Posttraumatic stress symptoms among school personnel after the Jokela school shooting: A longitudinal study of exposure, interventions, and symptom changes

Psychology master's thesis (35+4)

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Tiivistelmä - Referat – Abstract

Tavoitteet: Koulussa tapahtuva väkivalta altistaa kouluhenkilökunnan posttraumaattiselle stressihäiriölle (PTSD). Suomessa on viime vuosina sattunut kaksi tällaista tapahtumaa, Jokelan koulusurmat 7.11.2007 ja Kauhajoen koulusurmat noin vuotta myöhemmin. Tutkimus selvitti PTSD-oireiden esiintyvyyttä ja muutosta yhden vuoden seurantajakson aikana Jokelan koulusurmien jälkeen. Tutkimuksen toinen tavoite oli tutkia kuinka altistumisen aste ja hoito vaikuttivat PTSD-oireisiin. Tutkimuksessa oli neljä hypoteesia: 1) Koulusurmille altistuneiden PTSD-oireet ovat korkeammat kuin niiden, jotka eivät altistuneet niille. 2) Seurantavaiheen PTSD-oireet nousevat niiden koulujen henkilökunnalla, joihin ei hyökätty, koska toinen samankaltainen tapahtuma tuo mieleen Jokelan tapahtumat. 3) Niillä, joiden altistumisen aste on korkea, on korkeammat PTSD-oireet 4kk ja 11kk ampumisesta, kuin niillä, jotka eivät suoranaisesti altistuneet ampumiselle. 4) PTSD-oireet laskevat enemmän ryhmässä, joka aloitti hoidon heti traumaattisen tapahtuman jälkeen, kuin muissa ryhmissä.

Menetelmät: Työssä tutkittiin 24 jäsenen otosta Jokelan kouluhenkilökunnasta 4kk ampumisen jälkeen ja 16 arvioitiin uudelleen 11kk ampumisesta. Oireiden esiintyvyyden ja muutoksen tutkimiseksi muissa kouluissa samaan aikaan käytettiin verrokkiryhmää (n=22), joka ei ollut altistunut ampumiselle. Arviointiin sisältyi sekä Post Traumatic Stress Disorder Checklist Specific (PCL-S) –kyselylomake että sosiaalisen ja ammatillisen tuen kyselylomake. Lisäksi kysyttiin kokemuksia tuen ajoituksesta ja psykologisesta jälkipuinnista.

Tulokset ja johtopäätökset: Suurimmalla osalla tutkimusryhmästä oli joitakin PTSD-oireita sekä 4kk ja 11kk tapahtuneen jälkeen. Molemmissa mittauksissa kolme henkilöä tutkimusryhmästä täytti PTSD:n diagnostiset kriteerit. Tutkimus- ja verrokkiryhmä erosivat tilastollisesti merkitsevästi PTSD-oireiden esiintyvyydessä. Tutkimusryhmällä oli enemmän PTSD-oireita ensimmäisessä mittauksessa, mutta seurantamittauksessa tutkimusryhmän oireet vähenivät ja verrokkiryhmän oireet lisääntyivät. PTSD-oireet vähenivät tilastollisesti merkitsevästi niillä, jotka aloittivat strukturoidun hoidon heti traumaattisen tapahtuman jälkeen. Tutkimuksen tulokset osoittavat, että koulusurmille altistuneilla on pitkään jatkuvia reaktioita ja oireita traumaattisen tapahtumaan liittyen. Tutkimustulokset osoittavat myös, että on tärkeä suunnitella riittävän pitkäkestoisia hoito- ja tukimuotoja koulusurmille altistuneille.

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Objectives. School personnel who are exposed to school violence are at risk in developing post traumatic stress disorder (PTSD). In Finland there have been two such events in recent years, Jokela school shooting on 7.11.2007 and Kauhajoki school shooting about a year later. The aim of the present study was to examine the presence and change in PTSD symptoms during the first year after the Jokela school shooting. A second aim was to study how the initial exposure and treatment affects the symptom levels of PTSD. There were four hypotheses: 1) The PTSD symptoms are higher for the people who were exposed to the school shooting than for the people who did not face the stressor. 2) The PTSD symptoms increase in the follow up for the people at the school which was not attacked because of the second incident brought up the memories from the Jokela school shooting. 3) Those who have greater exposure to the shooting will have higher level of PTSD symptoms at both 4 and 11 months after the shooting than those who were not directly exposed to the shooting. 4) The PTSD symptoms are reduced more in the group that starts treatment right after the traumatic event than in other groups.

Methods. A sample of 24 members of Jokela school personnel were examined four months after the incident and 16 were reassessed 11 month after the incident. To study the change and level of symptoms in other schools during the same period, a group with no exposure to the shooting was used as a control group (n=22). The assessment included Post Traumatic Stress Disorder Checklist Specific (PCL-S) and a social and professional support questionnaire. In addition questions about timing of support and experiences of psychological debriefing were asked.

Results and conclusions. Most participants in the study group experienced some symptoms of PTSD at both 4 and 11 months. In both measures three participants from the study group fulfilled the diagnostic criteria for PTSD. The study group and control group differed significantly in overall symptom levels. The study group had more PTSD symptoms in the first measure but in the follow-up the study group's PTSD symptoms decreased and the control group's increased. There was a significant change in the study groups PTSD symptom level for those who started treatment right after the traumatic event. The results from this study showed that an exposure to school shooting has long-term effects on school personnel. The findings suggest that it is crucial to plan a comprehensive and long-term treatment for school personnel in the aftermath of school shooting.

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Nina Lyytinen

1 *Introduction*

The unexpected school shooting on November 7th, 2007 shocked the Finnish nation. An eighteen-year old male student opened fire at his school, Jokela school center[1] in municipality of Tuusula killing 9 people: 6 students, 2 staff members (the school principal and the school nurse), and himself. One person was injured from the shooting and eleven people were injured from the shattering glass when escaping the school building. There has only been one school related shooting before this incident in Finnish history. It occurred in 1989 at the Raumanmeri School in Rauma and led to the death of two students. Less than a year after the Jokela school shooting, Finland faced another school shooting on September 23rd when a male student at the Seinäjoki University of Applied Sciences in Kauhajoki opened fire killing 10 people and himself. After the Kauhajoki school shooting hundreds of threats have been made to different schools around Finland. This has affected school communities in Finland by increasing feelings of insecurity.

