptomatology, however, vary considerably (Fitzgerald et al., 2016). For a long time, posttraumatic stress reactions have been

viewed as reflecting survivors' inability to process and integrate the traumatic experience with their pre-trauma knowledge of the self and the world (e.g., Horowitz, 1986; Janoff-Bulman, 1992), and/or their autobiographical memories (Ehlers & Clark, 2000). For example, according to Ehlers and Clark (2000), among people with PTSD symptomatology, the trauma memory is "poorly elaborated and inadequately integrated into its context in time, place, subsequent and previous information and other autobiographical memories" (p.325). They argue that this can explain why survivors have trouble remembering certain aspects of the traumatic event, the 'here and now' quality of their intrusions/re-experiences, and their strong reactions to triggers. More recently, however, Rubin, Berntsen, and Bohni (2008) have questioned this assumption of poor memory integration, and presented an alternative view on trauma memories. They postulate that a traumatic event, because of its distinctness and strong emotional impact, becomes highly integrated into the individual's schemata and forms a reference point for the organization of their autobiographical knowledge (Berntsen & Rubin, 2007). They refer to the degree to which people perceive a traumatic event as a central part of their identity and life story as 'event centrality' (Berntsen & Rubin, 2006).

According to Berntsen and Rubin (2006), there are three different ways in which the memory of a traumatic event may become highly interconnected in an individual's autobiographical memory: First, a traumatic memory can become a *reference point* for everyday inferences, and thereby affect the trauma survivor's attributions and interpretations of non-traumatic experiences and past events, as well as future expectations (Berntsen & Rubin, 2006). Second, the trauma can become a *turning point* in the trauma survivor's life story and, as a way of maintaining the consistency of their story, the survivors may focus on aspects of their life that can be explained by reference to the trauma, and ignore aspects that cannot. Finally, if a trauma becomes a central turning point in the survivor's life story, it is also likely to become emblematic in their conception of themselves, and thus an important component of their *personal identity* (Berntsen & Rubin, 2007). According to Berntsen and Rubin (2006; 2007), when the memory of the traumatic event is highly accessible and salient (i.e., high event centrality), it may cause the survivor to overestimate the likelihood that similar events will occur in the future, which might lead to unnecessary precautions, startle responses, and avoidance. Furthermore, re-experiencing symptoms are considered to be the result of "an extraordinary accessibility of the trauma memory caused by a multitude of connections between this memory and other material in memory" (Thomsen & Berntsen, 2009, p. 581).

In short, Berntsen and Rubin (2006) argue that posttraumatic stress reactions develop when the trauma memory has become too central in the survivor's cognitive organization of

their identity and personal narrative, rather than as a result of poorly integrated trauma memories. This theory has sparked a great deal of interest in the role of perceived event centrality in the development and maintenance of PTSD symptomatology, something which we will delve into next.

1.2.3 Can perceived centrality predict later PTSD?

From the onset, high levels of event centrality was hypothesized to be predictive of PTSD symptomatology. In line with this postulation, to the best of my knowledge, results from all published cross-sectional studies to date show a positive association between levels of event centrality and PTSD symptoms, both among undergraduate students self-reporting a stressful event (e.g., Bernard, Whittles, Kertz, Burke, & Kendall-Tackett, 2015; Boals & Schuettler, 2011; Lancaster, Rodriguez, & Weston, 2011; Webb & Jobson, 2011), and in various trauma-exposed samples (e.g., Blix, Solberg, & Heir, 2013; Brown, Antonius, Kramer, Root, & Hirst, 2010; da Silva et al., 2016). These findings suggest that the aspects of the post-trauma memory/narrative measured by the Centrality of Event Scale (CES) may contribute significantly to our understanding of individual differences in levels of PTSD symptoms. However, because a cross-sectional association cannot reveal the direction of the relationship between these two constructs, we do not know whether identification with the traumatic event serves to reinforce and maintain the survivors' mental health problems, or if this is simply a natural byproduct of having experienced severe trauma and suffering from post-trauma distress and functional impairment. Thus, to further our understanding of whether event centrality really is a predictor of PTSD symptomatology, or just a cross-sectional correlate, longitudinal studies are imperative (Boals, 2014).

To the best of my knowledge, only four studies to date have examined the relationship between event centrality and PTSD longitudinally (i.e., Blix, Birkeland, Solberg, Hansen, & Heir, 2016; Boals & Ruggero, 2015; Boelen, 2012; Palgi et al., 2018), whereof two explored the direction of this relationship (i.e., Boals & Ruggero, 2015; Palgi et al., 2018). They found contrasting results: Boals and Ruggero (2015) found that level of event centrality predicted later PTSD symptomatology (controlling for PTSD Time 1), but not vice versa, among undergraduate students self-reporting a stressful event, while Palgi et al. (2018) found the opposite in a convenience sample of young adults who had been exposed to military conflict (resident in Israel).

In sum, most existing research appears to be based on the *a priori* position that event centrality leads to PTSD. However, given the dearth of longitudinal studies, and their mixed

findings, the directionality of this relationship is still unknown and merits further empirical attention. Interestingly, whereas the CES originally was developed to explore the relationship between event centrality and post-trauma psychopathology, the association between perceived centrality and positive personal post-trauma change has recently spurred scientific interest, particularly the positive association between centrality and posttraumatic growth.

1.3 Posttraumatic growth (PTG)

Growth is often a painful process (Maslow, 1970, p. xiii)

Since ancient times, religious and philosophical traditions have recognized the possibility that suffering and distress in the aftermath of major life challenges may be an impetus for positive change. In the last two decades, a variety of concepts have been used in the scientific literature to describe such self-perceived positive personal changes post-trauma, including stress-related growth (Park, Cohen, & Murch, 1996), benefit-finding (Tomich & Helgeson, 2004), and thriving (O'Leary & Ickovics, 1995). However, the most used term to date is posttraumatic growth (PTG), defined as: "Positive psychological change experienced as a result of the struggle with highly challenging life circumstances" (Tedeschi & Calhoun, 2004, p.1). When the term was coined by Tedeschi and Calhoun in the mid-1990s, positive post-trauma changes were divided into three different categories: Perceived changes in the self (increased self-reliance and personal strength; recognition and appreciation of one's vulnerability); a changed sense of relationship with others (increased self-disclosure, emotional expressiveness, compassion, empathy, and effort in relationships); and a changed philosophy of life (appreciation for existence, changes in priorities, recognizing meaning) (Tedeschi & Calhoun, 1995). However, in their development of the Posttraumatic Growth Inventory (PTGI), Tedeschi and Calhoun (1996) identified five growth domains, which were named: Relating to others, new possibilities, personal strength, spiritual change, and appreciation of life.

Self-reported PTG has been documented after a wide variety of potentially traumatizing experiences, including combat, sexual abuse, terrorist attacks, natural disasters, and chronic illness (for a review, see Shakespeare-Finch & Lurie-Beck, 2014), but as evidenced by the results from a much cited meta-analysis by Linley and Joseph (2004), determining the prevalence of such positive changes is complicated. In their analysis of 39 empirical studies on positive changes post-trauma, Linley and Joseph found far-ranging discrepancies in reported prevalence (defined as percentage of respondents endorsing positive change items), from 3% in a sample of adults coping with the loss of a family member (Davis, Nolen-Hoeksema, &

Larson, 1998) to 98% in a sample of women with breast cancer (Weiss, 2002). This wide range can probably be attributed to the variability in the methodology used across studies, for example in the measure used, the study sample, the nature of the trauma experienced, and the time since trauma.

1.3.1 Event centrality as a mechanism towards PTG?

According to Tedeschi and Calhoun (2004), the process towards PTG is initiated by an encounter with a highly stressful life event that significantly challenges one's assumptive world or core beliefs. In an effort to cope with the subsequent psychological turmoil (including emotional distress and intrusive rumination), and a struggle to reestablish new useful basic cognitive guides (which incorporate the trauma and its aftermath), the individual re-examines his/her pre-trauma assumptions and deliberately ruminates on what happened. Through this process, Tedeschi and Calhoun argue, an opportunity for growth arises. According to the authors, growth is also closely connected to "the development and modification of the individual's life narrative" (Tedeschi & Calhoun, 2004, p.12). More specifically, they postulate that growth occurs when trauma assumes a central place in survivors' life stories (Tedeschi & Calhoun, 1995). In the revised model of PTG, Tedeschi, Shakespeare-Finch, Taku, and Calhoun (2018) have included a construct which taps this aspect of the post-trauma narrative, namely 'event centrality' (Berntsen & Rubin, 2006). The statements in the measure used to explore level of perceived event centrality (i.e., the CES) do not make reference to any emotional valence (e.g., "This event has become a reference point for the way I understand myself and the world" and "I feel that this event has become part of my identity"). As such, it can be used to investigate the hypothesis that the perceived importance of a traumatic event predicts self-perceived PTG (Staugaard, Johannessen, Thomsen, Bertelsen, & Berntsen, 2015).

To date, in line with Tedeschi and Calhoun's model, numerous cross-sectional studies have found a positive relationship between level of event centrality and self-perceived growth, both in student samples exposed to a negative life event(s) (e.g., Groleau, Calhoun, Cann, & Tedeschi, 2013; Lancaster, Klein, Nadia, Szabo, & Mogerman, 2015; Schuettler & Boals, 2011) and among trauma survivors (e.g., Allbaugh, Wright, & Folger, 2015; Barton, Boals, & Knowles, 2013; Kuenemund, Zwick, Rief, & Exner, 2016; Roland, Currier, Rojas-Flores, & Herrera, 2013; Rubin, Boals, & Hoyle, 2014). However, it should be noted that the longitudinal association between event centrality and PTG has only been explored in two studies, and the results are mixed. In the first, Staugaard et al. (2015) studied PTG among war veterans. They found that level of centrality for the most negative event experienced among veterans during

deployment, predicted level of PTG two to four months after deployment. In contrast, in the second longitudinal study, Blix, Birkeland, Hansen, and Heir (2015) explored the cross-lagged association between level of event centrality and PTG among ministerial employees exposed to the Oslo bombing in 2011, measured at 10 months and two years post-terror, and they did not find a time-lagged causal effect in any direction. In sum, while event centrality has long been theorized to be involved in the process towards growth, and recently been included as a factor in the PTG model, most studies exploring the association between event centrality and PTG to date are cross-sectional. Existing longitudinal studies are rare and have yielded mixed results.

In the PTG model (Tedeschi & Calhoun, 1995; 2004), emotional distress related to a challenging life experience is considered necessary to initiate the cognitive processing leading towards growth. In line with this, several researchers have found a positive association between peritraumatic distress and later self-reported PTG (Blix et al., 2013; Hafstad, Kilmer, & Gil-Rivas, 2011; Kleim & Ehlers, 2009; Kunst, 2010). Strong peritraumatic reactions can also be hypothesized to lead to high levels of perceived centrality. Berntsen and Rubin (2006) have argued that a traumatic event, because of its distinctness and strong emotional impact, becomes highly central to a survivor's identity and personal narrative. In line with this, Blix et al. (2013) have found a significant positive association between peritraumatic reactions and level of centrality among individuals present during the 2011 Oslo bombing attack.

While we could expect an indirect effect whereby trauma survivors' peritraumatic reactions predict PTG through their contribution to event centrality, perceived event centrality as a potential mediator for growth has not yet been investigated. More research on the process towards PTG, including the cognitive pathways that promote such change, is warranted. Another area which has received relatively little attention in the growth literature, is the behavioral aspect of such positive change and whether self-perceived PTG can be observed by others.

1.3.2 Can PTG be observed?

Most existing studies on PTG are based on self-report. As such, some researchers have questioned the validity of the construct and suggested that PTG may be illusory, or simply reflect survivors' coping mechanisms (Frazier et al., 2009; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). According to Tedeschi, Park, and Calhoun (1998), PTG may have behavioral implications. Others have gone further and argued that 'true growth' (as opposed to perceived growth) is accompanied by behavioral change (e.g., Hobfoll et al., 2007). Consistent with this perspective, several researchers have claimed that those who grow in the aftermath of

a trauma probably will display measurable behavioral changes (e.g., Frazier, Coyne, & Tennen, 2014; Jayawickreme & Blackie, 2014). However, as noted by Blix et al. (2016), we have little knowledge to date about how "self-reported growth manifests as behavior" (p.7).

According to Helgeson (2010), corroborating observational reports of growth would increase confidence in the validity of the construct. Of note, in the extant set of studies where relatives/close friends' ratings of PTG have been compared to the trauma survivors' own reports, the findings largely suggest alignment in the sources' ratings (Blackie, Jayawickreme, Helzer, Forgeard, & Roepke, 2015; Helgeson, 2010; McMillen & Cook, 2003; Moore et al., 2011; Park et al., 1996; Shakespeare‐Finch & Barrington, 2012; Shakespeare‐Finch & Enders, 2008; Tallman, Lohnberg, Yamada, Halfdanarson, & Altmaier, 2014; Weiss, 2002). Another way to explore the authenticity of PTG and possible growth-related behavior is to ask people who are close to the survivor to provide concrete examples of growth. That is, we can ask survivors' family members or close friends to describe what kind of positive changes they have observed post-trauma. To the best of my knowledge, only one study has provided qualitative examples of observable positive behavioral changes post-trauma (i.e., Shakespeare-Finch & Barrington, 2012). Here, the authors sought to explore PTG-related behavioral changes as reported by the survivors themselves and by individuals they had a close relationship with (significant others), using the PTGI and five open-ended questions. Shakespeare-Finch and Barrington found that almost all survivors reported positive behavioral changes post-trauma, and these changes were corroborated by their significant others. However, in the published paper, they predominantly provided examples of the survivors' own descriptions of their positive behavior change, not those reported by their significant others. Documenting observational reports of positive post-trauma change would not only enhance the veracity of the PTG concept, but may also provide insightful descriptions of how such changes unfold in everyday life.

