TUIJA TURUNEN

Trauma Recovery After a School Shooting

The role of theory-based psychosocial care and attachment in facilitating recovery

ACADEMIC DISSERTATION
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One bird
singing a sad song.
And for a moment,
everything else is quiet.

Risto Rasa (translated by Juuli Honko)

“First anniversary”

photo by Tuija Turunen

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Abstract

Two school shootings within a single year shattered the sense of safety in Finland and placed healthcare providers in a situation in which the preparedness and functionality of psychosocial care were tested in practice. The long roots of acute crisis work, together with updated trauma- and attachment-theory-based knowledge, guided the planning and implementation of the outreach model of psychosocial services after the shooting in Kauhajoki in 2008. This dissertation describes the rationale and guidelines behind the outreach. It analyzes the contents of the multilevel and multiprofessional models of support provided to those traumatized in the shootings, the perceptions of the trauma-exposed students regarding the support they perceived, and the role of attachment style in trauma recovery.

The main findings were that the need for both acute and long-term psychosocial care was acknowledged and that psychosocial services were provided according to current national and international guidelines. The support was provided comprehensively, frequently, and for a long enough period to meet the needs and timetables of recovery of the trauma-affected individuals, families, and communities. It was especially targeted to those in greatest need, i.e., those who lost loved ones in the shootings and those with the most severe trauma exposure. Normalizing psychoeducative information was also provided in order to enhance resilience among citizens. The trauma-exposed students considered support from their natural social networks to be the most important for their recovery. They also appreciated professional support, especially its psychoeducative and psychotherapeutic elements and continuity of the services.

The results regarding the role of attachment style in trauma recovery revealed that attachment-informed knowledge should be taken into account when tailoring psychosocial services in the future. The study confirmed earlier results regarding the benefits of the secure attachment style in trauma recovery. It also revealed the unique vulnerabilities of both the insecure-avoidant and insecure-preoccupied attachment styles. Because the victims had post-traumatic stress symptoms at different phases of recovery, they also need different dosings and timings of support.

This dissertation aims to increase the variety of practical, theory-based models to support a large number of people after a mass tragedy. School shootings as a

form of mass violence are a phenomenon of our era, and unfortunately, there will be another shooting someday, somewhere. This is why preparedness for psychosocial care should be comprehensive and the experiences and lessons learned so far should be shared for the common goal of facilitating recovery.

Tiivistelmä

Kaksi kouluampumistapausta vuoden sisällä horjutti turvallisuudentunnetta Suomessa. Psykososiaalisen tuen tarve oli suuri ja sen käytännöt ja riittävyys punnittiin tositilanteessa. Kriisiavun perinteet ja teorioihin ja näyttöön perustuva päivitetty tietämys ohjasivat lyhyt- ja pitkäkestoisen psykososiaalisen jälkihoidon suunnittelua ja toteuttamista Kauhajoen koulusurmien jälkeen vuonna 2008. Tässä väitöskirjassa kuvataan monitahoisen ja moniammatillisen jälkihoidon teoreettinen perusta. Lisäksi analysoidaan jälkihoidon pohjana olevien kansallisten ja kansainvälisten suositusten toteutumista. Tutkimuksessa analysoidaan myös koulusurmille altistuneiden opiskelijoiden kokemuksia heille tarjotusta tuesta ja sen hoitavista elementeistä. Lisäksi selvitetään kiintymyssuhteen osuutta traumaattisen kokemuksen jälkeiselle toipumiselle.

Päätulosten mukaan sekä lyhyt- että pitkäkestoista psykososiaalista tukea ja palveluita tarjottiin voimassaolevien kansallisten ja kansainvälisten suositusten mukaisesti. Tuki organisoitiin monitoimijahankkeen kautta ja sitä oli tarjolla kattavasti, toistuvasti ja riittävän pitkään. Siksi traumasta selviytyvien yksilölliset tarpeet ja toipumisen aikataulut voitiin huomioida yksilö-, perhe- ja yhteisötasollakin. Tukea tarjottiin erityisesti heille, joilla tuen tarve oli suurin, kuten läheisensä menettäneille omaisille ja traumaattisille tapahtumille vakavimmin altistuneille opiskelijoille ja koulun henkilökunnalle. Laajemmalle yhteisölle jaettiin tiedotusvälineissä ja vanhempainilloissa selviytymistä tukevaa, kriisireaktioita normalisoivaa psykoedukaatiota.

Odotusten mukaisesti tutkimus osoitti, että kouluampumisille altistuneet opiskelijat kokivat tärkeimmäksi läheisiltään saadun psykososiaalisen tuen. He arvostivat myös ammatillista tukea ja erityisesti sen psykoedukatiivisia ja psykoterapeuttisia elementtejä sekä palveluiden jatkuvuutta. Tutkimustulokset osoittivat myös, että psykososiaalisia palveluita tarjottaessa kiintymyssuhteisiin liittyvä tieto on syytä huomioida. Tutkimus vahvisti aiempia tuloksia turvallisen kiintymyssuhteen eduista traumasta toipumiselle. Se paljasti myös turvattomien kiintymyssuhteiden (välttelevä ja takertuva) erityiset haavoittuvuudet. Turvattomasti kiintyneet opiskelijat reagoivat post traumaattisen stressin oireilla eri tavoin ja toipumisen eri vaiheissa. Sen vuoksi he myös tarvitsevat yksilöllisesti ajoitettua ja annosteltua tukea.

Tämä väitöstutkimus pyrkii lisäämään teoriaan ja suosituksiin perustuvia, konkreettisia psykososiaalisen tuen käytäntöjä. Se mallintaa vaiheittaisen jälkihoidon prosessin kokonaisuutena ja sen kaksi erityistä tukiprosessia. Ensimmäinen on suunnattu läheisensä menettäneille omaisille ja toinen koulusurmille altistuneen kouluyhteisön opiskelijoille ja henkilökunnalle. Koulusurmat ovat aikamme ilmiönä yksi suuriin joukkoihin kohdistuva massaväkivallan muoto. On siis valitettavasti todennäköistä, että jonakin päivänä jossain tapahtuu uusi vastaavanlainen väkivallanteko. Sen vuoksi varautuminen myös psykososiaalisen tuen osalta tulee olla kattavaa. Tähän mennessä kertyneitä kokemuksia on tärkeätä jakaa ja niistä on syytä oppia, jotta voimme entistä paremmin tukea yhteistä päämäärää; toipumista.

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all people, know me the best. Now it was my turn to spend long hours in the study and I am grateful for you enabling it. Combination of your delicious meals, patience, and company has been ideal.

The sixth anniversary of Kauhajoki school shootings just passed. It is autumn again and the memories of the tragic days of the two tragedies travels with all of us. I would like to, once again, express my warmest condolence to those that the tragedies affected the most. Especially, the relatives of the deceased at the shootings and the students and staff of Kauhajoki school, I thank you all for letting us walk beside you through the first years of recovery and for sharing your experiences of recovery with us. I dedicate this dissertation to you all. You will always have a special place in my heart.

Like a wave takes another
across the ocean,
so will we survive,
carrying each other.

Risto Rasa (translated by Juuli Honko)

Abbreviations

AACAP	American Academy of Child and Adolescent Psychiatry
A-DES	The Adolescent Dissociative Experiences Scale
ANS	Autonomic Nervous System
APA	American Psychiatric Association
ASD	Acute Stress Disorder
ASQ	Attachment Style Questionnaire
DSM IV, V	Diagnostic and Statistical Manual of Mental Disorders
EMDR	Eye Movement Desensitization and Reprocessing
ICD – 10	International Classification of Diseases and Related Health Problems
IES	Impact of Event Scale
NICE	National Institute of Health and Care Excellence
PTE	Potentially Traumatic Event
PTG	Post Traumatic Growth
PTGI	Post Traumatic Growth Inventory
PTSD	Post Traumatic Stress Disorder
PTSS	Post Traumatic Stress Symptom
Sedu	Vocational Education Centre
SeAMK	Seinäjoki University of Applied Sciences
TENTS	The European Network for Traumatic Stress
TF-CBT	Trauma Focused Cognitive Behavioral Therapy

List of original publications

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III Turunen, T., Haravuori, H., Pihlajamäki, J., Marttunen, M., & Punamäki, R-L. (2014). Framework of the outreach after a school shooting and the students' perceptions of the provided support. Published in *European Journal of Psychotraumatology, 5*: 23079.

IV Turunen, T., Haravuori, H., Punamäki, R-L, Suomalainen, L., & Marttunen, M. (2014). The Role of Attachment in Recovery after a School Shooting Trauma Published in *European Journal of Psychotraumatology, 5*: 22728.

1 Introduction

In 2007 and 2008, two school shootings shattered the sense of security in a terrible and unexpected way in Finland. The sudden and violent loss of lives among students and staff left a large number of relatives, friends, and peers to grieve for the deceased. Also, the Finnish school system had to face a new situation in which threats, suspicions, and potential violence had to be taken seriously. The need for the psychosocial support provided by healthcare professionals was acknowledged. Their actions were based on the international and national guidelines and the best practices regarding the facilitation of recovery after a mass trauma situation.

In Finland, there is a long tradition of providing psychosocial support, especially in the immediate wake of a trauma (Saari & Hynninen, 2010). After large-scale tragedies in Finland, such as a bombing in a shopping mall (2002), a ski bus accident (2004), and an Asian tsunami (2004), a model of a long-term collective assistance was implemented for the relatives of the deceased (Dyregrov, Straume, & Sari, 2009; Saari, 2006). The need for mid- and long-term psychosocial support was anticipated when the school shooting trauma affected schools. This support was based on the human capacity to thrive, even after horrible tragedies, with the help of personal resilience and support from natural social networks (Bonnano & Mancini, 2008).

The aim of this dissertation is to describe how the multilevel, trauma-, and attachment-theory-based model of acute and long-term professional psychosocial support was developed and implemented after the second school shooting in Kauhajoki, Finland, in 2008. It presents the rationale for the selection and timing of various theory-based interventions aimed at facilitating recovery, as well as the students' experiences of the support provided. Because the key role of professional support is to activate and supplement the natural support of the survivors' relations, the role of various attachment styles in recovery after trauma exposure is analyzed. Finally, the study summarizes lessons learned from the model and the studies and provides suggestions for the further development of psychosocial care, as well as suggestions for the topics of future research.

1.1 School shootings as a form of mass violence

School violence in a form of gang fights or firearms possession does not characterize school life in Finland. The physical safety of pupils has been taken for granted until recently. However, bullying is a common phenomenon in Finnish schools; approximately 8% of 7-15-year-old pupils report being bullied at least once a week (School Health Promotion Study, 2013). Preventive programs for decreasing bullying and increasing a sense of togetherness among the pupils have been developed, and the experiences of such, e.g., the "KiVa School" anti-bullying program, have been positive. Kärnä et al. (2011) showed that the implementation the KiVa school program significantly reduced both victimization and bullying after the first year. As a whole, however, the Finnish school system can be considered to be a well-functioning and effective learning milieu in which pupils achieve high-quality learning results year after year (Organization of Economic Cooperation and Development, 2010). Therefore, the school shootings in Jokela in 2007 and in Kauhajoki in 2008 were a horrible shock as they shattered the image of safe schools in Finland.

School shootings appear to be a phenomenon of our era. Although rampage-style school shootings have occurred in various societies, e.g., in the United States, Germany, and Finland, they share common characteristics. They are carefully planned, spectacular, and publicity-seeking massacres with the goal of causing large losses of life and severe damage to the environment (Newman & Fox, 2009; Punamäki, Tirri, Nokelainen, & Marttunen, 2011). The massacre is usually conducted on the premises of the perpetrator's current or former school, the structure and daily program of which are familiar to the perpetrator(s). The perpetrator may choose most of the victims randomly, but often, at least some of the victims are chosen particularly for their significance to the perpetrator or symbolic status.

Many school shooters share common characteristics. Most of them have been bullied during some phase of their school years, and the massacre can thus be considered revenge (Newman & Fox, 2009; Punamäki et al., 2011). In a fresh study one of the main findings was that the German school shooters (N =7) had had problems with their teachers before the massacre (Bondü & Scheithauer, 2014). In recent school shootings worldwide, the perpetrators have used the Internet as a channel to validate and enhance their opinions via online communities that admire violence and previous school shootings. They have also used the Internet and social media to obtain publicity and downloaded alarming material just before the massacre (Punamäki et al., 2011). The two school shootings in Finland in 2007 and 2008 closely resembled the most deadly ones in the US (Columbine and Virginia Tech), and they can thus be defined as copy-cats, meaning that their intention was to conduct a similar rampage. In all the recent rampages,

the perpetrator(s) have committed suicide after the police arrived on the scene (Ministry of Justice, 2010; Newman & Fox, 2009). The perpetrators aim to shatter the sense of safety in their communities, leaving the survivors in a completely changed situation, in which they must begin to re-build the sense of safety and recover using their own unique resources.

1.2 Attachment as a basis for emotion regulation in threatening situations and loss

According to attachment theory, the basis for our resources and vulnerabilities are built in infancy in the context of the unique communication pattern created between the child and the primary caregiver(s) (Ainsworth, Blehar, Waters, & Wall, 1987; Bowlby, 1980). The infant needs the caregiver's help to learn how to regulate arousal and emotional reactions, especially when distressed or threatened. These abilities develop through the attachment bonds between an infant and a caregiver (Mikulincer & Shaver, 2010; Schore, 2009; van der Kolk, 2006). The early relationship between a child and caregiver creates the conditions for a later sense of security or insecurity as infants learn how to receive attention, proximity, and consolation. These skills are internalized as working models and generalized to other relationships in life.

The attachment-style-specific ways of approaching dangers, emotion regulation, and trust are especially activated in stressful and dangerous situations (Ainsworth et al., 1987; Bowlby, 1980; Mikulincer, Shaver, & Hores, 2006). In times of trouble, children with a secure attachment style have consoling and assuring mental representations of a caregiver. Also, they a have deeply ingrained, positive belief about the self, other people, and the world. They have learned that help-seeking normally results in comfort, relief, and protection. They also have learned several self-soothing and problem-solving skills, which gives them a variety of tools with which to regulate emotions in distressing situations later in life (Mikulincer & Shaver, 2010, p.190). Schore (2009) emphasizes that resilience, i.e., the ability to recover regulatory equilibrium after extreme stress, is an important indicator of secure attachment.

An insecure-avoidant attachment style develops when the caregiver answers the infant's behavior with rejection. This causes disappointment and uncertainty regarding support's availability. That is why persons with an avoidant attachment style feel that it is not safe to express emotions freely. They learn to down-regulate their threat-related emotions and minimize closeness with other people. For them, support-seeking is perceived as risky and uncomfortable (Mikulincer & Shaver, 2010, pp. 192–193.), and thus, they may not actively seek support.

When a child's desire to obtain attachment the caregiver's attention and reliable protection is repeatedly unfulfilled, an insecure-preoccupied (ambivalent in childhood) attachment style develops. The caregiver's behavior is unpredictable, being comforting in one situation and neglecting in another (Ainsworth et al., 1987). In order to gain attention, the child must intensify his or her emotions. This may cause an overflow of threat-related thoughts and feelings in infancy and adulthood as well as a lack of appropriate tools with which to regulate them (Mikulincer & Shaver, 2010, p.193).

According to Mikulincer and Shaver (2010, p. 388), the ability to mobilize external and/or internal forms of security during trauma exposure, e.g., by thinking about the safety of a caregiver or the ability to regulate stress arousal, reduces the intensity of post-traumatic stress symptoms (PTSS). Insecurely attached persons' inability to trust and inability to maintain inner security or receive external social support interferes with stress regulation. This increases the possibility of post-traumatic stress disorder (PTSD) because it makes the resolution of the trauma more complex. On the other hand, secure attachment is commonly acknowledged as a protective factor against PTSD (Mikulincer & Shaver, 2010, p. 388).

Attachment bonds are considered to be lifelong and continue even after the other half of the attachment dyad dies. The continuing bond with the deceased allows the bereaved to gradually adapt to the new reality of life without physical contact with the deceased (Bowlby, 1980; Field, Gao, & Paderna, 2004; Harper, O´Connor, Dickson, & O'Carroll, 2011). Separation distress and a search for the dead loved one, as well as the need to visit the places where the deceased used to be, are signs of the continuity of the attachment bond. Gradually, the bereaved adapts to the permanence of the loss and internalizes the unique attachment bond with the deceased while cherishing his or her memory (Field et al., 2004). The traumatic loss of a loved one may, however, complicate this internalization process because the loss itself contains elements that cause traumatic stress.

1.3 Comprehensive impact of trauma

A large epidemiological study indicates that during the course of life, most adults experience at least one potentially traumatic event (PTE) (Kessler et. al., 1995). Children and adolescents often experience the same traumatic events as the adults they are close to (Shaw, 2000). Because of their unfinished physiological, cognitive, and personality development, their ability to cope with the experience often requires help from their caregivers and other close attachment figures (Levine & Klein, 2007; Mikulincer & Shaver, 2010; Shaw, 2000). Research shows that most people recover from traumatic events without severe mental health consequences

(Bonnano, 2004). Because trauma impacts almost everyone, even strong trauma-related reactions and traumatic stress symptoms are considered to be normal in the immediate wake of a traumatic situation (Duodecim, 2009; Galea, Nandi, & Vlahov, 2005). People tend to regain a sense of security and control after a threatening situation, and they process the experiences simultaneously with the trauma-exposure as the mind and the body aim to survive and re-establish psychobiological homeostasis.

The exposure to extreme stress and danger affects a person comprehensively and contributes to the nature of the traumatic stress responses (Ogden & Minton, 2000; Nijenhuis, Vanderlinden, & Spinhoven, 1998; Rothchild, 2000; Schore, 2009; van der Hart, Nijenhuis, & Steele, 2006). A potential threat to one's life, i.e., a perceived or realistic danger, automatically and immediately activates various psychobiological defense reactions (Levine & Klein, 2007; Nijenhuis et al., 1998; Rothchild, 2000). These flight-fight-freeze responses are aimed at survival and are therefore not conscious choices. Instead, these primary responses are instinctual because in order to survive, one has to act, not lose time in thinking (Levine & Klein, 2007). As Nijenhuis et al. (1998) explain, after being alerted to a potentially traumatic situation, a person orients to the danger and weighs the possibilities of survival. A threatened person often cries for help in order to gain the attention of others. This is conceptualized as an attachment cry. If there is a possibility of escape, the flight response is then activated. If escaping is not possible, the freeze response increases survival chances while simultaneously keeping the ability to move available. Immobility and silence may cause the predator's attention to settle on more noisy stimuli. Freezing can also be combined with analgesia, which inhibits the sensation of pain and gives more possibilities of escape. When these defensive systems cannot be used, the fighting response is activated. If fighting is not possible, as in case of armed violence or whenever the perpetrator is overpowering, such as in natural disasters, often, the final option to increase the possibility of survival is to feign death. This is also conceptualized as "surrender" in the face of unavoidable and overwhelming danger. This may save the victim's life, but the recovery from such a total submission is slower than that after a more active flight-fight response is used (Nijenhuis et al., 1998; Rothchild, 2000; van der Hart et al., 2006; Levine & Klein, 2007).

Sometimes, the danger is so overwhelming that in order to protect his/her psychological integrity, a person may dissociate the cognitive, sensory, and motor processes and contain the unbearable emotions within altered states of consciousness (Schore, 2006; Suokas-Cunliffe & van der Hart, 2006; van der Hart et al., 2006). When there is no physiological way out of danger, this peri-traumatic dissociation makes a psychological getaway possible (Suokas-Cunliffe & van der Hart, 2006; Wieland, 2011). Dissociation is thus an adaptive response in the context of horrifying and/ or repetitive traumatic events, but it may also be a risk

factor for later mental health problems (Lensvelt-Mulders et al., 2008; Ozer, Best, Lipsey, & Weiss, 2003; van der Hart et al., 2006).

The role of the autonomic nervous system (ANS) is also important in automatic defensive stress responses during potentially traumatic events, as well as during the recovery from such events. After the danger is over, the defensive responses only gradually discharge. The hyper-arousal of the sympathetic nervous system helps the subject in orienting and defending oneself against danger. Afterwards, it must settle down, and the parasympathetic system must activate in order to calm down the stress reactions. Neurobiological recovery after trauma is a gradual process because the limbic brain structures (e.g., the amygdala) may continue tagging incoming stimuli as potentially dangerous for some time and thus alert and activate these defensive stress responses, even when the original threat is over (Rothchild, 2000; van der Hart et al., 2006; van der Kolk, 2006). Because of the hyper- or hypo-arousal of ANS, the traumatic experiences do not become integrated into the memory in the same way as ordinary life experiences do. Traumatic experiences are recorded in a fragmented form. They are mostly stored in the implicit memory, where they cannot be as easily verbalized as ordinary life experiences, which are stored in the explorative memory (Ogden & Minton, 2000; Rothchild, 2000).

In order to survive potentially threatening situations in the future, the ability to learn from experience is important. The theory of classical conditioning illustrates the phenomenon of learning from experience. In terms of potentially life-threatening situations, it is essential to learn from the very first experience and to avoid situations that are perceived as similar in the future. It is thus common that response generalizes, which may result in the surrounding environment suddenly being perceived as threatening and full of potential danger, even when the environment is safe (Antervo, 2009).

For a successful recovery from a traumatic event, it is therefore crucial that both the body and the mind learn and believe that the danger is over. When the psychobiological arousal is within the "window of tolerance," this knowledge of a traumatic event being in the past can be processed and integrated on the cognitive, emotional, and bodily levels (Ogden & Minton, 2000). When this realization of present safety fails or becomes complicated, the startle responses continue activating, causing hypo- or hyper-arousal and thus disrupting the integrative process of trauma recovery (Rothchild, 2000; Suokas-Cunliffe & van der Hart, 2006; van der Kolk, 2006). Consequently the trauma survivor may respond to present-day reminders (triggers) of a traumatic experience with responses much like their responses in the original situation, even if these are no longer appropriate (van der Kolk, 2006).

1.3.1 Phases of trauma recovery

The trauma recovery process is often described by dividing the symptoms into immediate and long-term stress reactions and symptoms. In Finland, however, this natural recovery process is often illustrated via the phase model presented by Cullberg (1991). Cullberg´s trauma recovery process contains phases that follow one another and sometimes overlap (Ministry of Social Affairs and Health, 2009; Palosaari, 2007; Saari & Hynninen, 2010). The first phase of the recovery process, a psychological shock, begins when a person finds her- or himself in a potentially traumatizing situation or hears news of one. The shock is a self-preserving reaction of the mind and body, and it continues as long as the stressful or threatening situation lasts and oftentimes even longer. Most people will preserve their ability to function but may feel numb and surreal or dissociate. The move from shock to the next stage – the reactive stage – occurs after the immediate threat no longer exists and the person feels safe. The need to get in touch with family members and other attachment figures is characteristic of survivors after the immediate threat has passed. If this connection is possible, the recovery process moves on to the reaction phase because the presence of these attachment figures represents safety. In this phase, the person becomes aware of what really happened, and the emotional impact of the event reaches the consciousness. The bursts of emotional and bodily reactions are sometimes very powerful and uncontrollable, but at this point, these are normal reactions to an abnormal situation. The ability to function may now deteriorate, and the usual mechanisms of defence and adaptation will not yet work. In this phase, a person will want to describe what happened all over again so as to create a narrative of the event, but he or she may not yet have the ability to decide with whom he or she wants to share the story.

In the next stage – processing – the subject will distance her- or himself from the event and the usual psychical mechanisms of defence or adaptation will be reactivated. At this point, it is common for the person to be unwilling to talk about the event all the time and to begin to process the event individually. This stage can continue for months or even years. The individual process is unique, and its duration and style depend on each person's own resources and personal situation. Also, the timing of the interventions aiming to facilitate recovery after potentially traumatic events depends on the phase of the natural recovery process of the survivors. Because the timetable of recovery is individual and unique, it is necessary to tailor the possible psychosocial interventions accordingly (Ministry of Social Affairs and Health, 2009; Palosaari, 2007; Saari & Hynninen, 2010). In case of a single event trauma the recovery process follows these phases but in cases of complex traumatization such as childhood abuse and maltreatment the recovery process is naturally different and more complex (Terr,1997). Despite its severity and impact, school shooting is a single event trauma. There might, however, be

trauma survivors with history of previous complex trauma, which may complicate the recovery process.

1.3.2 Acute stress disorder and post-traumatic stress disorder

The psychological consequences of a traumatic experience greatly depend on the nature and severity of the traumatic event, the response to it, and the support provided to the victim after it (Duodecim, 2009; NICE, 2005; Rothchild, 2000; Yule & Canterbury, 1994). The development of a mental health disorder, such as PTSD, is possible. The increasing knowledge of protective and risk factors for PTSD guides professionals to screen survivors for potential risk factors and thus facilitate recovery and resilience among them.

Immediately after a traumatic event, even powerful stress symptoms are normal reactions to an abnormal situation. However, even during the very early phase after a traumatic event, a great amount of distress may require clinical intervention (Galea et al., 2005). Acute stress disorder (ASD) with a variety of post-traumatic stress symptoms (PTSS) may occur within the first days after a traumatic event and last for at least two days but less than four weeks. Thus, it is temporal. ASD may, however, precede PTSD, and it is therefore important to detect and help those who have strong reactions in the immediate wake of trauma (Duodecim, 2009; NICE, 2005).

According to Kessler et al. (2005), the lifetime prevalence of PTSD is approximately 8%. Adult women tend to develop lifetime PTSD more frequently, with prevalence rates being 15% for women vs 5% for men (Foa, Keane, & Friedman, 2000). Among adolescents who have experienced a disaster, PTSD is a common consequence, and the disorder may persist for years (Yule et al., 2000). PTSD is especially common after man-made trauma; the first-year prevalence may be as high as 25-75% (Galea et al., 2005). PTSD usually appears in the first few months after the traumatic experience, but in some cases, years may have passed before the disorder appears. It is then called delayed or late-onset (Bonnano, 2004; Hobfoll et al., 2007; NICE, 2005; Santiago et al., 2013). There is substantial natural recovery from PTSD in the first months and years after the traumatic event, but the disorder may become chronic in some cases. For a minority of survivors, the symptoms may persist for years and thus affect the rest of their lives (Yule, 2001). The course of PTSD may also fluctuate over time, and survivors may have multiple episodes of PTSD during the years after trauma exposure. That was the case in the aftermath of the sinking of a cruise ship, in which 17.5% of the survivors had PTSD seven years after the tragedy and approximately 5% had experienced several episodes of PTSD during the follow-up period (Yule, 2001). It is also common that secondary problems, disabilities, and comorbidity with other disorders,

such as substance abuse or depression, will arise (Duodecim, 2009; Foa et al., 2000; NICE, 2005, WHO, 2013; Yule, 2001). This is why it is so important to detect those whose traumatic stress symptoms seem to be persistent.

The diagnostic criteria for PTSD according to DSM-IV and ICD-10 include several criteria **related to the traumatic event**, (exposure to an event(s) that involved actual death, threatened death, serious injury, or a threat to physical integrity of oneself or others), the **person's responses during the event** (fear, helplessness, horror, dissociation), the **development of symptoms** (intrusive re-experiencing, avoidance, hyper-arousal), the **duration** (more than one month), and the **level of functioning** (distress or impairment in social, occupational, or other areas of functioning) (Duodecim, 2009; NICE, 2005). It is important to note that the development of PTSD depends on both subjective perceptions and objective facts regarding the event. This means that those who have witnessed the traumatic event without being in danger may develop PTSD (NICE, 2005). According to Galea et al. (2005), 30-40% of direct victims of a traumatic event suffer from PTSD, and at the same time, 5-10% of the general population, i.e., those who have not been exposed to the traumatic event themselves, may develop PTSD. Also, rescue workers are at risk of PTSD; 10 to 20% of them suffer from the disorder (Galea et al., 2005). This enlarges the number of individuals potentially in need of professional care after a mass trauma situation, such as a school shooting.

PTSD symptoms are divided into three types (Duodecim, 2009; NICE, 2005). **First**, people may re-experience the traumatic event via ***intrusive*** thoughts, images, various sensory flashbacks, or dreams about what happened. Re-experiencing the event in the form of emotional or physical reactions can be caused by various reminders (triggers) of the experience. Trauma can be re-activated as much as 100 times a day, and each time, the traumatized person can enter into a hyper- or hypo-aroused state (Davidson, Stein, Shalev, & Yehuda, 2004). People may occasionally feel and even act as if the painful experience is happening all over again. **Second**, people may try attempt keep away from or protect against this distress by ***avoiding*** and withdrawing. These symptoms include attempting to avoid thinking, talking, and having feelings about the traumatic event. The traumatized person may also try to avoid any reminders of the event, e.g., people and places that are somehow connected to what happened. Their emotions may become numb or restricted in order to protect against distress. The traumatized individuals may feel detached from the others, and there may also be a loss of interest in everyday life and the things that used to give pleasure. Therefore, there is a possibility that the traumatized may become socially withdrawn. The **third** type of PTSD symptoms include ***physical hyperarousal symptoms,*** which make the body react as if danger is still present. These reactions include constant alertness and preparedness for a new danger. Jumpiness, hypervigilance, and an accelerated heart rate, as well as

rapid breathing or other somatic stress responses, may become chronic and thus lead to sleep disturbances (difficulty falling or staying asleep), as well as to difficulties in concentration. Numbness and hypo-arousal are also possible (Duodecim, 2009; NICE, 2005; Rothchild, 2000).