This study evaluates the Posttraumatic stress disorder (PTSD) symptoms at 4 months and then at 11 months after the Jokela school shooting given that PTSD symptoms are common after incidents of school violence. To evaluate PTSD symptoms a control group will be used. Since there is little documentation of the care the school personnel receives in the aftermath of school shootings this study also describes the professional and social support school personnel have received after the Jokela school shooting. This study focuses on the immediate and long-term services. Also, the personnel's attitudes and perceptions about the care they have received will be evaluated. Findings can be used to understand better the psychological effects of school shootings and to refer school personnel to the appropriate care in the aftermath of school shootings.

1.1 *The Jokela school shooting as a traumatic event*

The Jokela school shooting fills the criteria for traumatic event according to the Diagnostic and Statistical Manual of Mental Health Disorders fourth edition (DSM-IV). The DSM-IV defines a traumatic event as one that involves "actual or threatened death or serious injury or a threat to the physical integrity of 'self or others' and response to the traumatic experience as 'intense fear, helplessness, or horror" (American Psychiatric Association, 1994, pp 427-428). Previous publications suggest that there are three defining features of traumatic events: 1) the event is experienced as

[1] Jokela school center consist of upper and high school

extremely negative, 2) the event is uncontrollable, and 3) the event is unexpected (Carlson & Dalenberg 2000, Herman, 1992; Saari, 2000). Research suggests that all three elements: uncontrollable, negative, and sudden should be present for the event to be traumatic. However, the event may not be traumatic even though all of the three parts are present (Carlson & Dalenberg 2000). It is not only the event that determines whether something is traumatic to someone, but the individual's experience of it. The crucial factor in a psychological trauma is that the experienced event overwhelms the individual's coping means, active or defensive, and his ability to integrate the ideas and emotions involved with the experience. The harm of the traumatic event increases when physical violation, exposure to extreme violence or witnessing death is present (Herman, 1992).

1.1.1 Posttraumatic stress disorder after exposure to a traumatic event

Posttraumatic stress reactions are normal reactions to traumatic events (Davidson & Foa, 1993). Most people go through normal stress reactions and do not develop PTSD. However, when the normal recovery process fails the individual is in a risk of developing PTSD. American Psychiatric Association's DSM-IV classifies PTSD as a mental disorder resulting from exposure to a traumatic event (American Psychiatric Association, 1994). According to DSM-IV, PTSD symptoms must be present for one month and cause "significant distress or impairment in social, occupational or other important areas of functioning" in order to be diagnosed it as a disorder. It also divides the symptoms of PTSD into three main categories: re-experiencing, avoidance, and increased arousal.

Re-experiencing can be highly distressing. Core symptoms of re-experiencing are: upsetting thoughts and memories of the traumatic event, recurrent nightmares, flashbacks (feeling as if the traumatic event is happening again), strong feelings of distress or physical symptoms like raising heart beat or sweating when reminded of the traumatic event (American Psychiatric Association, 1994 pp 428).

Core symptoms of avoidance are: effortlessly avoiding thoughts, feelings or conversations about the traumatic event, avoiding places or people that remind about the traumatic event, difficulties in remembering important parts of the event, loss of interest in important activities, feeling distant from others and difficulty in having positive feelings and feeling that life may be cut short (American Psychiatric Association, 1994 pp 428).

Increased arousal is the third symptom of PTSD. Arousal symptoms include difficulties in falling or staying asleep, feeling irritable or outbursts of anger, difficulties in concentrating, constantly feeling

“jumpy” or “ on guard”. People who suffer from PTSD often jump to negative reactions even when the stressor is very minor. They easily feel threatened, they overreact to minor incidents and they may shut down or freeze. Increased arousal also makes it difficult to concentrate and pay attention to things (American Psychiatric Association, 1994; Van Der Kolk, McFarlane & Weisaeth, 1996).

The severeness and length of a traumatic experience affect the length of the PTSD symptoms it causes. The symptoms last longer the more severe and longer the experience is (Davidson & Foa, 1993). Direct exposure to trauma has been found to generate higher prevalence of PTSD (Nader, Pyynos, Fairbanks & Frederick, 1990; Neria, Nandi, & Galea, 2008). Some studies have also found that intentional acts of violence are more likely to produce symptoms of PTSD than other types of traumatic experiences. In some cases PTSD symptoms worsen over time in the absence of treatment (Davidson & Foa, 1993; Newman, Harding, Mehta & Roth, 2004). To better understand the changes of PTSD symptoms with different exposures, it is important to conduct longitudinal research. It is also important to screen trauma-exposed victims to be able to offer and better target services for them. High social support (Brewin, Andrew, & Valentine, 2000), seeking for support, and received individual and group counseling has been found to be good recovery factors from PTSD.

1.1.2 Prevalence of PTSD after exposure to a school shooting

A school shooting initiates a time of crisis for the whole community, especially for members of the attacked school. The experience of facing a school shooting can have a powerful effect on the members of the school community. As it can disrupt their behavioral, cognitive and psychological well being (Hawkins, McIntosh, Silver & Holman, 2004; Palinkas, Prussing, Reznik & Landsverk, 2004). There are both short- and long-term consequences after a traumatic experience (Daniels et al., 2007; Newman et al., 2004).

Research suggest that only 9-20% of those exposed to a traumatic stressor develop PTSD (Breslau et al., 1998; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Other studies and clinical experience show that 30-40% of people who face traumatic events and do not receive professional support are at risk of developing PTSD symptoms and difficulties in social relationships (Saari, 2000).

A perceived threat to life is found to be a predictor of the onset of PTSD (Holbrook, Hoyt, Stein & Sieber, 2001). Also, lack of social support has been found to increase the likelihood of PTSD after

trauma exposure in military and civilian samples (Brewin, Andrews & Valentine 2000; Adams & Boscarino, 2000). Even though most people who are faced with a traumatic event do not develop PTSD the symptoms are not uncommon (Breslau, 2002). PTSD symptoms are not only distressing and impairing but they can cause other psychiatric disorders like depression and anxiety (Breslau, 2002; Khamis, 2008).