1.4 The developmental timing of trauma exposure

The impact of a potentially traumatic event may vary depending on when in the life cycle it occurs (Ogle, Rubin, Berntsen, & Siegler, 2013). McAdams (2001) has labeled the developmental period from late adolescence to young adulthood *the narrative era.* According to him, this is when the individual begins to create a self-defining life story. Along the same lines, Arnett (2000) has proposed *emerging adulthood* as a conception of development for the period from the late teens through the twenties, with a particular focus on ages 18-25. According to Arnett, these are years of profound change and importance, characterized by exploration of

possible life directions, particularly in the areas of love, work, and worldview. He argues that whereas identity formation has typically been associated with adolescence, "Erikson (1950, 1968) clearly believed that industrialized societies allow for a prolonged adolescence for extended identity explorations" (p. 473). In line with this postulation, research on identity formation suggests that identity development continues through our late teens and into our twenties/adulthood (e.g., Valde, 1996; Whitbourne & Tesch, 1985). Other developmental tasks during this life phase include emancipation from parents, establishing a career, gaining economic independence, and finding a life partner (Noller & Callan, 1991).

Given that young men and women embark on their identity projects and begin to actively formulate their integrative life stories during late adolescence/young adulthood, they may be more likely to encode personal events occurring during these years as relevant to their identity (McAdams, 2001). Indeed, as noted by Rubin, Rahhal, and Poon (1998), when asked to recall important events, vivid memories, or the first event that comes to mind when they are cued by a word, people often report autobiographical memories from adolescence and early adulthood (referred to as 'the reminiscence bump'). Consequently, as pointed out by Tedeschi and Calhoun (1995), whereas traumatic events experienced during adulthood may pose a threat to our already established identity, events experienced at an earlier developmental stage are more likely to become integrated into our identity and be carried with us throughout life, affecting our thoughts, perceptions, and reactions. Along the same lines, Ogle et al. (2013) have argued that compared with traumatic events faced at other time-points, trauma encountered in the transition from adolescence to adulthood may disturb the young survivors' psychological development and have a particularly enduring impact on his/her identity and life.

In short, adolescence/early adulthood is a critical developmental period in which to explore the impact of trauma – as its influence can have long-lasting effects on young trauma survivors' future development. Trauma can lead to significant distress, but also experiences of personal growth. Survivors' perception of event centrality has been hypothesized to play a crucial role in both these forms of post-trauma change. In the present thesis, I will examine posttraumatic stress, growth, and perceived event centrality, among youth and emerging adults, and discuss the main findings within a narrative framework.

1.5 The narrative framework

As noted by Rappaport (1995), a narrative is, simply stated, a story. Narrative theorists assert that we organize our life events and experiences into a coherent, ever-evolving life story, which helps us to understand and respond adaptively to life's occurrences (e.g., Joseph, 2012;

Neimeyer, 2006; Polkinghorne, 1988). The underlying theme in this perspective is that the stories we create about ourselves define and construct our experiences. Stephen Joseph (2012) vividly describes this in the following:

> Human beings are storytellers. It is human nature to make meaning of our lives by organizing what happens to us in stories. We live our stories as if they were true. We tell stories to understand what happens to us and to provide us with a framework to shape new experiences. (…) Our stories help us to construct self-understanding. They help us to bind together our thoughts, feelings and behaviours in a way that is continuous with our view of ourselves and our past history (p. 143).

As such, from this perspective, our narratives are held to serve important functions, both in terms of meaning-making (i.e., understanding ourselves and our experiences) and providing us with a feeling of consistency. In short, from a narrative perspective, the well-known mantra: "We are what we eat", may be re-phrased as: "We are what we narrate". As noted by Bruner (2004), the stories we create about ourselves and the world may also influence our future life: "The ways of telling and the ways of conceptualizing that go with them become so habitual that they finally become recipes for structuring experience itself, for laying down routes into memory, for not only guiding the life narrative up to the present but directing it into the future" (p. 708).

1.5.1 Narrative disruption

In our daily lives, we constantly encounter new situations and events that may change our story (and thus ourselves), and which either confirm or challenge our existing narrative (Polkinghorne, 1988). Fortunately, as noted by Jirek (2017), most of these new experiences can be incorporated into our life stories relatively effortlessly (i.e., with minimal disruption to our existing construct system and narrative). A traumatic event, on the other hand, challenges our ability to create a meaningful account of our experience – a state referred to by Sewell and Williams (2001) as *constructive bankruptcy* – and can thus be extremely difficult to integrate into our existing narrative. In the words of Neimeyer (2006): "perhaps the starkest form of narrative disruption is the substantial and sometimes pervasive disorganization of the survivor's self-narrative following exposure to a traumatic event" (p.72).

In line with the narrative approach, Ronnie Janoff-Bulman (1989), a theorist whose ideas have been highly influential in current conceptualizations of psychological reactions to trauma,

has proposed that individuals have three fundamental assumptions about the world and the self: 'The world is meaningful', 'the world is benevolent', and 'the self is worthy' (p.117). She argues that these fundamental beliefs are formed during childhood, through early interactions with our caregivers, and help us maintain a sense of meaning, justice, and agency: "At the most fundamental level of our inner world, we believe that who we are and how we act determine what happens to us: if we are good people (justice) and we engage in appropriately precautionary behaviors (control), bad things will not happen to us" (2004, p. 32). When we are confronted with trauma, these fundamental assumptions are not only forcefully challenged, according to Janoff-Bulman (1992), but "shattered", and she has described this as a "shock to our inner worlds" (2006, p.83). According to Janoff-Bulman (2004), post-trauma, the very assumptions that had provided us with psychological stability and coherence in our daily lives, are recognized as inadequate and inaccurate. Her use of the word 'shattered', conveys how utterly broken our assumptions are rendered by a traumatic experience; a condition which, as noted by Adams (2012), is referenced in the classic English nursery rhyme 'Humpty Dumpty':

> Humpty Dumpty sat on a wall,
> Humpty Dumpty had a great fall,
> all the king's horses and all the king's men,
> couldn't put Humpty together again.

Unfortunately, as with Humpty Dumpty, although many trauma survivors begin treatment with a strong wish to: 'be again as I used to be', such a 'narrative rewind', as noted by Botella and Herrero (2000), is impossible. However, importantly, while we cannot readopt our pre-trauma assumptions wholesale, we *can* reexamine and reintegrate them into our understanding of ourselves and the world in a manner that is more complex and mature (Botella & Herrero, 2000; Janoff-Bulman, 1992). In the literature, this is commonly referred to as narrative reconstruction.

1.5.2 Narrative reconstruction

An important component of trauma treatment is to help the survivor reconstruct their story about the traumatic event and its effects (Herman, 1992). As noted by Webster and Deng (2015), part of this reconstruction process involves an effort to find meaning in the event and its aftermath; "An active and evaluative search for the psychosocial antecedents and consequents of highly stressful, or traumatic, events" (p.255). Why did this happen? Why me? How will this experience affect my life? What do my reactions say about me? Through wrestling with such

questions in their struggle to make sense of the event and its aftermath, trauma survivors can reconstruct and rebuild their basic assumptions about the world and the self, which incorporates the traumatic experience. In line with this, Neimeyer (2001) has described how human beings are "(co)authors of their life stories, struggling to compose a meaningful account of the important events of their lives and revising, editing, or even dramatically rewriting these when the presuppositions that sustain these accounts are challenged by unanticipated or incongruous events" (p.263). As such, from the narrative perspective, through telling new stories, we can rebuild our sense of self and restructure our understanding of who we are, our place in the world, and our expectations of the world (Joseph, 2012). According to Janoff-Bulman (2006), while this is a long and painful process, most survivors eventually manage to successfully incorporate the traumatic event into their assumptive world, and the experience is "represented and acknowledged, but does not wholly define the inner world" (p.87).

To sum up, traumatic events can forcefully disrupt our personal narrative, leaving our life story obsolete. In our struggle to rebuild our fundamental assumptions, we search for the psychological antecedents and consequences of the event. In the following, I will examine reports of posttraumatic stress, growth, and perceived event centrality, among survivors of the terrorist attack on Utøya island, Norway, in 2011.

1.6 The present thesis

1.6.1 The terrorist attack on Utøya island

The terrorist attack in Norway on the 22nd July, 2011, was motivated by extremist right-wing ideology, and included two separate events. First, a car bomb was detonated in the Government Quarter in Oslo. Eight people were killed, and nine severely injured. Second, the perpetrator drove to Utøya island, 30 kilometers north of Oslo, where 564 people were gathered for the annual summer camp for the Norwegian Labor Party's youth organization (AUF). Heavily armed and disguised as a police officer, he arrived on the island and began shooting at those he came across. The young campers were trapped on the small island, which could only be reached (and departed from) by boat, with no opportunity to defend themselves and little opportunity to hide or escape (i.e., they had to swim at least 500 m in the cold water to reach the shore). In total, 69 people were killed in the attack on Utøya island and 35 were hospitalized with severe injuries. Those who survived had experienced high levels of trauma exposure, including the intense and persistent sound of gun shots, hearing people scream in pain and fear, threat to life, and loss of someone close (Dyb et al., 2014). Further complicating the nature of this experience, the youths' parents were following the events as they unfolded on the news and via digital

media. Although some parents were in contact with their children by phone, others were not able to establish contact; many parents did not know whether or not their child was alive for a period of hours (Glad, Kilmer, Dyb, & Hafstad, 2019). After the attack, the survivors received massive media attention, and many participated in interviews with the press (Thoresen, Jensen, & Dyb, 2014). Four to five months post-terror, 47% of the survivors reported clinical levels of PTSD (Dyb et al., 2014).

Two aspects of the terrorist attack on Utøya island and its aftermath provide an important foundation for the present work. First, given the brutal nature of the attack, it is likely that the event shattered the survivors' basic assumptions about the world (cf. Janoff-Bulman, 1992). Second, the survivors were mainly youths and emerging adults. This may be a critical developmental period in which to explore the degree to which the survivors experienced the terrible event as defining for their characters, and how reports of event centrality relate to self-reported psychopathology, as well as positive post-trauma changes, years after the attack.

1.6.2 Aims and research questions

The overarching aim of this thesis was to increase knowledge about self-perceived negative and positive post-trauma changes among people directly exposed to a terrorist attack. More specifically, I wanted to investigate the level of event centrality among young survivors of terrorism, and examine the directional association between their perceived centrality and PTSD symptomatology. I also want to test the hypothesis that event centrality act as a mediator on the causal pathway between peritraumatic reactions and later PTG. Finally, I aimed to investigate whether positive post-trauma change is translated into observable action. The three empirical studies that form the basis for the present thesis address the following research questions:

Paper I. What is the level of event centrality at two different time-points in a terror-exposed sample, and what is the concurrent and longitudinal association between survivors' perceived event centrality and PTSD symptomatology?

Paper II. Does perceived event centrality act as a mediator on the causal pathway between peritraumatic reactions and later perceptions of PTG?

Paper III. Have the caregivers observed positive changes in their children after the terrorist attack on Utøya island, and, if so, what type of changes have they noticed?

2 METHOD

The Utøya study is a comprehensive longitudinal face-to-face interview study, which commenced shortly after the terrorist attack on Utøya island on the 22nd of July, 2011. The study is funded by the Norwegian Directorate of Health and consists of three data collection waves, conducted at 4-5 months (T1), 14-15 months (T2), and 30-32 months (T3) post-terror. The empirical data used in the present thesis is drawn from the Utøya study. For an overview of the study design in the three papers that form the basis for this thesis, see Table 1.

Table 1: Overview of the study design in the three papers.

	Paper I	**Paper II**	**Paper III**
Main focus	PTSD symptomatology CES	PTG CES Peritraumatic reactions	PTG behaviors
Design	Longitudinal (T2, T3)	Longitudinal (T1, T2, T3)	Cross-sectional (T1)
Data source	Interview/self-report	Interview/self-report	Interview
Participants	Survivors	Survivors	Caregivers
Analysis	Cross-lag panel model	Causal mediation analysis	Thematic analysis

2.1 Procedures and participants

According to police records, 495 people survived the massacre on Utøya island. Of these, five were excluded from the study, four of whom were younger than 13 years old at the time of the attack and one who was living abroad. The remaining 490 individuals were sent postal invitations to participate in the first round of interviews (T1) approximately four months after the attack. As for the caregivers, because we did not have their contact information in the first wave, we wrote "Caregivers of (name of the survivor)" on the envelope along with their child's address. In this letter, we provided information about central aspects of the study and stated that an interviewer would call them in approximately two weeks. If they agreed to participate when we called, arrangements were made for the interview. If they declined, the interviewer asked if they were willing to give a reason for why they did not want to participate. The most common reasons stated were as follows: 'do not have the time'; 'living abroad'; 'do not feel like it', 'it's been so much', 'illness in the family', 'do not want to stir things up again/be reminded of the tragedy'; 'too stressful', or that they simply were not interested.

Survivors and caregivers of survivors who were born in 1992 or later took part in individual, face-to-face, semi-structured interviews performed by health care personnel (mostly

psychologists, medical doctors, and nurses). The participants came from all over the country, and in order to build a sufficiently large group of interviewers, we used our professional networks. Prior to conducting the interviews, the interviewers attended a one-day training seminar, in which the project group systematically went through the interview manual and thoroughly explained the questions and the rationale behind each topic. At the seminar, the interviewers practiced using the manual by taking turns interviewing each other. Most participants were interviewed in their own homes. The interviews were audiotaped and lasted approximately an hour and a half. Because we did not have the resources to perform interviews with all the caregivers, parents of survivors born in 1991 or earlier (or who were not available for interviews) participated through postal questionnaires.