The PTSD criteria have been amended in the DSM-V (American Psychiatric Association, 2013). Exposure criteria do not require person's peri-traumatic reacting no longer. Re-experiencing or intrusion symptoms, duration, and the functional significance criteria remain similar to the DSM-IV. Revised symptom categories are avoidance, negative alterations in cognitions and mood, and alterations in arousal and reactivity (APA, 2013). Avoidance symptoms are either avoiding trauma related external reminders or internal thoughts and/or feelings. Negative alterations in cognitions and mood may include diverse symptoms of e.g. inability to remember, persistent negative beliefs and expectations about oneself or the world, or persistent distorted blame of self or others. Also persistent negative trauma-related emotions, e.g. fear, horror, anger, guilt, or shame as well as diminished interest in significant activities, feeling detachment, and inability to experience positive emotions may occur. Alterations in arousal and reactivity symptoms such as irritable or aggressive behavior, self-destructive or reckless behavior, hypervigilance, exaggerated startle response, problems in concentration, and sleep disturbances are possible. New specifications such as delayed expression of PTSD and dissociative subtype are also recognized (APA, 2013).

Table 1 presents the most common risk factors for PTSD as summarized from Brewin, Andrews, and Valentine (2000) and Ozer et al. (2003). The knowledge of these risk factors can be utilized in the aftercare of mass trauma situations such as school shootings to support those at the greatest risk. The nature of the traumatic event plays a crucial role in recovery. Tragedies in which the survivors are exposed to a severe life-threat or must witness grotesque injury or death are more likely to cause severe PTSS and eventually PTSD (Pynoos, Goenjian, & Steinberg, 1995). The risk of PTSD increases if the traumatic act is caused intentionally, instead of being a natural disaster or an accident (Galea et al., 2005; NICE, 2005; Santiago et al., 2013). School shootings are particularly man-made and intentional. In Kauhajoki, 95% of the students were female. Because the female gender is considered to be one of the risk factors for PTSD, high levels of PTSS could be anticipated. Risk factors like a young age and a severe level of trauma exposure can be detected by aftercare providers. Assessing whether the survivors of a school shooting lack social support, have previous mental health problems, or have previous trauma experiences requires individual interviews or other screening methods, as well as close co-operation with student welfare and other staff (Pynoos et al., 1987; Pynoos et al., 1995; Pfefferbaum, Shaw, & AACAP, 2013).

Table 1.
Risk Factors of Post-Traumatic Stress Disorder in the Pre-, Peri- and Post-trauma Phases Summarized from Brewin, Andrews, & Valentine (2000) and Ozer et al. (2003).

Pre-trauma	Peri-trauma	Post-trauma
Female gender Low socio-economic status Low intelligence Previous mental health problems Previous traumatization Adverse childhood experiences Insecure attachment style Loss of a parent in childhood	Severe trauma exposure Emotional responses during the event or peri-traumatic dissociation Man-made or intentional trauma	Lack of social support Other concurrent life stress

Perceived social support from family, friends, and other significant persons prior to and after the trauma exposure is of high importance in trauma recovery (Brewin et al., 2000; Haden, Scrapa, Jones, & Ollendick, 2006; Littleton, Grills-Taquechel, & Axom, 2009; Murtonen, Suomalainen, Haravuori, & Marttunen, 2011). It was found to be a protective factor in the recovery process after the Virginia Tech school shootings in 2007 (Littleton et al., 2009). Trust in the availability of support is a protective factor after a stressful life event, and support from family and friends has a positive influence on the ability to cope with trauma (Norris & Kaniasty, 1996). In a meta-analysis by Brewin et al. (2000) social support was found to be the strongest predictor, accounting for 40% of variance in PTSD severity. When trauma survivors perceived strong support from their families, they tended to experience less severe PTSD (Haden et al., 2006).

Despite the fact that social support is acknowledged to be a protective factor against PTSD (Brewin et al., 2003; Ozer et al., 2000), it worth acknowledging that this coin has another side as well. The quality of the support also matters, and all support is not perceived positively. If the survivors' experiences and/or trauma-related reactions are not acknowledged and understood or are minimized by their significant others, they may feel let down by them and thus become resistant to expressing their ongoing need for support (Arnberg, Hultman, Michel, & Lundin, 2013; Thorensen, Jensen, Wentzel-Larsen, & Dyb, 2014). The next of kin may also be so distressed themselves that the trauma survivor may want to spare them the details of their own painful experiences (Arnberg et al., 2013; Thorensen et al., 2013). The survivor may also feel that other people may feel tired of

hearing the same story over and over again, which may prevent him or her from seeking support from significant others in the long run (Thorensen et al,. 2014). As time passes after the traumatic event, the survivors may expect that they should feel better. If their level of psychosocial distress remains high, they may feel that they have failed in recovery (Arnberg et al., 2013; Kristensen, Weisaeth, & Heir, 2012). According to Arnberg et al. (2013), the some of the survivors of the car ferry disaster in 1994 felt pressure to move on, which hindered them from making use of the available psychosocial services. Another possible barrier to seeking support is the fact that survivors often feel that those who have not experienced the same situation cannot really understand its overall consequences and meaning (Arnberg et al., 2013; Thorensen et al., 2014). For those whose social networks are not supportive enough, supplemental support from professionals is essential.

1.3.3 Traumatic and complicated grief

Rampage school shootings aim to cause as much damage as possible in terms of the number of causalities and other victims, as well as physical destruction. Losing a loved one in a school shooting causes what has been described as a "grief like no other" (Ellis, 2011). Death by mass violence is a traumatic event that causes serious psychological distress and can lead to severe mental health problems, such as PTSD or major depressive disorder (MDD), or it can otherwise complicate and/or prolong grief (Bryant, 2012; Kristensen et al., 2012; Mannarino & Cohen, 2011; Raphael, Stevens, & Dunsmore, 2006).

Violent and unexpected death of a child, sibling, or peer, shatters the secure basis of living, forcing one to face one's vulnerability, and often includes the most violent and intrusive elements of the death. This creates anxiety, which is a common aftereffect of all traumatic stressors. Grieving over a violent death is different from "normal" mourning because the death was caused by human intent or negligence, and thus, questions about the goodness of people are raised (Armour, 2006).

Several concepts describe the phenomenon of grief after a traumatic loss. The concepts of traumatic, complicated, pathological, and prolonged grief are the most commonly used in the literature (Poijula, 2010; Prigerson et al., 1997; Schneider, Elhai, & Gray, 2007). Raphael et al. (2006) use the concept of traumatic bereavement to denote the complex interactions that may occur between traumatic stress phenomena and bereavement phenomena. This may particularly arise when the death is a caused by a violent act.

The term complicated grief was first used to describe any bereavement reactions that did not meet the definition of uncomplicated, or normal, bereavement. In the 1990s, this term began to be used to describe bereavement that was

complicated by separation distress and traumatic symptoms related to a loss of a relationship (Prigerson et al., 1997). According to Bowlby (1980), concept of complicated grief is based on attachment theory; separation anxiety, intense yearning, and searching for the deceased are its prominent symptoms, and they originate from object loss anxiety.

The other underlying theme of the formation of complicated grief is the traumatic nature of some deaths. In this conceptualization, PTSD symptoms are prominent (Cohen et al., 2002). Traumatic loss is a traumatic stress event that can lead to PTSD, and it should therefore be treated as a traumatic stressor (Mannarino & Cohen, 2011; Raphael et al., 2006; Schneider et al., 2007).

Bereavement after homicide has been described as a synergism of trauma and loss by Rynearson and McCreery (1993). In their study, they found that the images of the violent deaths of relatives recurred as disorganizing flashbacks and dreams. Accordingly, the bereaved may experience intrusive trauma-related thoughts, memories, and images, which can be triggered by **trauma reminders** (e.g., situations, places, smells, sights, or sounds), **loss reminders** (e.g., thoughts, memories, places, or people who remind the survivor of the deceased person), or **change reminders** (e.g., situations, places, or things that remind the survivor of changes in living circumstances) (Pynoos, 1992). To prevent experiencing these unpleasant feelings, the bereaved may use avoidant and numbing strategies, which complicate bereavement (Cohen et al., 2002).

Research shows that complicated grief is common after the violent death of a child and that the parents may suffer long-term mental health problems (Kristensen et al., 2012; Murphy, 2006; Poijula, 2010). Parents whose children were murdered suffered higher rates of psychological distress as long as five years later than those parents whose child had died in another violent way (Murphy, 2006). The prevalence of PTSD was twice as common in fathers and mothers whose children were murdered as in those parents whose children were killed in another violent way, i.e., motor vehicle accidents (Murphy et al., 1999). The parents of murdered children reported difficulties in coping with involuntary memories of the homicide of their child. They also reported high levels of hyper-arousal symptoms, such as lack of sleep and an inability to concentrate (Murphy et al., 1999). Their symptoms seemed to be persistent (Murphy, 1999; Murphy, Johnson, Chumg, & Beaton, 2003). According to a Finnish study, over half of relatives of homicide victims suffered from one or more psychological disorder 2 to 10 years after the violent loss (Poijula, 2010). Women had more psychological symptoms than men, and prolonged grief was more common among the parents of the victims than among other family members.

Also, the widows and widowers of homicide victims must face sudden and unexpected loss and grief. Losing one's spouse is considered to be among the most stressful of all life events (Prigerson et al., 1997). In their study, Prigerson

et al. (1997) found that the subgroup of bereaved spouses were at an increased risk of traumatic grief and therefore at an increased risk of several psychiatric and somatic problems as well. Traumatic grief is known to be associated with physical health problems, such as high blood pressure, cardiac events, suicidality, and global dysfunction (Armour, 2006; Prigerson et al., 1997).

For children and adolescents, the death of a family member is a shocking experience. If the child is not supported enough, the sudden loss of a loved one can make that child more vulnerable to later adversity in life, especially dealing with separation or loss (Bowlby, 1980). Losing a family member in childhood or adolescence forces the child to face a unique challenge (Mannarino & Cohen, 2011) and puts them at risk for the development of severe and persistent mental health problems (Brown & Goodman, 2005).

1.3.4 Psychological consequences of exposure to school shootings

There is still only a small amount of knowledge about how exposure to school shootings affects the trauma-exposed students' mental wellbeing. It is acknowledged that exposure to a violent act causes risk for disturbances in children's lives (Yehuda, 1988). The most commonly studied consequence of trauma exposure is the amount of PTSSs or PTSD, and this is also the case with studies in the context of school shootings. Research reveals that some pupils and students exposed to school shootings have PTSD symptoms after the trauma exposure and that these symptoms may be persistent (Haravuori et al., 2012; Hughes et al., 2011; Littleton et al., 2009; Nader, Pynoss, Fairbanks, & Frederick, 1990; Pynoos et al., 1987; Suomalainen et al., 2011).

After a sniper attack on an elementary school playground in the United States in 1984, 38% of the exposed children (N = 159) had moderate or severe post-traumatic stress symptoms one month after the incident. Sixty percent of them still had PTSD one year after the attack (Nader et al, 1990). Accordingly, 30% of the female students at Virginia Tech (N = 293) had post-traumatic symptoms three months after the incident, and 24% still suffered from these symptoms one year afterwards (Littleton et al., 2009). A two-year follow-up study of the two school shootings in Finland revealed that 43% of the students in both trauma- affected schools had PTSS (IES score ≥ 20) four months after the incidents measured with Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979) and that 19% of the students had a significant level of PTSS (IES score ≥ 35), indicating possible PTSD. The levels of symptoms decreased during follow-up. At the end of the follow-up, three out of four of the Jokela School's students, where the first massacre occurred, and four out of five of the Kauhajoki School's students (the scene of the second massacre) had no post-traumatic symptoms (Haravuori et al., 2012).

Pynoos and colleagues (1987) point out that a severe level of exposure will lead to distress in virtually everyone. When the exposure is milder, individual vulnerability and protective factors influence recovery more greatly. The dose effect between the severity of trauma exposure and the prevalence of PTSD symptoms has also been revealed in other studies of the consequences of school shooting trauma. The more severe the exposure to the traumatic act was, the more post-traumatic symptoms were reported (Pynoos et al., 1987; Haravuori et al., 2012; Hughes et al., 2011; Suomalainen et al., 2010). Children with severe exposure to a sniper attack reported a wide range of symptoms, but those with less severe exposure rarely had acute PTSD (Pynoos et al., 1987). The prevalence of PTSD was also significantly higher (31.7-45.2%) among the most severely exposed students than among those with less severe exposure after the deadliest school shooting tragedy in US history, the Virginia Tech massacre of 2007 (Hughes et al., 2011). The dose effect of the severity of exposure was confirmed among the survivors of the Finnish school shootings. The more severe the trauma exposure was, the greater the level of PTSS was. The recovery was also slower among those with more severe trauma exposure (Haravuori et al., 2012; Haravuori, personal information, 2014).

School shootings also put the staff of the trauma-exposed schools at a risk of traumatization. The caregivers of the students, as well as the wider community, are affected by the massacre as well. The longitudinal study conducted among Jokela High School's staff revealed that the majority of the participants showed PTSS both 4 and 11 months after the school shooting and that 12.5% of them met the diagnostic criteria for PTSD in both assessment points (Lyytinen, 2010). When a child is in danger, it also affects his or her caregivers, as a study of children exposed to a man-made trauma in their school revealed (Scrimin et al., 2006). Three months after being taken hostage in the Russian school in Beslan in 2004, both children and their parents had high levels of PTSS. It is noteworthy that even among the caregivers who were not inside the school during the incident, the level of PTSS was as high as their children's, indicating that the impact of man-made violence in the school affected the entire family (Scrimin et al., 2006).

School shootings may shatter the sense of safety in other schools and wider communities as well. A National Youth Risk Behavior Survey was coincidentally conducted in the US at the same time as a school shooting occurred in Columbine High School, in 1999. According to this survey, US students reported feeling unsafe at school, and the amount of missed school increased dramatically; students missing school because of safety concerns was 2.6 times higher after the Columbine incident than before (Brener et al., 2002). Brener and colleagues thus emphasize that the aftermath of an extremely violent act in a school impacts not only those in the immediate proximity of the trauma-affected school but also the entire nation, thus increasing the number of individuals potentially in need of

professional guidance and support. In Finland, malicious threats towards Finnish schools increased after the first school shooting in 2007, causing suspicion, alertness, and uncertainty. Between November of 2007 (the first massacre) and April of 2009, the total number of malicious threats was 225, half of which led to criminal complaints (Ministry of Justice, 2010). After the Kauhajoki School shootings in 2008, there were as many as 41 malicious threats within the first two weeks after the massacre, causing fear in Finnish schools (Ministry of Justice, 2010).

School shootings have an impact on the authorities as well. Witnessing the horrifying scene of a massacre and helping the victims of shootings is highly distressing. Police and rescue workers, as well as the healthcare professionals, are thus at risk for vicarious traumatization or compassion fatigue (Figley, 2002; Galea et al, 2005; Rothchild & Rand, 2006).

1.3.5 Resilience and the trajectories of recovery

Because terrible things such as school shootings and terrorist attacks continue happening, it is important to bear in mind that most people cope well and recover from even severe traumatic events and losses (Bonnano, 2004; Bonnano & Mancini, 2008; Orcutt, Bonnano, Hannan, & Miron, 2014). A single situation, even if it is unquestionably life-threatening, can traumatize one person and leave another without remarkable psychological distress. This ability to cope after a potentially traumatic event is usually conceptualized as resilience. Resilience can be divided into three subtypes: health protective, health recovery, and health-promoting, and they all help an individual to bounce back to the psychological level of function he or she had prior the trauma (Davydov, Stewart, Ritchie, & Chadieu, 2010).

Although some individuals are more vulnerable, and some are more resilient to traumatic stress, no one is immune to suffering in extreme situations (van der Kolk, 2006; Walsh, 2007). This means that resilient people also feel the painful effects of a tragedy. Among resilient individuals, these reactions tend, however, to be mild to moderate and relatively short-term, and they do not decrease the ability to function in the long run (Bonnano, 2004; Bonnano & Mancini, 2008). It has been estimated that about two out of three of those individuals exposed to a potentially traumatic event recover without serious and or long-term consequences in terms of mental health (Bonnano, 2004). The common trajectories of recovery are shown in Figure 1.

According to Bonnano (2004), up to 55% of those exposed to PTE are resilient and have only minor post-traumatic stress symptoms in the early phase of recovery and no symptoms at the two-year follow-up. Some 15-25% has many symptoms in the early phase, but the number of symptoms is halved by the one-

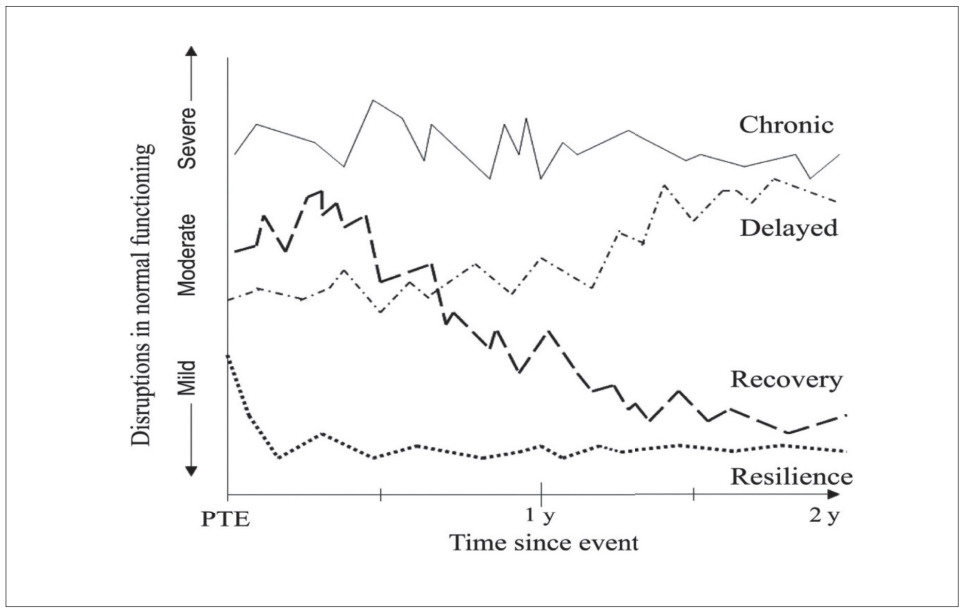

Figure 1.
Trajectories of recovery after a potentially traumatic event. Adapted from Bonnano (2004).

year follow-up and further diminished by the two-year follow-up. A small number of survivors (5-10%) had delayed symptomology, and 10-30% of the survivors seemed to have high, persistent levels of PTSS.

Orcutt et al. (2014) studied posttraumatic stress trajectories among female students exposed to a campus shooting. In their study, they had information regarding the levels of PTSS prior to exposure to the shootings. Four trajectories of recovery were identified, minimal-impact-resilience being the most common (60.9%). Students with this trajectory had less previous exposure to trauma, less severe exposure to the campus shooting, and better emotion regulation skills than all other trajectories. Also, 29.1% of the students belonged to a high-impact-recovery trajectory, 8.2% belonged to the moderate-impact-moderate-symptoms trajectory, and a minority of 1.8% belonged to the chronic dysfunction trajectory. Students in the final trajectory had been more severely exposed to the shootings than those in the high-impact recovery trajectory. The students (n = 819 - 559) were followed for 31 months. The students' PTSSs stayed at or decreased to the levels seen prior the shootings in each trajectory within approximately six months. Almost the same trajectories were found in a study of the recovery processes of the school-shooting-trauma-exposed students in Finland, as shown in Figure 2 (Haravuori, personal information, 2014).

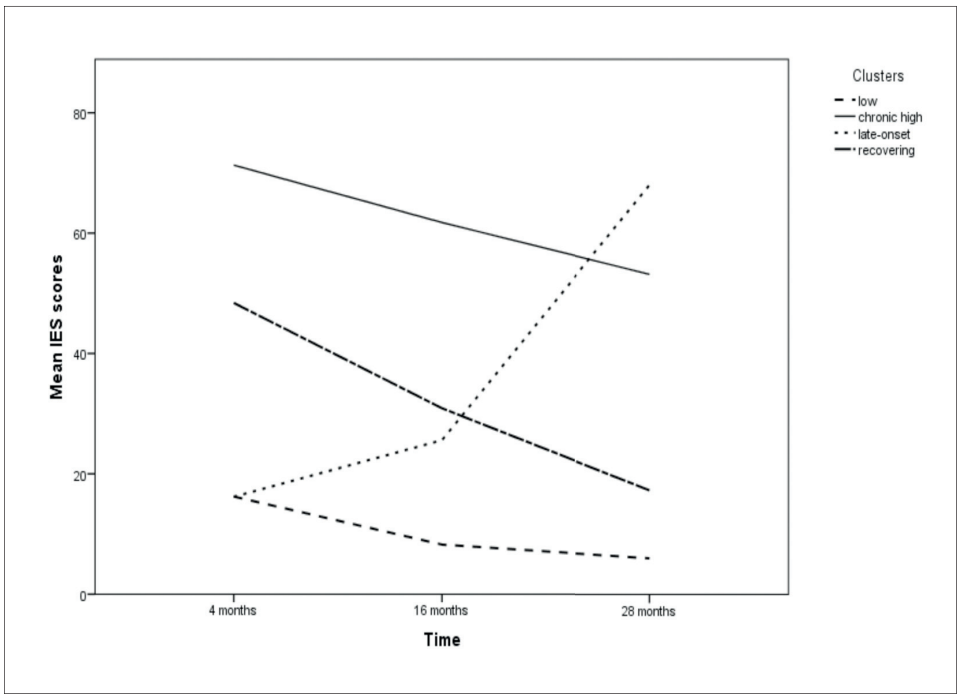

Figure 2.
Trajectories of recovery after exposure to school shootings in Finland by Haravuori, personal information (2014).

In a combined sample of students exposed to the Jokela and Kauhajoki school shootings, four trajectories of recovery were revealed. About two-thirds of the students (66%, n = 289) belonged to the low trajectory, having a small number of PTSSs at 4 months and a still-decreasing number of symptoms at follow-up. The low trajectory was associated with older age and higher perceived social support from the family. The recovering trajectory (23%, n=101) showed more PTSSs at four months than the low recovery trajectory, but less than the high recovery trajectory. There was a remarkable decrease in symptomology at both 16 and 28 months. Nine percent of the exposed students (n = 41) belonged to the chronic high trajectory, with the high number of PTSSs at all time-points. There was, however, a decrease in their symptomology as well. The recovering and chronic high trajectories were both associated with more severe exposure to the trauma. The chronic high trajectory was also associated with two or more previous traumatic experiences. Five students in the combined sample (1%) belonged to a late onset trajectory, with an increase of PTSSs at both 16 and 28 months (Haravuori, personal information, 2014). These trajectories reflect the clinical experiences of

the aftercare in Kauhajoki perfectly; the phenomenon could be observed in practice as well.

1.3.6 Post-traumatic growth

Traumatic experiences do not only have negative impacts. For some, they can also help crystallize the value of life. The trauma survivors may also feel stronger, wiser, and more self-confident after surviving the horrifying experience. The concept of post-traumatic growth (PTG) captures the observation that some survivors become more aware of the significance and gracefulness of life, appreciate contact with others, and recognize the spiritual aspects of life (Calhoun & Tedechi, 2004). Achieving PTG does not mean that psychological distress is absent, but the survivors' perceptions of positive changes may indicate also positive mental health among the trauma survivors (Prati & Pietrantoni, 2008).

Attachment style is also associated with PTG. In their study Salo, Qouta, and Punamäki (2005) examined the role of adult attachment style in trauma victims' capacity for beneficial transformation. The study revealed that among Palestinian political prisoners (N = 275), survivors with a secure attachment style reported more PTG than prisoners with a preoccupied attachment style. Furthermore, among the securely attached prisoners, exposure to severe trauma even increased PTG. Among prisoners with an avoidant attachment style, severe trauma exposure was associated with low levels of personal strength and contact with others.

Prati and Pietrantoni (2008) examined the roles of optimism, social support, and coping strategies in achieving PTG. The results of their meta-analysis of 103 studies confirmed the associative role of positive reappraisal coping, religious coping, seeking and receiving social support, spirituality, and optimism. Based on their results, they suggest that those interventions that increase optimism and social support, as well as a variety of spiritual coping skills, may promote positive changes in the aftermath of trauma (Prati & Pietrantoni, 2008).

1.4 Guidelines and best practices for psychosocial support

Together with cumulative knowledge of the psychophysiological origins of traumatization, as well as individual vulnerability and protective factors' effects on mental health problems and resilience, the number of theory-based guidelines has increased around the world (AACAP, 2010; Call, Pfefferbaum, Jenuwine, & Flynn, 2012; Duodecim, 2009: Hobfoll et al., 2007; NICE, 2005; North & Pfefferbaum, 2013; TENTS, 2008; Pfefferbaum, Shaw, & American Academy of Child and Adolescent Psychiatry (AACAP), 2013). These evidence-informed consensus statements and best practices guide the authorities in planning, organ-

Table 2.
Recommended Psychosocial Care Interventions in Different Phases of Recovery Adapted from Hobfoll et al. (2007), Pfefferbaum et al. (2013), and The European Network for Traumatic Stress, TENTS (2008).

Preparation	Immediate	Acute	Mid-Term	Long-Term
– Establishing planning groups – Preparing emergency plans – Mapping for specialists – Training healthcare professionals – Educating politicians about traumatization and psychosocial care – Practicing emergency plans and interventions	– Ensuring safety – Active help and support in connecting with next of kin – Activating natural support systems – Reducing hyper-arousal – Taking care of basic needs – Providing practical help – Providing fact-based information – Providing proactive, honest, and empathetic support – Limiting exposure to media	– Providing psychoeducation regarding the common post-traumatic reactions via multiple channels – Reducing hyper-arousal – Activating natural support systems and providing more support for those whose own networks are not sufficient – Detecting and assessing those in need of more intense support – Providing professional support for those in greatest need – Promoting self- and community efficacy – Limiting exposure to media – Providing proactive support – Ensuring collaboration	– Providing psychoeducation about recovery and the services available – Providing proactive support – Assessing and detecting those in need for more support by, e.g., screening in the school environment – Providing trauma-focused interventions and treatment – Promoting hope-rebuilding community rituals – Promoting collaboration between the victims and the authorities	– Providing watchful waiting for delayed trauma-related distress – Assessing and detecting those who are in need for more intense support – Providing trauma-focused treatment for those in need – Ensuring a return to work or rehabilitation for the most traumatized – Ensuring continuity of the services – Taking care of the wellbeing of mental health workers

izing, and implementing psychosocial care for those exposed to a traumatic event. Table 2 summarizes the common aims for support based on the guidelines of Hobfoll et al. (2007), Pfefferbaum et al. (2013), and TENTS (2008). They all aim to promote recovery and resilience on the other hand and to prevent and treat mental health distress on the other. The types of support and interventions recommended in the guidelines are usually divided in phases according to the course of recovery. The guidelines contain evidence-based information about how professionals can facilitate recovery on both the individual and community levels. The consensus of statement Hobfoll and colleagues (2007) summarizes five basic elements of psychosocial care, which are acknowledged in most of the other guidelines as well. The basic aims of support are to increase the sense of safety, calm hyper-arousal reactions, and promote a sense of self- and community efficacy, connectedness, and hope.

1.4.1 Preparation and preparedness for disasters

Efficient aftercare requires preparedness. Disaster planning, establishing multiagency psychosocial care planning groups, preparing emergency plans for psychosocial services, as well as testing and practicing them, should be performed prior a tragedy's occurrence (TENTS, 2008). Mapping for the experts in the region, as well as training mental healthcare workers and educating politicians and governmental authorities in advance, is considered to be crucial in providing sufficient and adequate support after a traumatic event, especially after mass-trauma situations (Duodecim, 2009; Pfefferbaum et al., 2013; TENTS, 2008). The care providers should be qualified experts in traumatization, and they should receive ongoing training, support, and supervision (Duodecim, 2009; Finnish Psychological Association and the Scientific Advisory Board of the Finnish Society of Psychology (SPL), 2010; TENTS, 2008).