There are relatively few studies addressing the aftermath of a violent, traumatic event in a school. Most research and literature has focused on the perpetrators, the assessment approaches, and causes of the violent crime (Langman, 2009, Leary, Kowalski, Smith & Phillips, 2003, Muschert, 2007, O'Toole, 2000, Warner, Weist & Krulak, 1999). Some literature suggests that the psychological effects of school related violence are well known among school personnel but they still do not receive adequate care after these incidents (Newman et al. 2004). There is little documentation on what services have been provided for school personnel after violent incidents in schools. Students usually receive multiple resources including psychological debriefings and evaluation of long-term effects like PTSD (Daniels, 2002). It is important that students and school personnel alike receive adequate care after a school related violent event.

1.1.3 Welfare of school personnel after a school shooting

School personnel have an important role in the school community. They have the responsibility for teaching and upbringing of children. Furthermore, teachers are role models for youth developing to adulthood. After a school shooting the teachers' role becomes even more important. The students who return to the attacked school need the adults to reconstruct a safe environment for growth and learning. Students have been found to easily lean on teachers with their post trauma symptoms (Newman, 2004). At the same time teachers have to work to reconstruct their own basic security.

Previous studies on school violence and teachers' professional disengagement show that feelings of insecurity at the workplace are predictors of burnout (Galand, Lecocd & Philippot, 2007). In a study conducted by Newman et al. (2004) researchers found that teachers felt neglected following the school shooting. Teachers were expected to provide mental health services for their students and reassure parents after the incident. However, teachers are victims themselves as well, and not trained to provide mental health services.

Previous studies show that most teachers do not voluntarily seek counseling after incidents of school violence (Kondrasuk et al., 2005). Therefore it is important to evaluate school personnel after incidents of school related violence to motivate personnel to seek care as well as to help the individual to identify personal strengths and resources and previous coping strategies. In some cases the procedure to receive affordable individual counseling is made difficult by bureaucracy (Newman et al., 2004). Forms that are easy to fill out in normal situations might be difficult for traumatized individuals. For example filling out forms for compensations or request for services can be overwhelming (Newman, et al., 2004). The bureaucracy should be made as simple as possible so that the services are easily reachable.

Research suggests that it is essential for counselors and psychologists to be aware of the impact of school violence on personnel (Daniels, Bradley & Hayes, 2007, Newman et al., 2004). This helps mental health professionals to understand the possible symptoms better and helps them to refer personnel to the appropriate care more efficiently (Daniels, Bradley & Hayes, 2007, Newman et al., 2004).

1.2 *Interventions*

1.2.1 Social support

Social support is often defined as the availability of people whom one can rely on and who let one know that he/she is cared for and valued (Sarason, Levine, Bashman & Sarrason, 1983). In this research social support extends to the professional source of support. Social support according to this study refers to the support received from family, friends, co-workers, and professional health care providers. Social support has two basic elements 1) the perception that there is enough support available and 2) degree of satisfaction of the perceived support available (Sarason et al., 1983). Previous studies show that lack of social support is linked to increased risk of PTSD (Brewin, Andrews & Valentine 2000; Adams & Boscarino, 2006).

In the aftermath of a school shooting some survivors have felt that the social support declines too fast since family members and others in the community do not understand the long-term effects of a school shooting. Survivors have felt that they are expected to get over the traumatic experience fast and if not something must be wrong with them (Newman et al., 2004). Studies have also found that family members have different ways of recovering and this might cause strains in close relationships. For

example, if in a relationship one tries to cope by talking about the event and the other does not wish to do so. Difficulties and even break-ups in the aftermath of school shooting can occur (Newman et al., 2004; Hawkins et al., 2004).

1.2.2 Psychological debriefing

Psychological debriefing is a brief group crisis intervention usually administered within 2-3 days after a traumatic event (Dyregrov, 1997; Mitchell, 1983; Palosaari, 2007). In Finland trained professionals conduct the psychological debriefing sessions. They usually have special training for crisis work and also have knowledge of crisis and trauma psychology (Palosaari, 2007; Saari, 2000). Knowledge of group dynamics is used in the sessions (Saari, 2000).

The group formation is an important part of the psychological debriefing process. The central principle is that the group must have experienced a common stressor (Dyregrov, 1997; Saari, 2000). In Finland it is preferred to conduct more than one session for a group. Usually two to three sessions are offered (Palosaari, 2007). In the structured and organized session, participants review in detail the facts, thoughts, feelings, and reactions to the critical event (Dyregrov, 1997; Mitchell, 1983, Palosaari, 2007). Participants also receive information about normal reactions to a crisis (Dyregrov, 1997; Palosaari, 2007).

In her book Lupa Särkyä (Permission to Shatter) Palosaari (2007) describes the psychological debriefing protocol in phases as follows. First, instructors introduce themselves, the rules and the purpose of the session. In the second phase participants are asked to review the scenarios of the situation and to discuss the facts related to it. This is referred to as the fact phase. The third phase is the thought phase where participants are asked to discus their thoughts and sensations of each scenario/situation that is presented. The fourth phase is thought and reaction phase. In this phase participants share their reactions and feelings about each of the scenarios/events. The fifth phase is referred to as the normalization phase where the instructors tell about normal reactions related to a crisis situation. Last phase is the closure.

The goal of these sessions is to reduce any psychological harm by letting participants talk about their personal reactions under the guidance of trained professionals who take care of the safe setting and outline of the session. The goal is also to give information about normal reactions and to increase the knowledge about coping methods (Dyregrov, 1997; Palosaari, 2007; Saari, 2000). After the Jokela

school shooting the debriefing sessions for the school personnel were offered by the Finnish Red Cross Psychologists' Preparedness Group.

There is an ongoing debate on the effectiveness of the debriefing as a treatment method. Some literature points out that there is no proof that debriefing prevent long-term psychological distress or psychopathology (Rose, Bisson, & Wessely, 2002; Rose, Bisson, Churchill, & Wessley, 2005). In his review Dyregrov (1998) found that there are major methodological flaws in both studies supporting and opposing debriefing. The flaws include the use of psychological intervention, self-selection of group, timing of interventions, and one-time sessions (Dyregrov, 1998). It is suggested to avoid one time psychological debriefing with the aim of preventing PTSD or other psychological problems (Dyregrov, 1998, Palosaari, 2007, Saari, 2000). It is important to make referrals to treatment services and to follow up on the individuals who have been exposed to a traumatic event (Dyregrov, 1998; Saari, 2000). In Finnish psychological debriefing process these issues are taken into consideration.