2.1.1 The survivors

At T1, three of the 490 survivors who received a postal invitation contacted the project group and said that they did not want to participate. Of the 487 survivors who were contacted by an interviewer, 325 agreed to participate, 135 declined, and 27 could not be reached. At T2, everyone who had not opted-out at T1 (n = 487) were invited. Of these, seven opted out, 285 agreed to participate, 152 declined; and 43 could not be reached. At T3, only survivors who had participated at T1 and/or T2 (n = 355) were invited, whereof two opted out, 261 agreed to participate, and 92 declined. For an overview, see Figure 1.

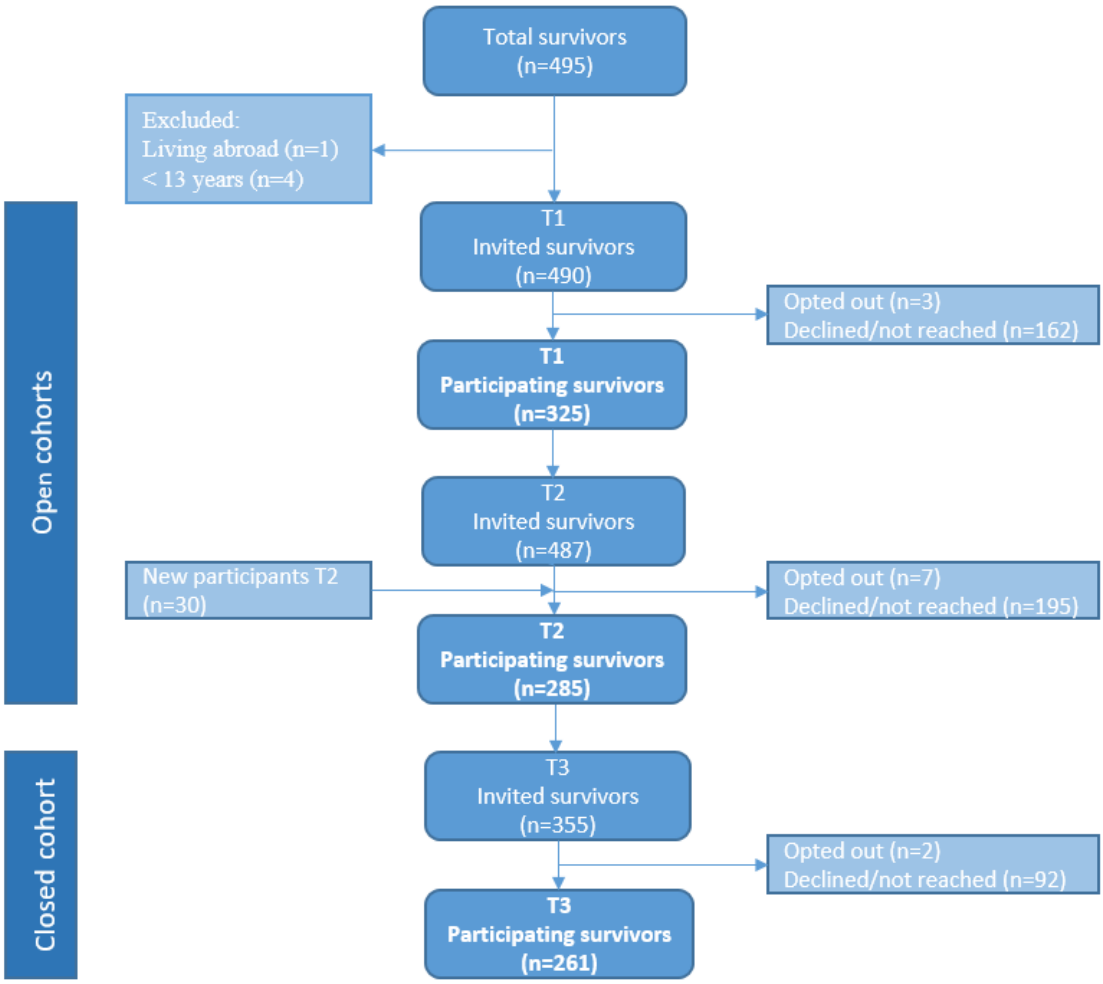

Figure 1: Overview of the survivors (n = 355) who participated in the Utøya study

Altogether, 355 survivors (72%) participated in at least one wave, of whom 206 (58%) participated at all three time-points. Their mean age at the time of the terrorist attack was 19.4 years (SD=4.6, range 13.3–56.8, 93.1% < 26), and 47.0% were female. The vast majority (89.5%) were of Norwegian origin (i.e., both parents were born in Norway). There were no significant differences between participants and non-participants with respect to age or sex (Stene & Dyb, 2016).

2.1.2 The caregivers

The survivors' caregivers were invited to participate at all three data collections. Caregivers of survivors who were 19 years old or younger were interviewed, whereas caregivers of older survivors (and those who were not available for an interview) participated through postal questionnaires. In total, 453 caregivers participated at T1, 426 at T2, and 367 at T3. In the present thesis, only data on the caregivers who participated in interviews in the third wave were

utilized. These caregivers (n=284, 62.3% females, *M* age=47.23, *SD*=5.79) included 174 mothers, 102 fathers, five stepfathers, one stepmother, one sister, and one foster mother. They were largely of Norwegian origin (91%), and typically reported an average or above average economic status (87.5%). The participants included 85 parental couples, 111 caregivers who participated without a partner, and one youth's three caregivers. The 284 caregivers represented 206 (41.6%) of the youth who survived.

2.2 Measures

2.2.1 Sociodemographic characteristics (Paper I, II, and III)

Participants' background information (including gender, age at the time of the terrorist attack, economic status, and country of birth) was collected as part of the structured, standardized self-report section of the interview for survivors and caregivers. To measure economic status, participants were asked to rate how they perceived their financial situation compared to others, on a scale from 1-5 (much poorer, somewhat poorer, similar, somewhat better, or much better). Responses were dichotomised into 'disadvantaged' (response 1-2) and 'average or better' (responses 3-5). Participants reported their own and their parents' country of birth, and ethnic origin was dichotomised into 'Norwegian origin' (i.e., both parents were born in Norway) or 'non-Norwegian origin'.

2.2.2 Posttraumatic stress symptoms (Paper I)

The survivors were interviewed about their posttraumatic stress reactions using the UCLA PTSD Reaction Index (PTSD-RI) (Pynoos, Rodriguez, Steinberg, Stuber, & Frederick, 1998; Steinberg, Brymer, Decker, & Pynoos, 2004). The PTSD-RI is a 20-item scale assessing posttraumatic stress reactions in the past month. Because three items have two alternative formulations, of which the highest score was applied to calculate the total score, the total symptom scale score is made up of 17 items, corresponding with the DSM-IV-TR criteria for PTSD (American Psychiatric Association, 2000), which was the diagnostic manual in 2011 (when the Utøya study commenced). Each question was explicitly related to the attack, and responses were recorded on a 5-point Likert-scale, ranging from 0 (never) to 4 (most of the time). Possible scores ranged from 0 to 68. Seven items tap avoidance, five items tap re-experiencing, and five items tap increased arousal. The UCLA was designed as a self-report instrument, not a clinical assessment tool, and it can be administered as a paper-and-pencil measure. However, in this study, we chose to let the interviewers read the questions aloud, and to fill out the participants' response, in order to increase the likelihood both that the questions

were understood correctly and that the frequency rating sheet (see Appendix 1) was used as intended for each question. The Norwegian version of the PTSD-RI has previously shown good internal consistency (α = .82–87; Jensen, Dyb, & Nygaard, 2009). In the present study, the PTSD-RI was calculated as a mean score, and the scale proved to have good internal consistency (T2, α = .90, T3, α = .92).

2.2.3 Traumatic exposure (Paper I)

A 14-item checklist was developed to assess the participants' potential traumatic exposures during the terrorist attack, it included items such as 'heard gun shots' and 'saw dead bodies' ('yes' or 'no' answers) (see Appendix 2). Traumatic exposure was operationalized as the count of the number of affirmative responses.

2.2.4 New traumatic experiences (Paper I)

Based on the Life Events Interview by Costello, Erkanli, Fairbank, and Angold (2002), a 10-item checklist was developed to assess whether the survivors had been exposed to any new traumatic experiences after the terrorist attack, such as exposure to violence, a serious accident, or the sudden (unexpected) loss of someone close. In order to fit our sample, we made some adjustments to the scale. For example, items on captivity were excluded (because such events are extremely rare in Norway). At T3, the participants were asked to indicate which, if any, of these experiences they had had within the last year. The new traumatic experiences scale was operationalized as the count of the number of affirmative responses.

2.2.5 Centrality of event (Paper I and II)

Berntsen and Rubin (2006) designed the Centrality of Event Scale (CES) to measure event centrality (i.e., to what degree an event has become a reference point, central component of personal identity, and a turning point in the life story). A 20-item CES was distributed to approximately 700 undergraduate students from four North American universities. The Cronbach's α was high both for the combined sample (i.e., .94) and for the four different samples (range of .93 - .95). As such, Berntsen and Rubin (2006) constructed a shorter scale. They chose the seven items which had the highest correlations with the sum of the other questions. For the 7-item scale, the Cronbach's α was .88 (range of .87 - .89). The correlation between the 7-item version and the 20-item version of the CES was .96. In the present thesis, the short version of the CES (Berntsen & Rubin, 2006) was used to measure the degree to which the terror attack on Utøya had been integrated into the survivors' life story and identity.

Responses were endorsed on a 5-point Likert-scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Participants completed the short version of the CES at T2 (α = .86) and T3 (α = .89).

2.2.6 Self-perceived posttraumatic growth (Paper II)

Tedeschi and Calhoun (1996) developed a 21-item measure to explore positive post-trauma changes among people exposed to major stressful events (i.e., the Posttraumatic Growth Inventory; PTGI). This measure had five factors, labeled: Relating to others, new possibilities, personal strength, spiritual change, and appreciation of life, and has shown good internal consistency (α = .90) (Tedeschi & Calhoun, 1996). About a decade and a half later, Cann et al. (2010) developed a short version of the PTGI. By conducting a factor analysis of the 21 PTGI items, based on the responses from approximately 1350 adults (from 16 different studies), they identified the items that loaded the most highly in each of the five factors. For three of the factors (i.e., spiritual change, appreciation of life, and personal strength), they selected the two items with the highest loading. However, for the remaining two factors, the two items with the highest loading were judged to be redundant. As such, they selected items that improved the breadth of the content. All 10 selected items in the Posttraumatic Growth Inventory-Short Form (PTGI-SF) loaded .63 or higher. In the present thesis, posttraumatic growth was measured using the PTGI-SF, completed at T3 (α = .81). Responses were endorsed on a 6-point Likert-scale ranging from 1 ('I did not experience this change') to 6 ('I experienced this change to a very great degree').

2.2.1 Peritraumatic reactions (Paper II)

Participants' peritraumatic reactions (i.e., cognitive, emotional, and physiological reactions during or immediately after the terrorist attack) were measured using six items. Five of these items tap the A2 Criteria for PTSD in the DSM-IV (i.e., fear, helplessness, horror, confusion, and peritraumatic dissociation), and were extracted from the UCLA PTSD-RI (Pynoos et al., 1998; Steinberg et al., 2004). The sixth item measures rapid heartbeat. Responses were endorsed on a 5-point Likert-scale, ranging from 0 (not experienced at all) to 4 (experienced very much). Peritraumatic reactions were recorded at T1 (4-5-monts post-terror, α = 0.61), and in our analyses we used the mean score of the six items.

2.2.2 Caregiver observed positive changes (Paper III)

In an effort to explore growth related behavior, all caregivers interviewed at T3 were asked the following open-ended question about observed positive changes in their child after the terrorist attack: "After a traumatic event some people change in ways they themselves, or others, perceive as positive. Have you noticed any such changes in your child?". Because we wanted to get concrete examples of such behavior, the caregivers who had noticed such positive changes, were asked the follow-up question: "Can you give examples in terms of how this has affected him/her in daily life or in relationships with other people? (Special things he/she does?)".

2.3 Data analyses

In the present study, three different types of analyses were conducted: Cross-lagged panel model, causal mediation analysis, and thematic analysis. These are described separately below.

2.3.1 Paper I.

In the first paper, we were interested in investigating the directional association between perceptions of event centrality and symptoms of PTSD. Hence, we fitted a latent variable cross-lagged panel model, implemented as a structural equation model (SEM) in the software package Mplus (Muthén & Muthén, 1998-2017). As noted by Byrne (2012), SEM has several advantages over traditional multivariate procedures. For example, whereas valid estimates in regular regression models are contingent upon the independent variables being measured without error, estimates of the path coefficients between latent variables in SEM models are not influenced by random measurement variance in the indicators. Before fitting the full structural equation model, we fitted a series of confirmatory factor models to examine the relationships between the factor indicators and the corresponding latent factors (i.e., CES and PTSD-RI). We also assessed measurement invariance for the two latent factors. Then we examined the concurrent and lagged relationships between CES and PTSD-RI using a cross-lagged panel model (CLPM).

2.3.1.1 Model fit

Once a model is specified, we can determine the goodness-of-fit between the model and the sample data and, as described by Byrne (2012): "If goodness-of-fit is adequate, the model argues for the plausibility of postulated relations among variables; if it is inadequate, the tenability of such relations is rejected" (p.3). The most reported fit statistic is the chi square

value (where a non-significant result indicates a good fitting model) (Bialosiewicz, Murphy, & Berry, 2013). However, because the chi square statistic is sensitive to sample size (i.e., with large sample sizes, the result often becomes significant), one usually reports other indices as well. In the present study, the fit of each model was assessed using the overall chi-square value, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). In line with Little (2013), RMSEA < .05-.08, and CFI and TLI > .90, was considered indicative of acceptable model fit.