1.4.2 Support during the immediate and acute phases of recovery

Immediately after the traumatic event, it is of utmost important to ensure physical safety for the survivors by evacuating them to a safe gathering place and taking care of their basic needs onsite. The attachment system activates when people are in a frightening situation, and their essential need is to connect with their family members. Concern about the wellbeing of loved ones is distressing, and thus, helping to connect survivors with their next of kin is one of the first priorities during the immediate phase (Hobfoll et al., 2007; TENTS, 2008). Pfefferbaum et al. (2013) recommend that immediate psychological first aid should focus on meet-

ing basic psychological and physiological needs by decreasing physiological arousal, providing accurate information about the event, providing psychoeducation about common stress responses, and assessing the need for more specific mental health services. Providing fact-based information about the situation helps the survivors to start to process what has happened, and simultaneously, it helps to keep rumors and horror stories from spreading, as they easily can in the immediate aftermath of the traumatic event. Help and support should be provided in an active, honest, open, and empathic manner (Hobfoll et al., 2007; TENTS, 2008; Pfefferbaum et al., 2013).

The psychosocial services during the acute phase of recovery, i.e., approximately the first few weeks, should contain psychoeducation about common stress responses and ways to regulate them. Teaching anxiety management techniques is recommended because it increases the survivors' understanding of the fact that the reactions are normal in an abnormal situation and that it is possible to gain at least some control over them. Reducing hyperarousal is considered important, and it can be fostered by therapeutic grounding or breathing exercises (Hobfoll et al., 2007). Avoiding a single-event debriefing that may enhance arousal instead of reducing it is recommended by the guidelines. Instead, multiple group sessions in the school setting may be ideal for processing the event, especially for children and adolescents who have experienced a common traumatic event such as a school shooting (Foa et al., 2000; Pfefferbaum et al., 2013; Shaw, 2000). The coping skills of the survivors can be actively enhanced by providing information about recovery and the services that are available for them via several channels, e.g., written leaflets, oral communication, websites, and telephone hotlines (Hobfoll et al., 2007; TENTS, 2008).

Trauma-affected persons and communities need to regain at least some sense of control over the emotions they must face after a tragedy. Families usually provide a secure base for recovery, and the authorities should thus promote the competence and inner wisdom of families. Because the traumatic event shatters the sense of coherence and the basic view of the world as a good place, it is essential that the authorities install positivity and hope among the survivors. Sharing the knowledge that most people will recover well may promote resilience among the survivors and help them to fight against distressing and catastrophic thoughts. Support regarding practical, e.g., economic, issues may also promote a sense of survival and hope (Hobfoll et al., 2007).

Collaboration between the authorities and the victims is crucial in facilitating recovery. Community activities, such as rituals, meetings, and religious gatherings, contribute to community efficacy, and returning to school and other normal activities soon after the event fosters self-efficacy among the survivors (Hawdon & Ryan, 2011; Hobfoll et al., 2007; Pfefferbaum et al., 2013; Pynoos et al., 1987).

1.4.3 Support during the mid-term and ongoing phases of recovery

Detecting those survivors who have strong post-traumatic reactions is recommended during the acute phase and also during the mid-term and ongoing phases of recovery. Those individuals with psychological distress should be clinically assessed and referred to adequate treatment (TENTS, 2008). Screening for possible PTSD symptoms is important for secondary prevention and early identification, especially after community-level tragedies that affect a large number of children and adolescents (AACAP, 2010, Pfefferbaum et al., 2013). The possible risk factors for psychological distress and indicators of resilience should be assessed both informally via the help of parents and teachers and clinically. According to Pfefferbaum et al. (2013), assessments and psychosocial services can logically be conducted in schools, which are familiar and natural sites for children and adolescents.

When more specific treatment is required, the use of the trauma-focused individual, family, and group interventions, especially trauma-focused cognitive behavioral therapy (TF-CBT) and eye movement desensitization and reprocessing (EMDR), are recommended to facilitate recovery (Hobfoll et al., 2007; Pfefferbaum et al., 2013; TENTS, 2008; WHO, 2013). Maintaining proactive contact with the distressed survivors is important in the mid-term and ongoing phases of recovery, as are the tailored acts of returning to work and providing rehabilitation for those who have problems re-adapting everyday life (TENTS, 2008). The continuity of psychosocial care should be guaranteed, and the local authorities or government should prepare to financially support existing services for several years to come because some symptoms may be persistent or delayed (Duodecim, 2009; Hobfoll et al., 2007; NICE, 2005; TENTS, 2008). This principle of "watchful waiting" for the delayed or re-occurring need for psychosocial care is pivotal because of the individual uniqueness of recovery and help-seeking behavior. The TENTS guidelines (2008) also emphasize the importance of taking care of the wellbeing of mental health workers and preventing or treating any vicarious traumatization.

1.4.4 National guidelines and psychosocial care after major tragedies in Finland

Psychological care in Finland has long roots, especially in the region of South Ostrobothnia, where Kauhajoki is located, due to earlier disasters. The most severe tragedy was an explosion of an ammunition factory in 1976, in which 40 people lost their lives, and several children lost either one or both of their parents. The accident traumatized a large number of this small town's inhabitants because almost everyone lost either a family member or an acquaintance or at least know some-

one who had suffered a loss. Comprehensive psychosocial support was provided via the means available at that time. Long-term support was also provided, but with limited resources (Juurakko, 2009).

Another massive tragedy in the South Ostrobothnia area was the plane crash at Ilmajoki in 1988, in which six people from different parts of Finland lost their lives and several were injured. The theories and the methods of crisis psychology were more advanced by then, and the survivors were offered some psychosocial aftercare (Heiskanen, 1994). The healthcare professionals and authorities were keen to learn more and implement new methods of crisis and catastrophe psychology because in this field, there had been a cumulative increase of new research results and knowledge around the world.

During the late 1980s and early 1990s, the methods of acute crisis work gained a foothold in Finland as Critical Incidents Stress Management and psychological debriefing spread across Norway and Finland. During the 1990s, psychological debriefing was a commonly used intervention in Finland after both large-scale tragedies and minor incidents (Saari & Hynninen, 2010; Palosaari, 2007). Acute crisis work in Finland in now organized through the local healthcare centers' crisis groups, and when needed, additional resources are available from neighboring communities. Every municipality is obliged to provide psychosocial support and services after traumatic situations. The routine single-event debriefing is no longer recommended, but active support that aims to enhance resilience and recovery, activate natural social network support, and provide psychoeducation about common trauma-related reactions and self-care advice is provided via municipalities' crisis groups in a form of voluntary group discussion sessions (Ministry of Social Affairs & Health, 2009; Saari & Hynninen, 2010; SPL, 2010). The Finnish recommendations emphasize support provided not only in the immediate aftermath of the traumatic event but longer-term support as well (Duodecim, 2009; Ministry of Social Affairs & Health, 2009; Saari & Hynninen, 2010). Professionally led peer support after major tragedies is recommended intervention at the later phases of recovery (Ministry of Social Affairs & Health, 2009).The principle of "watchful waiting" (NICE, 2005), meaning actively following-up on the trauma survivors' wellbeing and awareness to identify possible late-onset PTSD or other psychological distress, is included in the recommendations (Duodecim, 2009; Ministry of Social Affairs & Health, 2009).

In large-scale national tragedies, such as the Asian tsunami or the Finnish school shootings, the Ministry of Social Affairs and Health is responsible for the co-ordination of services. It can further delegate the responsibility to local authorities. The appropriate provision of support and services through the close co-operation of healthcare and social services is of utmost importance. The collaboration with the church and the third sector (e.g., the Finnish Red Cross) is important as well (Ministry of Social Affairs & Health, 2009).

The Finnish Red Cross has a special group of experienced crisis psychologists, thus providing an additional resource, especially in large-scale tragedies, if the municipalities' own resources are insufficient. This psychologist's preparedness group was established in 1993, and it has been involved in providing services after several minor and major incidents, especially during the immediate and acute phases. The group also provided longer-term support after a ski bus accident with multiple causalities and the Asian tsunami of 2004; professionally led peer support group processes were carried out among the family members of those who died in these tragedies (Saari, 2006; Garoff, Hynninen, Luoma, & Saari, 2013). This kind of long-term collective assistance has been used in other Nordic countries as well (Dyregrov et al, 2009).

Quite a large amount of crisis and trauma-focused knowledge exists in the South Ostrobothnia area because since the end of the 1980s, acute crisis work has been done systematically. There are well-educated crisis teams in nearly every healthcare center. Seinäjoki Central Hospital has had a multi-professional psychological first aid team since 1995. This team is specialized in providing immediate psychosocial support for victims and their relatives who are in a psychological shock. The group supplements the personnel of the Emergency Unit and is called on duty by them. The Psychiatric Operating Unit of the Hospital District of South Ostrobothnia has local policlinic units specialized in first aid psychiatry. One of these units is located in Kauhajoki, where the shootings took place.

1.5 Context of the study

The two school shootings in Finland happened within ten months, and the wounds of the first had not healed when the second occurred. The sense of safety collapsed again, which complicated recovery. To illustrate the similarity and impact of these massacres, both of them are described here. The first school shooting in Finland took place in Jokela, a community of 6,000 inhabitants, on November 7th, 2007. The students of the Jokela School Center were 13-20 years of age and participated in lower and upper secondary education, which were both located in the same building. The students of the Jokela School Center were mainly from the Jokela area, and most of them lived with their parents (Suomalainen et al., 2010).

The school shooter was known as a distinctive, withdrawn, and intelligent graduate student. He entered to school just before lunch break and started to shoot indiscriminately at other pupils inside the school building. He moved around the school corridors and classrooms, shooting and shouting, and tried to set the building on fire. Almost all of the pupils and staff in the building were exposed to danger and threats to their lives. Pupils and teachers locked themselves inside the classrooms to seek safety. The order to do so was given by the

headmaster through central radio. Some of the escaped pupils spent several hours locked in their classrooms before being evacuated. When the police entered the school, the perpetrator shot himself and later died in the hospital. Afterwards, it became clear that the perpetrator had been bullied during his school years, had belonged to online sites and communities that admired the Columbine massacre, and had published an online video in which he threatened the school with a gun, all of which are typical acts for copy-cat perpetrators (Ministry of Justice, 2009; Punamäki et al., 2011).

Only ten months later, on September 23rd, 2008, at Kauhajoki, the second massacre, studied in this dissertation, occurred. Again, the perpetrator was one of the school's own students, but this time, he was known as an ordinary student who had some friends. He also had a history of being bullied, but in his current school, there was no bullying. He entered the school building before lunch break and went straight to his own classroom, where his fellow students were completing an exam. He opened fire immediately and shot nine of his fellow students to death, as well as a teacher who was supervising the exam. Then he set the classroom on fire and went walking around the building, shooting and damaging the premises. The perpetrator did not notice that there were two students who hid behind their desks. They managed to escape by breaking the windows of the burning classroom, together with one student who had been shot at. The perpetrator set fires in several other places in the building. He pointed the gun at and threatened a large number of other people as well, although he did not kill them. He killed only students in his own classroom. Most of the other students and the school staff were able to get out of the building moments before the perpetrator came out from his classroom, due to the rapid evacuation command given by one of the teachers. Again, the perpetrator shot himself to death when the police entered the building. He had been interviewed by the police a day before the massacre because of the shooting-related videos he had published online a few days before (Ministry of Justice, 2010).

The educational institution in Kauhajoki was a combination of Seinäjoki University of Applied Sciences (SeAMK) and the Vocational Education Centre (Sedu). The majority of the students were adolescents or young adults, their ages ranging from 15 to 25 years. Kauhajoki is a small rural town with 14,000 inhabitants. The students came from several different parts of Finland, and many of them lived alone in student apartments near the school. At the time of the incident, the educational center had approximately 260 full-time students out of a total of 390 (Haravuori et al., 2012). Every school in the vicinity of Kauhajoki was alarmed. All the students in the Kauhajoki area were kept inside their school buildings for several hours due the potential dangers. It was unclear whether there were one or several perpetrators. Malicious SMS messages and threats to the other schools in

the Southern Ostrobothnia area spread rapidly, and the schools closed their doors in case of more attacks (Ala-aho & Turunen, 2011). The need for psychosocial support on the individual, family, and community levels was inevitable because the sense of safety had been shattered for the second time in a year.

1.6 Research questions

There is only a limited amount of detailed descriptions of the outreach models of psychosocial care after major tragedies. This dissertation describes and analyzes the theoretical rationale and the adequacy of the elements of the outreach project, which was developed and implemented after school shooting in Kauhajoki, 2008, in order to facilitate resilience and recovery among those traumatized due the shooting. The multidisciplinary and multi-professional outreach model was based on the current recommendations and best practices concerning provision on psychosocial care after major tragedies and it lasted for two years and four months. The outreach aimed at ensuring that all those individuals, families, groups, and communities in need for support got the care they needed. This dissertation analyzes how these needs were met.

First, it analyzes the theoretical rationale and the theory-based elements of 1) the professionally led peer support group process for the relatives of those deceased in the shootings, 2) the phase model of psychosocial care among the trauma exposed students and staff, and 3) the acute and long-term psychosocial care for other traumatized individuals, groups, and communities. Also the ways in which the national and international guidelines were applied are reviewed. Then the trauma-exposed students' perceptions of the availability of, usage of, and satisfaction with the support provided are analyzed. Finally, this dissertation examines the role of attachment in trauma recovery after mass violence. The future directions for further developing theory-based interventions are also discussed. The dissertation is based on four original publications, which are summarized below.

Article I

The first article, *"Professionally led peer support group process after a school shooting in Finland: Organization, group work, and recovery phases,"* aims to increase the variety of theory-based support for those bereaved after the violent death of a family member. It presents a two-year-long model of collective assistance for those who have lost family members in a school shooting. The article describes the model and the timing of the professionally led peer support group work and interventions according to the stages of bereavement. It also presents the theory base, principles, and practical examples of psychoeducation; provides attachment-theory-

based elements within group work; and encourages the cohesion and strength of families' natural networks and support systems. The participants' perceptions of the process are presented briefly.

Article II

The second article, *"Psychosocial support for trauma-affected students after school shootings in Finland,"* presents a phase model of the psychosocial support conducted among the students and staff of the trauma-exposed school in Kauhajoki. It describes the six phases and the interventions used during the aftercare, as well as the trauma-theoretical rationale behind them. The aim of the study is to model an intervention and share practical tools for theory-based support with clinicians and researchers in the field.

Article III

The third article, *"Framework of the outreach after a school shooting and the students' perceptions of the provided support,"* expands the scope and describes the comprehensive model of psychosocial support in all its diversity. The outreach covered the support provided to the other schools in the area, as well as wider communities. The article analyzes the perceptions of the trauma-exposed school's students concerning the availability of, usage of, and satisfaction with the psychosocial support provided. The students' perceptions of the most healing elements of the professional support are analyzed in an attempt to further develop interventions that are perceived as helpful.

Article IV

The research conducted among the trauma-exposed students in Kauhajoki analyzes the role of attachment style in mental health outcomes and post-traumatic growth. In the study *"The role of attachment in recovery after a school shooting trauma,"* the hypothesis was that survivors with a secure attachment style report lower levels of post-traumatic stress symptoms and dissociation and higher levels of post-traumatic growth than survivors with either insecure-avoidant or insecure-preoccupied attachment style.

2 Methods

2.1 Participants and the procedure of the study

The participants of the studies presented in this dissertation were the family members of those who died in the school shooting in Kauhajoki (articles I and III), the students of the trauma-affected school (articles II, III, and IV), and other trauma-affected individuals and communities in the region (article III). On average, 50 relatives of the deceased participated in the professionally led peer support gatherings. Their perceptions of the professionally led peer support group process were collected via telephone survey (Ala-aho & Turunen, 2012; Ala-aho, personal information).

The empirical data was collected from the trauma-affected school's students, who were studying in the educational institution (SeAMK and Sedu) in Kauhajoki at the time of the shootings (N = 389). The mean age of the participants was 24. 9 years, and the majority of the students (95%) were female due the certain branches of the school being more popular among females (Haravuori et al., 2012). The two-year follow-up study was carried out by the research group of the National Institute for Health and Welfare in co-operation with the management and personnel of the school, as well as the aftercare providers. The study protocol was accepted by the Ethics Committee of the Hospital District of South Ostrobothnia. The same study protocol as was used in Jokela, where the first school shooting happened, was used (Suomalainen et al., 2010).

2.2 Characteristics of the outreach model of psychosocial care

This study includes both qualitative and quantitative methods. The quantitative descriptive case study presents the outreach model of psychosocial care. The service analysis was conducted to determine the theoretical rationale behind the outreach model that was implemented in Kauhajoki. The analysis was conducted according to the contents and schedule of the current recommendations regarding the provision of psychosocial care after a mass tragedy. The adequacy of the interventions was also discussed. Two special long-term interventions were modeled: the professionally led peer support group process for the families of the

deceased (Article I) and the phase model of psychosocial support in the trauma-affected school (Article II). The comprehensive outreach model was also described in all its diversity (Article III).

2.3 Trauma-affected students' experiences and post-shooting wellbeing

A two-year follow-up study was conducted among the trauma-exposed students. The purpose of the study was first explained to the students in both verbal and written forms. The students were asked to write a statement of written informed consent. A total of 236 students (60.7%) participated in the first assessment, four months after the shooting (T1). One hundred and eighty students participated in the sixteen-month follow-up (T2), and 137 students participated in the twenty-eight-month follow-up (T3). The first and second assessments were conducted in the school. Mental healthcare professionals were available for the students in case some of the study participants required psychological support after filling out the questionnaire. The third questionnaire was mailed to the participants. The level of trauma-exposure regarding the school shootings and the degree of symptomology were not associated with dropping out of the follow-up assessments (Haravuori et al., 2012).

2.3.1 Students' experiences of the psychosocial support provided

The data were collected via self-filled questionnaires that contained questions regarding background information and trauma exposure, as well as its consequences. *The severity of trauma exposure* was based on students' experiences of threats to their lives and the losses they suffered (Suomalainen et al., 2010). Participants answered "yes" or "no" to 19 statements concerning their experiences during the shooting incident, including *"I saw the perpetrator," "I saw someone get shot,"* and *"I lost a good friend/ friends".* There was also space for additional comments after three questions. The answers were categorized according to the severity of exposure. "Mild exposure" was chosen when the student was not on the school premises at the time of the shootings and did not lose any acquaintances. Exposure was considered to be "moderate" when the student was not in a direct danger of losing his or her life or was evacuated from the building and did not lose any acquaintances. "Significant exposure" was chosen when the student was in danger of losing his or her life and had to act in order to escape from the shooter or hide, saw dead or wounded bodies, or lost acquaintances. "Severe exposure" was chosen when the student was near mortal danger, saw somebody threatened with a gun, or lost a friend(s) or some other significant person. Exposure was rated as "Extreme" when

the student was in mortal danger, saw somebody shot and killed, or lost a family member.

Immediate crisis support was assessed by asking whether the participants were offered support immediately after the incident and whether they accepted that support. The participants were also asked if they attended the common sessions for the entire school community within the first week. The students answered "yes" or "no" to these questions. *Experiences with immediate crisis support* were assessed using a 5-point scale (1 = helped a lot; 2 = helped enough; 3 = helped a little; 4 = did not help; 5 = hindered recovery).

The extent of the use of psychosocial support during the acute phase was estimated using 13 questions regarding where and from whom the students received support. The sources of support were grouped as *natural intimate support* (family, other relatives, friends), *professional support and care from healthcare specialists* (crisis workers for the school community, use of a low-threshold crisis clinic, a municipal healthcare center, student healthcare and/or psychiatric outpatient clinics), and *other social support* (teachers, youth workers, workers of the parish, clubs or extracurricular activities). The number of different types of support was assessed using five alternative answers: no support available, some support, enough support, too much support, and not interested. The perceived effects of the different types of psychosocial support were evaluated using five alternative answers (did not help, cannot say, did help, was irritating, and not interested). Students were further asked if and when they had started psychotherapy or regular meetings with healthcare professionals and whether or not the psychotherapy included EMDR-therapy.

Students' experiences with professional support and its healing effects were studied using open questions, such as "*Where did you get the most important help for your traumatic and distressing experiences?*" and "*What was the most important reason for its healing effect?"* Responses to these questions at T1 (four months) were analysed. To examine what were perceived to be the healing elements of professional support, during the ongoing phases of recovery (T2 = 16 months, and T3 = 28 months), answers that indicated professional support was helpful were selected for further analysis. The answers to the question *"What was the most important reason for its healing effect?"* were classified by a clinician and a researcher into five categories according to the concepts of psychosocial support.

2.3.2 Students' mental health after exposure to a school shooting

Students' previous and later traumatization was assessed via a structured questionnaire. Participants answered yes/no according to their previous experiences of traumatic incidents, such as being involved in a traffic accident, experiencing a

natural disaster, or witnessing or experiencing violence. They were also asked how old they were at the time of the traumatic event.

Attachment style was measured via items from the Attachment Style Questionnaire (ASQ), created by Feeney, Noller, & Hanharan (1994). A short version of 15 descriptions of how people typically feel in close relationships was used. Participants estimated items on a 1 – 6 Likert scale (1 = strongly disagree, 6 = strongly agree). The sum variables were formed following Feeney et al. (1994), and they depicted the secure attachment style (five items, e.g., *"I find it easy to trust others"; "I find it relatively easy to get close to other people"*), the avoidant attachment style (five items, e.g., *"I worry about people getting too close"; "Achieving things is more important than building relationships,"* and the preoccupied attachment style (five items, e.g., *"Other people often disappoint me"; "I worry that others won't care about me as much as I care about them"*). Sum scores were calculated for the three attachment styles, which showed sufficient internal consistency Cronbach´s α values being 0.77 for secure, 0.70 for avoidant, and 0.70 for preoccupied attachment style. The three factor scores were also calculated using the sixteen-month follow-up material in order to assess the stability of the attachment system. Sum scores varied significantly between the predominant types of clusters in a similar manner as at T1, which indicates stability across time.

Post-traumatic symptoms were measured via the Impact of Event Scale (IES) by Horowitz et al (1979) version IES-22. It consists of 22 questions regarding post-traumatic symptoms people may have after traumatic events. Participants estimated items on of scale 0 = not at all, 1 = rarely, 3 = sometimes, and 5 = often, based on how their experiences of the school shootings had affected them during the previous week. The sum variables were created depicting intrusive, avoidant, and hyper-arousal symptoms. The sum scores for the total scale and the three subscales were calculated at T1, T2, and T3 and used as continuous variables. Good internal consistency among the total scale and the subscales was observed.

Dissociative symptoms were assessed via the Adolescents' Dissociative Experience Scale (A-DES), based on the Dissociative Experience Scale (DES), created by Bernstein and Putnam (1986). A high correlation between these two versions has been reported by Armstrong et al. (1997). The A-DES originally had 30 questions. To avoid the questionnaire being too long, the number of items was cut down to nine. These items involved amnestic dissociation (2), depersonalization (3), derealisation (1), hearing voices (1), and acting like someone else (2). The participants answered on 0 – 10 Likert scale (0 = never, 10 = always) regarding how often they experienced the symptoms. The mean sum score of the items was used for the analyses.

Post-traumatic growth was measured via the Posttraumatic Growth Inventory (PTGI), created by Tedeschi and Calhoun (1996). The original PTGI had 21 items that involved the dimensions of contact with others (seven items), new pos-

sibilities (five items), personal strength (four items), spiritual change (two items), and appreciation of life (three items) (Taku, Cann, Calhoun, & Tedeschi, 2008). Two items (one from contact with others and another from new possibilities) were omitted from the version used in this study due to very low loadings. The participants rated the questions on a 1 – 5 Likert scale (I did not experience this change – I experienced this change to a very great degree) at T2 and T3. The total sum score and five subscales, relating to others, new possibilities, personal strength, spiritual change, and appreciation of life, were applied in this study.

2.4 Statistical analysis

All analyses were performed using SPSS 20.0. The distributions of variables were presented as percentages for categorical variables and as means (*M*) and standard deviations (*SD*) for continuous variables. Differences between the groups were tested using the chi-square test and analyses of variance (ANOVAs). In the analyses, two-tailed significance levels < .05 were chosen. Scales with less than 15 percent of missing items were accepted for the analyses, while missing items were replaced with the series mean.

In order to identify attachment clusters, hierarchical cluster analyses were performed using Ward's method to decide the appropriate number of clusters to form. *K*-means cluster analysis was used to assign the studied individuals into the different cluster groups representing their dominant attachment styles. To analyze the association between the attachment style and trauma-related symptoms and posttraumatic growth, analysis of variance (ANOVA), along with Scheffé's post-hoc analysis, was used. The three-class attachment cluster variable was the independent variable, and PTSD, dissociation, and PTGI with subscales were the dependent variables. A factor analysis with the ASQ items was performed using the principal component extraction method and rotated using the Varimax method with Kaiser normalization. The secure attachment style was separately compared with the two different types of insecure attachment styles (avoidant = 1; secure = 0; preoccupied = 1) as a potential risk factor for or protective factor against posttraumatic symptoms (IES) using multivariate linear regression analyses. Those background variables that were associated with the symptoms were included (previous traumatization: no = 0, yes = 1; exposure: mild = 1 to extreme = 6; previous psychosocial support or psychological treatment: no = 0, yes = 1; and age as a covariate). Socio-economic status and living arrangements were not associated with the symptoms and were not included in the final model. Gender could not be analyzed due to the low number of men in the sample.

3 Results

This dissertation models the framework of an outreach model of psychosocial care as a whole and its two phase models of support targeted to the most severely affected by the school shootings (Figure 3). The analyses of the theoretical rationale and elements of the multidisciplinary and multi-professional long-term outreach model show that the psychosocial care was provided proactively and comprehensively and the guidelines were followed.

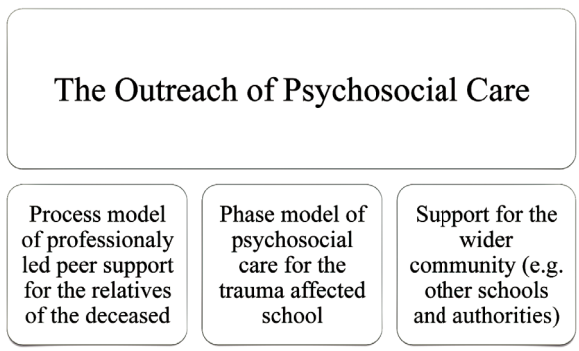

Figure 3.
The main elements of the Outreach program after school shooting in Kauhajoki

Supporting families after the violent death of a family member is acknowledged to be important because the traumatic nature of the death increases the risk of prolonged and/or complicated grief. Articles I and III describes the services and the interventions that were provided to the relatives of the deceased.

The bereaved relatives were considered to be one of the main groups in need of professional support, and the professionally led peer support group process was chosen as a common long-term intervention for them. The structure and content

of the group process were based on trauma- and attachment-informed knowledge and theories. Clinical experiences from previous professionally led peer support group processes implemented in Finland after major tragedies were used and further developed and the Scandinavian model of collective assistance after tragedies was also utilized.

Professionally led peer support group process lasted for two years. 50–54 relatives of the deceased participated in the gatherings and most of them took part in all five of them. The process consisted of five gatherings with common sessions to all participants and separate small peer group sessions. There were special peer groups for e.g. mothers, fathers and siblings of the deceased. The process was led by professionals with expertise on grief, trauma recovery, and psychotherapy. The aim of the process was facilitate the natural recovery and resilience among the bereaved and it was based on principles of: 1) timing, 2) psychoeducation and recognizing signs of possible post-traumatic and other distressing symptoms, 3) uniqueness of the traumatic grief process, and 4) enhancing cohesion and strength of families' natural social networks. The contents of the gatherings included group-work, psychoeducation, and shared rituals.

The feedback from the participants in the professionally led peer support group process was collected via telephone survey, but not for scientific analysis. The feedback was highly positive, indicating that this kind of long-term support was appreciated among the relatives. They reported being supported, heard, and understood by both the professionals and their peers in the group. They also expressed their satisfaction with the total number of gatherings and the duration of the process.

The relatives of the victims were offered also additional support and treatment when necessary as described in the Table 3. For example psychotherapy and help in practical issues were offered for those family members who were in need of them. The same professionals were available for the families for over two years, which made the interaction seamless and confidential.

The service analyses of the **phase model of psychosocial support for the trauma-exposed school** (Article II) revealed that the students and staff of the trauma-exposed school were also provided immediate, acute, and long-term psychosocial support comprehensively. The aftercare was implemented in close co-operation with the school's management and staff. It was provided in six phases according to the victims' psychological recovery, as well as the changes in the school's daily functioning and the salient dates of the year. The immediate support phase lasted for the first 24 hours. The following two weeks-long acute phase contained calming and psychoeducative elements. The empowerment and stabilization phase lasted for five months i.e. as long as the school operated in temporary premises. The habituation phase coincided with the returning to the renovated school building and it was followed by the first anniversary phase, which covered months

around the anniversary. The last phase, follow-up aimed at watchful waiting for possible delayed need for support and training grass-root professionals.