1.2.3 Crisis counseling & long-term psychotherapy

Crisis counseling consists of one or multiple sessions (Gard & Ruzek, 2006). Crisis counseling offers support for the immediate reactions, education about normal reactions, and responses to traumatic event (Daniels, Bradley & Hayes, 2007; Gard & Ruzek, 2006; Palosaari 2007). Previous studies and clinical experience show that people who are faced with crisis situations find it helpful to get information about normal stress reactions to the incident (Brewin, 2001; Saari 2000). Crisis counseling is usually offered by mental health professionals such as psychologists or psychiatric nurses who have been trained in crisis interventions (Palosaari, 2007).

After crisis counseling the support might extend to a long-term psychotherapy which usually lasts from 1 to 3 years. It is not uncommon for school personnel to need therapy several years after school shootings (Newman, et al., 2004). In Finland the financially supported psychotherapy needs a three-month psychiatric evaluation and a trial treatment. The social insurance institution of Finland provides access to psychotherapy for one year at a time, the maximum time being three years. They financially support the costs of psychotherapy and individual pays just an excess amount for each appointment (Kela, 2009). After the Jokela school shooting the personnel was offered crisis counseling for free. It was paid either by the insurance company or by the municipality of Tuusula. For the long-term psychotherapy the municipality paid the deductible.

1.3 *Aftercare services provided to the Jokela school center personnel*

Crisis work at the Jokela school center started immediately after the personnel and students were evacuated from the school. A crisis center was based at a nearby church. Support and counseling were offered there by crisis workers and psychologists prepared to work during crisis situations.

Day after the shooting (8th November, 2007) the Finnish Red Cross Psychologist' Preparedness Group held a defusing session for the personnel of the Jokela school center. Thirty teachers participated in the session. On the 9th of November the debriefing sessions were conducted for the personnel by eight psychologists from the Preparedness Group. There were four groups in which 42 members of the personnel participated. The groups were formed by the level of exposure 1) person had been in mortal danger, had seen others being shot, seen dead bodies etc., 2) person had been in the building when the events occurred and 3) two other groups (not in the building when the events occurred). Between two to seven sessions were held for the groups, over the course of two months. The least exposed group met two times and the group with the greatest level of exposure met seven times. After the psychological debriefing the participants in need of extra care were referred to individual counseling. Follow-up phone calls were also made for support.

School started on the 12th of November at a temporary facility and continued for three days with extra support services. Psychologists from the Preparedness Group provided support via individual and group counseling for the students and school personnel. The day before teaching was resumed at Jokela school center, the school personnel visited the school building with the psychologists. The personnel walked around and checked every corner to feel that the building was safe again for them to start to work there. The goal was to retake the school building psychologically into their possession.

On the 15th of November school personnel and students returned to the Jokela school center. The return was organized by the substitute principal, vice-principal, and two crisis psychologists. On the first day of teaching at the Jokela school center 16 of the psychologists from the Preparedness Group and eight other psychologists or crisis workers offered support for the staff and students. Each class had a support person for the teacher and the students. Also, ten substitute teachers were hired to ensure that teaching would not be interrupted in the event that any of the teachers could not carry on their work.

Psychological support was available at the school the next day and for a week after the return. The municipality of Tuusula also hired two experienced crisis psychologists to work at the Jokela school center. One of the psychologists worked mainly with the personnel from 7th of November, 2007 till the end of year 2008. The other psychologist worked mainly with the students till the end of the year 2007. After that another psychologist was hired to work with the students until the end of 2008.

The day after the shooting the municipality of Tuusula formed an administrative aftercare group to plan the aftercare of the incident. The group included management personnel from sectors affected by the shooting. Later aftercare coordinators joined the group. The objective of the group was to assess the needs, plan, monitor, and evaluate the aftercare services. Clinical experience from previous catastrophes was used in the planning process. The Jokela aftercare group formulated an aftercare plan which extends to the end of 2012. The municipality of Tuusula hired 43 persons for various aftercare duties in 2008. They included both professionals in psychosocial support, health care, and educational personnel. In 2009, 39 persons were hired to work in aftercare.

The occupational health care services were strengthened after the school shooting. Tuusula hired a part time doctor to provide extra assistance to the Jokela area. The municipality also hired an occupational nurse who visited the school regularly to conduct health check-ups and to provide services to the personnel. An occupational psychologist was available for the personnel.

Previously mentioned aftercare coordinators, two psychologists/psychotherapists and two crisis workers, were hired by the municipality to work with the aftercare group. The psychologists had a long history of working with crisis situations and catastrophes having both worked in the field from the beginning of 1990. The coordinators provided psychosocial services and psychological consultations. For example they helped the school personnel in aftercare arrangements such as finding a psychotherapist, and applying for compensations from insurance companies, social insurance institution, and from the State Treasury. The coordinator group took part in planning the aftercare intervention services and also held psychosocial information sessions at the school. These sessions helped the participants to understand the after-effects of the traumatic experience and to discuss their crisis and trauma reactions in the school community and with the parents. During the fall term of 2008, one of the most significant work areas for the coordinator group was to take into consideration the effects of the upcoming one-year anniversary and the reactions that the day might bring. The coordinators helped to plan the anniversary in cooperation with the school personnel and the students.

The coordinators also arranged and prepared the support personnel that was present for the anniversary. The Kauhajoki school shooting affected the planning process of the anniversary.

Crisis and trauma counseling was made available for the school personnel by the aftercare group. Those who needed long-term psychotherapy received a psychiatric evaluation and a referral to psychotherapy. The crisis counseling and psychiatric evaluation for the personnel was paid by the Tuusula municipality. If long-term psychotherapy was needed, municipality paid the individuals deductible amount for the psychotherapy and a compensation for travel expenses. Some of the services were covered by the occupational accident insurance and by the social insurance institution of Finland. Personnel was also encouraged to apply for compensation from the State Treasury. The municipality of Tuusula received financial support from the Finnish government to implement the aftercare plan.