2.3.1.2 Confirmatory factor analysis

In Paper I, the CES and PTSD-RI were represented by latent constructs, with items from the measures serving as indicators. We evaluated the measurement models at T2 and T3 through confirmatory factor analyses. Based on results from previous factor analysis of the CES (Berntsen & Rubin, 2006), the seven items were specified to load onto one factor. In a recent systematic literature review of the latent structure of PTSD in DSM-IV (Armour, Műllerová, & Elhai, 2016), the higher-order Dysphoric Arousal model (Elhai et al., 2011) was found to demonstrate best fit. Based on this, we chose to specify the 17 PTSD-RI items to load onto the following five sub-factors: Re-experiencing, avoidance, dysphoric arousal, anxious arousal, and numbing. In the CLPM, a second order factor for PTSD-RI was used. In line with recommendations by Little, Preacher, Selig, and Card (2007), the residuals for the corresponding indicators in each latent construct were allowed to correlate over time. We also autocorrelated the subfactor residuals for PTSD (because not allowing correlated residuals among the first order factors might inflate the estimated association between the second order factors). Finally, to account for shared variance between the residuals of CES items 1 and 3, items 5 and 6, and items 3 and 4, they were allowed to correlate at both time points.

2.3.1.3 Measurement invariance

Measurement invariance indicates that the same latent construct is being measured across groups or across time (Bialosiewicz et al., 2013). In Paper I, to evaluate measurement invariance for the CES and PTSD-RI, we first did a configural invariance test to assess whether the same items measured these latent variables at both time points. Subsequently, to assess whether each item loaded onto the specified latent factor with similar magnitude, across participants, we conducted a test of metric invariance. Here, all factor loadings were constrained to be equal to corresponding indicators at both time points. Because the individual items had a relatively small number of ordinal categories, and the responses were highly skewed, CES and PTSD-RI items

were treated as ordinal. We compared the relative fit of the unconstrained (configural) model with the constrained (metric) model, using the DIFFTEST function in Mplus (Muthén & Muthén, 1998-2017).

2.3.1.4 Cross-lagged panel model

Finally, to examine the concurrent and lagged association between CES and PTSD-RI at T2 and T3, controlling for sex, age, ethnicity, trauma exposure, and new traumatic experiences, we used a CLPM. In a CLPM, the initial levels of the dependent variables are controlled for. This allows us to predict changes in the dependent constructs over and above previous levels (Selig & Little, 2012). Model parameters were estimated using the robust weighted least squares estimator (WLSMV). To handle missing data we used pairwise present analysis, which is the default routines for the WLSMV in Mplus (Muthén & Muthén, 1998-2017).

2.3.2 Paper II.

In Paper II, we chose to use a causal mediation analysis to explore whether perceived event centrality acts as a mediator on the pathway between peritraumatic reactions and later experiences of PTG. We used a counterfactual framework approach, which allowed us to decompose the total effect into direct and indirect effects.

First, to assess the relationship between peritraumatic reactions (T1), CES (T2) and PTGI-SF (T3), we calculated Pearson correlations. Subsequently, we applied causal mediation analysis to study the average causal mediation effect (ACME) of perceived event centrality linking emotional, cognitive, and physiological reactions during the terrorist attack to self-reported posttraumatic growth and the average direct effect (ADE) (Imai, Keele, & Tingley, 2010). All variables were adjusted for age and sex. We first assessed the potential direct and indirect effect (through CES) of peritraumatic reactions on PTG. Subsequently, we estimated the direct and mediated effects as proportions of the total effect.

Causal mediation analysis relies on an assumption of sequential ignorability (i.e., there are no unmeasured confounders that causally affect both the mediator and the outcome) (Imai et al., 2010). This assumption is untestable. As such, a sensitivity analysis is recommended to quantify the robustness of the empirical findings (Imai et al., 2010). This analysis is based on the correlation ρ between the error terms in the mediation and outcome models. Under sequential ignorability, the correlation is zero.

2.3.3 Paper III.

In the final paper, we wanted to systematically analyze the caregivers' descriptions of positive post-trauma change that they had observed in their children post-trauma. Because our goal was to explore and summarize patterns within a relatively large data set (n = 252), we decided to use thematic analysis (Braun & Clarke, 2006). This technique has been described as "a method for identifying, analyzing and reporting patterns (themes) within data" (Braun & Clarke, 2006, p.79). Thematic analysis consists of six phases: (1) Getting familiar with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing the themes, (5) defining/naming the themes, and (6) producing the report. In the following, I will describe how we conducted the analysis in Paper III according to these six phases.

First, to become familiar with the data, I read all the interviews carefully and wrote reflective notes. Then, I identified initial codes in the material, by organizing the data into meaningful units. I identified the codes deductively, based on Tedeschi and Calhoun (1995) PTG model, but also inductively, from the data. In parallel, the fourth author (coder 2) read the first 18 pages (10%) of the transcribed material. She marked all statements she believed to be reflective of growth, and we compared our ratings. No systematic differences were identified. Subsequently, I sorted the initial codes into preliminary themes. I re-read the statements multiple times and systematically compared the statements within each theme. Then I developed a coding scheme. Here, all the statements from the caregiver reports thought to reflect potential PTG (324 unique quotes) were coded into one of the three growth themes (i.e., personal change, relational change, or changed philosophy of life). Coder 2 independently coded all statements. The inter-rater reliability between our coding was high; Cohen's kappa = 0.93. Finally, the sub-themes and associated behavioral components were discussed, defined, and labeled by the author team. Here, we went back to the transcripts and re-read the text before making final decisions regarding codes and labels.

2.3.4 Statistical software

Descriptive analyses were performed using IBM SPSS statistics for Windows, version 20.0 (SPSS, 2011). For all modeling analyses we used Mplus Version 8 (Muthén & Muthén, 1998-2017). The thematic analysis was conducted using Excel (version 2016).

2.4 Ethical considerations

Research on human subjects is regulated by the Declaration of Helsinki (World Medical Association, 2013), and national legislation (Nylenna & Simonsen, 2009). In line with

Norwegian law, the present study was approved by the Regional Committee for Medical and Health Research Ethics (reference number #2011/1625 with principal investigator professor Grete Dyb). In the following, I will reflect on some of the ethical considerations of the present study.

2.4.1 Informed consent

One of the main ethical principles in all research on human subjects is the principle of informed consent (World Medical Association, 2013). The goal of the informed consent process is to provide participants with sufficient information about the study, so that they can voluntary decide if they want to participate. To accommodate this, we sent out a postal information letter to all potential participants, in which we provided information about the rationale, design and other relevant aspects of the study. We also gave everyone the opportunity to opt out by calling or sending a text message to the research team. Some participants were not old enough to provide consent themselves according to Norwegian law (i.e., they were younger than 16 years of age), in which case the parents gave consent for them. Before the interview, participants were explicitly informed that they were free to withdraw from the study at any time, and to refrain from answering any question they did not want to. Participants who were under 16 years old, and their caregivers, were informed that all the information they would give to the interviewer was confidential (even from their caregivers), unless issues of considerable concern (e.g., suicide ideation) were discovered. In such instances, the child was informed that the interviewer would talk to his/her caregiver(s).

2.4.2 Risks, burdens, and benefits

Another main ethical principle is that the importance of the research objective outweighs the risks and burdens associated with participation, and that the researcher(s) conduct a careful assessment of potential risks and benefits (World Medical Association, 2013). For society, knowledge about how people exposed to a potentially traumatizing event react, and important predictors for their responses, are imperative in order to provide evidence-based services post-trauma. For the participants in the present study, the potential benefits included the opportunity to describe their personal experiences to an attentive listener; to receive help in getting in contact with adequate services (if needed); and to contribute meaningfully to increasing systematic knowledge on psychological reactions to potentially traumatizing experiences. The risks included potential discomfort and distress during the interview (e.g., when being asked to describe what they experienced on the 22nd of July, 2011). While it has been debated whether participation in trauma studies may represent additional strain for survivors, study findings

indicate that individuals find participation meaningful, and even beneficial, and that the risks for reactivating posttraumatic stress symptoms through a research interview are minimal (Griffin, Resick, Waldrop, & Mechanic, 2003). Furthermore, in a relatively recent meta-analysis of empirical literature on participants' reactions to trauma-related research, Jaffe, Dilillo, Hoffman, Haikalis, and Dykstra (2015) found that while it can lead to some immediate psychological distress, "individuals generally find research participation to be a positive experience and do not regret participation, regardless of trauma history and PTSD" (p.40). As such, we considered the potential risks of participation to be relatively low. Nevertheless, in line with ethical guidelines, an emphasis was placed on preventing unnecessary strain and discomfort for the participants, who were in a vulnerable situation, and ensuring that they received sufficient support and follow-up. For example, when discussing what data collection format to use (i.e., face-to-face interview, telephone interview, or questionnaire), despite the advantages of a postal/web-based questionnaire (i.e., cost-effectiveness), we decided to interview the directly affected in person. We believed that this format would give the participants a stronger feeling of being met and listened to, and that this would best enable us to identify participants who were struggling with unmet needs related to their experience on Utøya and help them get in contact with help services (Dyb, Glad, & Hafstad, 2016). We also chose to use local health care personnel as interviewers, because they had the knowledge and competence necessary to respond to any potential concerns. In an effort to minimize unnecessary stress for our participants, the interview was conducted in a place chosen by them (most often their home), and the interviewers were instructed to let the participants answer the questions at their own pace and to take a break if needed.

Another possible burden for the participants was related to the media coverage of the results, both in terms of privacy issues and potential distress/stigmatization. To protect the privacy and confidentiality of our participants, identification of individual participants is not possible in any published work from the study. However, given that survivors of the Utøya island attack are an identifiable group, we have had to take special consideration when publishing on the material, to evade stigmatization (for example how we phrase ourselves when we report on phenomena such as centrality of event). We have also made an effort to contact the national support group and let them know when our papers were going to be published – so that they could prepare the directly affected.

In addition to thoroughly considering the potential risks and benefits for our participants, we needed to evaluate how our interviewers could be affected. Interviewing directly exposed trauma survivors can be a challenging task, as it involves bearing witness to detailed

descriptions of horrific experiences and potentially handling strong emotions evoked in the participants. From the literature on therapists working with trauma survivors, we know that this can result in negative reactions, including secondary traumatization (Kassam-Adams, 1995) and vicarious trauma (Schauben & Frazier, 1995). Several steps were taken in an effort to prevent such reactions among our interviewers. First, to facilitate collegial support between the interviewers, and give them the opportunity to share their experiences, we decided that they should travel to the families in pairs. Furthermore, in an effort to prepare the interviewers, we arranged a one-day training seminar, in which the project group systematically went through the interview manual and thoroughly explained the questions and the rationale behind each topic. The interviewers were also provided supervision from the project group throughout the data collection, and we provided a helpline which they could use any time of day during the data collection. Finally, we organized a seminar after each wave, in which the interviewers were given the opportunity to share their experiences and presented with some preliminary results. In terms of potential benefits, participating as an interviewer could be experienced as meaningful and as an opportunity to learn about human responses to trauma.

2.4.3 Confidentiality

According to the Declaration of Helsinki, every precaution must be taken to protect the privacy of the research participants and the confidentiality of their personal information (World Medical Association, 2013). A central part of this is protection of the research data. In the present study, each participant received an ID number. The data, with the ID number, was stored separately from the name list, and all the material was stored in Services for Sensitive Data ("Tjenester for sensitive data"; TSD). This is a data repository for collecting, storing, and analyzing sensitive data at the University of Oslo, and the analyses were done via TSD.

3 RESULTS

3.1 Summary of the findings from Paper I

In the first paper, we investigated level of event centrality at two different time-points, and the concurrent and longitudinal association between level of event centrality and symptoms of posttraumatic stress disorder (PTSD), among people exposed to the terrorist attack on Utøya island. We found that the survivors reported high and stable levels of event centrality, suggesting that the terrorist attack had become an important part of the young survivors' identity and life story. We also found a significant positive relationship between the survivors' levels of PTSD symptoms and perceived event centrality at both time-points. In terms of the cross-lagged relationship between these constructs over time, contrary to our expectation, we found that PTSD symptoms prospectively predicted level of event centrality, but not vice versa. This suggests that targeting and reducing trauma survivors' perception of the terrorist attack as a central component of their identity and life story will not necessarily reduce their prospective levels of PTSD symptoms.

3.2 Summary of the findings from Paper II

The aim of the second study was to investigate the hypothesized mechanism of perceived event centrality as a mediator on the pathway between peritraumatic reactions and later PTG. We found that the vast majority of the survivors reported (at least some) PTG, particularly greater personal strength and a new appreciation of life. There was a significant, positive association between survivors' peritraumatic reactions, perceived event centrality and self-reported growth. However, we did not find support for the hypothesis that perceived event centrality significantly mediates the pathway between peritraumatic reactions and later perceptions of PTG. These findings add to the existing literature signifying that positive change is a common experience post-trauma, and suggest that peritraumatic reactions and perceptions of centrality may help explain individual differences in trauma survivors' levels of PTG. We did not find perceived event centrality to be a significant mediator between initial reactions to trauma and subsequent self-reported growth.