The analyses of the **outreach model of psychosocial support** in its entirety show that the outreach organized and provided theory-based psychosocial services comprehensively on the individual, family, and school community levels and to some extent for wider communities and professionals. Psychosocial services were carried out in phases in order to meet the immediate and acute support needs, as well as the long-term and delayed needs. The multidisciplinary and multiprofessional outreach centralized the provision of services making the support available for those in need regardless their place of residence. The main elements of the outreach are summarized in Table 3. Timing and provision of interventions were in line with national and international guidelines of providing psychosocial care after major tragedies.

The main results regarding **students' perceptions of the provided psychosocial support** are described in Table 4.The results show that the students rely, as expected, on their natural social relations in the times of danger and horror. Support from parents, siblings, and friends was considered helpful by almost everyone (97.8%). Professional psychosocial support enhances and supplements familial support, and it was considered helpful by 78.6% of the students.

The majority of the students and all of the most severely exposed students were offered psychosocial support by professionals immediately after the school shooting tragedy. The majority of students attended both the common psychoeducative and informative sessions for the school community (71.1%) and the discussion groups for their own classes (60.6%).

Across the recovery process, the role of professional support deepened, especially among those students who were severely traumatized and therefore suffered from greater psychological distress more frequently. Almost all of the most severely exposed students perceived professional support as being helpful at the follow-ups (91.7% at T2 and 91.7% at T3). The results further show that the most severely exposed students began psychotherapy more often than those with milder exposure. EMDR treatment was included in one-fifth of the cases of psychotherapy.

The healing elements of the provided professional support in ongoing phases of recovery (T1 and T2) according to the students' perceptions were the possibility to share the story (over 50%), receive professional support (21–37%), psychoeducation (14–26%), specific therapeutic interventions (7–14%), and enhancing safety and continuity (5–17%). Over half of the students mentioned that sharing their experiences with their peers and professionals was important for them. Talking and listening were the most commonly used words to describe this healing element. The students mentioned that it was helpful for them to talk with their classmates, who could really understand what had happened.

Table 3.
Summary of the Main Elements of the Psychosocial Support Provided to Families, Students and School Staff Modified from Article III

Level of intervention	Families of the deceased		Students and staff exposed to the shootings	
	Immediate and acute phase	Later and ongoing recovery	Immediate and acute phase	Later and ongoing recovery
Individual	– Services of the crisis clinic – Support when visiting the scene of the massacre – Practical assistance	– Services of the crisis clinic – Psychotherapies – Physiotherapies – Practical assistance	– Services of the crisis clinic – Interviews to assess the severity of exposure and available support	– Services of the crisis clinic – Screening of the possible PTSSs – Health check-ups – Psychotherapies – Physiotherapies
Family	– Group discussions – Support for families visiting the scene of the massacre – Telephone contact with every family to ensure the sufficiency and appropriateness of support	– Frequent contacts by telephone to assess the unique needs of each family member – Home visits to assess the family situation and needs – Support in emotionally demanding occasions	– Family evenings at the school	– Professionally led peer support group process
Group	– Psychoeducation, information about the services (e.g. peer support process)	– Professionally led peer support group process – Support in emotionally demanding situations – Rituals	– Group discussions for the staff and students – Common sessions with psychoeducation and rituals	– Group discussions for the staff and students – Supervision sessions for teachers – Rituals
Community			– Services of the crisis clinic – Group discussions in the other schools at the area – Parents´ evenings in the other schools – Media coverage with psychoeducative and calming content	– Services of the crisis clinic – Reinforced youth work and student welfare in the other schools – Comprehensive media coverage and open doors at the school around the moving back and the first anniversary

Table 4.
Immediate, Acute, and Long-term Psychosocial Support and Care for the Students of the Exposed School

Type of the support	All students	Severely to extremely exposed students	Mildly to significantly exposed students	Difference between the exposure groups
	n = 236 *n* (%)	*n* = 20[a] *n* (%)	*n* = 216[a] *n* (%)	
Reached by Immediate Crisis Support first 24 h)	199 (84.7)	20 (100.0)	179 (89.9)	$\chi^2 = 3.96$, df = 1, $p = .047$
At the evacuation center	121 (53.8)	13 (72.2)	108 (52.2)	
At the municipal healthcare center	12 (5.3)	2 (11.1)	10 (4.8)	
By crisis teams	13 (5.8)	1 (5.6)	12 (5.8)	
Contacted by phone	21 (9.3)	0 (0.0)	21 (10.1)	
At school, by school staff	13 (5.8)	2 (11.1)	11 (5.3)	
Immediate crisis support accepted	113 (58.5)	15 (75.0)	98 (56.6)	n.s.
Perceived as helpful	110 (92.4)	15 (100.0)	95 (91.3)	n.s.
Attended the sessions for the whole school	167 (71.1)	17 (85.0)	150 (69.8)	n.s.
Attended the group discussions	140 (60.6)	18 (90.0)	122 (57.8)	$\chi^2 = 7.92$, df = 1, $p = .005$
Crisis support received within two weeks				
From family and friends	232 (98.7)	20 (100.0)	212 (98.6)	n.s.
From other social networks	179 (79.6)	15 (78.9)	164 (79.6)	n.s.
From professionals	164 (71.0)	18 (90.0)	146 (69.2)	$\chi^2 = 3.84$, df = 1, $p = .050$
Perceived the received crisis support as helpful				
Family and friends	220 (97.8)	19 (95.0)	201 (98.0)	n.s.
Other social networks	148 (89.2)	14 (93.3)	134 (88.7)	n.s.
Professional support and care	114 (78.6)	12 (75.0)	102 (79.1)	n.s.
Professional support and care (T2)[c]	83 (89.2)	11 (91.7)	72 (88.9)	n.s.
Professional support and care (T3)[d]	76 (73.1)	11 (91.7)	65 (70.7)	n.s.

Note.
[a] Percentages shown within the exposure group. [b] Asked whether they received immediate help and support after the incident, within the first 24 hours. Asked about primary source of support with an open question. [c] Question about perception of professional support repeated 16 months after the incident, n = 123 (those who had been offered professional crisis help). [d] Question about the perception of professional support repeated 28 months after the incident, n = 104 (those who had been offered professional crisis help).

The group discussion sessions, conceptualized as ventilation groups, were arranged for the students (and the staff as well) several times during the aftercare, starting a couple of days after the massacre. Single-event debriefing was avoided. The groups were formed based upon members having similar experiences during the event. Ventilation groups were led by experienced professionals, and they gathered whenever an increase in PTSS was anticipated, i.e., when the students moved back to the original school premises after five months of renovation and around the first anniversary, when the atmosphere was tense and rumors of possible new massacre were spreading.

Professionalism and expertise of the psychosocial care providers were perceived helpful by the students as well. They mentioned that it was important to them to know that experienced professionals were there to support them and help them cope. The possibility of talking to the professionals in private was also considered helpful and the students mentioned that they especially wanted to consult the professionals.

Psychoeducation was provided through several channels from the very beginning and it was also perceived as helpful. The students reported being relieved when they learned that their PTSS were normal reactions, instead of signs of "going crazy". "Teaching how to breathe" was also mentioned as an example of useful psychoeducation. Psychoeducative group discussions led by professionals were mentioned as being beneficial because they helped the students to understand and regulate their PTSSs. One practical way to illustrate the variation between hyper- and hypo-arousal is the window of tolerance, which was created by Ogden and Minton (2000). This concept was presented to the trauma-exposed students and the staff. This method turned out to be useful in teaching how to recognize the peak levels of arousal and how to tune into a more optimal zone, in which rational and clear thinking, processing, and the integration of the traumatic memory are possible (Ogden & Minton, 2000). The window of tolerance is illustrated in Figure 4.

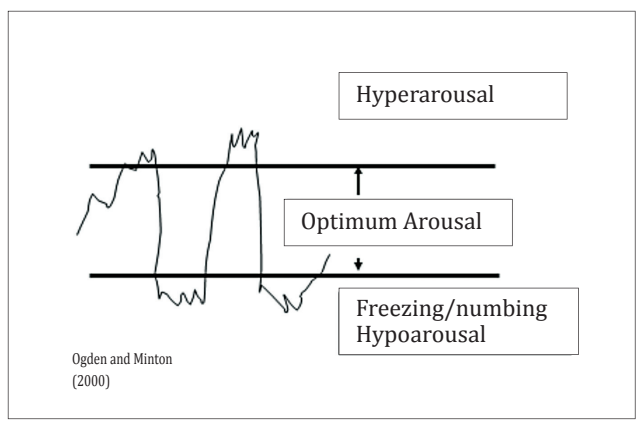

Figure 4.
Window of Tolerance, modified from Ogden and Minton, 2000.

Special therapeutic interventions, such as psychotherapy, EMDR, and medication were considered helpful as well. The continuity of the personnel providing psychosocial care was perceived as helpful and students also perceived that the professionals enhanced their feeling of safety with their presence. A following quotation illustrates this experience: "Where ever I met them, I immediately felt safe".

The results regarding the role of attachment style in recovery after exposure to a school shooting revealed that the secure attachment style was, as hypothesized, the most beneficial in trauma recovery. The students with the secure attachment style had significantly lower levels of overall post-traumatic stress symptoms than those students with the insecure-preoccupied style at both four and sixteen months after the school shooting. The secure survivors also showed lower levels of avoidance and intrusive symptoms than the preoccupied survivors at baseline and at these time points. At the 28-month follow-up, there were no longer significant differences between the survivors with secure, insecure-preoccupied, and insecure-avoidant attachment styles in terms of the total number of PTSSs.

The vulnerability of both insecure attachment styles, i.e., preoccupied and avoidant, was revealed in that they differed in the timing of their symptoms as illustrated in Table 5. The preoccupied attachment style was, as hypothesized, significantly associated with high numbers of total PTSS and avoiding symptoms at the four-month assessment. Contrary to the hypothesis, the students with the insecure-avoidant attachment style did not differ from those with the secure attachment style at either four or sixteen months. The students with the avoidant attachment style had, interestingly, more symptoms at the 28-month follow-up. They showed higher levels of intrusive and hyperarousal symptoms than the survivors with the secure attachment style. The amount of time elapsed since the trauma thus played an important role in how the attachment style was associated with specific post-traumatic stress symptoms.

Previous traumatization and the level of exposure to the school shooting were associated with increased posttraumatic symptomatology, but the levels of PTSS decreased across time periods in all attachment styles.

As hypothesized, the secure attachment style was also beneficial in terms of dissociative symptoms. The students with the secure attachment style had lower levels of dissociative symptoms than those with the insecure-preoccupied attachment style at four months after the trauma exposure. Contrary to the hypotheses, the secure and avoidant attachment styles did not differ in terms of dissociative symptoms. However, both the secure and avoidant attachments styles differed significantly from the preoccupied attachment style at sixteen months. At the 28-month follow-up, there were no longer differences between the attachment styles in terms of the level of dissociative symptoms. It is noteworthy that the

Table 5.
Association between Predominant Attachment Style and Recovering from Post-traumatic Symptoms, Measured Via the Impact of Event Scale (IES) at Four (T1), Sixteen (T2), and Twenty-Eight Months (T3) (Article IV)

	Type of predominant attachment style				
	Secure	Avoidant	Preoccupation		
Measures	*n* = 99, 79, 64 M (SD)	*n* = 80, 62, 42 M (SD)	*n* = 50, 37, 28 M (SD)	*p*	Significant differences in post-hoc analysis
T1 IES-22	22.3 (20.7)	27.5 (21.6)	38.9 (25.5)	< .001	Sec-Pre, Avo-Pre
T2 IES-22	13.1 (16.2)	18.6 (20.3)	24.8 (23.4)	.010	Sec-Pre
T3 IES-22	8.2 (13.3)	15.9 (21.1)	16.5 (19.6)	.032	
T1 IES-Intrusive	7.7 (7.7)	9.7 (8.3)	12.6 (9.6)	.004	Sec-Pre
T2 IES-Intrusive	5.0 (6.2)	7.0 (8.1)	8.3 (8.3)	.056	
T3 IES-Intrusive	3.3 (5.3)	6.6 (8.7)	5.7 (6.1	.030	Sec-Avo
T1 IES-Avoidance	8.8 (8.3)	10.4 (8.3)	16.3 (9.8)	.000	Sec-Pre, Avo-Pre
T2 IES-Avoidance	5.1 (6.9)	7.2 (8.9)	10.1 (9.9)	.013	Sec-Pre
T3 IES-Avoidance	3.5 (5.7)	5.7 (8.7)	6.8 (9.1)	.106	
T1 IES-Hyperarousal	5.9 (6.8)	7.3 (7.2)	10.0 (8.3)	.005	Sec-Pre
T2 IES-Hyperarousal	3.0 (4.6)	4.5 (5.7)	6.4 (6.9)	.009	Sec-Pre
T3 IES-Hyperarousal	1.4 (3.5)	3.6 (5.8)	4.0 (6.1)	.021	

overall levels of dissociative symptoms were low in all groups and at all time points.

After a traumatic event, it is also possible to achieve post-traumatic growth. The attachment style, however, did not predict PTG at 16 and 28 months as hypothesized. There were no differences between the secure and insecure attachments styles in overall PTG at any assessment point. Concerning the subscales of PGT, the survivors with the avoidant attachment style reported lower levels of PTG *relating to others* than those with the preoccupied attachment style at 16 months and lower levels than those with either the secure or preoccupied attachment style at 28 months.

4 Discussion

The aim of this dissertation was to deepen the understanding of the unique process of trauma recovery and the ways the professionals can contribute to successful outcomes and optimal recoveries for survivors of mass trauma. Despite the availability of useful guidelines for services, there is little empirical testing about the ways in which theory-based outreach models can be implemented to facilitate resilience and recovery among various groups of survivors. This dissertation aimed to narrow this gap by presenting an outreach model that was developed and implemented in the context of the Kauhajoki school shooting. This outreach consists of a variety of practical and theory-based interventions, and it provides techniques that can be used in acute, mid-, and long-term psychosocial care for the bereaved relatives of the deceased, trauma-affected students and staff, and wider communities. When evaluating the psychosocial outreach model, it was important to let the voices of the survivors to be heard. Therefore, the dissertation analyzed the students' perceptions of the psychosocial support provided and their experiences of its most helpful elements. The results provide valuable information for clinicians about the timetables of help-seeking and how to target and specify the interventions needed by survivors.

This dissertation further aimed to increase the knowledge of how the attachment theory contributes to supporting trauma-affected and bereaved survivors. The survivors differ greatly in their styles and abilities to recover after a traumatic event, and the attachment theory on its part explains these differences. Because the survivors are individuals with their own attachment styles, coping skills, social relations, and other protective and vulnerability factors, the courses of the recovery processes of the students were found to be unique as well, as has also been noted in earlier studies (Bonnano, 2004; Fraley, Fazzarri, Bonnano, & Dekel, 2006, 2006). The pivotal role of the attachment style in trauma recovery was revealed as the students with an insecure attachment style, either avoidant or preoccupied, had PTSS at different time points in recovery and thus needed support that was calibrated to their unique schedules of recovery. This finding enhances the importance of the principle of "watchful waiting," which is recommended in the current guidelines (NICE, 2005; TENTS, 2008; Pfefferbaum et al., 2013). The results regarding the attachment-specific issues concerning the unique needs for support and the timing of that support suggests that they should be taken into

account to further develop and tailor the interventions in a way that respects the strengths and vulnerabilities of each attachment style.

Reaching the victims with the greatest need for support is a great challenge when providing psychosocial care after a mass trauma. The plan for the outreach model analyzed in this dissertation was to provide the most intensive, proactive, and multilevel professional support to (a) relatives of students who died in the school shooting incident and (b) students and staff who directly witnessed the shooting and were in life-threatening danger. It can thus be argued that the outreach managed to reach the most severely affected survivors, as is recommended by the guidelines and clinical research (Hobfoll et al., 2007: Pynoos et al., 1995; TENTS, 2008; Yule, 2006). According to Yule (2006), it is ethical to ascertain the extent and nature of the needs of the survivors, and this was accomplished through the outreach model by providing tailored support on the individual, family, and community levels for over two years.

The findings show that the majority of students exposed to the school shooting recovered, as was indicated by the decrease in PTSS over a two-year follow-up period. Social support from both the natural networks and professionals facilitated the recovery process of the surviving students. These results concur with the earlier research (Fraley et al., 2006; Littleton et al., 2006; Murtonen et al., 2012). The results further pointed out the healing elements, such as psychoeducation and learning stress management skills, which the students perceived as most helpful for them. These practical tools are also mentioned in several guidelines and best practices, and this valuable message from the surviving students confirms their benefits. The results of the dissertation show this the kind of outreach model can be applied in the aftermath of future tragedies as well.

4.1 Support for the families of the deceased

The relatives of homicide victims form a special group of bereaved who must face both the loss of a loved one and the tragic and violent nature of his or her death. That may make the bereavement complicated, and relatives of the deceased will be in need of extra support in terms of both practical issues and bereavement. The outreach model acknowledged and prioritized their special needs and offered support and access to equal services, regardless of their place of residence. Proactive support, assessment, treatment, and follow-up were provided for over two years and for even longer whenever needed. The model thus followed both the national and international guidelines and best practices in facilitating recovery and resilience among the most affected survivors (Duodecim, 2009; Hobfoll et al., 2007; Pfefferbaum et al., 2013; TENTS, 2008).

All interventions provided to the relatives of the deceased in the immediate, acute, and ongoing phases of recovery aimed at activating and enhancing the families' own social networks and resources while simultaneously assessing familial and individual needs and requests for professional care, as recommended (Hobfoll et al., 2007; TENTS, 2008).

The relatives of the deceased has a need to meet one another and share experiences with peers who had experienced the same kind of loss, which was anticipated in the context of school shootings based on clinical experiences and the literature (Murphy, 2006; Shahani & Trish, 2006; Walsh, 2007). Sharing thoughts and emotions with someone who had had the same experiences increased the feeling of being understood, as was the case in survivors' meetings after the passenger and car ferry Estonia sank in 1994 (Arnberg et al., 2013). The professionally led peer support group process filled that need during the mid-term and ongoing phases of recovery. It simultaneously aimed to provide psychoeducation, facilitate and monitor the grieving processes, and enhance the healing power and resilience with and within the families, as is recommended in the guidelines and grief-specific literature (Rynearson et al, 2006; Shahani & Trish, 2006; TENTS, 2008).

Because the peer support model was based on the theories of trauma, attachment, and grief, it contained several healing elements that took into consideration, e.g., the different attachment bonds between the bereaved and the deceased, age- and gender-specific issues, and a variety of coping skills. The attachment bond between the deceased and the bereaved is unique. This is why the process and expressions of grief vary individually (Rynearson et al., 2006). Via a professionally led peer support group process, it was possible to offer a variety of tools aimed at facilitating recovery so that the participants could find the options that were most suitable for them and simultaneously learn new coping skills from one another. Assessing the recovery of the relatives was also possible during the long-term support and weekend-long gatherings. Referrals to more intensive care were made when needed, as is recommended in the guidelines (Hobfoll et al., 2007; TENTS, 2008; WHO, 2013).

Participating in the peer support process was naturally voluntary and the peer support was exactly that: support, not treatment. Therefore, it was also in line with the updated recommendations made by the World Health Organization (WHO, 2013). Around 50 relatives participated in each of the five peer support gatherings, and the participation rate remained over 90%, indicating a high level of commitment to the program and satisfaction with it, which was also confirmed by the feedback collected from the participants. As a conclusion, the professionally led peer support process turned out to be highly appreciated among the relatives of the deceased, which concurs with earlier experiences regarding collective assistance and peer support programs (Dyregrov, Straume, & Sari, 2009; Harja-

järvi, Kiikala, & Pirkola, 2006; Murphy, 2006; Poijula, 2010; Saari & Hynninen, 2010).

Naturally, the same issues regarding help-seeking behaviors and readiness to make use of professional support exist among the family members of the deceased, as well as among the other trauma survivors. For a majority, the support from their significant others is enough, but some do need more intensive, supplementary care. The support was therefore tailored to screen and meet the unique needs of each family member, as emphasized by Yule et al. (2000). Individual timetables for making use of the services were respected and the family members were proactively contacted frequently and for a long period to assess their situations. A survivor identity is often considered negative among both the bereaved and non-bereaved survivors (Arnberg et al., 2013). Therefore, the risk of being viewed mainly as a bereaved individual due to the school shooting was acknowledged, and the support offered to the relatives was as neutral and resiliency-promoting as possible.

The multiple and special needs of each bereaved relative, especially in the immediate wake of trauma, should be explored carefully. Practical assistance and assessment for treatment is recommended (Duodecim, 2009; Hobfoll et al., 2007; TENTS, 2008) and the relatives were provided additional support when needed. In the future tragedies, support in especially practical and legal issues should be offered even more. Even though the resources for providing psychosocial support are guaranteed by law in Finland, the practices were found to be diverse in various municipalities. Because the deceased were from several towns around Finland, mapping the next of kin of every deceased individual was crucial in order to ensure the equal quality of the support. Accordingly, it was essential to centralize the provision of the support in the context of school shootings. When the services were provided via a special outreach project, every family and every member of those families were offered the same services, regardless of their age or place of residence. This kind of centralized outreach model can be recommended in a mass trauma situation with multiple victims and thus a large number of next-of-kin in need of support.

4.2 Facilitating the unique process of recovery

As discussed earlier, the trajectories of recovery in the context of the Finnish school shootings were much like those presented by Bonnano in the aftermath of the 9/11 terrorist attacks in New York and those of the female survivors of campus shootings in the U.S. (Bonnano, 2004; Haravuori, personal information, 2014; Orcutt et al., 2014). The human capacity to cope and recover from even very tragic events was confirmed in Kauhajoki both scientifically and clinically.

The unique timetables of recovery and help-seeking behavior were observed, recognized, and respected. The fact that recovery and resilience can be fostered but not forced or speeded up was verified. Recovery and trauma processing requires safety, psychological strength, and stability, and it may take time. The trajectories of recovery show, however, that the survivors of school shootings do get better over the two-year follow-up period and that the majority recover without a significant amount of PTSS (Haravuori et al., 2012; Haravuori, personal information, 2014). The aftercare providers need to believe in this potential to thrive from the very beginning of recovery because maintaining hope in times of despair is essential for recovery (Walsh, 2007).

However, recovery and resilience are much more than the absence of PTSD (Bonnano, 2006). Therefore, focusing only on the diagnosis and symptoms of PTSD does not take into account or describe the diversity of reactions people commonly have to their own overwhelming experiences (van der Kolk & Farlane, 1987). For some survivors, clinical interventions are essential from the very early phase after a traumatic event because of the intensive psychological distress or lowered level of function (Galea et al., 2005). In the context of the Kauhajoki school shootings, those survivors with high levels of psychological distress were screened and referred to medical assessment from a very early phase. For a minority of survivors, recovery takes a long time, and PTSS may persist for years (Bonnano, 2004; Orcutt et al., 2014; Yule at al., 2000). The persistence of PTSS was also revealed in this study.

Suffering from PTSS may be painful and exhausting; they bind psychological energy and thus decrease the level of function. It is distressing to have "shaking viscera" week after week, as one trauma survivor described her post-traumatic stress after the school shooting (Turunen, unpublished case study, 2009). Regaining a sense of safety after being in a life-threatening situation caused by a fellow student takes time. In Kauhajoki, for example, just entering the school and sitting in the classroom was effort enough for some students at the beginning. Studying and learning was not the top priority for those students who had just survived life-threatening danger, but learning to trust that bad things do not happen over and over again was. The role of the professionals is to share their knowledge of trauma's possible impact on various levels of survivors' lives (Foa et al., 2000, Foa, Keane, Friedman, & Cohen, 2009; TENTS, 2008). After the school shooting in Kauhajoki, this was accomplished by providing comprehensive psychoeducation, normalizing the possible PTSS, and hence increasing the understanding of the uniqueness of recovery among the survivors. Enabling the healing process to happen in peace, without the pressure to recover faster than it is possible, is important. At the same time, usage of the most effective therapeutic tools is pivotal (AACAP, 2010; TENTS, 2008).

Aftercare providers should also be aware that is not necessarily easy for survivors to recognize their need for help, seek support, and accept it (Mikulincer & Shaver, 2010; Thorensen et al., 2014). Traumatized persons may be resistant to seeking treatment, even if they need it, because they do not consider themselves to be sick, but in shock (Harjajärvi et al., 2006; Somasundaram & van de Put, 2006). They may also think that their PTSS will dissipate with time and may thus not seek help for even strong reactions (Foa et al., 2000). For adolescents, help-seeking may be difficult because one developmental task in adolescence is to increase autonomy (Broberg, Dyregrov, & Lilled, 2005). They may also tend to minimize the impact of adverse emotions in every area of their lives and thus be reluctant to seek for help (Pfefferbaum et al., 2003). Because psychological distress may not be visible, it is not easy for others to recognize, even when the survivor needs more intensive support (Fraley et al.2006; Pfefferbaum et al., 2013). Implicit or explicit phrases from other people indicating that the survivor should feel better after a short period of time may cause distress among those survivors whose psychological distress declines slowly (Arnberg et al., 2013). Sometimes, the survivors may feel that their next of kin do not acknowledge, understand, or take seriously the survivors' need to be supported, which can also lead to resistance against seeking help (Arnberg et al., 2013; Thorensen et al., 2014). Therefore, the professional support should be offered in a comprehensive and proactive manner that normalizes and justifies the need for support and avoids stigmatizing it (Pfefferbaum et al., 2013, Yule & Canterbury, 1994).

These potential barriers to seek for help, even when needed, were acknowledged after the school shooting in Kauhajoki. The recommendation that the support should be provided in a neutral way and that access to the services should be as easy as possible was followed. The psychosocial care was provided inside the school premises, and no referrals to treatment were needed. The crisis workers were available for the students in the lobbies and canteen, which was found to be useful in, e.g., Sweden after a discotheque fire (Broberg et al., 2005). It was, however, observed that despite the easy access to services, some students reported that they wanted to ensure that their peers received the support first. They wanted to wait for their turn, even though their own PTSS was distressing enough. That altruism and solidarity was touching. It was, however, crucial to emphasize that the support was available for everyone who needed it, regardless of their exposure to the event, as is recommended (TENTS, 2008). The result that the students perceived professionalism and expertise of the personnel as one of the healing elements of the psychosocial care enhances the special role of professional support.

The personal timelines of readiness to deal what had happened vary, and that should be honored (Raphael et al., 2006). This unique timetable of readiness to process the traumatic experiences of school shootings may be illustrated via the following example. One of the students contacted the crisis psychologists a week

after the third anniversary of the school shooting. She had been aware of the aftercare services but wanted to manage on her own. On the third anniversary, the shooting was covered in the media, and the memories of the tragic day had been opened up. The student suddenly felt very distressed and alert. Her timetable of recovery had now reached the point at which she was ready to seek and accept support, and individual treatment was naturally arranged for her, even though the organized outreach was already finished (Turunen, unpublished case study, 2012). The importance of watchful waiting for delayed PTSS was thus proven in practice.

To decrease treatable psychological distress, it is essential for healthcare providers to find those who are in need for professional support, even if PTSS is not obvious. There may still be unmet needs for extra support that can be recognized by professionals (Yule, 2006). One way to recognize PTSS and other forms of psychological distress in different phases of recovery is screening. This was carried out in several ways in the context of the Kauhajoki school shootings, as is recommended in several guidelines, e.g., AACAP (2010), Duodecim (2009), Pfefferbaum et al. (2013), and TENTS (2008). The screening procedure is described in detail in Article II. Via frequent and comprehensive screening, it was possible to reach those students and staff members who had high levels of PTSS or other forms of psychological distress. Those survivors with remarkable PTSS were actively offered more intensive support, and when needed, they were referred to clinical assessment, as is recommended in the guidelines.

Relying only or mainly on the knowledge that most people recover by themselves and with the support from their next-of-kin may underestimate the painfulness of psychological distress. It may also result in a situation in which support is offered only after severe dysfunction has already developed (Saari & Hynninen, 2010). Ensuring that at least those most severely exposed to the trauma and those who have lost their loved ones are actively offered support and care more than once is pivotal. By taking all these aspects associated with seeking support into account, professional care can respect the individual timetables of recovery. The results of this dissertation confirm that it is possible to offer psychosocial care in a way that emphasizes the basic assumption that the survivors are ordinary people in an extraordinary situation and that they are eligible to receive the support and care they need when they need it and as long as they are in need of it.

4.3 Application of the attachment-related knowledge in psychosocial care

When developing outreach models to facilitate recovery after traumatic experiences, the role of attachment style is worth taking into account because it has an

impact on the trauma recovery in various ways, as mentioned in earlier studies (e.g., Fraley et al., 2006; Mikulincer, Shaver, & Horesh, 2006) and as the study presented in this dissertation shows. Attachment theory formed the theoretical basis for the outreach model in the context of the Kauhajoki school shootings. For example, the knowledge of the activation of the attachment system in times of distress was utilized when providing overall psychoeducation to the citizens via mass media. The invaluable supportive role of close relationships and parenthood was emphasized in press releases. The knowledge of attachment-specific coping styles and help-seeking behavior was utilized among the school community and among the relatives of the deceased.