A physiotherapist was hired to treat the bodily tension of personnel caused by the traumatic event. She provided individual and group treatment sessions. A 10-week relaxation class was also conducted for the school personnel by a music therapist.

Finally, the educational services of the municipality of Tuusula started a development project to help alleviate the impact of the Jokela school shooting in a comprehensive manner in the future. Through this project more personnel were hired to schools, training was provided to personnel, and the cooperation between the school and the homes was strengthened.

1.4 *Aims of the present study*

The primary focus of this study was on describing the symptoms of PTSD and the first two study questions were related to this. The first aim was to follow the presence and the change of the PTSD symptoms of the school personnel during the first year after the event. The second aim was to examine how different levels of exposure to the shooting were related to the PTSD symptoms. A control group with no exposure to the shooting was added to study the change and level of symptoms in other schools during the same period. The study design became more complicated during follow-up since there was another school shooting in Finland one month before the second measure. Based on results from previous studies and clinical experience, it was hypothesized that:

1) The PTSD symptoms are higher for the people who faced the stressor school shooting than for the people who did not face the stressor both 4 and 11 months after the Jokela school shooting.

2) The PTSD symptoms increase in follow-up for the people at the school which was not attacked because the second incident brought up the memories from the Jokela shooting.

3) Those who have greater exposure to the shooting will have higher level of PTSD symptoms at both 4 and 11 months after the shooting than those who were not directly exposed to the shooting.

The secondary focus of this study was the interventions offered. The third aim was to study whether the exposure level affected timing of starting treatment and if timing in turn affected the course of the PTSD symptoms. The fourth aim was to describe the professional and social support received and the perception of the support in different exposure groups.

Based on the results from previous studies and clinical experience, it was hypothesized that:

4) The PTSD symptoms are reduced more in the group that starts regular treatment right after the traumatic event than in other groups.

2 *Methods*

2.1 *Participants*

The option to participate in the study was offered to all school personnel (N = 48) at the Jokela school center. The term school personnel is used in this study to refer to any adult who works at the school, for example teachers, teacher's assistants, cleaners, and cooks. These participants were exposed to the stressor (school shooting).

The study group consisted of 24 members of Jokela school personnel (5 men, 19 women, 21 teachers, 3 others) who initially volunteered to participate in the study. The follow up questionnaire 11 months later was returned by 16 of the 24 (67%). The response rates can be seen in Table 1.

Control group participants were recruited from two other schools in a different municipality in Finland. These participants were not exposed to the stressor. These schools were selected so that upper and secondary school personnel were represented in the control group similar to the study group. The high school that was selected was located about 30 kilometers from Jokela and the upper school was located about 90 km from Jokela. The option to participate in the study was offered to all of the school personnel at the chosen schools (N = 109).

The control group consisted of 22 members of school personnel (6 men, 16 women, 15 teachers, 7 others) who volunteered to participate. The follow up questionnaire was returned by 7 of the 22 (32%) (see table 1).

There was no statistically significant difference between the background variables age, gender, and profession between the two groups in the first measure. Age t(41)= -1,270, p = .211, gender Fisher's exact p = .472, and profession Fisher's exact p = .261.

Table 1. Response rate in the follow-up study among those who initially participated.

	Study Group (n=24)		Control Group (n=22)		Combined (n=46)	
Responses Received From	N	% of Responses	N	% of Responses	N	% of Responses
All Personnel	16/24	67%	7/22	32%	23/46	50%
Teachers	15/21	71%	4/15	27%	19/36	53%
Other Personnel	1/3	33%	3/7	43%	4/10	40%
Men	3/5	60%	2/6	33%	5/11	0.45%
Women	13/19	68%	5/16	31%	18/35	51%

2.2 *The division of study group by exposure to the event*

The study group was faced with an extreme stressor when their school was attacked but the level of the exposure varied. The exposure information was collected from the question: where were you when the the event occurred? Four study group participants were not in the school building when the shooting occurred. Forty-two per cent (n=10) of the participants mentioned being trapped in a classroom, teachers' lounge or in a restroom. Twenty-one per cent (n=5) of the participants saw dead bodies, 21 % (n=5) heard gunshots, 21% (n=5) faced the shooter, 12.5% (n=3) saw others being shot, and 8% (n=2) were shot at. The information was used to divide the study group into three exposure groups by the level of exposure (see table 2): 1) moderate exposure 2) significant exposure 3) extreme exposure.

Table 2. The group frequencies by exposure level

Exposure Group	N	At School	Direct Exposure [a]
Moderate	4	No	No
Significant	10	Yes	No
Extreme	10	Yes	Yes

[a] Yes if participant mentioned any of the following when answering the question: "Where were you when the event ocurred?"*heard gunshots, saw dead bodies, faced the shooter, saw others being shot at, and/or was shot at.*

2.3 *Design and procedure*

This was a longitudinal questionnaire study, with measures at two different points in time, one at 4 and the other at 11 months after the Jokela school shooting. A questionnaire was designed especially for the purpose of this study by the researcher and two experienced Finnish psychologists/psychotherapist. Both psychotherapists and the researcher also worked as aftercare coordinators in Tuusula after the Jokela school shooting.

The first questionnaire was mailed to all of the members of the Jokela school personnel by the researcher. The questionnaire included a consent form that asked permission for the researcher to 1) evaluate the results from the needs assessment point of view in collaboration with the psychotherapist member of the coordination group, 2) evaluate the results in collaboration with occupational healthcare personnel, 3) use the collected information for scientific purposes and 4) send a follow-up questionnaire. The answer choices for the questions were Yes or No. If participants answered no to any of the questions, they were informed that they would not be excluded from any of the other parts. For example if the participant did not give permission for the scientific study, their need of support would still be evaluated. The follow-up questionnaire was mailed only to those who gave permission in the first questionnaire.

For the control group the school principals distributed the first questionnaire. All school personnel were asked to participate. In the consent form the control group was asked for permission for researcher to 1) use the participant's responses as part of the scientific study and 2) to send a follow-up questionnaire. The follow-up questionnaire was sent only to those who gave permission in the first part of the study. Their mailing addresses were asked in the first questionnaire for the purpose of offering recommendations for treatment if needed and to mail the follow-up questionnaire.