3.3 Summary of the findings from Paper III

In the final paper, we sought to extend the large existing body of research on self-reported posttraumatic growth (PTG) by exploring caregivers' observed positive changes in their children post-trauma and detailing the nature of these changes. Of the 252 caregivers who responded to the open-ended question about PTG, a majority (64%) reported that they had

observed positive changes in their children after the terrorist attack on Utøya island. Furthermore, we found that the dimensions described by these caregivers largely aligned with the findings in the existing PTG literature, including a stronger family bond (e.g., more openness); more compassion (e.g., increased sensitivity); and greater personal strength (e.g., increased self-confidence) (Figure 2). This suggests that post-trauma positive change is translated into observable action, and the rich examples of positive behavioral changes support the validity of the PTG construct. Importantly, though, almost one-fifth of the caregivers who described positive post-trauma changes expressed uncertainty as to whether the changes were indisputably positive for their children (e.g., greater maturity vs. losing a part of one's childhood). This underscores the importance of exploring the cognitions that accompany survivors' post-trauma changes and their adaptive significance.

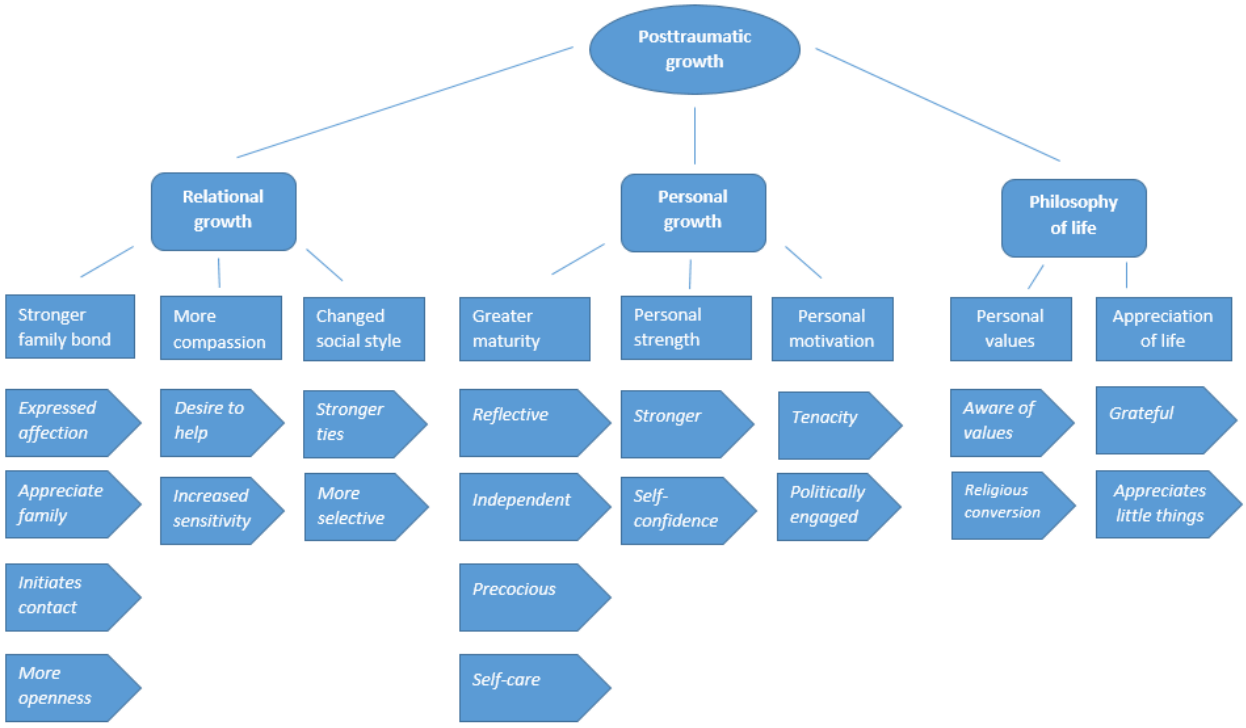

Figure 2: The different forms of positive changes the caregivers of the survivors of the attack on Utøya island observed in their children post-terror.

(retrieved from Glad & Hafstad, 2019)

4 DISCUSSION

The participants in the present study had all been exposed to an atrocious event. For a majority of the survivors, the attack struck at a critical period in their development, a time when their self-defining life story was beginning to take shape. The three main constructs in this thesis tap personal reactions post-trauma and the significance of the event for the survivors' identity and life story. As such, I believe that a narrative framework may make a meaningful contribution in the interpretation of the main findings. I will also use a developmental perspective as an analytical lens. Important methodological considerations in relation to the study findings, and clinical implications and suggestions for future research, will be discussed.

4.1 Main findings

4.1.1 The attack was perceived as highly central

The participants in the current study reported high and stable levels of perceived event centrality. As discussed in Paper I, there may be several explanations for this finding, including the particularly severe and brutal nature of the attack (which resulted in high levels of psychopathology and loss); the fact that this was a national tragedy (and thereby not only a central part of the survivors' life stories, but Norway's history); the extensive media coverage (many survivors became public figures); and the developmental stage of those directly affected (young survivors may be more likely to perceive a stressful event as central to their identity and personal narrative compared to older adults). In the following, I will expand on these final two points and discuss why young people exposed to a public event with intense media coverage may be particularly likely to report high centrality post-trauma, including the social aspects of identity formation.

Tedeschi et al. (1998) have noted that, for some people, a traumatic event can generate the first conscious examination of their life story. This may be particularly true for youths and emerging adults, as it is during this developmental stage that we embark on our identity project and actively formulate our integrative life stories (Fitzgerald, 1988; Habermas & Bluck, 2000; McAdams, 2001). Tedeschi et al. (1998) further argue that trauma survivors' reflections on how they reacted to the trauma can become an important indication to individuals for what kind of person they are today, and who they were before the event. In this way, the trauma and its aftermath may "come to occupy a significant place in that narrative, with the individuals seeing the event as a point where a radical change occurred, and where life took a sharp turn" (Tedeschi et al., 1998, p.232). In addition to this intrapersonal process, the survivors' interpersonal experiences may influence their perception of event centrality post-trauma. In our daily life, we

seek social acceptance, particularly in our self-defining groups (e.g., family, friends, colleagues), and we try to manage the impressions others have of us. In his psycho-social theory, Erikson (1968) described adolescence as a stage during which our awareness of how we appear to others begins to develop, and he noted that young people are often curiously "preoccupied with what they appear to be in the eyes of others as compared with what they feel they are" (p.128). Erikson also described adolescence as a fragile period and, as noted by Skarstein and Schultz (2011), it is possible that this vulnerability may be greater in modern societies, in which peers have become so prominent in young people's identity formation (Gee, 2000; Pugh & Hart, 1999), and with the introduction and wide-spread use of social media. After a traumatic event, survivors may think: What will other people think of me now? Will people treat me differently because of what I have been through? These thoughts may be particularly pertinent after public events with high media exposure – given that more people know about it – compared to more 'private' traumas (e.g., rape).

The Utøya massacre was a public event which received massive media attention and many survivors told their story to the press (Thoresen et al., 2014). As such, "everybody knew" who was on the island that day and "what happened" there. These socially shared narratives may be personally beneficial for some. For example, sharing one's story with the press is an efficient way to communicate with the public, and thereby avoid having to endlessly repeat one's personal story, and also to let the world know what really happened that day (Glad, Thoresen, Hafstad, & Dyb, 2018). However, the public portrayal of a traumatic event and those directly affected (including their actions and reactions during and after the event) can also signify additional challenges for the survivors. For example, once something is posted online, it is there forever. As one survivor put it: "Knowing that I was on Utøya that day is just a Google search away" (personal communication during interview). Furthermore, such public narratives may leave less room for survivors to try to understand and work through their personal experience and reactions on their own: After a publicly shared trauma, it can be difficult for some survivors (both internally, for themselves, but also externally, in relation to others) to separate the "me and my experience" from "the group and the groups' experience" (Glad, 2012). Also, if they feel that the portrayal in the media is inconsistent with their private experience, it may signify an extra burden post-trauma (Aakvaag, Thoresen, Wentzel‐Larsen, Røysamb, & Dyb, 2014; Glad et al., 2018).

Skarstein and Schultz (2017) noted that several survivors from Utøya experienced little correspondence between their self-understanding and the imposed aspects of identity from the outside. These authors also found that the survivors expressed a lack of, and struggled to regain,

control over their own identity configuration, which "seemed to be in the hands of others – the media, peers, teachers, and outside experts" (Skarstein & Schultz, 2017, p. 13). This strongly underscores the social aspect of our identity configuration and, along these lines, Jirek (2017) has pointed out that it is important that we do not exaggerate individual autonomy in the construction of our life narrative. The fact that the survivors frequently were, and still are, referred to in the media as 'the Utøya survivors' or 'the Utøya youth', illustrates this form of imposed external framing of their identity (Skarstein & Schultz, 2017). From a centrality of event perspective, I propose referring to this as *externally imposed centrality*, wherein other people ascribe the event as central to the survivors' identity and life story. This form of centrality may, again, be divided into 'anticipated' and 'experienced'. We can hypothesize that *anticipated* externally imposed centrality may hinder survivors from disclosing their traumatic experiences (e.g., because they fear that this will change people's perception of who they are, and/or how they are treated), whereas *experienced* externally imposed centrality may serve to solidify the significance of the event in their self-perceived identity. In line with this postulation, Skarstein and Schultz (2017) found that several youths expressed that they did not want to draw attention to – or that they (had) even deliberately concealed – their association with Utøya, as exemplified in the following quote: "In November I came out of the closet [as an Utøya survivor]" (p.7). Furthermore, in line with the hypothesis that this concealment may be related to anticipation of the effect of others knowing that they were on the island during the massacre, another participant stated: "So I don't want them [other people] to know, because right away they'll treat me differently" (Skarstein & Schultz, 2017, p.5).

In short, the high reports of event centrality may suggest that the terrorist attack had become primary for the young survivors' identity and life story, years post-trauma. Importantly, the survivors had also experienced a high degree of imposed external framing of their identity, by the media, their peers, teachers, and outside experts (Skarstein & Schultz, 2017). A key question then is: What are the implications of this high centrality? As Broadbridge (2018) has succinctly asked; "Is the centralization of potentially traumatic events always negative?" (p.315).

4.1.2 Centrality was associated with PTSD and PTG

In line with Berntsen and Rubin's (2006) postulation and several cross-sectional studies (e.g., Blix et al., 2013; da Silva et al., 2016), we found that perceived event centrality was positively associated with PTSD symptomatology (Paper I). More specifically, we found that survivors with high PTSD symptomology reported that they experienced the event to be more central in

the cognitive organization of their identity and personal narrative. Of note, we also found a positive association between perceived centrality and self-reported growth (Paper II). Based on similar findings, Boals and Schuettler (2011) have suggested that event centrality may serve as a double-edged sword: "allowing for both debilitation and growth" (p. 821). More recently, Sapach, Horswill, Parkerson, Asmundson, and Carleton (2019) have asked whether centrality of a traumatic event really is a double-edged sword – or if it could rather be a matter of valence? In an effort to examine this, they developed a modified, bivalent version of the CES to capture the valence of centrality appraisals for traumatic events (i.e., CES-V, Sapach et al., 2019). In their study, they found that participants who reported their traumatic event (e.g., a natural disaster, fire/explosion, transportation accident, illness/injury) to be central-positive reported the most PTG, whereas those who reported it to be central-negative reported the most PTSD. Similarly, Broadbridge (2018) created a modified version of the CES, composed of one positive and one negative item for each of the original CES items. She found that negative centralization was more strongly associated with PTSD symptoms than positive centralization among undergraduate students reporting on their most stressful or traumatic event. Though preliminary, based on these findings, the question may not simply be whether or not the traumatic event has been integrated into the survivor's identity and life story; rather, the effect may be dependent on the valence of their centralization.

According to Herman (1992), in the final stage of recovery from a traumatic event, "the survivor will no longer feel possessed by her traumatic past; she is in possession of herself" (p.202). That is, through narrative reconstruction (alone or in interplay with someone else), the trauma story can become a part of the survivor's life experience, but only one part of it: "The trauma no longer commands the central place in her life" (Herman, 1992, p. 195). However, in light of the findings of the present study (Paper II) and recent findings on PTG and centrality valence (Broadbridge, 2018; Sapach et al., 2019), it is possible that the trauma can command a central place in the survivors' life story in the final stages of recovery, but not necessarily a negative one. From this perspective, we can imagine that the traumatic event can be experienced by the survivor as an important and integrated part of who they are, which has changed, but not determined (at least not in a negative way), his/her life (Sewell & Williams, 2001). For survivors who experience strong PTG, the change may be viewed as a change for the better, at least in certain ways, with a more meaningful and fulfilling life after the trauma (Tedeschi et al., 1998). The next question then, is: What, if any, are the long-term effects of the survivors' perceived centrality?

4.1.3 No longitudinal effects of centrality

While our results confirmed earlier findings of a positive association between centrality and PTSD/PTG, we did not find support for the hypothesis that perceived centrality predicts later PTSD symptomology (when initial PTSD levels were controlled for) (Paper I), nor that level of centrality significantly mediates the association between peritraumatic reactions and later growth (Paper II). Rather, we found that PTSD symptomatology predicted later event centrality (Paper I). Based on this, we might speculate that while the predominant assumption in the field is that perceptions of centrality affects survivors' levels of PTG/PTSD, the relationship may go in the opposite direction, with a survivor's experienced post-trauma reactions (symptomatology and/or growth) leading them to perceive the event as central. In line with this, in the other most recent study examining the longitudinal association between centrality and PTSD, Palgi et al. (2018) found that PTSD symptomatology predicted centrality one month later, but not vice versa. On the other hand, it is also possible that perceived centrality predicts later PTSD, and/or mediates the association between peritraumatic reactions and later PTG, but that we did not detect it due to various factors, including the time lag between data collections, the timing of the first data collection, and/or a failure to measure centrality valence. For example, as mentioned in Paper I, it is possible that PTSD symptomology has a more long-term effect on event centrality, than vice versa. That is, people who have suffered from high levels of PTSD symptoms will probably consider the traumatic event to be a salient part of their life story, even after their symptoms have dissipated, whereas the association between event centrality and prospective PTSD symptoms may be better characterized by more short-term, reciprocal effects (Glad, Czajkowski, Dyb, & Hafstad, 2020).