The study that is described in Article IV revealed the important role of attachment style in the levels and timing of PTSS and dissociation, as well as in achieving PTG. The secure attachment style was found to be a protective shield against PTSS and dissociation, which concurs with the earlier research results of, e.g., Fraley et al. (2006); Kanninen, Punamäki, and Qouta (2003), and Mikulincer et al. (2006). The survivors with the secure attachment style have learned several ways of regulating their emotions by themselves, as well as to express their emotions freely. They feel comfortable asking for help and support when they need it (Mikulincer & Shaver, 2010). In the context of a school shooting, the survivors with the secure attachment style may therefore seek help and utilize the support they are offered from their significant others and professionals as well. It is natural and neutral for them to be comforted by other people.

On the other hand, those survivors with either insecure-preoccupied or insecure-avoidant attachment styles are more vulnerable to PTSS and dissociation, as the results of the study presented here confirmed. The study noted that the survivors with the insecure-preoccupied attachment style had higher levels of PTSS and dissociation during the early phase, i.e., four months after the shootings and at 16 months than did those with either the insecure-avoidant or secure style. The attachment theory provides an explanation for this: the survivors with the insecure-preoccupied attachment style have not learned to trust the availability of support in their early relationships. Therefore, they tend to show their distress openly and even maximize it in order to obtain attention and the support (Mikulincer & Shaver, 2010). Their ability to soothe themselves is not good enough in the aftermath of a traumatic event, and they need others to help them to regulate their emotional and physiological arousal in order to decrease their risk of PTSD. Because their PTSS are usually visible, their distress can be recognized by others, and they may thus be likely to obtain support from both their next of kin and from professionals than those with the insecure-avoidant attachment style, whose PTSS may not be as visible (Fraley et al., 2006).

The survivors with the insecure-avoidant attachment style had more intrusive and hyperarousal symptoms as late as the final assessment (T3, 28 months) than

those with the insecure-preoccupied or secure attachment style. These results concur with the previous study of Fraley et al. (2006). It is typical of those survivors with the avoidant attachment style to manage on their own because they have learned to trust only themselves in times of distress. They often minimize their reactions, and therefore, it is not easy for others to recognize their need for support, because they seem to cope well (Fraley et al., 2006; Mikulincer & Shaver, 2010).

These attachment-style-dependent ways to regulate emotions are not conscious choices, but because they have a strong impact on PTSS and help-seeking behavior, it is essential to acknowledge the attachment-specific issues when tailoring support for the trauma survivors. Because the timing and intensity of their trauma-related distress varies, services should be provided to them actively and discretely, bearing in mind that they probably need support at different dosages and timings according to their attachment style.

These results validate the outreach model's way of providing support in different phases of recovery. Psychosocial care for the students and staff was provided in the school environment in a way that normalized the need for support and minimized the possibility of stigmatization, as is recommended by, e.g., Pfefferbaum et al. (2013) and Yule and Canterbury (1994). The possibility of obtaining support not only during the immediate phases of recovery but also during the ongoing phases as well respected the needs and timetables of the surviving students and the relatives of the deceased as well.

4.4 Healing elements of support according to the trauma-exposed students

One of the main aims of this dissertation was to increase the scale of practical tools aimed at supporting those who had been exposed to a school shooting or other traumatic event. Therefore, some of the most-mentioned healing elements of the professional support are discussed below. Even though the study did not evaluate the effectiveness of the interventions used, the students' perceptions of them provide invaluable information to the clinicians who try their best in helping the survivors to cope better. It is pivotal that professionals provide theory- and evidence-based support and use updated interventions when supporting the survivors. Theory-based and recommended interventions that are especially appreciated by the survivors themselves should naturally be utilized.

A possibility of sharing experiences was mentioned as a beneficial element of support, which enhances the knowledge of the need to form a narrative of what happened and to connect with those who have had similar experiences (Arnberg et al., 2013; Pynoos et al., 1997; Shaw, 2000). This need was met by providing special group discussion sessions for the trauma-exposed students and staff. Sin-

gle-event debriefing was avoided, as recommended (Duodecim, 2009; TENTS, 2008). The groups were formed based upon members having similar experiences during the event. In practice, the groups were the familiar study groups because most of the students had the same level of trauma exposure, and thus, the grouping was based on their natural groups, as e.g. Yule and Canterbury (1994) recommends. The group discussion sessions aimed to facilitate a sense of togetherness and recovery. The students mentioned that it was helpful for them to talk with their classmates, who could really understand what had happened, which concurs with the results of Arnberg et al. (2013) and Yule and Canterbury (1994).

The expertise of the professionals was also mentioned as being helpful in recovery. The students appreciated that experienced professionals were available for them. Private sessions with professionals were considered helpful, which concurs with the knowledge that group discussions are important but may not be sufficient for everybody (Pfefferbaum et al., 2013; Yule & Canterbury, 1994).

Psychoeducation was mentioned helpful as well. The students reported being relieved when they learned that their PTSS were normal reactions, instead of signs of "going crazy". The same kinds of thoughts were also reported by Yule and Canterbury (1994). Helping to decrease strong PTSS is an essential recommendation in the guidelines and best practices (AACAP, 2010; Foa et al., 2000, 2009; Hobfoll et al., 2007; TENTS, 2008). Learning to regulate hyper- and hypo-arousal is important for trauma recovery because PTSS such as alertness, hypervigilance, or jumpiness may predict PTSD. Breathing is also easily disturbed when a person is stressed or scared. However, by breathing deeply enough, it is possible to develop at least some control over psychophysiological hyperarousal (van der Kolk, 2006). "Teaching how to breathe and calm yourself" was mentioned as an example of useful psychoeducation, which confirms its importance in practice.

Psychoeducative group discussions led by professionals were appreciated by the students as they helped them to understand and regulate their PTSSs. The students further reported that the presence and stability of the professionals helped them to feel safe, which is one of the main aims of psychosocial support (Hobfoll et al., 2007).

Special interventions, such as psychotherapy and EMDR were mentioned as beneficial. In Finland, there are some psychotherapists with trauma-focused cognitive behavioral therapy. There are also training programs for trauma-focused psychotherapy, which include EMDR training as well. TF-CBT and EMDR are recommended interventions, e.g., Duodecim (2009), TENTS (2008), and WHO (2013) and therefore, these approaches were prioritized when recruiting psychotherapists for the students, staff, and relatives of the deceased. About a fifth of those students who had psychotherapy had also had EMDR, which is quite a reasonable fraction.

4.5 Implications and future directions

4.5.1 Generalization of the results

Finland is a small country that has reasonably good resources within the healthcare sector and crisis work. There is a firm and legitimized practice of providing early interventions after crises, and methods for long-term support and follow-up has been developed, especially after the recent large-scale national tragedies (Ministry of Social Affairs and Health, 2009; SPL, 2010; Saari & Hynninen, 2010). Experiencing two school shootings within a one year was, however, a shock to the authorities, but their ability to function was sustained, probably because of the cumulative expertise and well-functioning networks in the crisis field. Because the language of traumatization is mainly psychobiological and thus not dependent on culture or language, the methods that facilitates trauma recovery may be utilized universally and several implications for the outreach models may be used in other countries as well. At least the following principles may be generalized and applied in the aftermath of future tragedies:

1) **A generic outreach model of acute and long-term psychosocial care** can be recommended as it follows the updated guidelines and takes into account the uniqueness of the recovery process. The support provided in the immediate aftermath of the trauma and early interventions are just the beginning. For a majority of the trauma-exposed survivors, it may be enough to receive normalizing psychoeducation and increase their understanding of PTSS and the ways to cope with them. For some, however, this is definitively not enough. The need for more tailored mid- and long-term support is acknowledged in the recommendations and consensus statements (AACAP, 2010; Hobfoll et al., 2007; NICE, 2005; TENTS, 2008). The central role of ongoing organized support was revealed in the context of the Finnish school shootings. Those survivors whose needs and readiness to receive professional support appear over the long term should have the same support as those who need support during the early phases. Frequent screening, watchful waiting, and educating grassroots workers in recognizing PTSS turned out to be practical ways of acknowledging the delayed need for support, and they can thus be recommended as tools with which to find, recognize, and help those who need support in the long term.

2) The **multi-operational and multidisciplinary collaboration** is an effective way to organize and implement long-term psychosocial care. When the authorities from various administrations share a single task, the responsibilities and duties can be shared, which prevents the overlapping of services. Well-functioning outreach requires close cooperation between the authorities. A prerequisite for multi-sectorial cooperation is that all of those involved must commit themselves to a common objective and show flexibility and mutual trust. It is pivotal to re-

cruit personnel who are suited to demanding and long-term aftercare (Zulueta, 2007). As is recommended, preparedness for mass crisis situation should begin long before anything happens (TENTS, 2008). When the mapping and training of experts is done beforehand, resources are easier to bring into use. The experiences gained through the multidisciplinary outreach model presented here show that it is possible to organise a well-functioning multi-actor cooperative effort with a common objective: facilitating recovery.

3) **Prioritizing** is necessary because the extra resources for support are limited and not meant to become permanent. The results of earlier studies and those presented here show that there is a significant dose effect between the severity of exposure to the traumatic event and the degree of PTSS (Haravuori et al., 2012; Hughes et al., 2011; Pynoos et al., 1987; Suomalainen et al., 2011). Also, losing a loved one through a violent act increases the risk for PTSD and complicated grief (Bryant, 2012; Murphy et al., 2003). In the outreach model presented here, the needs of the relatives of the deceased and the students and staff of the trauma-affected school were met. Their needs were prioritized because they had lost the most and/or experienced the worst.

4.5.2 Future directions

The research in the trauma field is increasing. The cumulative results regarding, e.g., the origins of traumatization; the role of attachment style, recovery trajectories, and resilience; and evidence-based interventions builds a bridge between the clinical practices and science. They both need each other in order to help people cope with shocking situations better. There is, however, still lack of studies that reveal the long-term consequences of school shooting trauma exposure and bereavement after losing a loved one in a massacre with multiple victims. Thus, additional research is needed. For example, the professionally led peer support group process was highly appreciated by the participants (Article I in this dissertation; Dyregrov et al., 2009; Harjajärvi et al., 2006; Saari, 2006), as was the phase model of psychosocial care among the trauma-exposed students (Articles II and III). More research is, however, needed to evaluate their effectiveness scientifically.

Attachment style has an important role in trauma recovery, and it would be beneficial to study the role in more depth, e.g., how attachment style is associated with help-seeking behavior, recovery trajectories, and perceived quality of life after trauma exposure. Also, the psychobiological origin of traumatization is a field with much ongoing research. The role of hyper- and hypo-arousal and the ways of regulating arousal would be an interesting subject for research. Such research could provide invaluable information about the coping skills the survivors have, use, and develop.

In the aftermath of future tragedies, the Internet and social media will have a more central role in providing psychoeducation and support. Websites and social media should be utilized comprehensively on a daily basis, which is already occurring in some cases. For example, the International Society for Traumatic Stress Studies and the National Child Traumatic Stress Network publish practical psychoeducative materials on their websites and social media frequently, especially after man-made tragedies such as shootings or after floods or other natural disasters. Websites have been used in Finland as well to some degree, but comprehensive and continuous utilization is currently under development.

After some time elapses, those who were in the outer circles of vulnerability, i.e., those not directly exposed and professionals may need support and a chance to ventilate their experiences. In the context of the Finnish school shootings, this need became visible, e.g., in the police force (Järvelin, 2011). Witnessing the scene of a massacre is not an ordinary job for anyone, not even the police or other rescue workers. In the future, more research should study how professionals cope with the extremely demanding task they perform when supporting the traumatized. Developing effective ways to minimize vicarious traumatization and compassion fatigue is important as well. Post-trauma workshops with peer support discussions, psychoeducation, and a chance to process work-related stress with EMDR has been provided to police officers in the US for years (McNally & Solomon, 1999). This intervention has been implemented in Finland recently, and it has been used among policemen and healthcare professionals. It might be a suitable intervention among other authorities as well because it aims to promote well-being and decrease vicarious traumatization. The effectiveness of the intervention should, however, be scientifically studied as well. Taking care of those who take care of others is of utmost importance in order to prevent vicarious traumatization and facilitate well-being and commitment to such demanding work (Figley, 2002; Järvelin, 2011; Rothchild & Rand, 2006; TENTS, 2008).

4.6 Strengths and limits of the study

This dissertation is a combined analysis of clinical practices and empirical studies. This is both strength and a limitation of the dissertation. The reason for the combination is my two-fold role as a clinician and a researcher. Personally, I have over 20 years of experience as a clinical crisis psychologist and over 10 years of experience as a crisis and trauma psychotherapist. I have been involved in the aftermath of several small- and medium-size tragedies and in national large-scale disasters as well. My clinical experience had convinced me of the human capacity to recover, but I wanted to learn more about the underlying mechanisms that af-

fect the course of recovery. Why do some people thrive in a "better" way than the others? How could clinicians facilitate recovery in most effective ways?

When I was first joined a research group of the National Institute of Health and Welfare in 2007, directly after the first school shooting had took place in Finland, my ambitions as a post-graduate student focused mainly on examining these underlying mechanisms that facilitate recovery after exposure to a school shooting. But crises do happen, and they do change plans. The baseline assessment among the pupils of the Jokela school center had just been conducted and the research group members were analyzing its preliminary results. I had spent hours and hours reading and updating my knowledge of research results, guidelines, and outreach models for mass trauma events. That knowledge was suddenly needed when the second massacre occurred in Kauhajoki in 2008.

My roles as crisis psychologist, psychotherapist, and researcher were tightly combined. I was in a position in which I could affect in organization and the content of the acute and long-term outreach. It was important to ensure that updated and theory-based interventions were implemented as recommended to the highest possible extent. One aim of the outreach was to evaluate it afterwards. I decided to analyze why, when and how the theory-based clinical interventions were implemented and what the survivors perceived as helpful. Letting the voices of the trauma-exposed survivors be heard was essential in developing the most effective care, both as clinicians and as researchers.

The strength of this dissertation is in its bridge-building content. This dissertation also aims to provide clinicians in schools and healthcare practical tools with which to facilitate recovery. It increases the knowledge of issues associated with trauma recovery. The important role of attachment style in recovery was revealed, and these results may be utilized in clinical practice immediately.

There are, however, several limitations of this dissertation. First, the empirical study was conducted only among trauma-exposed students. The recovery processes of the relatives of the deceased, the staff of the trauma-exposed school, and the authorities were not studied empirically. Also, the relatives' perceptions of the provided support were not scientifically analyzed. As crises happen without warning, the study protocol for the trauma-exposed students' experiences was retrospective. It was therefore not possible to assess neither the psychological statuses of the students nor their attachment styles prior the trauma exposure.

The trauma-exposed students in Kauhajoki were mostly female, which can be considered a limit of the study. However, the response rate indicated that the research included two-thirds of the students, which is quite reasonable in trauma research. In the study protocol we had to shorten some of the questionnaires in order to keep the length of the questionnaire reasonable. However we kept those questions that were the most appropriate for adolescents and young adults.

Taking these strengths and limits of the study into account, this dissertation hopefully fulfills its aims of deepening the understanding of the multiple consequences of a rampage school shooting and the ways in which to help the survivors face their new situation.

4.7 Conclusions

September 23rd, 2008 was supposed to be just a normal Tuesday. It turned out to be a day when time froze and everything was changed. On that day, the lives of innocent, ordinary students and a teacher were lost. On that day, the lives of the next-of-kin of the deceased were changed forever. On that day, the students and staff of the Kauhajoki school faced life-threatening danger in their previously safe working environment. That day shattered the sense of safety for many citizens and communities around Finland and placed many authorities in a new and demanding situation.

However, that was also the day when the seed of recovery was planted, the strength of individual and collective efficacy was revealed, and solidarity and togetherness began to facilitate recovery. Simultaneously, the professionals began to walk beside the survivors, supporting those who were in greatest need. This dissertation aimed to illustrate the diverse psychological consequences of a school shooting, the elements that are associated with trauma recovery, and examples of the trauma- and attachment-theory-based psychosocial support interventions used. In a crisis situation, the need for support starts immediately and lasts for a long period of time. However, the resources to offer support are limited and thus the support should be provided in a most effective and comprehensive way bearing in mind that most people recover with the support from their natural social networks. The challenge for the psychosocial outreach is to find those in greatest need of additional and /or professional support. In the Kauhajoki case, two groups of survivors were prioritized due to their high exposure to the event: the relatives of the deceased and the students and staff of the trauma-affected school.

Because school shootings and other mass-violence tragedies continue to happen, it is of most importance for the authorities to be prepared for them but not scared of them. This means, among other things, learning from others, practicing, and updating the knowledge of theory-based interventions and recommendations regarding the care of those exposed to a traumatic event. Well-functioning relationships between authorities are invaluable when the crisis hits. The time to build and enhance them and to prepare the evidence-based preparedness plans is now, before anything terrible happens.

I hope this dissertation contributes to the trauma field, which aims to facilitate recovery after tragedies. Recovery is both possible and probable (Bonnano, 2004,

Haravuori et al., 2012; Haravuori, personal information, 2014). The miracle of recovery was confirmed in Kauhajoki, for example, by witnessing the fact that the students who lost their classmates in the massacre did graduate from the SeAMK. Some of them graduated on time, others a slightly later (Varmola, personal information, 2013).

It is not possible to travel back in time and undo the tragedy. There is no way to forget, and there is no need to forget. The lives of the deceased were lost much too early. They will always have their special places in the hearts of their loved ones and peers, and their memory will be cherished. The students and staff of trauma-exposed schools around the world will always remember the day when fear and terror entered their schools, but hopefully, they will also remember how they managed to support each other as a community and as individuals. Fortunately, there are ways to process and cope with what happened and to regain a sense of safety. The special role of the outreach models of professional support is to share expertise in times of trouble and find those who need supplementary professional support. The professionals' golden, implicit message should be: You are safe now. You are not alone, and most importantly, there is always hope.

Appendix

Figure 5.
A gesture of sympathy and condolence. Copyright Anu Hietarinta.

The piece of art in Figure 5 represents the healing power of social support. This wall-size painting was made by the pupils and staff of an elementary school located near the Jokela school center, the school at which the first shooting happened. The text in the painting reads, "For you all. These hands will hold you." It was sent to Kauhajoki after the school shootings happened there. This piece of art turned out to be very important for the trauma-exposed school community, and it hung on the wall of temporary premises and the renovated school. When the next school shooting happened, in Winnenden, Germany, on March 2009, the students of the Kauhajoki school wanted to send a similar one to the survivors in Germany. They bought the finger paints, translated the text, and pressed their handprints on their piece of art. They wanted to share their sympathy because they know how touching and encouraging sympathy could be. They wanted to say, "You are not alone. There is always hope."

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Original publications

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Psychosocial Support for Trauma-Affected Students After School Shootings in Finland

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In Finland, as many as 20 people have lost their lives in two school shootings within one year. This article describes trauma-theoretical rationale, planning, and implementation of acute and long-term psychosocial aftercare that was organized in Kauhajoki where one of the school shootings happened. The aftercare was embedded in the school community's everyday life to enhance easy access. The aftercare proceeded in 6 phases, involving the immediate support phase at the first 24 hr, the acute phase for the first 2 weeks, followed by a 5-month period of empowerment, normalization, and creating "a safe place." The habituation phase coincided with the completion of the renovation of the damaged school building and students returning to the scene. The first anniversary was marked by shared rituals and remembrance, and the follow-up phase lasted until the end of the aftercare in 2 years. The aftercare contained, for example, psychoeducation, screening, and services at community, group, and individual levels.

Keywords: school shooting; psychosocial aftercare; crisis intervention; phase model; multidisciplinary cooperation; trauma

The school system in Finland is regarded as a well-functioning and safe learning milieu providing high-quality educational results (Organisation for Economic Cooperation and Development, 2010). However, there have been two serious school shooting tragedies in the past few years in Finland, in which as many as 20 people—including pupils, students, and school personnel—have lost their lives. These two school shootings differ from each other in many ways but, at the same time, they show common characteristics. Both also share similarities with school shootings in the United States in the systematic planning to kill, usage of specific arms, informing public through the Internet, and having a history of school bullying (Henry, 2009; Newman & Fox, 2009; Wike & Fraser, 2009). On November 11, 2007, in a school center in Jokela, one of the students shot six fellow students, the school nurse, and the headmaster. After that, he shot himself. On September 23, 2008, on the premises of the University of Applied Sciences in Kauhajoki, a student shot nine of his classmates and his teacher before killing himself.

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Adaptation after traumatic event is agreed to be a long, multilevel, and demanding process that can result in recovery or psychopathology. Effective professional help must be based on accurate knowledge about the timing, content, and progress on individual and societal trauma responses. In this article, we describe how the immediate, acute, and long-term professional aftercare were planned and executed in a 2-year systematic aftercare in Kauhajoki. Furthermore, the aftercare services, elements, and contents are analyzed.

PSYCHOSOCIAL AFTERCARE FOR TRAUMA-AFFECTED STUDENTS AND SCHOOL PERSONNEL

In Kauhajoki, the perpetrator was one of the school's own students. He entered the school building right before the lunch break and went straight to his own classroom where his fellow students were taking an exam. The perpetrator opened fire immediately and shot to death nine of his fellow students and a teacher who was supervising the exam. Then he set the classroom on fire and walked around the building continuing shooting and damaging the premises. He threatened a great number of other people as well, although he did not kill them. Most of the other students and the school staff were able to get out of the building moments before the perpetrator came out from his classroom because of a rapid evacuation command (Ministry of Justice, 2010).

The psychosocial aftercare for the school shooting survivors was planned in the context of the governmental recommendations that all municipalities in Finland are obliged to organize crisis teams that provide psychosocial support according to the demands and needs in specific phases of the trauma recovery (Ministry of Social Affairs and Health, 2009). Timing, form, and content of the psychosocial aftercare was further based on the international guidelines of the World Health Organization (Ommeren, Saxena, & Saraceno, 2005), National Institute for Health and Clinical Excellence (2005), American Psychiatric Association (2004), evidence-based consensus (Hobfoll et al., 2007), as well as clinical experiences of the crisis psychologists. Hobfoll et al. (2007) identified five empirically supported intervention principles to be applied to the early to midterm stages of mass trauma aftercare that formed an important base for the psychosocial aftercare in Kauhajoki. They include (a) regaining and maintaining the sense of safety, (b) calming down upset minds and providing support, (c) increasing sense of self- and community efficacy, (d) connectedness involving the activation of natural healing networks, and finally (e) encouraging hope and belief that recovery is possible. In addition to these guidelines, the psychosocial aftercare followed sensitively the actual and unique demands of the vulnerable students (Wethington et al., 2008) and methods and interventions were tailored to their special needs.

As soon as the severity and full extent of the traumatization was realized, it became evident that the crisis affected hundreds of people and therefore the special Kauhajoki project was founded. It was a multioperator, multidisciplinary, and multiprofessional project and it coordinated the psychosocial support to the traumatized communities and individuals until the end of 2010, that is, 2 years and 4 months after the school shooting (Ala–aho & Turunen, 2012). The main aftercare team consisted of four crisis psychologists, two psychiatric nurses, one school nurse, and one psychiatrist.

The *immediate support phase* of the aftercare consisted of psychosocial support offered to the victims within the first 24 hr. The students were in psychological shock and targeted interventions were active, empathic, and practical. The second phase was the *acute*

phase, with duration of 2 weeks. During this phase, the school and the aftercare team organized temporary psychoeducative programs for the students. The *empowerment and normalization phase* followed during the next 5 months as the school operated in temporary location. This phase served as a safe-place-time and was also the time for systematic screening for trauma-related symptoms, and teaching anxiety-releasing techniques, as well as providing individual support. The *habituation phase* started when the renovation of the damaged school building neared the end and moving back to the old building was approaching. Interventions aimed for the safe return to and a new start in the old building. The *first anniversary phase* dealt with the reactions, fears, and rumors raised by the upcoming anniversary. The last phase was called the *follow-up phase* and lasted from the first anniversary to 2 years. During the last phase, the community was getting back to normal. The aftercare team conducted "watchful waiting" for possible late trauma-related symptom and gradually transferred its work to the local health care system. These phases and interventions are illustrated in Table 1.

Immediate Support Phase

The aim for immediate psychosocial support was to offer structure and a safe place for trauma-affected students and personnel to feel safe and share their experiences. It also served as a change to identify those in need for individual support. Police and other authorities arranged a central place where they provided important, updated information and instructions to the survivors. It is crucial that people in crisis can easily reach active support and consoling and get clear and systematically formulated information about the situation. They need to contact their next of kin as soon as possible at least by phone. Survivors should not to be left alone near the place where they just had experienced life threat and horror because they might be in psychological shock, suffer from peritraumatic dissociation, and have acute posttraumatic stress disorder (PTSD; Hobfoll et al., 2007). There is evidence that support given immediately after the traumatic event can counteract and prevent long-term adverse effects (Davidhizar & Shearer, 2002) through calming, assuring safety, and identifying risk groups.

Psychosocial support for the students and personnel of the Kauhajoki school began immediately after the alarm sounded and the order to evacuate the building was given. The psychological shock, terror, and disbelief were tremendous. Students, teachers, and relatives were looking for their missing loved ones. Others had witnessed the perpetrator's violence, heard shooting, or smelled the odor of smoke and gunpowder. Some had been shot at before being rescued. Many of the victims suffered from acute stress reactions and showed severe distress. The most traumatized students were taken to the medical center for assessment. Immediate support was offered mainly by local health care professionals and the school personnel. Local youth workers, as well as church, and volunteers of the Finnish Red Cross performed also very valuable crisis work among the young and others from the very beginning.

Acute Phase: Psychoeducation and Risk Identification

About two out of three trauma survivors recover from trauma-related distress without developing mental health disorders such as PTSD (Bonnano, 2004; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Along these lines, a study in a context of school shooting found that about a quarter (27%) of those who had lost their classmates suffered from PTSD 8–14 months after the massacre (Jonker & Hamrin, 2003). The levels

of posttraumatic stress symptoms (PTSS) at 4 months were similar (27% IES score ≥ 35) among Finnish female students exposed to the Jokela school shooting (Suomalainen, Haravuori, Berg, Kiviruusu, & Marttunen, 2010). Whereas, only 15% of students in the Virginia Tech shooting showed these high levels of PTSS 3–4 months after the massacre (Hughes et al., 2011). On the other hand, 30% of the 239 female students exposed to Virginia Tech shootings suffered from significant PTSS 2 months after and 24% 6 months after the massacre (Littleton, Grills-Taquechel, & Axom, 2009). These studies reported a dose–effect relationship between severity of exposure and PTSS, that is, students with direct witnessing of shooting and traumatic losses were most vulnerable to PTSD symptoms. The aftercare team was aware that female gender, life-endangering trauma exposure, lack of social support, family mental health burden, and earlier traumatization are considered risk factors for PTSD (Holbrook, Hoyt, Stein, & Sieber, 2001; Ozer, Best, Lipsey, & Weiss, 2003). Further acute stress disorder (ASD) is also known to predict PTSD.

The aims of acute psychosocial support in Kauhajoki were to enhance the support of the natural social networks, give information, normalize overwhelming psychological and physiological reactions, and help to regain a sense of security. Psychoeducative information was formulated to help severely traumatized victims to comprehend what has happened and understand better their behavior and emotional responses. Relaxation and anxiety management techniques in turn aimed at helping survivors to achieve normalization, feelings of control, and effective emotional and physiological arousal regulation. Identifying students and personnel who were most traumatized and needed specific care was also an important task in the acute phase (Pynoos & Nader, 1988).

The planning of the acute phase support was based on the knowledge that trauma and life threat reactivates early attachment-related ways of coping, seeking help, and expressing feelings (Mikulincer, Shaver, & Horesh, 2006; Punamäki, 2006). In times of crisis, children and adolescents look for adults and peers for stability, affiliation, and security, and therefore professional help should enhance support from natural networks. Social support from family, friends, and other significant persons is considered critical in trauma recovery, in general, and also after school shooting tragedies (Littleton et al., 2009).

In the morning following the tragedy, the school personnel and students were gathered together at the temporary building. The prime minister, two other ministers, and the principal of the Seinäjoki Joint Municipal Authority for Education, the deans, and other leaders were present. They spoke to the audience and promised provision of care and support. The student pastor led a moment of remembrance. The aftercare team (crisis psychologists, psychiatric nurses, and a psychiatrist) introduced themselves and gave some initial information about common stress reactions and self-treatment and advised where to get psychological help. At the end of the common session, the students were given the schedule for the following days that included, for example, group discussion sessions and contact information of the aftercare services.