2.4 *Ethical considerations*

Permission for this study was granted by the Municipal Manager of Tuusula, the Jokela aftercare group, and the school principals. Ethical considerations were also discussed with two of the coordinator group psychologists as well as the university professors.

Previous research suggests that participating in studies that measure psychological trauma has more benefits than harm for the participants. Most of the participants report benefits and interest in participating in trauma research (Griffin, 2003; Newman & Kaloupek 2004).

Besides the scientific objective the study also had practical goals. The coordinator group wanted to get feedback on the services offered in order to improve the services and to ensure that they are based on the actual needs of the Jokela school personnel. To this aim it was important to encourage as much participation from the personnel at the Jokela school center as possible. Participants in both groups were offered feedback from their screening questionnaires. The personnel at the Jokela school who

were evaluated as needing psychological or psychiatric care were contacted by phone or mail to be referred to proper services provided by the aftercare group. For the control group the evaluation of possible care needed was done in collaboration with the two psychotherapists. If the evaluation indicated a need of care the participants were sent a letter recommending they contact their occupational health care services.

Participants were assured that the information they provided was handled abiding by the rules of confidentiality. If the participant denied the permission to discuss his/her answers with the occupational health care or the psychotherapist member of the coordination group their answers were not shown to them. Participants were also informed that their responses to the questionnaires would only be used and accessed by the researcher and would be stored in a locked file cabinet. When the results of the questionnaires were discussed in the Jokela aftercare group no names or other identifier information were used. For the scientific data analyses only numbers, not participant names, were used. The numbers were assigned to each participant when the researcher received the filled out questionnaire and that same number was used for the follow-up. All names and identifying numbers were stored in a separate file.

2.5 *Measures*

2.5.1 Posttraumatic Stress Disorder Checklist

The posttraumatic stress symptoms were measured by *Posttraumatic Stress Disorder Checklist Specific (PCL-S,* see appendix 1).The PCL was translated into Finnish by the researcher. The PCL is a 17-item self-report instrument developed by Weathers and colleagues in 1994 (Weathers, Litsz, Huska & Keane, 1994). It is based on the DSM-IV. The PCL can be divided into three different subscales, which correspond to the main symptoms of PTSD; re-experiencing (items 1-5), avoidance (items 6-12), and hyperarousal (items 13-17). Questions in this study were keyed to the Jokela school shooting. Weathers et al., (1994) suggested that a symptom should be considered as meeting the threshold on criterion if an individual reports that it has bothered him or her moderately, quite a bit, or extremely. Summing of the threshold items indicates whether the person meets the criteria for each of the DSM-IV symptom categories. For example, one or more re-experiencing symptoms of item 1-5 represents category B. Three or more symptoms of avoidance represents category C. Two or more arousal symptom questions represent category D. If person meets each symptom category criteria, he or she meets DSM-IV

symptom criteria for PTSD. PCL items can also be summed to generate a total PTSD symptom score. A cutoff score of 44 and above is recommended among treatment seeking trauma survivors (Blanchard, Jones-Alexander, Buckley & Forneris, 1996; Ruggiero, Del Ben, Scotti, & Rabalais, 2003). The lowest total score possible is 17. A mixed scoring using the category symptoms and full cut off score can provide better diagnostical efficiency than using the total score alone as the cut off. When screening for treatment seeking trauma survivors the benefits of using lower cut off scores might be beneficial for the client (Ruggiero et al., 2003).

For this study Cronbach's alpha coefficients for full PCL was (.92), for subscale re-experiencing (.89), avoidance (.83), and for hyper arousal (.90) which indicated a good internal consistency. Other studies have reported good internal consistency for PCL (.94) (Blanchard et. al., 1996; Ruggiero et. al., 2003) The PCL correlates highly with the Mississippi PTSD Scale (.82), Impact of Event Scale (.77) and Keane PTSD scale (.77; Ruggiero et al., 2003).

2.5.2 Social and professional support questionnaire

Perception of offered Social and Professional support and experiences of the support received were measured by a self-report questionnaire where 11 support systems offered to school personnel after the Jokela school shooting were measured (appendix 2 & 3). The questionnaire was designed for this study. Each question began with "from where was support offered after the incident?" The eleven support units asked about were: family, other relatives, friends, colleagues, crisis workers in the first week of the incident, psychologists working at the school, the physiotherapist working at the school, doctors from the occupational health care center, psychologist from the occupational health care, nurse from the occupational health care, from the parish or its workers and at last some other instance, and to indicate which one. The answer options were: 1=was not offered, 2= was offered little, 3= was offered enough, 4 = was offered too much, 5 = I did not take the offered support. The questions for experience of the received support were: "How did you experience the support you received?" The answer units were the same as above. A Likert-scale format was used for the answers. For the experience of the support units the answer options were: 1 = did not help, 2 = can not say, 3 = has helped, 4 = help has annoyed me, and 5 = I did not accept the offered support. After the likert scale questions there were two open ended question "who offered the most functional support for you? What did you find helpful?"

Professional support was measured by three questions. The first question asked, whether the participant started regular treatment for issues which bothered him/her after the events of November 2007. Answer choices were 1. No 2. Yes, right after the event, 3. Yes, later. The second question asked: “where have you started regular treatment or meetings?” Answer choices were 1. At the psychologist who work at the school, 2. At the occupational doctor, 3. At the occupational psychologist, 4. At the private doctor or psychiatrist, 5. At the psychotherapist, 6. At the parish, 7. Somewhere else, where. The third question asked whether the treatment or meetings were still ongoing. The answer choices were same as above except an eight choice was added: No, when did the treatment end?

2.5.3 Follow-up questionnaire

About six months after the first screening (11 months after the shooting), the participants who had given permission in the first screening were sent similar questionnaires as a follow-up to asses the persistence and changes of the symptoms. A question about the timing of offered crisis support after the Jokela shooting was added to the second questionnaire. Question asked: was crisis help offered to you at the right time? The answer choices were: 1. the help was offered too soon, 2. the help was offered too late, 3.the help was offered at the right time, 4. help was not offered. After these choices an opened ended question was asked: if the timing was not right, what kind of support and at which point did you feel the need for it? These questions were added because timing is central in planning crisis interventions. The researcher and the psychologists from the aftercare coordinator group discussed this issue after the first screening and decided to add this question. It was seen as an important piece of information for the field of crisis psychology when planning the crisis interventions.