Furthermore, as noted in Paper II, it is also possible that the type of centrality we measure depends on how soon after the event we interview the survivors, and that this distinction may be important in terms of its prospective association with other factors. More specifically, prospectively anticipated centrality (measured during, or shortly after, a traumatic event) may differ significantly from survivors' retrospectively evaluated centrality, which is based on reflections and experiences of the degree to which the event *has* affected their life months, or even years, post-trauma (Glad, Czajkowski, Dyb, & Hafstad, in press). In relation to PTSD, from a narrative perspective, we can imagine that the more the survivors' basic assumptions are shattered, the stronger their anticipated centrality (e.g., "This event will change my life forever") during/immediately after the event will be, which again may initiate the development of post-trauma psychopathology. Retrospectively evaluated centrality, on the other hand, may be more related to later levels of (experienced) PTSD symptomatology.

Similarly, in relation to growth, we could hypothesize that trauma survivors' anticipated centrality, may be closely related to the PTG process, whereas retrospectively evaluated centrality may be more strongly related to PTG as an outcome.

Finally, based on the results from recent studies on centrality valence (Broadbridge, 2018; Sapach et al., 2019), we might speculate that we did not find long-term effects because we did not differentiate between positive and negative centralization. For example, it is possible that we would have found a prospective, causal association between survivors' negative event centrality and PTSD symptomatology, had we measured the valence of their centrality.

4.1.4 PTG was commonly experienced and observed

The vast majority of our sample reported that they had experienced (at least some) PTG (Paper II) and a majority of the caregivers reported having observed positive changes in their children (Paper III). These findings add to the existing literature signifying that self-perceived positive change is a common experience post-trauma (Tedeschi et al., 2018), and that such a change is translated into observable action (Shakespeare-Finch & Barrington, 2012). Furthermore, the fact that the observed changes could be categorized with relative ease according to the themes of growth described in the theoretical and empirical literature supports the validity of the PTG construct and domains.

The survivors reported highest growth in the domains of greater personal strength and new appreciation of life (Paper II). According to Tedeschi et al. (2018), PTG may manifest itself differently at different developmental stages, and they argue that it is possible that "the relative importance of the PTGI contents may reflect developmental characteristics". In a study on American adolescents, Taku and McDiarmid (2015) found that the PTGI item "I discovered that I am stronger than I thought I was" was rated as the most personally important to them. Tedeschi et al. (2018) suggest that this finding may be related to the fact that "adolescents are more likely to focus on becoming autonomous and independent from others at this life stage" (p.125), particularly in Western societies. As such, this may also explain the high report of perceived personal strength in the present sample of young trauma survivors. On the other hand, as noted in Paper III, the fact that the participants were all in life danger on the island, but survived, may in itself have prompted an awareness and experience of personal strength.

In terms of observed growth, Tedeschi et al. (1998) have argued that: "it may be a difficult, if not impossible, challenge to identify satisfactory external referents, at least for some of the proposed dimensions" (p. 219). While we have not systematically compared the individual youths' self-reports of PTG and their caregivers' reports of observed positive

changes to date, we can see that overall the youths reported relatively high levels of 'a new appreciation of life' (Paper II), whereas 'changed philosophy of life' was the least frequently reported observed growth category (Paper III). This may suggest that philosophy of life changes are less visible to others. However, it is also important to note that some forms of growth go hand in hand and, to a certain degree, overlap (Glad & Hafstad, 2019). For example, if someone has changed their priorities in life and started to appreciate their family more post-trauma, this could lead them to reach out and express their affection for their family members more openly. While this could have been categorized under 'changed philosophy of life' (and possibly was by the youths themselves), we chose to categorize these behaviors under 'relational change'. As such, how the positive changes were categorized may, at least partly, explain the apparently discrepant findings in the two papers.

According to Pals and McAdams (2004), PTG may be best understood as a process wherein survivors construe a narrative understanding of how they have been positively transformed by the traumatic event and then integrate this into their identity-defining life story. Importantly, as noted by McAdams (1996), our life story is jointly authored with the people in our social network, in which, of course, parents play a central role. As such, youths' response to trauma, including their understanding of what happened and coping repertoire, will be strongly influenced by their caregivers (Kilmer et al., 2014). In line with this, Janoff-Bulman (1992) has stated that: "Those very close to the child can potentially reframe and transform the event so that it is less frightening and less likely to challenge the child's inner world" (p.84). Hafstad et al. (2011), who studied PTG in families exposed to the tsunami in South East Asia in 2004, found that parents who reported positive changes had children who also reported higher levels of PTG. Based on this finding, the authors argued that it is possible that parents who experience positive changes may facilitate growth in their children, for example by helping them reframe the aftermath of the event in a more positive way. Unfortunately, in the present study, because we did not explore PTG among the caregivers, we could not investigate this hypothesis further. However, the fact that so many caregivers described having observed positive changes in their youth (Paper III) suggest that they were open to such changes and may have fostered PTG in their children.

On a final note, almost one fifth of the caregivers who reported having observed PTG in their child expressed concern about the timing, nature, or source of these changes, and ambivalence as to whether the changes were indisputably positive (e.g., greater maturity vs. lost childhood) (Paper III). Consistent with this, several researchers have questioned whether certain post-trauma changes are actually indicative of positive growth, especially when reported

in young trauma survivors (Glad, Jensen, Holt, & Ormhaug, 2013; Wong, Cavanaugh, Macleamy, Sojourner-Nelson, & Koopman, 2009). From a developmental perspective, seemingly positive changes, such as being more grateful and not taking things for granted, might in fact reflect a heightened sense of vulnerability (Glad, Kilmer, et al., 2019). This underscores the importance of exploring the cognitions that accompany survivors' post-trauma changes and their adaptive significance (see section 4.3.3).

4.2 Methodological considerations

As noted by Douglas (2014), the value we place on science is largely based on the fact that it can provide us with empirically supported knowledge. Importantly though, this knowledge is only as good as the methods we use to acquire it. Thus, we need to carefully consider the strengths and weaknesses of the methods we use.

Scientific validity refers to how rigorously and 'truthfully' a study can answer a research question. Internal validity relates to the trustworthiness of the results within the target population, whereas external validity concerns the generalizability of the results outside the target population (Schoenbach, 2001). In the following, three types of threats to the internal validity of the findings in the present thesis are discussed (i.e., selection bias, information bias, and confounding bias). Additionally, the generalizability and reliability of the findings are considered.

4.2.1 Internal validity

4.2.1.1 Selection bias

Selection bias refers to errors resulting from systematic differences between the sample being investigated and the population of interest (Schoenbach, 2001). Selection bias may result from systematic bias in the recruitment process and/or attrition. In the present study, given that all the individuals present on the island during the massacre were identifiable in police records, we were able to extend invitations to all eligible participants (except one who was living abroad). This is a considerable study strength. Furthermore, because we had the names and birth dates of everyone who was on the island, we could check that participants did not differ from non-participants with regards to sex and age. However, because we lacked information regarding ethnicity, terror exposure, and posttraumatic reactions among non-participants, we do not know whether they differ on these characteristics. Importantly, though, we do have this information for the survivors who initially declined to participate (at T1), but subsequently joined the study at T2. In a systematic exploration of the participants in the Utøya study, Stene and Dyb (2016)

found that survivors who entered the study at T2 (n = 30) reported more PTSD symptomatology, anxiety/depression and somatic symptoms, compared to survivors who participated at T1. Stene and Dyb (2016) also found systematic differences among survivors who dropped out: Those who were lost to follow-up after T1 were more likely to be non-Norwegian and non-members of the political youth organization (i.e., AUF), and to report higher levels of exposure, compared to those who participated in both the first waves. As such, although we reached out to all the survivors and managed to get a high response rate (i.e., 72.4 % of the survivors participated at one or more time-points), it is possible that we have a sample selection bias, whereby survivors who participated may have had lower levels of psychopathology, and those who continued to be in the study over time were more likely to be of Norwegian origin, members of AUF, and to have somewhat lower levels of exposure.

Caregivers were recruited through postal letters sent to the home address of each survivor, with "Caregivers of (name of the survivor)" written on the envelope. As pointed out by Haga (2019), selection bias in this group may have resulted from many factors, including: (a) whom the survivor identified as a 'caregiver', (b) whether these individuals actually received the invitation, (c) whether they were willing to participate, and (d) attrition. We do not have data to inform points a-c in the families where neither the child nor caregiver(s) participated (Haga, 2019). However, in a comparison of children of participating caregivers with children of non-participating caregivers, Haga (2019) found that a higher number caregivers participated for children of Norwegian origin, who were members of the AUF, had a young age, and who shared accommodation with their parents. In terms of attrition, caregivers who were lost to follow-up were more likely to be male, but did not differ on other sociodemographic variables (Haga, Thoresen, Stene, Wentzel-Larsen, & Dyb, 2017).

4.2.1.2 Information bias

Information bias refers to systematic errors resulting from inaccuracies in the measurement or classification of the study variables (Schoenbach, 2001). In the following, potential information biases related to the main measures used, the timing of measurement, and the data collection format (i.e., self-report and caregivers as observers) are discussed.

4.2.1.2.1 Main measures

The three main measures used in the present thesis, were UCLA PTSD-RI, CES and PTGI-SF. Whereas the UCLA PTSD-RI has been validated in American youth samples, and has been widely used in studies of young trauma survivors worldwide, it has not been validated in a Norwegian sample. This limits the validity of the level of PTSD symptomatology reported.

Notably, however, in Paper I, we applied a test of measurement invariance to establish whether the PTSD-RI items had the same relationship to the latent construct at both time-points. We found that the same manifest variables appeared to measure the same latent factors in the same way at T2 and T3. This suggests that the participants used the measure in the same way over time.

The two other main measures (i.e., CES and PTGI-SF) are short-forms. An important benefit of short forms is that they reduce the assessment burden on participants. On the other hand, as pointed out by Smith, McCarthy, and Anderson (2000), a short form is, by definition, a measure with reduced coverage of the target domain. As such, it is crucial that validity and reliability are independently established for this new, alternative measure (Smith et al., 2000). In terms of the 7-item version of the CES, results from a principal factor analysis indicated one single underlying factor in a sample of American undergraduate students (Berntsen & Rubin, 2006). Furthermore, in their evaluation of the factor structure, internal consistency and convergent validity of the short-form of the CES, Galan et al. (2017) concluded that "the 7-item version is reliable across settings and cultures" (p.666). The 7-item version has not been validated in Norway. However, in an exploratory factor analysis of the CES in the present study, we found strong support for a unidimensional underlying construct. Also, in a measurement invariance test (Paper I), we found that the same manifest variables appeared to measure the same latent factors in the same way at T2 and T3. This suggests that the participants used the measure in the same way over time.

As noted by Smith et al. (2001), it is important that researchers make sure that the short form preserves the content coverage of each factor in the original measure. Cann et al. (2010) did this in their development of the PTGI-SF (see section 2.2.6). Furthermore, in their assessment of the short form, Cann et al. demonstrated convergent validity and they identified a five-factor structure (equivalent to the original PTGI) in a factor analysis. Researchers in several other countries have also identified this five-factor structure in the PTGI-SF, e.g., in Portugal (Lamela, Figueiredo, Bastos, & Martins, 2014), Italy (Prati & Pietrantoni, 2014), and Chile (García & Wlodarczyk, 2016).

4.2.1.2.2 The timing of measurement

According to Little (2013), a study's measurement time-points are too often selected "on the basis of convenience rather than on the basis of clear theoretical rational" (p.49). This may be particularly true for disaster studies, in which a lot of data is gathered at once, and the design is thus typically not specifically tailored for each research question of interest. This constitutes a

problem, given that while timing may not be everything, it is often an important element in how applicable the design is to answering the research question. In the present thesis, for example, peritraumatic reactions (Paper II) were measured 4-5 months post-trauma. While obviously practically difficult in the midst of a national tragedy, measuring such reactions closer to the actual event would likely yield more valid reports. Another important aspect of the timing of measurement has been pointed out by Little, Card, Preacher, and McConnell (2009): "There is always the possibility that Y causes X over time spans other than those studied, which limits our conclusions regarding the direction of influence between X and Y to the particular time span investigated" (p. 29). With regards to the main constructs in the present thesis (i.e., PTSD, PTG, and CES), and their association over time, it is possible that we would have found different results if our data collections had been conducted at different time-points post-trauma (for more discussion on this, see section 4.1.3).

4.2.1.2.3 The data collection format

Information on the participants' level of PTSD, PTG, and event centrality was derived from self-report through face-to-face interviews and questionnaires. Self-report is the only way to tap an individuals' subjective experience (Baldwin, 2000). As such, this data collection format can provide valuable information. However, there are some important weaknesses we need to be aware of when we use this data collection format. For example, self-reported data is prone to biases in the informants who provide the data (Baldwin, 2000). When participating in a research study, people will not necessarily only be concerned with trying to answer accurately, they may also be motivated by their self-presentation, which could distort the data either intentionally or unintentionally (Robins & John, 1997). The most commonly noted bias is the so-called "social desirability" bias, which refers to the notion that people are more likely to report experiences that reflect positively on them and that are considered to be socially acceptable. In relation to two of the core themes in this thesis (i.e., PTG and PTSD), the participants may, based on this, be inclined to under-report their PTSD symptomatology and over-report PTG experiences. Other challenges to accuracy with self-report data are related to memory (e.g., recall bias) and to what degree the participants understand the questions they are being asked. In an effort to overcome these threats to validity in the current study, several measures were taken: First, to ensure that the questions were understood by the participants, the PTGI and CES were filled out by the participants themselves (which increased the privacy of their reporting, and may thereby have reduced the self-presentation/social desirably bias), while the interviewer was right beside them, available for questions if they needed help or

clarification. Second, for the PTSD measure we specified a time frame (of one month) for each question, and the interviewer presented the participants with a graphic representation of the frequency scales, which illustrated the response options (see Appendix 1).