The first screening to identify students with special needs was realized through interviews and individual support. The aftercare team interviewed every student and evaluated the mental health status, available social support, and special needs. Students who needed individual psychological help were guided to the health care center. The aftercare team called by phone every student who were not present and gave information about organized help. The interviews in the school and phone calls served as the first screening to identify students who would need special care, including those directly exposed and with severe ASD.

TABLE 1. Aftercare Phases, Types of Interventions, Aims, and Healing Elements

Phase Interventions	Immediate	Acute	Empowerment and Normalization	Habituation	Anniversary	Follow-Up
Psychoeducation	• Normalization • Calming	• Normalization • Self-care practices • Information of normal stress reactions • Teaching methods to regulate arousals • Introducing the Window of Tolerance method for regulation	• Promoting feeling of hope and confidence in oneself and community • Normalization and affirmation that the danger is over • Teaching about trauma triggers • Teaching about trauma impacts on social, emotional, and cognitive domain	• Normalization of the reactions when reentering the trauma scene • Teaching about trauma triggers • Reminding about the usefulness of the Window of Tolerance and other methods of emotion regulation • Information about understanding and recognition of own and other responses to traumatic stress	• Talking about the cycle of the year • Normalization • Discussions about timing and nature of grief • Healing function of memories • Information to prevent rumors spreading • Support to adults to act as safe figures	• Raising awareness of possible delayed trauma symptoms • Triggers to activate trauma memories • Vicarious traumatization • Training grassroot workers about working with trauma survivors
School community, family, and media	• Promoting feeling of safety • Providing safe gathering place • Helping to get connected (e.g., providing cell phones, name lists) • Taking care of the basic needs	• Promoting connectedness, a sense of safety, and hope • Common program • Rituals such as “The power circle” • Psychoeducation and information via media • Family gatherings	• Promoting feeling of safety and cohesion • Frequent common sessions for the school community • Importance of information and rituals	• Promoting feeling of hope and trust • Frequent common sessions for the school community • Rituals of moving back • Family gatherings • Press releases about the recovery and building process	• Promoting feeling of safety • Frequent common sessions • Making a safety card • Rituals of mourning together • Press conference • Family gatherings	• Promoting sense of survival • Common sessions when needed • Providing information about the psychosocial services • Family gatherings • Press releases • Publishing and sharing research results

Group		• Ventilation groups for the students and school personnel • Multiple meetings with informative contents	• Group discussions • Psychoeducation of trauma symptoms • Peer support meeting and sharing of emotions and training coping strategies • Encouragement to speak about trauma to construct a narrative	• Group discussions about thoughts, fears, and future expectations • Symbolic and in vivo habituation in the old school building • Create safety by exploring the school building inch by inch • Peer support meeting for trauma-affected students and their families	• Group discussions dealing with recovery, fears, and sorrow • Training the usage of anxiety management techniques	• Last group discussions for reassessing the well-being
Individual	• Calming and consoling • Guidance to medical assessment	• Guidance to psychological treatment	• Supportive discussions • Trauma-focused and other psychotherapy • Physiotherapy	• Trauma-focused and other psychotherapy • Supportive discussions • Physiotherapy	• Trauma-focused and other psychotherapy • Supportive discussions • Physiotherapy	• Psychotherapy • Support for school work and completing the studies
Screening	• Identify survivors with severe acute reactions • Referral to medical assessments	• Screening via supportive interviews	• Systematic individual screening of the severely exposed • Health checkups • Comprehensive screening together with the research group	• Follow-up screening of the severely exposed students	• Screening by student welfare team	• Follow-up screening of the severely exposed • Assessments by the research group at 1- and 2-year follow-ups

During the following 2 weeks, the school organized mutual program for the students as a means to gradually restart the curriculum. The schedule was similar every day: in the morning, everyone gathered together to hear information given by authorities, school personnel, and aftercare team; in the afternoon, there were alternative activities in which the students could choose to participate. At the end of each mutual morning session, a ritual called "The Power Circle" was performed. Everyone took each other's hand and stood quietly in the circle, feeling the power spreading in the group. This ritual enhanced team spirit and hope and promoted feelings of surviving together. At most, there were about 200 people in the circle.

Voluntary programs of swimming, gymnastics, and dancing served a way of relaxation and anxiety management during the first 2 weeks. The aftercare team and several crisis workers took part in the voluntary program as group members to be available for students who wanted to have a private conversation. A part of the students went back to their hometowns and their health care organizations were informed about the possibility of increasing need for professional support.

Many of the families of the students lived hundreds of kilometers from Kauhajoki, but the parents came to meet their children as soon as they had heard the news. Crisis workers were available for them too. Parents could participate in group discussions of their own. In the following week, the school organized an evening event for the parents and other family members. In this "family evening," school personnel and police gave information and crisis psychologists presented a psychoeducative lecture, for example, about common responses to trauma and ways of getting help.

The aftercare team provided psychoeducation also via local media. It included articles about common reactions in crisis situations, special developmental issues related to children's and adolescents' stress reactions, family issues, help for parenting traumatized children, and information about aftercare services.

Acute Phase: Psychosocial Group Work

The adolescents experienced the school shooting trauma as a group, and thus a group approach was chosen as a main method of support. The aim was to increase cohesiveness and affiliation as well as to enhance learning and emotion sharing. Group participation allows and encourages the members to discuss, share, and ventilate their emotions, which in turn promote catharsis, identification, and a sense of safety in the school (Somasundaram & van de Put, 2006). The here-and-now group discussions help survivors to transfer their attention from the past trauma and focus more on the present. Sharing their coping experiences and ways of regulating trauma-related emotions provide survivors possibilities to learn and validate their own feelings (Layne, Pynoos, & Cardenas, 2001; Veenema & Schroeder-Bruce, 2002).

In Kauhajoki, psychosocial group consultations were arranged separately to the students and school personnel. They were called as ventilation groups and participation to these groups was absolutely voluntary. Each group had two experienced leaders, one crisis psychologist and one psychiatric nurse, and each session lasted for approximately 2 hr. The groups were formed based on the severity and nature of trauma exposure. Most of the students had similar traumatic experiences and their ventilation group consisted of their own familiar peers. An own group was formed for the most severely exposed students, that is, those who had witnessed the shootings, been in a direct life danger, and lost their classmates.

The goal for the group sessions is to share mutual experience and construct a narrative of what had happened (Shaw, 2000). Integrated and comprehensive narratives of the event

are encouraged because successful construction of shared, factual, sequential, and coherent trauma story is considered beneficial for recovery from trauma (Brewin, 2014). It is common that rumors start to spread immediately after mass trauma, and so was it also in Kauhajoki. Psychoeducative elements thus formed an important part of the ventilation group work in Kauhajoki. The information was, for example, about negative consequences of possible avoidant actions such as alcohol use, numbing emotions, and avoidance in social contacts. Groups were taught some stress-regulation methods such as deep breathing and relaxation. The Window of Tolerance method was introduced to help students recognize and regulate their psychological and physiological arousal and keep it in tolerable level (Ogden & Minton, 2000). It is recommended that survivors should not be offered single group meeting or individual consultations including therapeutic elements in early stages of recovery (Witteveen et al., 2012). Accordingly, the group work in Kauhajoki concentrated on practical issues, help, and advice in the acute phase after shooting. However, the early group work acknowledged the survivors' natural need to ventilate and to construct a mutual narrative and share their trauma-evoked emotions. At Kauhajoki, ventilation groups met several times during the aftercare process, two times in average during the acute phase.

The role of the school personnel is very important after the trauma because they are familiar and trusted adults who signify safety and continuation to the students. Students carefully observe their teachers' responses, and their signs of recovery served student's trust and hope (Pynoos, Goenjian, & Steinberg, 1995). It was important that school personnel had the opportunity to come together to discuss and share the actual and precise information and check out the rumors as they start to spread after the trauma. However, the personnel were as traumatized as the students and needed also help to cope with their own trauma. The procedure of helping teachers first was conceptualized as an "oxygen mask"—principle similar to airplane instructions of advising parents to put on the oxygen mask first and then protect the child. However, it was emphasized that the school personnel was not expected to function as therapists for the students. The teachers and other staff were encouraged to process their trauma-related memories and emotions and the psychosocial support was offered to them as well.

Empowerment and Normalization Phase: Getting Back to Normal

Renovation of the damaged school building was expected to last several months. A temporary school at the Technology Center "Logistia" in Kauhajoki provided a suitable environment for the traumatized school community. It had several offices with nonaffected employees carrying on normal activities, giving the impression of normal everyday life, continuity, and safety. The aftercare team systematically planned the next phase of 5 months to enhance empowerment and normalization by using the Logistia as a "safe place." The aim was to help students and personnel to collect strength and figure out what really had happened as well as give them time and space to encounter painful and bewildering emotions and memories of the school shooting. The ventilation groups continued through this phase, sharing discussions about ways of coping, fears, and future aspects. Psychoeducation was, for example, about trauma triggers and normal and abnormal long-term consequences of trauma. Multiple forms of screening strengths and vulnerabilities among students also belonged to this phase of recovery (see Table 1).

After a traumatic event, it is important to continue as many normal activities as possible (Pynoos & Nader, 1988); and in Kauhajoki, normal lectures and studying began 2 weeks after the school shootings. On the other hand, there are observations that traumatic

memories can be reactivated even 100 times a day and traumatized persons can be in the hyperaroused or hypoaroused state (Davidson, Stein, Shalev, & Yehuda, 2004). Through psychoeducation, the teachers and students were aware of the possibility that trauma-related symptoms and problems may continue long after trauma, including irritability, mood swings, concentration problems, hyperalertness, sleeping disturbances, and irrational generalized fears. They were assured that these reactions do not necessarily lead to psychopathology and learned various ways to manage them. In the ventilation groups, students trained methods of how to recognize daily cues evoked by traumatic memories and how to regulate both overwhelming and numbed fears, anger, and worries and how to deal with excessive and fragmented emotion arousals. Using the Window of Tolerance, the students learned how to recognize their levels of physiological arousal and how to bring it back into more convenient level.

Exposure to trauma and PTSD symptoms can have dramatic negative impacts on adolescents' schoolwork and peer relations (Broberg, Dyregrov, & Lilled, 2005; Michael, Ehlers, Halligan, & Clark, 2005; Somasundaram & van de Put, 2006). Teachers and aftercare team observed various avoidance behaviors among students in Kauhajoki. For some students, it was a great achievement just to go to school and to dare to sit in the classroom. Therefore, the aftercare team arranged crisis workers to provide support, especially in the lessons that were held during dark evening hours. This kind of "in vivo" support and presence of familiar professionals helped to process easily aroused traumatic memories.

Traumatic memories often evoke intensive sensory impressions and bodily tensions are common (Ehlers et al., 2001; Ogden, Minton, & Pain, 2006). The physiotherapists' services were combined in the psychosocial support and were used as a tool to regulate the physical and psychological stress reactions among some students.

Systematic Individual and Group Screening and Support

Traumatized people are often resistant to seek treatment and usually do not see themselves as patients (Harjajärvi, Kiikkala, & Pirkola, 2007; Somasundaram & van de Put, 2006). Yet, facing a violent man-made trauma, such as school shooting, increases the risk for PTSD (Somasundaram & van de Put, 2006). Untreated PTSD, especially in adolescence, has multiple negative developmental impacts and evidence shows that receiving adequate support and treatment can prevent chronic PTSD (Punamäki, 2006; Yule et al., 2000). Subsequently, it was important to identify students who would be at risk for PTSD to guarantee their daily functioning and prevent mental health problems.

Screening for traumatic stress symptoms was done several times and several ways. *First*, a highly exposed group of students who had lost half of their classmates in the tragedy were individually interviewed by the crisis psychologists to assess their psychological status and PTSD symptoms by using the Impact of Event Scale—Revised (IES-R) questionnaire (Horowitz, Wilner, & Alvarez, 1979). In case the clinical cutoff score was exceeded, the student was referred to trauma-focused or other psychotherapy within due time. In addition, the aftercare team arranged several special peer-support meetings for the most severely traumatized students and their family members.

Second, the school nurse conducted individual general health checkups involving all students during the following 6 months after the school shooting. It was pivotal to screen both physical and psychological health status of the students because research suggest that traumatic stress can weaken the survivors' immunological and cardiovascular systems and make them more susceptible to physical illnesses (Roelofs & Spinhoven, 2007).

Third, there was a routinely working student welfare group in the school, consisting of a psychologist, a nurse, a student counselor, and teachers. It intensified its work after the shooting. The school psychologists had consultations with students who were seeking help themselves or were referred by teachers, student welfare group, or the aftercare team.

Fourth, teachers observed the possible changes in student's behavior and guided students to mental health professionals. The school psychologist screened several student groups by using interview and IES questionnaire.

Fifth, the members of the aftercare team were easily available for the students and school personnel in the school building. They had their routine meeting place in the lobbies and cafeteria. Their conversations with students or personnel in these informal situations included screening elements in addition of provided support. This type of easy access support was adopted in Kauhajoki, from experiences from colleagues working with adolescents in an aftercare crisis setting after a discotheque fire in Sweden (Broberg et al., 2005).

Sixth, the 2-year follow-up study on mental health and related factors was conducted among students exposed to the two school shootings in Finland by the National Institute for Health and Welfare. It was tightly linked to the aftercare process from the very beginning and it served as a comprehensive screening method for trauma-related symptoms. Participation was naturally voluntary, and 60.4% of the students participated in the first assessment in Kauhajoki (Haravuori et al., 2009). Students with clinical cutoff scores in IES-R for PTSD or in General Health Questionnaire for psychological distress and depression were referred to mental health services by the aftercare team.

Habituation Phase: Practical and Symbolic Return

The mass trauma of a school shooting signifies a loss of a familiar secure place that has been infiltrated with threat and horror (Hobfoll et al., 2007). In Kauhajoki, the renovation of the old school building took 5 months. Moving back to the scene of the shooting was frightening and even distressing, but, at the same time, it was something that the students had been looking forward.

All of the victims of the massacre were shot in one classroom and it would have been very stressful for everyone to go back to that particular room. The classroom was changed into a lobby with sofas and tables. Walls were painted with bright yellow to communicate light and hope. One wall was decorated by four pictures of trees and flowers that were donated by parents of one victim who had photographed the schoolyard the day before the tragedy. On another wall, there was a large painting that pupils of the elementary school of Jokela (the place of the other school shooting tragedy) had given as a present to students in Kauhajoki. It carried a text "These hands will hold you" with handprints of every pupil of that school. This expression of solidarity from peers with same trauma experiences became very important for the Kauhajoki school community, and they sent a similar art production to Winnenden, Germany, when a school shooting tragedy happened there on March 11, 2009.

The habituation process was graded according to the severity of the trauma exposure. Returning to the school was expected to be most stressful for those students who had witnessed directly the shooting and had lost their classmates in the shooting. Students with severe trauma had visited the school building with familiar aftercare professionals already several times during the renovation process. Moreover, a particular peer-support meeting was arranged for the most severely exposed students and their families in January 2009, 4 months after the shooting.

The occasion of the actual moving back to the own school was planned to involve symbolic and practical procedures to enhance normalization and collective empowerment. The aftercare team arranged a gathering in the school premises for the school personnel a day before the students moved in. It was dedicated to smooth and safe encounter with the trauma scenes and related memories that helped the settling down in the renovated building. The personnel walked around the building in small groups, inspecting every corner and room to verify its safety both symbolically and practically.

On the day of return, there were flowers and candles in the table of the lobby in remembrance of those who lost their lives there. In the school's auditorium were tables with white tablecloths holding all the letters of condolence the school had received so everyone could see, read, and feel the enormous outpouring of sympathy from different parts of the world. In the morning, students and personnel gathered in the auditorium to listen for speeches and enjoy cultural programs. The future and new hope were emphasized symbolically and practically by letting students plant a seed of barley in a large, beautiful glass bowl. Then the crisis psychologists provided information of the possibility of the reactivation of traumatic memories and how to deal with emotions and reactions that possibly arise. The students were reminded about the Window of Tolerance to help them calm down and keep arousal tolerable. The main message was that the traumatic event already belonged to the past and the building is safe for the students to study. The students were affirmed that the shooting will not happen again, even though it's memory lives among the survivors.

After the common program, the students were divided in small walking groups led by their own teacher and accompanied by a crisis worker. The purpose of the slow and solemn "going through the building" was to check every inch of it to make sure that it was safe to return for both mind and body. As one police officer said, "The building did not do any harm." Later on that day the normal lunch break followed, during which it was possible to hear usual sounds of chatting and laughter in the canteen.

The First Anniversary Phase

Recovery is not a straightforward road and also normal reactions show great variation across time. The first anniversary of the trauma can interfere with the grief process because it evokes painful memories and possibly overwhelming reactions (Cohen & Mannarino, 2006). In Finland, there were only 10 months between the two school shootings and the fear of a new one was felt everywhere in the country. In fact, there had been 225 malicious threats on schools in various parts of the country in a year and a half after the first massacre (Ministry of Justice, 2010). In the approach of the first anniversary of the Kauhajoki shooting, there was a tangible atmosphere of tension and fear and rumors of a possible new attack were spreading around.

The aftercare team observed an increase in trauma-related symptoms among students around the anniversary. These reactions were normalized and stabilized in common and group, and individual and through psychoeducation. The students and personnel were reminded and helped to acquire the relaxation and anxiety-managing techniques they had learned. The group meetings served as a place to ventilate fears and share sorrows, memories, and coping tools. An aim was to discuss rumors and the actions made to dispel them. Most of the ventilation groups met several times during the anniversary period. One practical tool to calm down the school community was printing a "safety card," which was a pocket-size card providing instructions on how to act in potentially threatening or dangerous situations.

The actual Memorial Day was peaceful and intimate. The agenda for the day involved time and space for both remembrance and grief as well as for looking forward. Teachers and students decorated the auditorium. The pictures of the deceased peers were placed on a table covered with a white cloth (with permission from their relatives). Memorial books and letters of condolence were placed in the room. A touching ceremony was the visit to the memorial stone in the front yard of the school building for the first time. Every student, school personnel member, management, and members of the aftercare team placed one dark red rose on the stone as a symbol of remembering the lost peers and friends.

The memorial ceremony involved short speeches from the teachers, deans, school pastor, and a crisis psychologist. Once more, everyone gathered in the power circle. Everyone was allowed to grieve, and feedback from the students confirmed the importance of feelings of the shared sorrow. The highly emotional and shared experience helped the students to realize that there was nothing to be afraid of and they can safely proceed with their studies. According to Hawdon and Ryan (2011), the event-specific memorials provide a communal forum of intense emotions and may reassure that the community, as a group, survives.

In the school, the atmosphere clearly changed after the first anniversary. The relief that all have survived the first year was enormous. Fears settled down, rumors diminished, and normal school work continued. The aftercare team slowly reduced its involvement yet continued informing the students about the availability of help if they still needed it.

Follow-up Phase

One aim of professional psychosocial aftercare is to make it unnecessary. It is important to make plans for the completion process early enough so that the transition phase is as controlled and smooth as possible. Trained grassroots health care workers can provide effective psychosocial support and rehabilitation services when (a) the most traumatized students receive psychosocial services tailored to their unique recovery process and (b) the normal health care staff (e.g., school psychologists and nurses) are provided sufficient knowledge and supervision about trauma (Somasundaram & van de Put, 2006). In Kauhajoki, there had been several training sessions for grassroot health care professionals to educate them to recognize trauma-related symptoms and phenomena and to improve their skills to meet and handle crisis situations.

There is evidence that trauma-related symptoms such as PTSD are long lasting and can emerge later as delayed symptoms. Therefore, follow-up phase is crucial for full recovery of school shooting trauma. A study of students exposed to the Jokela school shootings showed that, after a year, there were both new cases with a PTSD diagnosis and several new referrals for treatment (Haravuori et al., 2012). At Kauhajoki, the student welfare and aftercare teams were prepared for new clients who would need treatment in the follow-up period. Student psychologists and the nurse continued their identification and preventive work among the students. Crisis psychologists interviewed and screened the most seriously exposed students once again. This group had had programs and schedules tailored for them and they were given extra time and help to complete their studies if needed. A 1-year follow-up inquiry by the research team was conducted as planned in cooperation with the aftercare.

The semester 2010 started with a very different atmosphere than the year before. Most students who had experienced the massacre had finished their studies or would graduate within a year. Students who had already graduated were informed about the support

services and reminded about possible delayed trauma symptoms. They were instructed to contact their own health care centers if they needed help and to mention the incident, even if the reason for seeking help was somatic. At the school, the school nurse and the student welfare team are responsible for treatment guidance, as they were before the tragedy. Anniversaries had passed. The students who were present at the time of the shootings have graduated. As a whole, the school community continues its work as it used to while the memory of the tragedy being a part of the school's history.

CONCLUSIONS

Every school shooting tragedy is one too many, but this repeat tragedy seems to be phenomena of our era (Newman & Fox, 2009). There should be awareness and preparedness that the next one can happen anywhere. In mass trauma situations, the need for psychological support is enormous and provision of services should start immediately. Therefore, updated emergency, preparedness, and psychosocial support plans for schools, health care centers, and municipalities are essential, as was emphasized by Newman, Fox, Harding, Metha, and Roth (2004) and in the report of the Virginia Tech shootings (Full Report of the Virginia Tech Review Panel, 2007). These plans should also be practiced frequently.

Trauma exposure causes unique and individual symptoms in almost everyone and there are individual timetables for recovery. Some symptoms may appear delayed. Because trauma survivors differ in their need and usage of psychosocial services, it is important that these services are multiple and available for a long enough time. The timing and repertoire of psychosocial services should be based on updated research on the normal and risky course of trauma-related responses. Frequent screenings are helpful in monitoring the recovery process.

Raising the awareness of traumatization and the appropriate methods of taking care and healing the trauma are important. These inhuman tragedies, such as school shootings, cause terror, shock, and fear to numbers of young victims as we again faced after the shootings in Sandy Hook Elementary school in Connecticut, USA, in December 2012. Effective psychosocial support protect and promote their healthy development despite the pain and loss.

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UNDERSTANDING TERROR AND VIOLENCE IN THE LIVES OF CHILDREN AND ADOLESCENTS

Framework of the outreach after a school shooting and the students perceptions of the provided support

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Background: A large number of bereaved family members, surviving students, and their relatives as well as school staff and the wider community were in need of psychosocial support as a result of a school shooting in Kauhajoki, Finland, 2008. A multilevel outreach project provided psychosocial care to the trauma-affected families, students, schools staff, and wider community for 2 years and 4 months.
Objective: This article is twofold. First, it presents the theoretical rationale behind the psychosocial support and describes the multimodal elements of the services. Second, it analyzes the trauma-exposed students' help-seeking behavior and perceptions of the usefulness of the support they were offered in different phases of recovery.
Method: Information of students' help-seeking and perceptions of support is based on a follow-up data from 4 months (T1, $N = 236$), 16 months (T2, $N = 180$), and 28 months (T3, $N = 137$) after the shootings. Mean age of students was 24.9 (SD = 10.2; 95% women). Their perceptions of the offered psychosocial support were collected with structured and open questions constructed for the study.
Results: The results confirmed the importance of enhancing the natural networks after a major trauma and offering additional professional support for those in greatest need. The students' perceptions of the provided care confirmed that the model of the acute and long-term outreach can be used after major tragedies in diverse situations and in other countries as well.

Keywords: *School shooting*; *psychosocial support*; *trauma*; *youth*; *bereaved families*

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The accumulated knowledge about short- and long-term consequences of a mass trauma is incorporated in several evidence-based and evidence-informed guidelines and consensus statements for psychosocial care after disasters (Call, Pefferbaum, Jenuwine, & Flynn, 2012; Hobfoll et al., 2007; NICE, 2005; Pfefferbaum, Shaw, & AACAP, 2013; TENTS, 2008). The guidelines emphasize both promoting resilience and treating prolonged psychological distress after traumatic events and systematic planning and management of care. They also argue for the usefulness of specific elements of interventions in immediate, acute, and ongoing phases of recovery. In the early- to mid-term stages of mass trauma aftercare, the aim is to locate the most vulnerable and needy and to provide information and psychoeducation in order to promote survivors' sense of safety, to calm down hyperarousal, and to facilitate feelings of belongingness and community efficacy (Hobfoll et al., 2007).

Support and services should be available for both families and individuals, and the interventions should be based on assessed physical, psychological, and social needs of the recipients. Psychoeducation provides balancing effects, information, and assurance; topics can include common reactions to trauma, access to services, and self-help methods (TENTS, 2008). According to the

guidelines, in the later phases of recovery, the provided care involves more therapeutic elements and is tailored according to survivors' and families' unique needs. When psychotherapy is used, Trauma Focused Cognitive Behavioral Therapy and Eye Movement Desensitization and Reprocessing (EMDR) are prioritized (TENTS, 2008; World Health Organization [WHO], 2013).

Activating the survivors' natural support systems is one of the primary aims for professional aftercare, as social support has been found to be a major protective factor in the recovery process (Brewin, Andrews, & Valentine, 2000). The timing and nature of survivors' responses and mental health problems differ, and therefore the emphasis is on the long-term tailored care and interventions even for several years (Hobfoll et al., 2007; TENTS, 2008). After a shooting incident, the school is a natural environment to provide psychosocial support to trauma-affected students and to identify those in need for intensive support (Pfefferbaum et al., 2013). Rescue workers and health care professionals are under intensive stress after mass trauma such as a school shooting and outreach programs should include prevention of vicarious traumatization (Galea, Nandi, & Vlahov, 2005; TENTS, 2008).

Kauhajoki school shooting

In September, 2008, a student of Seinäjoki University of Applied Sciences entered the school building in Kauhajoki armed with a hand gun and opened fire indiscriminately. He shot to death nine of his classmates and a teacher and threatened several others. He also set fires and damaged the premises. Other students and the school staff managed to escape from the building (Ministry of Justice [MOJ], 2010). The majority of the students were females aged between 15 and 25. At the time of the shooting, there were approximately 260 students and 40 staff members inside the school.

The emergency situation following the shooting lasted several hours in the town of Kauhajoki and every school in the vicinity was alerted. The students were kept inside their school buildings for several hours, because of the potential danger. Malicious threats via SMS-messages toward other schools in the South Ostrobothnia area spread quickly, as did rumors of possible new massacres. Subsequently other school communities also experienced the terror caused by the massacre. Their need for psychosocial support was also acknowledged. The tragedy was overwhelming for the police, rescue workers, health care professionals, and other authorities, and they needed extra supervision and support.

Aims of the study

There is little research about the ways of delivering theory-based psychosocial care after mass trauma, and about recipients' experiences of the provided support. The aim of this article was twofold:

1) To describe the framework of a multilevel outreach model, which provided psychosocial care to the families of the deceased, students, and school staff, as well as the wider community in the aftermath of the school shooting tragedy (part 1).
2) To analyze the surviving students' help-seeking behavior and their perceptions of the usefulness and the healing elements of the multi-level support (part 2).

Part 1: Implementation of an outreach model

Preparation, management, and organizing crisis help

Every municipality in Finland is obliged to offer psychosocial first aid and support after catastrophes and disasters. This activity is commonly arranged by the local crisis teams, for example, with psychologists, general practitioners, and social workers with expertise in traumatic stress. The local crisis teams are, however, intended for providing only the immediate and acute support. As the need for long-term support was anticipated after the school shooting, a multidisciplinary project was founded. The aim of the outreach was to ensure that all traumatized persons and groups would have access to psychosocial support according to their needs and phases of recovery (Ala-aho & Turunen, 2012; Turunen & Punamäki, 2014). Table 1 presents examples of the psychosocial support provided to the families of the deceased, students, school staff, and the wider community in the immediate, acute, later, and ongoing phases of recovery.

Implementing psychosocial care at immediate and acute phases

The recipients of the immediate support were the evacuated students, school staff, and families searching for their loved ones, as well as other citizens in shock. The interventions included helping families to connect with their children, providing facts regarding the situation, and giving information about the services that were available for them. Furthermore, they involved monitoring overwhelming and incontrollable trauma reactions, and providing support and medical assessment for those in need. An outpatient crisis clinic provided services 24 hours a day for the first 2 weeks and, ultimately, during office hours. A telephone hotline with health care specialists answering questions was open during the first days, and a website was launched for crisis support and information.