3 *Results*

3.1 *The presence and changes in posttraumatic stress disorder symptoms over time*

Table 3 shows the PTSD symptoms for the study and control group in the first measure at 4 months after the shooting and in the second measure at 11 months after the shooting. Most participants in the study group experienced at least some symptoms of PTSD in both measures: four months after the shooting 21/24 (87.5%) had a score over 18 and 11 months after the shooting 13/16 (75%) had a score over 18 in the PCL. In the first and second measure three participants from the study group fulfilled the diagnostic criteria for PTSD, their score in PCL exceeding the cut off point 44. In the control group none in the first measure and one participant in the second measure had a score exceeding 44 on full PCL.

Table 3. Posttraumatic stress symptoms for study and control groups. Means and standard deviations (SD) in the first and second measure.

	Study		Control	
PCL scores	at 4 months	at 11 months	at 4 months	at 11 months
Mean	32.5	30.9	18.6	25.9
SD	11.7	10.0	2.6	10.4
Range	17-66	17-51	17-27	17-48

Repeated measures ANOVA (General Linear Model, GLM) was used to compare the changes in PTSD symptoms between study and control group as measured at 4 and 11 months. There was no significant within-subjects difference in PCL total score between the two measures but there was a between subjects effect that was significant [$F(1,21)=5.054$, $p=.035$] indicating more symptoms in the study group. There was also a significant group x time interaction so that while the study group's PTSD reactions seemed to have reduced in the second measure for the control group the reactions seemed to have increased (Wilks' lambda) $F(1,21) = 8.47$, $p=.008$ (see figure 1).

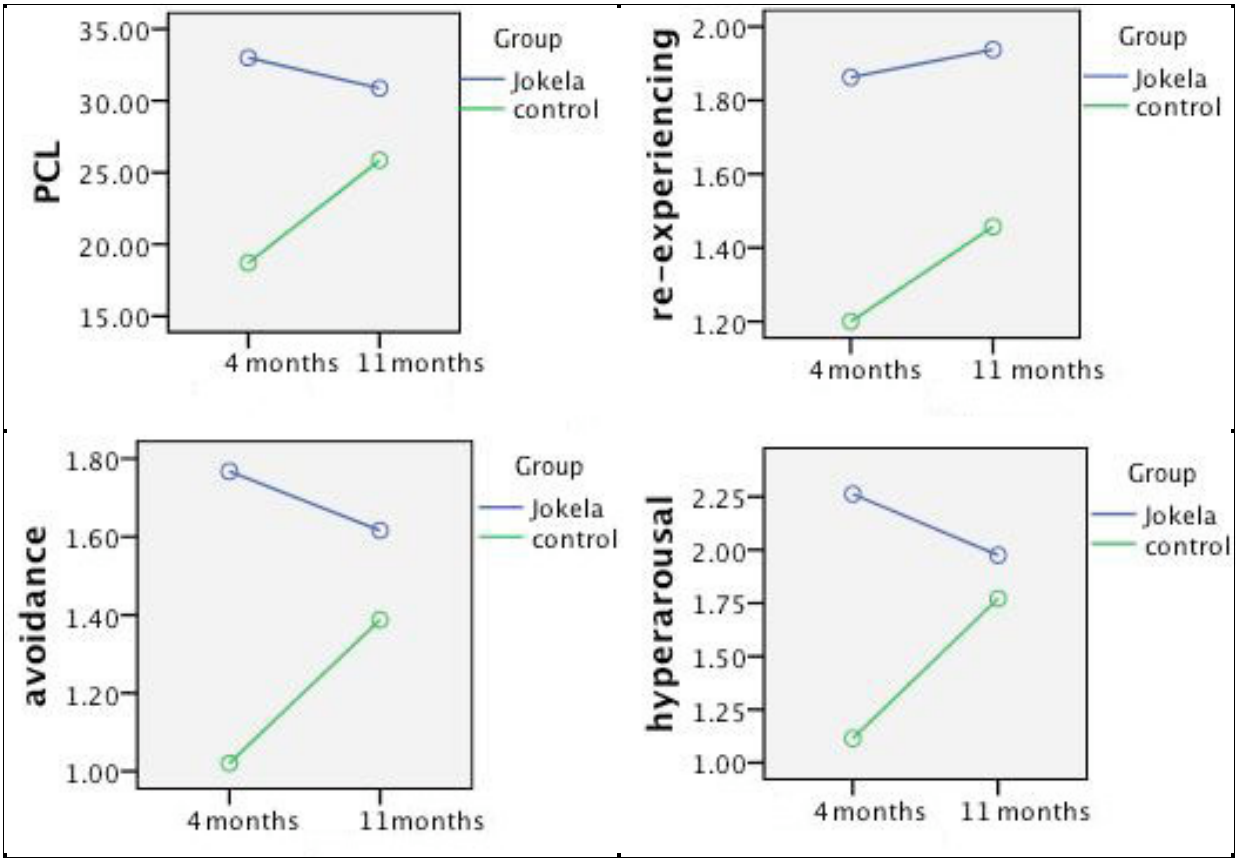

Figure 1 Changes in PTSD symptoms: full PCL, re-experiencing, avoidance, and hyperarousal

We then conducted a similar repeated measures MANOVA with the three PTSD categories: re-experiencing, avoidance, hyperarousal. Again the main effect on the time of measure was not statistically significant. There was, however, a significant time x group interaction on the avoidance and hyperaraousal categories: for the re-experiencing category $F(1,21)= .501$, $p = .49$, for the avoidance category $F(1,21)=6.01$, $p=. 023$, the hyperarousal category $F(1,21)=10.90$, $p=. 003$.

To test the difference in PTSD symptoms of the two groups in the first measure, the full score on PCL and the mean scores of three main categories of PTSD diagnostic criteria were compared between the two groups with an independent sample T-test. There was a significant difference in the symptoms of PTSD, with a full score of PCL $t(42)= 5.18$, $p =.001$ and re-experiencing $t(42)=3.74$, $p = .001$, avoidance $t(42)=5.08$, $p = .001$, hyperarousal $t(42)=5.15$, $p = 001$ with the study group showing higher scores in all.