As noted in Paper III, several methodological issues need to be considered when using caregivers as observers of their children's post-trauma changes. First, although their status as 'external' observers is a study strength, particularly given the salience of caregivers in young people's lives, it also introduced certain challenges. For instance, parents may lack in-depth knowledge about certain aspects of their child's life, including their friendships and romantic relationship behavior. Second, as noted by Frazier et al. (2014), the reports of people who are closest to the trauma survivors, such as their caregivers, may be biased in that they probably have a desire or a wish to believe that their loved one has gained something from their terrible experience and is adjusting well post-terror. Also, in light of the nature of this event, with many caregivers following the events, in real time, as they unfolded on the news and via digital media, they were potentially traumatized themselves. As such, it is possible that their reports of observed PTG primarily reflected their own experiences. However, I believe that by asking caregivers to report concrete and detailed behavioral examples of positive changes from day-to-day life, we minimized the degree to which their own reactions and biases affected the findings.

4.2.1.3 Confounding bias

Confounding bias occurs when we try to determine the effect of a variable, but actually measure the effect of another variable (Jager, Zoccali, Macleod, & Dekker, 2007). To reduce this type of threat to validity, we can adjust for potential confounding variables in the statistical analyses. Trauma survivors' level of PTSD and/or event centrality has been found to be related to age, sex, ethnicity, and level of traumatic exposure (Boals, Hayslip, Knowles, & Banks, 2012; May & Wisco, 2016; Olff, Langeland, Draijer, & Gersons, 2007; Perilla, Norris, & Lavizzo, 2002). As such, these factors were adjusted for in our cross-lagged analysis in Paper I. In addition, we wanted to include factors that might have changed in the survivors' lives between measurements and thus may affect the longitudinal relationship between the two constructs of interest. Hence, survivors' exposure to new traumatic experiences in this period was adjusted for. When conducting a causal mediation analysis, only pre-exposure confounders may be adjusted for (Imai, Keele, Tingley, & Yamamoto, 2011). As such, in Paper II, we adjusted for sex and age. Notably, the sensitivity analysis showed that the estimate of the mediated effect of

centrality had low robustness. This suggests that the findings are vulnerable to unmeasured confounders.

4.2.2 External validity

External validity refers to the extent to which the study findings are generalizable to populations other than the one being investigated (Schoenbach, 2001). In the present thesis, posttraumatic reactions following one potentially traumatizing event (i.e., the terrorist attack on Utøya island) among young survivors attending a political summer camp in Norway were assessed. While this provides important specificity, the findings are not necessarily generalizable to the diverse types of traumas experienced in the context of daily living (e.g., car accidents, loss by suicide, sexual abuse). For example, because the event was a national tragedy extensively covered in the media, those directly affected received more public attention post-trauma, for an extended period of time, than most other trauma survivors. Furthermore, with regards to other disasters, the specific nature of this event (i.e., significant life-threat via a single, man-made trauma; geographically constricted to a small island; high mortality), and the fact that the participants were youths and emerging adults, who were part of a group before the attack (i.e., 82% were members of the Norwegian Labor Party's youth organization), may impede the generalizability of the findings to other events, age groups and trauma exposed populations. That said, the fact that this was an observational study, conducted without introducing any incentives or interventions, strengthens its external validity.

4.2.3 Reliability

Broadly speaking, reliability refers to the consistency of a measure, over time, instruments, and observers (Schoenbach, 2001). As noted by Streiner (2003), the Cronbach's α is probably the most widely used index of the reliability of a scale. The α is an estimate of the internal consistency of a scale, which refers to how well the items measure the construct of interest. More specifically, it indicates how much of the item scores reflect the values of the latent variable, and how much reflects measurement error (Schoenbach, 2001). Importantly, however, as pointed out by Streiner (2003), α is strongly affected by the length of the scale. Thus, while high value of α is a prerequisite for internal consistency, it does not guarantee it. Norwegian versions of the three main scales used in the present thesis have previously shown adequate internal consistency; the UCLA PTSD-RI (α = .82–87; Jensen et al., 2009), the CES (α =92; Blix et al., 2013), and PTGI-SF (α = .74; Hafstad et al., 2011). In the present study all three measures had an α index above .80, which is considered an adequate value (Schoenback, 2001).

Test-retest reliability refers to the degree to which test scores on an instrument are consistent from one test administration to the next. The UCLA PTSD-RI has shown acceptable test-retest reliability (r=0.84) with an interval range from 6-28 days (Rodriquez et al., as cited in Steinberg et al., 2004). The PTGI has also shown acceptable test-retest reliability (r=0.71) (Tedeschi & Calhoun, 1996), however, to the best of my knowledge, this has not been tested on the short form. In terms of the CES, Fernández-Alcántara et al. (2015) found acceptable test-retest reliability at two months (r=0.83) in their Spanish adaptation of the measure.

Whereas qualitative methods provide us with the opportunity to explore people's experiences in greater depth, there are several considerations we need to have in mind when we use data collected with an open-ended measure. For example, the question the caregivers were asked about positive post-trauma change in their children (Paper III) was quite broad. This can be considered a study strength, in that their answers would not be constricted by established growth domains. On the other hand, it is possible that more focused questioning, and/or more prompts, could have stimulated reports of growth from more participants. In terms of the analysis of the participants' responses, the interpretation and categorization of this material is prone to biases in the researcher(s) involved. With this in mind, in our endeavor to ensure reliability and transparency, both the first and last author categorized each PTG statement separately. The inter-rater reliability was high (Cohen's kappa = 0.93). In addition, by presenting many direct quotes from the participants in Paper III, we have provided the readers with an opportunity to consider for themselves whether they agree with our categorization and interpretation.

4.3 Clinical implications and future directions

4.3.1 Centrality as a component of PTSD treatment?

This is the first study to investigate the direction of the longitudinal association between PTSD and perceived event centrality in a directly exposed trauma sample. Though we cannot provide a conclusive answer regarding the direction of this relationship, the fact that we did not find support for the predominating hypothesis in the field (i.e., that high CES will predict PTSD symptomatology), but rather the opposite (i.e., that PTSD predicted CES), may have clinical implications. While current trauma-focused therapies do not explicitly focus on event centrality, Groleau et al. (2013) concluded in their cross-sectional study on the association between centrality and PTSD that: "Clinicians may usefully attend to centrality when working with individuals who have experienced a potentially traumatic event" (p.477). Echoing this, Boals and Murrell (2016) have recently advocated that treatments specifically focusing on narrative

centrality "hold great promise for reducing trauma-related symptoms" (p.11). As such, while an explicit focus on event centrality is not implemented in standard treatment approaches for PTSD to date, based on the robust findings from the cross-sectional studies, the field may be moving in this direction. However, importantly, the findings in the present study suggest that targeting and reducing trauma survivors' perception of the traumatic event as a central component of their identity and life story not necessarily reduce their prospective levels of PTSD symptoms. As such, rigorous empirical investigation is warranted before we can conclude that targeting centrality should be a standard component in PTSD treatment. In the following, I will provide three suggestions for future research in this regard.

First, because we only measured the constructs at two time-points, a clear separation of within- and between-person level was not possible in the present study. Rather, in the CLPM it is assumed that all participants vary over time around the same means and that there are no-trait like individual differences that endure (Hamaker, Kuiper, & Grasman, 2015). This is problematic, as pointed out by Hamaker et al. (2015), because "it is difficult to imagine a psychological construct that is not to some extent characterized by stable individual differences" (p.104). Other statistical models, such as the random-intercepts CLPM, can overcome this limitation. Here within-person processes are separated from between-person effects, through the inclusion of a random intercept, but at least three data collections are necessary to conduct such an analysis (Hamaker et al., 2015). Hence, to get a better understanding of the longitudinal association between trauma survivors' perceived event centrality and PTSD symptomatology, future studies with multiple data collections are warranted.

Second, clinical studies, in which clients' perceived centrality is experimentally manipulated, could provide some answers. As noted by Lancaster et al. (2015), "of particular interest is whether events become less central during treatment or whether one's appraisal/interpretation of the central event is the source of this change" (p. 413). Of note, three clinical studies have recently been published. In one of these, Boals and Murell (2016) used a modified version of the Acceptance and Commitment Therapy (ACT, Hayes et al., 1999) and found a reduction in event centrality and PTSD symptoms from pre-to post treatment, but this reduction did not hold 6 weeks later. In the two other studies, the researchers found that whereas event centrality was reduced in the experimental condition compared to controls, there were no group differences in changes in PTSD symptomatology (Boals, Murrell, Berntsen, Southard-Dobbs, & Agtarap, 2015; Vermeulen, Brown, Raes, & Krans, 2019). In sum, the preliminary findings from clinical studies suggest that manipulation of event centrality does not influence prospective levels of PTSD symptomatology.

Finally, as noted by Sapach et al. (2019), the clinical utility of using centrality valence to predict trauma responses should be further explored.

4.3.2 The centrality of event construct

In terms of the centrality of event construct itself, it would be interesting to explore its temporal dimension, including how stable it is over time. Relatedly, it would also be interesting to explore the degree to which survivors' anticipated event centrality differs from their retrospectively evaluated centrality, and whether this distinction is important in terms of the concurrent and longitudinal association between centrality and other factors (e.g., various forms of psychopathology and/or growth). Furthermore, I believe that an important aspect of survivors' post-trauma narratives, lacking in the current version of the CES (which assesses self-perceived centrality), is the appraisal of others (i.e., to what degree *other people* ascribe the event as central to the survivor's identity and future life), here referred to as externally imposed centrality. After public traumas (such as a terrorist attack), people may report experiencing high levels of externally imposed centrality (as exemplified by Skarstein & Schultz, 2016). In contrast, people who are exposed to more private traumas (such as rape), may mainly report high levels of anticipated externally imposed centrality. They may, for example, expect or fear that disclosure will result in people considering the traumatic event to be defining for whom they are – and that they will be treated differently. This, again, may be a potentially important barrier for disclosure. Externally imposed centrality (both anticipated and experienced), and its effects on our well-being post-trauma, may be a fruitful area for future research.

4.3.3 Posttraumatic growth

Many people exposed to a potentially traumatic event report that they have changed in a positive way post-trauma, and our findings suggest that such changes can be observed by people in their social network. These findings signify that PTG is a prevalent phenomenon worthy of further clinical and empirical attention. In the present thesis, the caregivers' detailed descriptions of their children's behavioral changes are a particularly important contribution to the field. In the following, I will present some suggestions for future research, which I believe could advance our understanding of PTG.

First, importantly, as pointed out by Jayawickreme and Blackie (2014), very few studies on PTG to date (including the present work) have used control groups (i.e., non-trauma exposed participants matched on sociodemographic factors). This may raise questions (particularly in relation to studies on youth) about whether reports of PTG simply reflect normative maturation.

As noted by one of our participants: “It is difficult to know what’s PTG and what’s the result of my [natural] personal development” (personal communication during interview). Further underscoring the issue, several caregivers in our study expressed that it was difficult to know whether the positive changes they had observed were related to the attack or a result of normative maturation and development (see Paper III). Thus, while findings from the few existing studies which have directly addressed this question suggest that reports of PTG reflect a process beyond normative growth (i.e., Alisic, Van Der Schoot, Van Ginkel, & Kleber, 2008; Taku, Kilmer, Cann, Tedeschi, & Calhoun, 2012), in future studies, particularly studies on young trauma survivors, the use of control groups would impart greater confidence that the positive change reported is related to the struggle with the traumatic event.

Second, in terms of PTG related behavior, it would have been interesting to ask the trauma survivors themselves to describe what, if any, positive behavioral changes they have experienced. This taps into an important, yet unresolved, question in the field, namely: What is the adaptive significance of PTG? That is, what are the implications of growth for the trauma survivors’ post-trauma health and/or adjustment? In the present study, while we did have the caregivers’ descriptions of their children’s behaviour, in order to determine whether these post-trauma changes also reflected self-perceived growth, we would have had to explore the cognitions that accompanied the changes (Roepke, Forgeard, & Elstein, 2014). Unfortunately, because we did not collect the youths’ own qualitative descriptions of their positive changes post-trauma, such an exploration was not possible. However, because we do have quantitative data from the youths, we could compare the individual survivors’ self-reported PTG and their caregivers’ reports of observed positive changes. That said, given the vastly diverse data collection formats, there are several methodological challenges related to conducting such an analysis. Thus, in a future study, a better way to explore corroborating evidence for PTG would probably be to use the same format for the directly exposed and their loved one(s) (i.e., a quantitative measure or a qualitative interview). Or, alternatively, to ask their loved one(s) to describe the changes they have observed, and then to ask the trauma exposed about these changes (e.g., whether they recognize the changes described, and how they have experienced them), or vice versa. Either way, I believe it is important that we continue to investigate the consequences positive post-trauma changes have for the survivors and their surroundings. Further research on both self- and observational reports of positive post-trauma behavioral changes may provide insightful descriptions of how this kind of change unfolds in everyday life. Again, this may not only give survivors themselves and researchers a greater understanding of the phenomenon, but also offer clinicians a better grasp of their clients’ post-trauma everyday

lives. At a societal level, knowledge about growth might reduce the stigmatization some trauma survivors experience by providing a more nuanced picture of the potential changes people experience post-trauma.