Support for the families of the deceased

The relatives of the deceased were a target group for psychosocial support, grief counseling, and practical assistance. They were provided guidance, information,

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Table 1. The main elements of the psychosocial support provided to families, students, and school staff according to the level of interventions and phase of exposure and recovery

	Families of the deceased		Students and staff exposed to the shootings	
Level of intervention	Immediate and acute phase	Later and ongoing recovery	Immediate and acute phase	Later and ongoing recovery
Individual	• Services of the crisis clinic • Support when visiting the scene of the massacre • Practical assistance	• Services of the crisis clinic • Psychotherapies • Physiotherapies • Practical assistance	• Services of the crisis clinic • Interviews to assess the severity of exposure and available support	• Services of the crisis clinic • Interviews to assess the need of extra support among the most severely exposed • Screening of the possible posttraumatic reactions at 2, 4, 16, and 28 months • Health check-ups, medical assessment • Psychotherapies • Physiotherapies and massage
Family	• Group discussions • Support for families visiting the scene of the massacre • Telephone contact with every family to ensure the sufficiency and appropriateness of support	• Frequent contacts by telephone to assess the unique needs of each family member • Two home visits to assess the family situation and needs • Support in emotionally demanding occasions	• Family evenings at the school	• Professionally led peer support group process
Group	• Information about the services provided by the Kauhajoki Project • Letter providing psychoeducative information and an invitation to join the peer support group process	• Professionally led peer support group process • Support in emotionally demanding situations • Rituals	• Group discussions separately for the staff and students • Common sessions with psychoeducation and rituals	• Group discussions separately for the staff and students • Supervision sessions for teachers • Rituals
Community			• Services of the crisis clinic • Group discussions in the other schools at the area • Parents' evenings in the other schools at the area • Media coverage with psychoeducative and calming content	• Services of the crisis clinic • Reinforced youth work and student welfare • Comprehensive media coverage around the first anniversary • Open doors at the trauma-affected school after moving back to the premises

and psychoeducation about common responses to trauma and helpful coping. Additional psychosocial support was available for the families in the emotionally charged occasions, such as visiting the scene of the massacre, respecting anniversaries, and attending trials. Psychotherapy was offered to family members who were in need for it according to the clinical assessments, and professionally led peer support group process was used as a group intervention for all the families of the deceased at the ongoing phases of recovery. The families were offered five peer support gatherings over 2 years. These weekend-long gatherings consisted of psychoeducative lectures, peer discussions, joint evening programs, as well as rituals for longing and recovery (Turunen & Punamäki, in press). The family of the perpetrator also received psychotherapeutic support, and a separate group process.

Support for the students and school staff

The psychosocial support and services for the trauma-affected school were embedded in the school community's

everyday life in order to make the access to services as easy as possible. The action plan was developed and implemented in close cooperation with the administration and staff of the school. Participation in all services was voluntary. The phase model of the support provided to the trauma-affected students and staff is summarized in Turunen & Punamäki (2014).

Individual support was proactively offered especially to those who had a severe trauma exposure and/or strong reactions. Common sessions for the whole school community were conducted daily for the first week to offer practical information, psychoeducation, and joint activities. Similar sessions were arranged whenever increasing of trauma-related stress was anticipated, that is, moving back to the renovated school, releasing police reports, and the first anniversary.

Group discussions with psychoeducative content were offered to students and staff. The groups gathered initially a couple of days after the shootings, and three to six times during the mid-term and ongoing recovery stages. The groups were led by a crisis psychologist and a psychiatric nurse. The psychoeducation involved teaching stress management techniques, normalizing of stress reactions, and general knowledge of trauma consequences. In the staff groups topics included also how the trauma may have an impact on academic performance and how the teachers may help the students to regulate heightened emotional arousal. According to the principle of watchful waiting (NICE, 2005) posttraumatic stress symptoms (PTSS) were screened by health care specialists and a research group at 2, 4, 16, and 28 months. Students and staff exceeding clinically significant levels of symptoms were referred to therapeutic services. Teachers were also offered supervision.

A professionally led peer support group was also conducted as a group intervention for the most severely exposed students and their family members. It contained three 1-day-long workshops with psychoeducative information; peer group discussions for parents, siblings, and students; and a visit to the school when the renovation was completed. The first meeting took place 3 months after the tragedy, the second around the first anniversary, and the last around the second anniversary.

Psychosocial services at the community level

Aftercare services at the community level were carried out in cooperation with the local authorities such as youth work and the management of the schools. The school shooting also had an impact on the students in the other schools in the area and the student welfare systems were therefore reinforced in several school units. The media was used as a means to provide information to the citizens. The information was psychoeducative in nature, and aimed at promoting parenting resources, normal routines, and social support.

Part 2: Surviving students' help-seeking behavior and their perceptions of the usefulness and the healing elements of the multi-level support

Method

Participants and procedure. Experiences of the exposed students were collected as a part of a 2-year follow-up study carried out by the National Institute for Health and Welfare. The basic sample was 389 students of the exposed school, who were approached 4 months after the shooting. The actual participants were 236 students (60.7% response rate) at 4 months after the shooting (T1). One-fifth of the basic sample (20.1%; $n = 78$) declined and another fifth could not be reached (19.5%; $n = 76$). The mean age of the participants was 24.9 ($SD = 10.2$), and the majority were females (95%). The students participated again at 16 months' (T2, $n = 180$) and 28 months' (T3, $n = 137$) follow-up. The study protocol was accepted by the ethics committee of the Hospital District of South Ostrobothnia. Participation was voluntary and every participant was asked to sign a written informed consent. The first and second assessments were carried out in the school and the third follow-up questionnaire was posted to the participants. The participating students who reported high levels of PTSS or other psychological distress were referred to the outreach services.

Measures. **The severity of trauma exposure** was based on the degree of threat to life and suffered losses. At T1, the students answered yes or no to 19 questions concerning their experiences during the school shootings (e.g., "I lost a friend/friends," "I had to escape the perpetrator," or "I saw someone to get shot"). The answers were categorized into five classes according to the severity of the exposure including categories of "mild, moderate, significant, severe, and extreme exposure" (Suomalainen et al., 2011). "Mild exposure" was rated when the student was not at the building at the time of the shootings. "Moderate exposure" was rated when a student evacuated from the building without being in a direct life danger and did not lose any acquaintances. "Significant exposure" was when a student had to act to escape the shooter, had to hide to avoid a danger to life, saw bodies, or lost acquaintances. Exposure was considered "Severe" when a student was near mortal danger, saw somebody threatened with a gun, or lost someone significant. When the exposure was rated as "Extreme" a student had been in a mortal danger or saw someone being shot or lost a family member. For the analysis, a dichotomy variable was formed: (1) Severely to extremely exposed students, and (2) Mildly to significantly exposed students.

The use of immediate crisis support was assessed by four questions at T1: whether the student was offered crisis support immediately after the incident irrespective of the provider (yes/no), whether they had accepted and

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used any of the services (yes/no), and whether they had attended the sessions for the whole school community (yes/no). Finally, students were asked about their perceptions about the usefulness of the immediate crisis support using a 5-point scale: 1 = helped a lot, 2 = helped enough, 3 = helped a little, 4 = did not help, and 5 = hindered recovery. Reporting 1 or 2 was recorded as immediate crisis support being helpful, whereas 3, 4, and 5 was recorded as immediate crisis support not being helpful.

The use of psychosocial support at the acute, later, and ongoing phases was assessed with 13 questions on the source and availability of support in all assessment points T1, T2, and T3. The sources of support were grouped as *social support from families and friends* (family, other relatives, friends), *professional support* (crisis workers for the school community, use of low-threshold crisis clinic, municipal health care center, student health care and/or psychiatric outpatient clinics), and *social support from others* (teachers, youth workers, workers of the parish, clubs, or extracurricular activities). Concerning the availability of different types of support, the students estimated whether they had received (1) no support, (2) some support, (3) enough support, (4) too much support, or (5) had not been interested in the provided support. Reporting "too much" or "enough" support was rated as having the support available.

The perceived effect of the different types of psychosocial support were evaluated with five alternative answers (1) did not help, (2) cannot say, (3) did help, (4) was irritating, and (5) not interested. Answering "did help" was indicative for perceiving the support helpful while the other alternative answers were indicative for support not being helpful. Students were also asked if they had started psychotherapy or regular meetings with health care professionals and whether or not psychotherapy included EMDR. Students answered yes or no to these questions. The students were also asked about the time when they had started psychotherapy.

Students' perceptions of the professional support and its healing elements were studied with two open questions. Students answered at T1, T2, and T3 to questions: "Where did you get the most important help for your traumatic and distressing experiences?" and "What was the most important reason for its healing effect." The answers indicating professional support as being helpful were selected for further analysis. Two coders (a clinician and a researcher) classified the answers to the question "What was the most important reason for its healing effect" in 10 categories according to the themes of the answers. The 10 categories were then reclassified into five final categories, which represent the concepts of psychosocial support. The coders classified the answers separately and deviating scores were settled by consensus.

Statistical analyses

Distributions of the use and perception of psychosocial services in immediate and acute phase were presented as percentages for categorical variables and as means (M) and standard deviations (SD) for continuous variables. Differences between the groups (e.g., with different exposure severity) were tested using the chi-square tests and analyses of variance. In the analyses, two-tailed significance levels $<.05$ were chosen. All analyses were performed using SPSS 20.0.

Results

Students' perception of the psychosocial support

Table 2 presents the use and perceptions of the different types of psychosocial support in the immediate, acute, later, and ongoing phases of recovery. A majority of the students (84.7%) had been offered immediate crisis support within the first 24 hours after the events and 58.5% of them accepted the support. Almost all of the students (92.4%, $n = 110$) who accepted the support estimated that the support had helped them "a lot" or "enough." Furthermore, more than two-thirds of the students attended the common sessions for the whole school during the first week and more than half attended the group sessions.

Concerning the severity of exposure to school shooting, all students with severe to extreme exposure to trauma had received the immediate support, which statistically differed from those with less severe exposure ($p < .05$). There was no significant difference in perception of the helpfulness of the accepted immediate psychosocial support according to the severity of the trauma as reported at T1. Similarly, students with severe to extreme exposure to trauma used more professional psychosocial support than the less severely exposed in both the acute and ongoing phases of recovery ($p < .001$). The type of support involved mostly psychotherapy or regular meetings with health care professionals. One-fifth (20%) of the psychotherapies included EMDR-therapy as well. A majority of the students who were offered professional help perceived it helpful at a later phase (89%) and (73%) at ongoing phase of recovery as reported in T2 and T3. The perceptions did not differ according to the severity of the exposure to school shooting trauma.

Table 3 presents students' perceptions of the support at the acute phase. It reveals that students predominantly relied on their natural social relations for support. They mentioned family members (57%), and friends and peers (54%) equally often as the main sources of support, assistance, and consolation. They accounted that family support enhanced their sense of safety and affiliation and felt at ease in sharing the pain with the family members. The helpfulness of peers and friends as support persons was based on sharing of similar feelings of horror, uncertainty, and common experiences of fear of death.

Table 2. Psychosocial support and care, and therapies for the students of the exposed school

Type of the support	All students *T1: n* = 236 *n* (%)[a]	Severely to extremely exposed students *n* = 20[a] *n* (%)[a,b]	Mildly to significantly exposed students *n* = 216[a] *n* (%)[a,b]	Difference between the exposure groups
Immediate crisis support[c]				
Reached by immediate (first 24 hours) crisis support	199 (84.7)	20 (100.0)	179 (89.9)	$\chi^2 = 3.96$, df = 1, $p = .047$
Immediate crisis support accepted	113 (58.5)	15 (75.0)	98 (56.6)	n.s.
Perceived accepted immediate crisis support as helpful	110 (92.4)	15 (100.0)	95 (91.3)	n.s.
Group and school sessions				
Attended the common sessions for the whole school	167 (71.1)	17 (85.0)	150 (69.8)	n.s.
Attended the group sessions	140 (60.6)	18 (90.0)	122 (57.8)	$\chi^2 = 7.92$, df = 1, $p = .005$
Acute phases psychosocial support[c]				
From families and friends	232 (98.7)	20 (100.0)	212 (98.6)	n.s.
From others	179 (79.6)	15 (78.9)	164 (79.6)	n.s.
From Professionals	164 (71.0)	18 (90.0)	146 (69.2)	$\chi^2 = 3.84$, df = 1, $p = .050$
Perceived the received crisis support as helpful				
Families and friends (T1)	220 (97.8)	19 (95.0)	201 (98.0)	n.s.
Others (T2)	148 (89.2)	14 (93.3)	134 (88.7)	n.s.
Professionals (T1)	114 (78.6)	12 (75.0)	102 (79.1)	n.s.
Professionals (T2)[d]	83 (89.2)	11 (91.7)	72 (88.9)	n.s.
Professionals (T3)[e]	76 (73.1)	11 (91.7)	65 (70.7)	n.s.
Psychotherapy or regular meetings[f] T1-, T3	60 (25.4)	13 (65.0)	47 (21.8)	$\chi^2 = 18.05$, df = 1, $p < .001$
Psychotherapy included EMDR T1-T3	12 (20.0)	6 (46.2)	6 (12.8)	$p = .015$, exact

n.s = not significant.
[a]Valid percentages shown (missing data not included). [b]Percentages shown within the exposure group. [c]Crisis support after the first day and within 2 weeks after the incident, availability of support asked by different sources. [d]Answers to the question about perception of professional support at T2 (16 months follow-up), $n = 123$ within those who have received the services. [e]Answers to the question about perception of professional support at T3 (28 months follow-up), $n = 104$ within those who have received the services. [f]Shows cumulative numbers and percentages across T1 to T3.

About a quarter of the students evaluated professional help as helpful at the acute phase, reported at T1, 4 months after the shooting. The most healing elements were practical assistance, psychoeducation, and creating of therapeutic alliance and emotional transference. Students perceived that the organized aftercare helped them to feel more secure. Teachers also served as a source of assistance and condolence, and created a feeling of stability for the trauma-affected students, and 6% of them perceived that as helpful. The parish and church were considered helpful (3%) as they provided shelter, a possible place to gather together, and to enjoy silence and individual support.

Table 4 summarizes the healing elements of professional care that the students perceived most helpful at the ongoing stages of recovery. They reported them at 16 (T2) and 28 months (T3) after the school shooting. More than a half of the recipients regarded the opportunity to narrate, frame, and share their frightening experiences as being beneficial. The proactive attitudes and emotional support from professionals were considered helpful, and students also emphasized the usefulness of psychoeducation and stress management. They mentioned examples such as "how to breathe and calm yourself" or "she gave permission to the emotions I considered to be crazy." Furthermore, they emphasized the relevance of continuity of the services (same providing professionals) and specific therapeutic interventions (medication and psychotherapeutic methods). The students felt that the professionals enhanced the feeling of safety ("Where ever I met them I immediately felt safe").

Discussion

In mass trauma situations, the need for psychological support is enormous and provision of services should start

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Table 3. Sources of the support among the students exposed to the school shootings in acute phase (T1): who provided the most important help and what was perceived as healing element(s)

Main source of the support	$n = 236$ *n* (%)	Healing elements	Examples
Own family and close relatives	134 (56.8)	• Intimacy • Love	• Intimacy and speaking about normal daily life issues • Mother and her genuine concern and love • I have the best dad in the world
Friends and fellow-students	127 (53.8)	• Peer support • Understanding because of similar experience	• It is easiest to talk to the close persons you can trust • Just being close, total presence, and feeling of understanding without words
Teachers and other school staff	14 (5.9)	• Togetherness • Understanding because of similar experience	• The best help comes from people who had experienced the same tragedy • We feel attached to our school, and that helps us
Crisis psychologists, psychiatrists, and other professionals	61 (25.8)	• Sharing the story • Professionalism • Psychoeducation • Therapeutic interventions • Enhancing safety	• Sessions with the psychiatrist consisted of real listening and deep understanding, not only of being together • The crisis psychologist listened, supported, and forwarded to the medical doctor • Crisis workers provided information about how to cope and how to deal with normal daily life issues and what helps you to continue your life • The groups in which we were together, that was a decisive experience in recovery • The awareness that there are crises workers available if needed, that has helped me
Church and parish	6 (2.5)	• Spiritual consolation	• My own parish and belonging to it, I was allowed to share and leave my worries to God
None or I cannot say	18 (7.6)		• I know that there was all kind of help available. But I did not have time to go, and also the strangeness of others does not help

Note: The percentages do not sum up to 100.0 because students mentioned more than one source of support and reasons as healing elements.

immediately, yet bearing in mind that the most important source of support for the traumatized is the support given by their natural networks. Professional care can supplement the natural social support by offering psychoeducation, support, and treatment in an active but discreet manner, promoting resiliency. The tailored services described here were provided via multilevel outreach, which followed the national and international guidelines, best practices, and consensus statements of acute, mid-term, and long-term psychosocial support after disasters.

The students' feedback, which is analyzed in this study, shows that they found the availability of psychosocial support helpful. The important role of intimate networks in enhancing recovery concurs with earlier studies that are conducted among school shooting survivors (Littleton, Grills-Taquechel, & Axsom, 2009; Murtonen, Suomalainen, Haravuori, & Marttunen, 2012). Almost 99% of the exposed students in Kauhajoki received support from family, relatives, or friends and almost all perceived it helpful. This is in line with the attachment theory revealing that the early created attachment system activates in the face of threat and distress, and the traumatized individuals seek comfort and safety from their close social relationships (Bowlby, 1969/1982; Mikulincer & Shaver, 2010, p. 12). Accordingly, the guidelines point out family members and other natural networks as the most important source of support for the traumatized survivors (Hobfoll et al., 2007; TENTS, 2008). The role of professional support is to facilitate activation of these natural networks, to offer psychoeducation and support, as well as to screen for those whose natural networks' support fails, whose trauma-related distress is severe, or who otherwise are at high risk for PTSD or other psychological impairment (Hobfoll et al., 2007; Pfefferbaum et al., 2013; TENTS, 2008).

The psychosocial support was offered to the families of the deceased, and the students and staff immediately after the tragedy, and it was extensively and proactively offered especially for those who were in greatest need as is recommended (Call et al., 2012; Hobfoll et al., 2007; Pfefferbaum et al., 2013; TENTS, 2008). The acute help for the trauma-affected students and staff included several

Table 4. The helpful elements of the professional support reported by students of the exposed school at ongoing recovery phases at T2 (16 months) and T3 (28 months) afterwards

Helpful element	T2 $n=42$ *n* (%)	T3 $n=35$ *n* (%)
Sharing the story	22 (52.4)	20 (57.1)
• Forming the narrative, listening, supporting		
Professionalism	9 (21.4)	13 (37.1)
• Expertise, neutrality, active support		
Psychoeducation	6 (14.3)	9 (25.7)
• Normalizing, teaching self-care techniques		
Therapeutic interventions	3 (7.1)	5 (14.3)
• Group interventions, therapeutic relationship		
• Medication/EMDR		
Enhancing safety, continuity	2 (4.8)	6 (17.1)
• Creating feeling of safety		
• Stability of the professionals		

Note: The percentages do not sum up to 100.0 because students mentioned more than one element of support as being helpful. Only answers with argumentation were classified.

psychoeducative group discussions and common sessions. They provided practical information, assurance for safety, and psychoeducation about acute stress responses. Constructing a coherent and shared narrative about the trauma is important as it is suggested to facilitate recovery from trauma in ongoing phases (Shaw, 2000).

Trauma-related symptoms may be delayed in occurrence, and the readiness to seek and receive support varies between individuals (Bonnano, 2004; Turunen, Haravuori, Punamäki, Suomalainen, & Marttunen, in press). Therefore "watchful waiting" principle was applied (NICE, 2005; TENTS, 2008) in order to be ready for potential delayed PTSS and re-evoked needs for psychosocial support. Professional support was especially targeted to the most severely exposed students, and most of them evaluated the support as helpful in all phases of recovery. Students appreciated the stability and continuity of aftercare services, and the neutrality and professional expertise of their familiar crisis workers. They expressed positive views on learning about common trauma-related responses, effective coping, and other ways of regulating arousals and stress. Frequent screening turned out to be a helpful tool for monitoring the progress of recovery process, and the professional interventions and intensive support could be allocated and targeted to those suffering from psychological distress.

The follow-up showed that students who were most severely exposed to the shooting were common clients in psychotherapy. One-fifth of the psychotherapies included also EMDR-therapy, which is a recommended treatment in various guidelines (Duodecim, 2009; TENTS, 2008; WHO, 2013). As a conclusion, the students' perceptions of the provided professional support were mainly positive, which indicates the usefulness of the outreach.

The study can be criticized for drop-out, retrospective setting for the students' experiences, and narrowness of descriptive data. The lack of systematic collection of experiences and opinions of other trauma-affected survivors such as family members or school staff is unfortunate. The study could reach 60.7% of the trauma-exposed students at 4 months (T1) after the school shootings, indicating reasonably high response rate in the field of trauma study. The loss of participants was not associated with the severity of trauma exposure. It may have been difficult for the students to assess in retrospect the quality of the acute services. Ethically, however, the 4 months as a baseline for the follow-up study was well chosen. The results of both structured and open questions are coherent, and support each other. The students' short responses to the open questions do not naturally depict in depth their experiences of the traumatization, psychosocial support and recovery. For that a qualitative research method would be more fitting.

Conclusion

The access to the psychosocial services needs to be easy after a tragedy that affects a large number of citizens. Support and care should be available for long enough time. The positive perceptions of the interventions provided within this outreach model suggest that like models may be used in other situations and countries after a mass traumatic event.

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There is no conflict of interest in the present study for any of the authors.

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UNDERSTANDING TERROR AND VIOLENCE IN THE LIVES OF CHILDREN AND ADOLESCENTS

The role of attachment in recovery after a school-shooting trauma

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Background: Survivors of life-endangering trauma use varying resources that help them to recover. Attachment system activates in the times of distress, and is expected to associate with stress responses, arousal regulation, and mental health.

Objective: We examined the associations of attachment style with posttraumatic stress disorders (PTSD) symptoms and dissociative symptoms, and posttraumatic growth (PTG) among students exposed to a school shooting in Finland in a three-wave follow-up setting.

Method: Participants were students (M_{age} = 24.9 years; 95% female) who were followed 4 (T1, N = 236), 16 (T2, N = 180), and 28 months (T3, N = 137) after the shooting. The assessments included the Attachment Style Questionnaire, the Impact of Event Scale, part of the Adolescent Dissociative Experiences Scale and the Posttraumatic Growth Inventory.

Results: Securely attached survivors had lower levels of posttraumatic stress and dissociative symptoms than preoccupied at T1 and T2 as hypothesized. At T3 survivors with avoidant attachment style had higher levels of intrusive and hyperarousal symptoms than those with secure style. Concerning PTG, survivors with avoidant attachment style scored lower in PTG at T3 than survivors with both secure and preoccupied style.

Conclusion: Secure attachment style was beneficial in trauma recovery. A challenge to the health care systems is to acknowledge that survivors with preoccupied and avoidant attachment styles react uniquely to trauma, and thus need help in different doses, modalities, and timings.

Keywords: *Attachment style*; *school violence*; *dissociation*; *posttraumatic stress symptoms*; *posttraumatic growth*

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School violence in the form of mass shootings causes feelings of horror, fear, and disbelief among students who suddenly lose their previously safe environment. Subsequently, survivors can suffer from various trauma-related symptoms such as acute stress disorder (ASD), posttraumatic stress disorders (PTSD) symptoms, depression, and anxiety. The severity of life danger and loss of close peers increases the risk for mental health problems (Hughes et al., 2011; Littleton, Grills-Taquechel, & Axsom, 2009; Suomalainen, Haravuori, Berg, Kiviruusu, & Marttunen, 2010). Not all survivors are similarly affected by traumatic events as each can have unique resources that contribute to recovery. These recourses are related, for example, to personality, social relations, and worldviews. The ways people cope with, make sense of, and regulate their emotions seem to play a crucial role in the success of recovery from trauma such as a school massacre (Boxer & Sloan-Power, 2013; Hughes et al., 2011). Attachment theory created by Bowlby (1969/1982) provides a good framework for understanding these

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individual differences in stress regulation and coping strategies when facing traumatic stress (Mikulincer & Shaver, 2010, p. 369–373).

According to attachment theory, the basis for the resources that promote or complicate the recovery after traumatic events is built in infancy when a child forms a unique communication pattern (attachment style) with his or her primary caregiver(s). This early relationship creates the conditions for a later sense of security or insecurity as infants learn how to regulate arousal and emotional reactions when distressed, and how to receive attention and support when threatened. These skills are internalized as working models and are generalized to other relationships later in life (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1980).

Securely attached persons are confident that they will receive comfort, protection, and relief when facing trauma. They also have learned a variety of self-soothing and problem-solving skills that provide effective emotion regulating tools in distressing situations (Crittenden, 2000; Mickulincer & Shaver, 2010, p. 190). Avoidantly attached persons perceive help and support seeking as risky and uncomfortable, even if in a life-threating situation (Mickulincer & Shaver, 2010, p. 192–193). Those with preoccupied (ambivalent in childhood) attachment style face difficulties in regulating overwhelming feelings of fear, which may cause an overflow of threat-related thoughts toward helpless feelings (Crittenden, 2000; Sroufe, Carlson, Levy, & Egeland, 1999).

The exposure to trauma and stress later in life activates internalized attachment patterns, which play a critical role in the occurrence of subsequent trauma-related mental health problems, as well as in the choice of coping strategies and emotion regulation. Research has confirmed that securely attached survivors show low and insecurely attached high levels of mental health problems such as PTSD. Thus, secure attachment style is considered to be protective toward stress, whereas insecure attachment (both avoidant and preoccupied) is viewed as a risk factor to psychopathology (Fraley, Fazzarri, Bonnano, & Dekel, 2006; Mikulincer, Florian, & Weller, 1993). Fraley et al. (2006) studied the relationship between adult attachment and psychological adaptation in the context of 9/11 terrorist attacks ($N=45$). The results showed that survivors with avoidant or preoccupied attachment styles had more PTSD and depression symptoms than those with secure attachment style over time. A study by O'Connor and Elklit (2008) among Danish adults ($N=328$; 15–61 years) showed that secure attachment style was associated with low and avoidant attachment with high levels of lifetime and current PTSD symptoms. Finally, there is evidence from war-zones, mainly from the Middle East, that secure attachment style can protect both civilians and soldiers from PTSD and other mental health problems (Kanninen, Qouta, & Punamäki, 2003a; Mikulincer, Shaver, & Hores, 2006). However, a study among Israeli prisoners of war revealed that severe PTSD predicted insecure attachment style rather than vice versa (Solomon, Dekel, & Mikulincer, 2008). A study among Palestinian political prisoners ($N=153$) revealed that survivors with secure attachment style typically processed their trauma-related emotions in balanced ways, whereas survivors with avoidant attachment style relied narrowly on cognitive, and those with preoccupied attachment style on behavioral emotion regulation. The nature of emotion regulation in turn mediated the trauma impacts on mental health (Kanninen, Qouta, & Punamäki, 2003b).

Severe trauma exposure can lead to dissociative symptoms, which may also vary according to attachment style. In extreme life-threatening situations, such as mass killings, some victims attempt to protect their psychic integrity through dissociation that shields against overwhelming fear, pain, and feelings of helplessness (Van Der Hart, Nijenhuis, & Steele, 2006). Although dissociation may help survivors to protect themselves from the overwhelming emotions, research suggests that it associates with later mental health problems (Lensvelt-Mulders et al., 2008). There is some evidence that adolescents with secure attachment style show less dissociative symptoms than insecurely attached ones (Calamari & Pini, 2003; Nilsson, Holmqvist, & Johnsson, 2011). In their study of 162 students (16–24 years), Calamari and Pini (2003) found that insecurely attached students, particularly those with preoccupied style, had more dissociative symptoms such as amnesia and depersonalization than those with secure attachment style. Nilsson et al. (2011) report that dissociation was more common among insecurely attached students than among those with secure attachment style ($N=568$, 15–20 years). There is no earlier research on attachment style and dissociation in the context of a school shooting.

Trauma survivors do not only suffer but may also feel stronger, wiser, and more self-confident despite the horrifying experience. There is evidence that they often feel grateful for surviving and appreciate life and affiliation to other people, conceptualized as posttraumatic growth (PTG) (Taku, Cann, Calhoun, & Tedeschi, 2008). We found one study that examined the role of adult attachment style accounting for trauma victims' capacity for beneficial transformation. Findings of a study among Palestinian political prisoners ($N=275$) suggest that survivors with secure attachment reported more PTG (i.e., personal strength, positive affiliation to others, and spiritual change) than prisoners with preoccupied attachment style (Salo, Qouta, & Punamäki, 2005). Interestingly, among prisoners with secure attachment style, severe exposure to torture even increased PTG, whereas among those with avoidant style the exposure was associated with very low levels of PTG.

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Background

There have been two school shootings in Finland in recent years. The first occurred in 2007 and the second, that is studied here, 10 months later in Kauhajoki in September 2008. In that second incident, a student of an educational institution in Kauhajoki shot nine of his classmates and his teacher. He threatened several other people causing fear and terror and severely damaged the premises before killing himself. The educational institution is a combination of a Vocational Education Centre and the University of Applied Sciences situated in Kauhajoki, a rural town of 14,000 inhabitants.

Research objectives

The aim of this study is to analyze the association of attachment style with mental health outcomes and PTG among students exposed to a school shooting in Finland, 4 (T1), 16 (T2) and 28 (T3) months after the incident. Our hypothesis was that survivors with secure attachment style report lower levels of PTSD and dissociative symptoms, and higher levels of PTG than survivors with insecure-avoidant and insecure-preoccupied attachment style.

Method

Participants and procedure

The 2-year follow-up study was carried out at the National Institute for Health and Welfare in co-operation with the personnel of the educational institutions and the aftercare providers. The ethics committee of Hospital District of Southern Ostrobothnia, Finland, accepted study protocol. All students at the Kauhajoki Educational Centre who were present at the time of the incident were asked to participate in the study at three time points; 4 months (T1), 16 months (T2), and 28 months (T3) after the school shooting as described in Fig. 1. Of the 389 students, 60.7% ($N = 236$) agreed to participate and completed the questionnaires at T1, 20.1% ($n = 78$) declined, and 19.5% ($n = 76$) could not be reached (Fig. 1). Mean age of the participants was 24.9 (SD = 10.2), median age was 21, and some 20% of the participants were over 30 years of age (studied parallel to working, studies supported by employment services). Of those participating at T1, 180 (76.3%) participated also at T2 and 137 (58.1%) at T3. The severity of exposure to the school shooting and symptomatology was not associated with dropping out from the study (Fig. 1). Characteristics of the participating students are shown in Table 1.

Measures

The severity of trauma exposure was based on the level of threat to life and losses suffered (Suomalainen et al., 2010). Participants answered *yes* or *no* to 19 questions concerning their experiences during the shooting incident (e.g., "I saw the perpetrator," "I saw someone get shot," "I lost a good friend/friends"). Three questions also had space for additional comments. The answers were categorized into five classes indicating the severity: Mild, Moderate, Significant, Severe, and Extreme exposure.

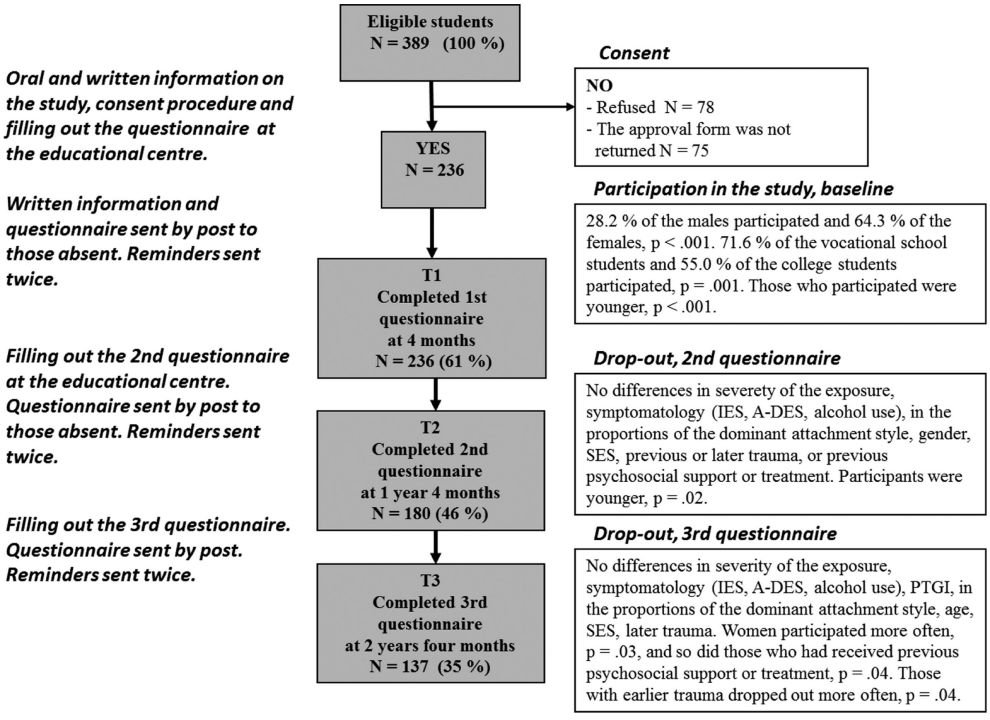

Fig. 1. Participation of the Kauhajoki Educational Centre in the study after the school-shooting incident, flow chart.

Table 1. Sociodemographic and clinical characteristics of the students at the Kauhajoki Educational Centre participating in the study

Characteristic	*n*	%
Gender		
Male	11	4.7
Female	225	95.3
Age at the incident, M (SD)	24.9	(10.2)
SES		
Entrepreneur	20	9.4
Upper middle class	23	10.8
Lower middle class	51	23.9
Working class	92	43.2
Student	26	12.2
Other[a]	1	0.5
Living arrangements		
With both biological parents	60	25.4
With one biological parent	20	8.5
With spouse	105	44.5
Alone or other arrangements[b]	51	21.6
Received previous psychosocial support	33	14.0
Previous psychological treatment	26	11.3
Level of exposure		
Mild	43	18.2
Moderate	71	30.1
Significant	102	43.2
Severe	11	4.7
Extreme	9	3.8

Note: SES = socioeconomic status.
[a]Housewife or pensioner.
[b]With an adult other than a guardian, or with a child.

"Mild exposure" was rated when the student was not at the school building at the time of the shootings and "Moderate" exposure when the student was evacuated from the building, without being in direct danger of life and did not lose any acquaintances. "Significant exposure" was rated when the student faced danger of life and had to act to escape the shooter or had to hide, or the student saw dead or wounded bodies or lost acquaintances; "Severe exposure" was rated when the student was near mortal danger or saw somebody threatened with a gun or lost a friend(s) or some other significant person; and "Extreme exposure" was rated when the student was in mortal danger or saw somebody being shot and killed or she/he lost a family member.

Previous and later traumatization was assessed by a structured questionnaire. Participants answered *yes* or *no* accordingly to their previous experiences of traumatic incidents such as traffic accidents, natural disaster, witnessed or experienced violence, and provided the time of the incident. Answers were dichotomized: 0 = no previous trauma, 1 = one or more previous traumas.

Attachment Style was measured by items from the Attachment Style Questionnaire (ASQ), by Feeney, Hanharan, and Noller (1994). We used a short version that consists of 15 descriptions of how people typically feel in close relationships. Participants estimated items on a 1–6 Likert scale (1 = strongly disagree, 6 = strongly agree). The sum variables were formed following Feeney et al. (1994), and they depicted secure attachment style (five items, e.g., "I find it easy to trust others"; "I find it relatively easy to get close to other people"), avoidant attachment style (five items, e.g., "I worry about people getting too close"; "Achieving things is more important than building relationships," and preoccupied attachment style (five items, e.g., "Other people often disappoint me"; "I worry that others won't care about me as much as I care about them"). Sum scores were calculated for the three attachment styles, showing sufficient internal consistency (Cronbach's α values were 0.77 for secure, 0.70 for avoidant, and 0.70 for preoccupied attachment styles).

The three factor scores were also calculated with the 16-month follow-up material. Sum scores varied significantly between the predominant types of clusters in an almost similar manner to T1. Table 2 shows that the attachment style scores were similar at T1 and T2, indicating stability across time. Test–retest type of correlation analysis was performed to further test constancy of the attachment style. Interclass coefficient for the secure items was 0.76, $p = 0.21$, for the avoidance items 0.71, $p = 0.08$, and for the preoccupation items 0.71, $p = 0.16$.

Posttraumatic stress symptoms were measured by the Impact of Event Scale (IES) by Horowitz, Wilner, and Alvarez (1979) version IES-22 that consists of 22 questions on posttraumatic symptoms. Participants estimated items on scale 0 = not at all, 1 = rarely, 3 = sometimes, and 4 = often, based on their experiences during the previous week. The sum variables were formed depicting intrusive, avoidant, and hyperarousal symptoms. Sum scores for the total scale and the three subscales were calculated at T1, T2, and T3 and used as continuous variables. Good internal consistency among the total scale and the subscales was observed. Cronbach's α for the total PTSD symptoms was 0.94, for the IES-Intrusive 0.89, IES-Avoidance 0.85, and IES-Hyperarousal 0.87 at T1 (α-values were 0.95, 0.89, 0.90, and 0.85 at T2 and at 0.95, 0.89, 0.90, and 0.88 at T3, respectively).

Dissociative symptoms were assessed by The Adolescents Dissociative Experience Scale (A-DES) based on the Dissociative Experience Scale (DES) by Bernstein and Putnam (1986). The high correlation between these two versions has been reported by Armstrong, Putnam, Carlson, Libero, and Smith (1997). Tolmunen et al.

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Table 2. Sum scores of the Attachment Style Questionnaire (ASQ) by predominant attachment style clusters

	Type of predominant attachment style			
ASQ sum scores T1, 4 months	Secure $n=99$	Avoidant $n=80$	Preoccupied $n=50$	F
Secure items[a]				
M (SD)	21.4 (3.4)	19.5 (2.9)	19.7 (3.2)	9.39***
Min–Max	11–29	10–28	14–29	
Median	22	20	19	
Avoidant items[b]				
M (SD)	11.5 (2.2)	16.4 (2.3)	13.8 (2.8)	132.19***
Min–Max	6–16	12–23	9–22	
Median	10	16	13.5	
Preoccupied items[c]				
M (SD)	10.6 (2.3)	13.4 (2.1)	17.5 (2.6)	148.58***
Min–Max	5–16	9–19	13–23	
Median	11	13	17	
T2, 16 months	Secure $n=79$	Avoidant $n=62$	Preoccupied $n=37$	
Secure items[d]				
M (SD)	21.9 (3.0)	20.3 (3.3)	19.4 (2.5)	10.50***
Avoidant items[e]				
M (SD)	12.1 (3.1)	15.5 (3.4)	13.9 (3.1)	18.64***
Preoccupied items[f]				
M (SD)	11.2 (2.8)	12.9 (2.9)	15.2 (3.6)	23.03***

[a]The Shceffé's post hoc analysis confirmed that the mean of the secure items was higher in the secure cluster than in the two insecure clusters. [b]The mean of the avoidant items was highest in the avoidant cluster and lowest in the secure cluster. [c]The mean of the preoccupied items was highest in the preoccupied cluster and lowest in the secure cluster. [d]The mean of the secure items was higher in the secure cluster than in the two insecure clusters. [e]The mean of the avoidant items was equally high in the avoidant cluster and preoccupied cluster and lower in the secure cluster. [f]The mean of preoccupied items was highest in the preoccupied cluster and lowest in the secure cluster.

***$p<0.001$.

(2007) have assessed dissociation in a sample of Finnish general population of adolescents aged 13–18 years ($N=4{,}019$) using A-DES. The mean A-DES score of 0.88 in the whole sample was lower than that in previous studies in other countries (Tolmunen et al., 2007). The A-DES originally has 30 questions. For practical reasons, we had to cut down items to nine, involving items on amnestic dissociation (2), depersonalization (3), derealization (1), hearing voices (1), and acting like someone else (2). The participants answered on a 0–10 Likert scale (0 = never, 10 = always) how frequent the symptom was. The mean sum score of the items was used for the analyses. Cronbach's α was 0.86 at T1, 0.80 at T2, and 0.88 at T3.

PTG was measured by the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996). The original PTGI has 21 items that involve dimensions of affiliation to others (seven items), new possibilities (five items), personal strength (four items), spiritual change (two items), and appreciation of life (three items) (Taku et al. 2008). Two items (one from affiliation to others and one from new possibilities) had to be omitted from the Finnish version due to very low loadings. The participants rated the questions on a 1–5 Likert scale ("I did not experience this change" to "I experienced this change to a very great degree"). The total sum score (Cronbach's $\alpha=0.93$ at both T2 and T3) and five subscales of relating to others ($\alpha=0.84$ at T2), new possibilities ($\alpha=0.79$), personal strength ($\alpha=0.80$), spiritual change ($\alpha=0.91$), and appreciation of life ($\alpha=0.79$) were applied in this study.

Data analysis

The distributions of variables were presented as percentages for categorical variables and means (M) and standard deviations (SD) for continuous variables. To analyze how the attachment style associated with trauma-related symptoms and PTG, analysis of variance (ANOVA) with Scheffé's post hoc analysis was used. The three-class attachment cluster variable was the independent and PTSD, dissociation, and PTGI with subscales were the

dependent variables. Factor analysis with the ASQ items was performed with principal component extraction method and rotated with Varimax method with Kaiser Normalization. In order to identify attachment clusters, hierarchical cluster analyses were performed with Ward's method to decide the appropriate number of the clusters to be formed. *K*-means cluster analysis was used to assign the studied individuals into the different cluster groups representing their dominant attachment style. The secure attachment style was compared separately with the two different types of insecure attachment styles (avoidant = 1; secure = 0; preoccupied = 1), as a potential risk or protective factor on posttraumatic symptoms (IES) using multivariate linear regression analyses. Those background variables that associated with the symptoms were included as covariates (previous traumatization: no = 0, yes = 1; exposure: mild = 1 to extreme = 6; previous psychosocial support or psychological treatment: no = 0, yes = 1; and age). Socioeconomic status and living arrangements did not associate with the symptoms and were not included in the final model. Gender could not be analyzed due to low numbers of men in the sample.

In the analyses, two-tailed significance levels <0.05 were chosen. All analyses were performed using SPSS 20.0. Scales with less than 15% of missing items were accepted for the analyses while missing items were replaced by the series mean.

Results

Identifying attachment styles

The result of factor analyses of the 15 ASQ items resulted in expected secure, avoidant, and preoccupied attachment dimensions. One item, "I find that others are reluctant to get as close as I would like" loaded equally on preoccupation and avoidance factors and was omitted from further analyses. Cluster analysis resulted in three attachment clusters, and participants were assigned accordingly to "Secure," "Avoidant," and "Preoccupied" dominant attachment styles (Table 2). The distribution of attachment styles in this sample was: 43% ($n = 99$) for secure, 35% ($n = 80$) for avoidant, and 22% ($n = 50$) for preoccupied.

Attachment styles and PTSD and dissociative symptoms

The means and SD of PTSD symptoms according to the attachment style are shown in Table 3. As hypothesized, the securely attached survivors had significantly lower levels of total PTSD symptoms than those with preoccupied attachment style at 4 months after the trauma (T1) and in the 16 months follow-up (T2). However, contrary to our hypothesis, the survivors with avoidant attachment style also showed significantly lower levels of PTSD symptoms than those with preoccupied attachment style at T1, and did not differ statistically from the securely attached survivors at T1 and T2. The survivors with secure and insecure attachment styles did not differ significantly in the total level of PTSD symptoms at T3 (28 months). Similarly to the total PTSD symptoms, the securely attached survivors showed lower levels of avoiding and hyperarousal symptoms than those with preoccupied style at T1 and T2. Again, the survivors with avoidant attachment style did not differ from those with secure style. However, concerning PTSD symptoms at T3 the survivors with avoidant attachment style showed higher levels of intrusive and hyperarousal PTSD symptoms than the survivors with secure attachment style.

Table 4 reports the results of multivariate linear regression analyses and confirms that the insecure-preoccupied attachment style was significantly associated with total PTSD symptoms (IES-22, $\beta = 0.20$, $p = 0.009$) and avoidance symptoms (IES-Avoidance, $\beta = 0.28$, $p < 0.001$) at 4 months, T1. The association was non-significant for IES-Intrusive ($p = 0.080$) and IES-Hyperarousal ($p = 0.115$) symptoms. Similarly to ANOVA results, the avoidant attachment style had no significant association with PTSD symptoms at T1 or T2, but was significantly associated with the total PTSD symptoms ($\beta = 0.21$, $p = 0.034$), IES-Intrusive ($\beta = 0.21$, $p = 0.035$), and IES-Hyperarousal ($\beta = 0.22$, $p = 0.026$) symptoms at 28 months, T3. The covariant of the severity of trauma exposure had a significant effect on IES symptoms at T1 and T2, but the effect of exposure attenuated by T3.

Concerning the association between the attachment styles and dissociative symptoms, as hypothesized, the survivors with secure attachment style had lower levels of dissociative symptoms than those preoccupied at 4 months. Again, the securely attached survivors did not report less dissociative symptoms than those with avoidant attachment style, which defeated that part of the hypothesis. At T2, both secure and avoidant attachments styles differed from the preoccupied (Table 3).

Attachment style and PTG

Table 3 further reports the results of Posttraumatic Growth Inventory (PTGI), revealing that attachment style was not associated with the total PTGI scores at T2 and T3. Against our hypothesis, the survivors with avoidant attachment style had a lower level of PTG relating to (affiliation with) others than those with preoccupied attachment style at T2 and lower levels than those with secure and preoccupied style at T3. The securely attached survivors did not differ from those with preoccupied style.

Discussion

We analyzed the role of attachment style in associating and predicting posttraumatic stress and dissociative symptoms, and positive growth among students exposed

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Table 3. Means and standard deviations (SD) of Impact of Event Scale (IES), Adolescent Dissociative Experiences Scale (A-DES), and Posttraumatic Growth Inventory (PTGI) in the different attachment style groups at 4 months (T1), 16 months (T2), and 28 months (T3) and ANOVA statistics for attachment effects with post hoc analyses to conclude which of the groups differ from each other

	Type of predominant attachment style				
Measures	Secure $n = 99, 79, 64$ M (SD)	Avoidant $n = 80, 62, 42$ M (SD)	Preoccupied $n = 50, 37, 28$ M (SD)	F	Post hoc analyses (Sheffé)
T1 IES-22	22.4 (20.7)	27.6 (21.8)	39.0 (25.7)	9.24***	Sec < Pre, Avo < Pre
T2 IES-22	13.1 (16.2)	18.7 (20.5)	24.8 (23.4)	4.73*	Sec < Pre
T3 IES-22	8.2 (13.3)	16.2 (21.7)	16.5 (19.6)	3.62*	
T1 IES-Intrusive	7.7 (7.7)	9.7 (8.3)	12.7 (9.8)	5.76**	Sec < Pre
T2 IES-Intrusive	5.0 (6.2)	7.1 (8.1)	8.3 (8.3)	2.87	
T3 IES-Intrusive	3.3 (5.3)	6.7 (8.9)	5.7 (6.1)	3.47*	Sec < Avo
T1 IES-Avoidance	8.8 (8.3)	10.5 (8.3)	16.3 (9.8)	12.66***	Sec < Pre, Avo < Pre
T2 IES-Avoidance	5.1 (6.9)	7.2 (9.0)	10.1 (9.9)	4.43**	Sec < Pre
T3 IES-Avoidance	3.5 (5.7)	5.7 (8.7)	6.8 (9.1)	2.34	
T1 IES-Hyperarousal	5.9 (6.8)	7.4 (7.2)	10.1 (8.3)	5.48**	Sec < Pre
T2 IES-Hyperarousal	3.0 (4.6)	4.5 (5.7)	6.4 (6.9)	4.88**	Sec < Pre
T3 IES-Hyperarousal	1.4 (3.5)	3.7 (5.9)	4.0 (6.1)	4.04*	
T1 A-DES	2.3 (3.8)	4.7 (6.5)	6.3 (11.2)	6.18**	Sec < Pre
T2 A-DES	1.5 (4.0)	2.5 (3.5)	5.7 (9.0)	8.00***	Sec < Pre, Avo < Pre
T3 A-DES	1.6 (6.0)	1.8 (3.3)	3.6 (6.8)	1.35	
T2 PTGI	53.9 (14.2)	51.7 (14.3)	57.6 (15.1)	1.80	
T3 PTGI	55.6 (15.7)	51.2 (13.5)	58.0 (13.2)	1.77	
T2 relating to others	18.8 (5.0)	17.7 (5.0)	20.6 (4.9)	3.64*	Avo < Pre
T3 relating to others	19.3 (5.6)	16.9 (5.0)	20.6 (4.2)	4.24*	Avo < Sec, Avo < Pre
T2 new possibilities	10.0 (3.5)	9.9 (3.4)	11.4 (3.6)	2.49	
T3 new possibilities	10.4 (3.7)	9.5 (3.6)	11.3 (2.7)	2.02	
T2 personal strength	11.1 (3.6)	10.8 (3.9)	11.1 (3.8)	0.16	
T3 personal strength	11.6 (4.1)	11.3 (3.4)	11.7 (3.8)	0.13	
T2 spiritual change	3.2 (1.8)	3.3 (2.1)	3.7 (2.3)	0.63	
T3 spiritual change	3.4 (1.8)	3.4 (2.2)	3.5 (2.2)	0.02	
T2 appreciation of life	10.7 (2.9)	10.0 (2.7)	10.9 (3.1)	1.19	
T3 appreciation of life	10.8 (2.9)	10.2 (2.5)	11.0 (2.6)	0.88	

Note: T1 = (first) questionnaire at 4 months, T2 = (second) questionnaire at 16 months, T3 = (third) questionnaire at 28 months. Sec = secure predominant attachment style, Avo = avoidant predominant attachment style, Pre = preoccupied predominant attachment style. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

to a school-shooting trauma in Finland. As expected, the secure attachment style was more protective than preoccupied style toward PTSD and dissociative symptoms. However, concerning PTG, survivors with secure attachment did not differ from insecure-preoccupied, although those with insecure-avoidant style showed a very low level of growth. The vulnerability of the two insecure attachment types, avoidant and preoccupied, differed according to the time that had elapsed since the school-shooting trauma. The survivors with preoccupied attachment style reported higher levels of PTSD and dissociative symptoms 4 and 16 months after the trauma, whereas those with avoidant style did not differ from the securely attached. In the long run, however, more than 2 years post-trauma, the survivors with avoidant style suffered most of the intrusive and hyperarousal PTSD symptoms. Our findings suggest that persons with different attachment styles show unique patterns of recovery, which is important to acknowledge in planning and tailoring psychosocial support and treatment.

The attachment theory highlights that facing threat and life danger such as in a school shooting, activates the attachment-specific ways of coping, regulating overwhelming emotions and relying on others' support (Bowlby, 1969/1982). The first measurement in this study took place 4 months after the trauma, and apparently

Table 4. Multivariate regression for the posttraumatic symptoms measured by the Impact of Event Scale (IES) studying the effects of avoidant and preoccupied attachment styles compared to secure attachment on recovering from a school-shooting trauma

	Avoidant vs. secure				Preoccupied vs. secure			
	R^2	B	SE B	β	R^2	B	SE B	β
IES-22								
T1	0.22	5.17	2.93	0.12	0.29	5.04	1.90	0.20**
T2	0.16	3.47	3.05	0.09	0.29	2.43	1.82	0.12
T3	0.11	7.59	3.53	0.21	0.17	1.96	1.81	0.11
IES-Intrusive								
T1	0.21	1.95	1.11	0.12	0.23	1.28	1.73	0.14
T2	0.14	1.0	1.20	0.08	0.25	0.51	0.68	0.07
T3	0.11	3.08	1.44	0.21	0.15	0.39	0.65	0.06
IES-Avoidance								
T1	0.15	1.72	1.20	0.10	0.25	2.78	0.78	0.28***
T2	0.08	1.44	1.38	0.09	0.24	1.21	0.80	0.14
T3	0.08	2.38	1.48	0.16	0.17	0.77	0.81	0.10
IES-Hyperarousal								
T1	0.21	1.50	0.97	0.11	0.27	0.97	0.62	0.12
T2	0.23	0.83	0.82	0.08	0.28	0.72	0.53	0.12
T3	0.12	2.13	0.93	0.22	0.15	0.81	0.53	0.16

Note: T1 = (first) questionnaire at 4 months, T2 = (second) questionnaire at 16 months, T3 = (third) questionnaire at 28 months. Age, previous traumatization, previous psychosocial support or psychological treatment and level of exposure were controlled for. Gender and later traumatization could not be analyzed due to low numbers of males and new traumas in the sample.
**$p < 0.01$, ***$p < 0.001$.

survivors' minds were still fresh with fears and horrors. The students with insecure-preoccupied attachment style were most vulnerable to PTSD and dissociative symptoms, which may be due to their tendency to accelerate their negative feelings, thus facing difficulties to regulate excessive arousal. At the 16 months follow-up, the survivors with preoccupied attachment style still had a higher level of PTSD and dissociative symptoms than the securely attached students. The lower symptom levels of securely attached students may be explained by their wide variety of effective self-soothing and problem-solving skills, and their ability to trust in other people's availability for help and emotional consoling (Crittenden, 1997; 2000). Securely attached survivors apparently appraised their psychological state accurately and were able to seek help if needed.

The survivors with preoccupied style typically kept the terrifying scene of the school shooting vividly in their minds for a long time, as it is habitual to them to maximize their feelings of loss and fear. The trauma survivors with preoccupied attachment style have been found to show especially intrusive PTSD symptoms, which is due to their difficulty to frame, control, and deal with overwhelming emotions (Kanninen et al., 2003b; Mikulincer et al., 2006). This was also the case in our study at 4 and 16 months after the trauma. Our findings concur with the study on survivors of the 9/11 terrorist attack that also found that the survivors with preoccupied attachment style showed the most severe PTSD in the 18 months follow-up (Fraley et al., 2006). Similarly to ours, cross-sectional studies by Calmari and Pini (2003) and Nilsson et al. (2011) showed that students with secure attachment style had lower levels of dissociation than those with preoccupied attachment style.

When two years had elapsed from the school-shooting trauma, students with insecure-avoidant attachment style showed higher levels of intrusive and hyperarousal PTSD symptoms than the securely attached, which accords with the hypothesis. Typically, survivors with avoidant attachment style try to suppress their threat-related emotions, deny experienced threat of life, and numb threat-related emotions (Crittenden, 2000; Mikulincer & Shaver, 2010). They are used to trust themselves as a source of support, and they may feel that seeking help in a traumatic situation is a sign of weakness. Their basic assumption is not to trust others, which in the aftermath of the school shooting may have led to isolation, fear of sharing experiences, and failure to seek adequate help. This explains why they would suffer from intrusive symptoms such as nightmares and flashbacks when a long time has elapsed since the trauma. As survivors with

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avoidant attachment style have difficulties expressing their emotions and their need for support, other people may fail to recognize their despair. In their study of recovery after terrorist attacks, Fraley et al. (2006) found that survivors with avoidant attachment style had a relatively high level of PTSD, but the symptoms were unrecognized by their family members and friends. Moreover, friends and peers thought that these trauma survivors were doing fine. This miscommunication may leave the course of symptom development invisible among persons with avoidant attachment style. When tailoring interventions and help, it is essential to keep in mind that survivors with avoidant attachment style have difficulties relating to others and asking for help, even if they are in great need.

The results of attachment style and PTG do not support the hypothesis that survivors with secure attachment style are the most successful in experiencing the possible positive sides of the trauma. Instead, survivors with insecure-preoccupied attachment style scored similarly to the securely attached survivors and higher than those with insecure-avoidant attachment style. It is noteworthy, that survivors with avoidant style showed very low growth in the PTGI dimension of relating to others. To gain a positive and growth-inducing experience after a tragedy requires support and sharing, and therefore survivors with avoidant attachment style are vulnerable as sharing with others is not a natural way for them (Crittenden, 1997; Kanninen et al., 2003a).

We were able to reach about two thirds of the exposed students. Yet, this proportion can be considered satisfactory considering the circumstances. The dropout at follow-ups was not dependent on the severity of trauma exposure or posttraumatic or dissociation symptoms. The majority of the students in the Kauhajoki Educational Centre are women (90%), which explains the female predominance in the sample. As a result, we could not examine the differences between male and female students, which might have given additional information about the studied phenomena. To avoid the questionnaire being excessively long, we were only able to use a limited number of items in some of the questionnaires (e.g., dissociative symptoms). Self-administered questionnaires may include reporting biases and are thus not as reliable as information from structured interview methods. However, this methodology allowed us to collect a large sample providing information about various types of mental health outcome. We have performed multiple testing on, for example, PTSD symptoms with subscales and different time points. This may increase the risk of chance capitalization, and caution should be taken not to overvalue the results presented. As we carried out the study as partners to the aftercare provision, the results served as screening those in need of intervention.

Conclusions

It is a great challenge for the health care professionals to plan and tailor effective interventions for survivors of traumatic, life-endangering experience, such as a school shooting. Psychosocial support and clinical interventions should be implemented in an attachment-specific way, keeping in mind that the survivors with different attachment styles have unique ways of coping, arousal regulation, the expression of emotions, as well as preparedness to seek help.

The conclusion of our study is that students with secure attachment style have the most beneficial means to recover after a school-shooting trauma. Both insecure-preoccupied and insecure-avoidant survivors are vulnerable, but may need help in different doses, modalities, and timing. We argue that those with preoccupied attachment style express their distress openly and their despair is easy to recognize and support offered. The insecure-preoccupied students are vulnerable especially at the wake of the trauma. Instead, it can be problematic to reach survivors with avoidant attachment style who may have persistent posttraumatic symptoms, but are not expressing their distress or seeking help. Further research is needed on the attachment-specific help-seeking behavior as well as on the different kinds of support that match the needs of survivors with secure and insecure attachment styles.

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There is no conflict of interest in the present study for any of the authors.

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