On a final note, given that many people report experiencing PTG, I believe that clinicians should be aware of, and open to, the possibility of growth in their clients. That said, it is important that we strive to avoid what Held (2002) has referred to as the "tyranny of the positive"; that is, we (clinicians, researchers, and other people in the survivors' social networks) should not convey *expectations* of positive changes after a stressful life event – as this could leave survivors feeling that they are "failing" if they do not experience PTG. Rather, growth is a phenomenon that some, but not all, people exposed to a potentially traumatizing event experience.

5 CONCLUSION

The findings in the present thesis contribute to increasing current knowledge about post-trauma reactions in several ways. First, few have explored the directional association between PTSD and perceived event centrality, and this was the first study to do so in a directly trauma exposed sample. The survivors reported high and stable levels of centrality, suggesting that the terrorist attack had become an important part of their identity and life story, years after the attack. In line with previous literature, we found that perceived event centrality was significantly associated with concurrent PTSD symptoms. However, contrary to the dominating hypothesis in the field, we found that PTSD symptoms prospectively predicted level of event centrality, but not vice versa. This suggests that targeting and reducing trauma survivors' perception of the traumatic event as a central component of their identity and life story not necessarily reduce their prospective levels of PTSD symptoms.

Second, whereas self-reported PTG has been documented after a wide variety of potentially traumatic experiences, research on the cognitive processes behind PTG is scarce. In the present study, we found a positive, significant association between survivors' peritraumatic reactions, perceived event centrality, and self-reported growth. This suggests that peritraumatic reactions and perceptions of centrality may help explain individual differences in trauma survivors' levels of PTG. However, we did not find perceived event centrality to be a significant mediator between initial reactions to trauma and subsequent self-reported growth.

Finally, to date, most research on PTG is based on self-report. As such, the detailed descriptions of observed positive behavioral changes reflected in the present thesis is an important contribution to the field. A majority of the caregivers reported that they had noticed positive changes in their child after the terrorist attack on Utøya island, and the growth dimensions they described align with the findings in the existing PTG literature, including a stronger family bond; more compassion; and greater personal strength. This suggests that post-trauma positive change is translated into observable action, and the rich examples of positive behavioral changes support the validity of the PTG construct.

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APPENDIX

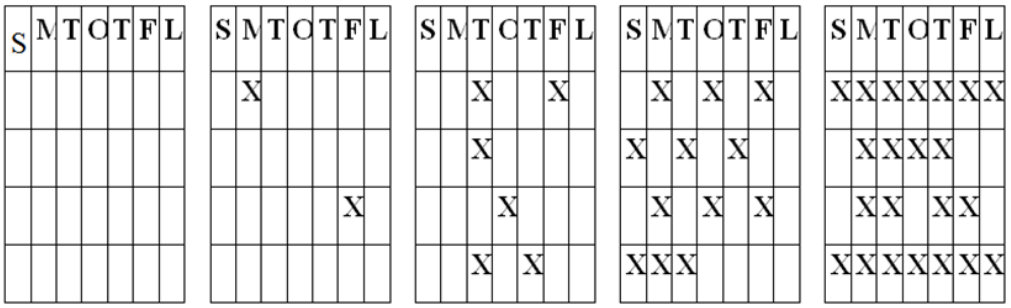
Appendix 1

FREKVENSRANGERINGSARK

HVOR OFTE ELLER HVOR MYE AV TIDEN DEN SISTE MÅNEDEN, DET VIL SI _____

OPPLEVER DU AT DU HAR DETTE PROBLEMET?

0	1	2	3	4
ALDRI	SJELDEN	NOEN GANGER	OFTE	NESTEN ALLTID



ALDRI	TO GANGER I MÅNEDEN	1-2 GANGER I UKEN	2-3 GANGER I UKEN	NESTEN ALLTID (HVER DAG)

For mer informasjon om rettigheter og eventuelle oppdateringer av oversettelse, kontakt Grete Dyb, NKVTS.

Appendix 2

The table displays the participants' exposure to potentially traumatic experiences during the terror-attack (retrieved from Glad, Jensen, Hafstad, & Dyb, 2016).

Event characteristics	**N (%)**
Heard gun shots	280 (100)
Hid from the perpetrator	270 (96.8)
Heard people screaming	259 (93.2)
Saw dead bodies	237 (85.3)
Was afraid that he/she would die	217 (78.1)
Was afraid of being seriously injured	211 (75.9)
Saw the perpetrator or heard his voice	197 (70.6)
Saw someone be injured or killed	172 (61.9)
Touched dead bodies or injured people	129 (46.2)
Saw the perpetrator point the gun at him/her or realized that he had shot at him/her	121 (43.4)
Felt threatened by the police	107 (39.2)
Smelled gunfire or other distinct smells	96 (35.0)
Was afraid that he/she would drown	81 (29.0)

Note: Due to missing data N varies between 273 and 280.

Appendix 3

Positive endringer

Q60 **Noen ganger kan mennesker fortelle om positive endringer etter større traumatiske opplevelser.**

For hvert av spørsmålene under, indikér i hvilken grad disse forandringene har skjedd i livet ditt som følge av terrorhandlingene 22. juli 2011.

1 = Jeg opplevde ***ikke*** denne forandringen som et resultat av terrorhandlingene.
2 = Jeg opplevde denne forandringen i ***svært liten grad*** som følge av terrorhandlingene
3 = Jeg opplevde denne forandringen i ***liten grad*** som følge av terrorhandlingene
4 = Jeg opplevde denne forandringen i ***middels grad*** som følge av terrorhandlingene
5 = Jeg opplevde denne forandringen i ***stor grad*** som følge av terrorhandlingene
6 = Jeg opplevde denne forandringen i ***veldig stor grad*** som følge av terrorhandlingene

Sett ett kryss i hver linje

	Ikke opp-levd					I veldig stor grad	
	1	2	3	4	5	6	
• Jeg har endret mine prioriteringer når det gjelder hva som er viktig i livet	☐	☐	☐	☐	☐	☐	1
• Jeg setter mer pris på livet mitt	☐	☐	☐	☐	☐	☐	2
• Jeg har fått en større forståelse for åndelige ting	☐	☐	☐	☐	☐	☐	3
• Jeg har lagt om kursen i livet mitt	☐	☐	☐	☐	☐	☐	4
• Jeg føler mer nærhet til andre mennesker	☐	☐	☐	☐	☐	☐	5
• Jeg vet nå at jeg kan takle vanskeligheter	☐	☐	☐	☐	☐	☐	6
• Jeg får mer ut av livet mitt nå	☐	☐	☐	☐	☐	☐	7
• Jeg har en sterkere religiøs tro	☐	☐	☐	☐	☐	☐	8
• Jeg har oppdaget at jeg er sterkere enn jeg trodde jeg var	☐	☐	☐	☐	☐	☐	9
• Jeg har lært mye om hvor flotte mennesker kan være	☐	☐	☐	☐	☐	☐	10

Appendix 4

Hendelsens betydning

Q62 Tenk på hendelsene på Utøya 22. juli 2011 og besvar hvor enig eller uenig du er i følgende utsagn. Sett ett kryss i hver linje

	Helt enig 1	Delvis enig 2	Verken eller 3	Delvis uenig 4	Helt uenig 5	
• Jeg føler at denne hendelsen har blitt en del av min identitet.	☐	☐	☐	☐	☐	1
• Denne hendelsen har blitt et referansepunkt for hvordan jeg forstår meg selv og verden.	☐	☐	☐	☐	☐	2
• Jeg føler at denne hendelsen har blitt en sentral del av min livshistorie.	☐	☐	☐	☐	☐	3
• Denne hendelsen har farget måten jeg tenker og føler rundt andre opplevelser.	☐	☐	☐	☐	☐	4
• Denne hendelsen har endret livet mitt for alltid.	☐	☐	☐	☐	☐	5
• Jeg tenker ofte på de virkningene denne hendelsen vil ha på min fremtid.	☐	☐	☐	☐	☐	6
• Denne hendelsen var et vendepunkt i livet mitt.	☐	☐	☐	☐	☐	7

Appendix 5

Del II Lukkede spørsmål

Posttraumatiske stressreaksjoner

Man kan få ulike reaksjoner på dramatiske hendelser. Nå kommer jeg til å lese opp noen påstander om mulige reaksjoner etter terrorangrepet på Utøya 22. juli 2011. For hver påstand vil jeg spørre hvor ofte du har opplevd å ha det slik DEN SISTE MÅNEDEN.
Her er et skjema som er til hjelp når du skal svare på hvor ofte du har opplevd problemet den siste måneden.

Instruksjon til intervjuer:

Ta frem frekvensarket og legg på bordet mellom dere. Gå gjennom de ulike alternativene før dere starter på listen.

Q1 **Hvor mye av tiden DEN SISTE MÅNEDEN**

	Aldri 1	Sjelden 2	Noen ganger 3	Ofte 4	Nesten alltid 5	
• Jeg er på vakt for fare eller ting jeg er redd for.	☐	☐	☐	☐	☐	1
• Når noe minner meg om det som skjedde på Utøya 22. juli 2011, blir jeg veldig ute av meg, redd eller trist.	☐	☐	☐	☐	☐	2
• Jeg får skremmende tanker, ser for meg bilder eller hører lyder fra det som skjedde på Utøya 22. juli 2011, selv om jeg ikke vil det.	☐	☐	☐	☐	☐	3
• Jeg føler meg sur, sint eller rasende.	☐	☐	☐	☐	☐	4
• Jeg drømmer om det som skjedde på Utøya 22. juli 2011 eller har mareritt om andre ting.	☐	☐	☐	☐	☐	5
• Jeg føler at jeg er tilbake til da terroren skjedde på Utøya 22. juli 2011, og opplever det om igjen.	☐	☐	☐	☐	☐	6
• Jeg har lyst til å være alene og ikke sammen med venner.	☐	☐	☐	☐	☐	7
• Jeg føler meg alene inni meg og føler ikke nærhet til andre mennesker.	☐	☐	☐	☐	☐	8
• Jeg forsøker å ikke snakke om det som skjedde på Utøya 22. juli 2011, tenke på det eller ha følelser rundt det.	☐	☐	☐	☐	☐	9
• Jeg har problemer med å føle glede eller kjærlighet.	☐	☐	☐	☐	☐	10
• Jeg har problemer med å føle tristhet eller sinne.	☐	☐	☐	☐	☐	11
• Jeg blir lett urolig eller skvetter lett, for eksempel når jeg hører høye lyder eller når noe overrasker meg.	☐	☐	☐	☐	☐	12
• Jeg har problemer med å få sove eller jeg våkner ofte om natten.	☐	☐	☐	☐	☐	13
• Jeg bebreider meg selv for noe av det som skjedde på Utøya 22. juli 2011	☐	☐	☐	☐	☐	14
• Jeg har problemer med å huske viktige ting fra det som skjedde på Utøya 22.juli.	☐	☐	☐	☐	☐	15
• Jeg har problemer med å konsentrere meg eller være oppmerksom.	☐	☐	☐	☐	☐	16
• Jeg forsøker å holde meg unna folk, steder eller ting som minner meg om det som skjedde på Utøya 22.juli.	☐	☐	☐	☐	☐	17
• Når noe minner meg om det som skjedde på Utøya 22. juli 2011, får jeg sterke følelser i kroppen, for eksempel hjertebank, hodepine eller mageknip.	☐	☐	☐	☐	☐	18
• Jeg tror ikke at jeg kommer til å leve lenge.	☐	☐	☐	☐	☐	19
• Jeg krangler eller slåss mye	☐	☐	☐	☐	☐	20
• Jeg er negativ eller pessimistisk når jeg tenker på fremtiden	☐	☐	☐	☐	☐	21

Hvor mye av tiden DEN SISTE MÅNEDEN

	Aldri	Sjelden	Noen ganger	Ofte	Nesten alltid	
• Jeg er redd for at noe lignende som det som skjedde på Utøya 22. juli 2011 skal skje igjen.	☐	☐	☐	☐	☐	22
• Jeg er sint på noen andre for at de ikke gjorde mer for å forhindre det som skjedde på Utøya 22. juli 2011, eller for at de ikke har gjort nok etterpå (gjelder ikke sinne mot gjerningsmannen).	☐	☐	☐	☐	☐	23
• Jeg tenker at andre vonde ting vil skje med meg i fremtiden.	☐	☐	☐	☐	☐	24
• Jeg gjør ting som skader eller kan skade meg selv eller andre. (For eksempel å kjøre for fort, bruke narkotika, drikke veldig mye, skade meg selv eller gjøre andre farlige ting).	☐	☐	☐	☐	☐	25
• Jeg klandrer meg selv for at jeg ikke er blitt fortere bra.	☐	☐	☐	☐	☐	26
• Jeg skammer meg over noe av det som skjedde på Utøya 22. juli 2011.	☐	☐	☐	☐	☐	27
• Det som hendte var så motbydelig og frastøtende at jeg føler meg dårlig, blir kvalm eller føler avsky når jeg tenker på det.	☐	☐	☐	☐	☐	28
• Jeg tenker at verden er utrygg, og at jeg ikke er godt nok beskyttet.	☐	☐	☐	☐	☐	29
• Jeg har sterke følelser om hevn	☐	☐	☐	☐	☐	30
• Jeg klandrer meg selv for at jeg lot det som skjedde på Utøya 22. juli 2011 endre meg så mye.	☐	☐	☐	☐	☐	31
• Jeg føler meg veldig redd.	☐	☐	☐	☐	☐	32
• Jeg tenker negativt om meg selv, for eksempel at jeg er et dårlig menneske, eller et menneske som ikke stoler på andre.	☐	☐	☐	☐	☐	33

PAPERS I-III

Paper I

Paper II

Paper III