To test the difference in PTSD symptoms of the two groups in the second measure the full score on PCL and the mean scores of three main categories of PTSD diagnostic criteria were similarly compared across the groups with and independent sample T-test. There were no significant differences in the symptoms of PTSD at follow up.

3.2 *Level of exposure and Posttraumatic stress disorder symptoms*

The study group was divided into three groups according to the level of exposure to the event. The amount of PTSD symptoms in different exposure level groups can be seen in Table 4. Extreme and significant exposure groups had the highest scores on PCL. One person in the significant exposure group and two in the extreme exposure group fulfilled the criteria for PTSD with the cut off score being in PCL being 44. None of the participants in the moderate exposure group had scores exceeding 44 in PCL. The GLM that was used to compare the level of PTSD symptoms between the three exposure groups and two times of measure did not yield significant results $F(1,13)=1.35$, ns.

Table 4. Exposure level and PTSD in the first and second measure

PCL Scores	at 4 months	at 11 months
Moderate Exposure	(N = 4)	(N = 2)
Mean ± SD	24 ± 5.35	19 ± 2.8
Range	18-31	17-21
Significant Exposure	(N = 10)	(N = 6)
Mean ± SD	31 ± 10	33 ± 8.6
Range	17-49	23-44
Extreme Exposure	(N = 10)	(N = 8)
Mean ± SD	37 ± 13.6	32 ± 10.8
Range	20-66	20-51

3.3 *Treatment and changes in PTSD symptoms*

Table 5 shows the frequencies in different exposure level groups compared to when the treatment was started. Repeated measures ANOVA (GML) was used to measure the change in PTSD symptoms over time in the groups that started treatment right away (n=5), started treatment later (n=8), or had no treatment (n=11). There was no significant difference in the PCL total score between the treatment groups ($F(1,14)=2.285$, ns). There was however a significant difference in the score over time ($F(1,14)=6.233$, $p=.026$) and a significant measure time x treatment interaction ($F(1,14)= 6.727$, $p = .021$) so that the PTSD symptoms had decreased in the group that started treatment right away after the traumatic event. There was no change of PTSD symptoms between the groups that started treatment later or did not start treatment at all.

Table 5. Starting time of treatment and the PCL scores in each group

	Began treatment immediately after the shooting (N = 5)		Began treatment later but before 1st questionnaire (N = 8)		No treatment before 1st questionnaire (N = 11)	
Exposure Groups	N	%	N	%	N	%
Moderate			1	13%	3	27%
Significant	1	20%	2	25%	7	64%
Extreme	4	80%	5	62%	1	9%
1st PCL Mean±SD	50±16.5		36±5.2		25±7.5	
Follow up PCL Mean±SD	37**±19.8		38±8.2		23±4.2	

** Change between measures is statistically significant $p < .05$

3.4 *Support offered and experiences of support*

All of the study group participants were offered support within the first four days after the shooting. Only one participant declined the offered support. All participants who accepted the offered support participated in a psychological debriefing. According to 20/23 (87%) participants the psychological debriefing was perceived as helpful. Most participants found the psychological debriefing beneficial. They thought that “it was crucial for their survival”. They felt cared about and that it brought the feeling that they “will survive”. Participants also mentioned that it was important to have intensive support in the beginning and that the support was continuous in form of several group meetings. Only two participants from the extreme exposure group felt that hearing other people’s experiences was not helpful in the beginning. They preferred family support and individual counseling. Two participants from the significant exposure group brought up that they did not benefit from the sessions. The moderate exposure group found the psychological debriefing helpful.

The frequencies of different forms of support offered and accepted can be found in the appendix 2. The crisis support offered on the first week after the incident was found helpful by most of the participants. In the extreme exposure group all who answered 8/10 (80%) found that there was enough support and 7/8 (87.5%) of those found it helpful. In the significant exposure group 6/10 (60%) stated that there was enough support and 7/10 (70%) found the support as helpful (see appendix 2 & 3).

The support from family was found to be important in moderate and significant exposure groups. In the extreme exposure group 7/10 (70%) had the experience that enough support was offered and 6/10 (60%) felt that the support helped. In the significant exposure group 9/10 (90%) found the offered support as being enough and 100% found it as helpful (see appendix 2 & 3).

Most participants felt that enough support had been offered from colleagues. All personnel in the moderate group 4/4 (100%) and 8/10 (80%) in both significant and extreme exposure groups thought that enough support had been offered. In the extreme exposure group 7/10 (70%) felt that the support had helped. In the moderate group 4/4 (100%) found it helpful whereas 9/10 (90%) in the significant group found the support helpful.

Individual medical and physical professional support was found helpful as well. However, the results show that support was sought more than was available. All of those who answered from the extreme exposure group (9/10) found the support from occupational doctor as helpful. Physical therapy was also found to be helpful by most participants (see appendix 2 & 3).

The question about timing of crisis support was added on the follow-up questionnaire. According to 14/16 (88%) of the study group participants the timing of crisis support was right. One participant stated that the support was offered too soon and one participant that it was offered too late. Two participants from the extreme exposure group brought up that they experienced a lack of support when returning to work. They had hoped for guidance on facing the students and how to take the shooting into consideration in their teaching process. Two teachers mentioned that they felt left alone upon returning to work.

4 *Discussion*

This study focused on the longitudinal changes in PTSD symptoms over one year period after the Jokela school shooting. One objective was to study the differences and changes in PTSD symptoms between a study and a control group over one year period after the Jokela school shooting. Another objective was to follow how the initial exposure level and treatment affects the symptom levels of PTSD.

There were four hypotheses: 1) The PTSD symptoms are higher for the people who faced the stressor school shooting than for the people who did not face the stressor both 4 and 11 months after the Jokela school shooting. 2) The PTSD symptoms increase in follow-up for the people at the school which was not attacked because the second incident brought up the memories from the Jokela shooting. 3) Those who have greater exposure to the shooting will have higher level of PTSD symptoms at both 4 and 11 months after the shooting than those who were not directly exposed to the shooting. 4) The PTSD symptoms are reduced more in the group that starts regular treatment right after the traumatic event than in other groups.

Furthermore, this study tried to identify what types of social and professional support were used and how they were perceived after the school shooting. These were studied in relation to the level of

exposure. There is little previous documentation found on the support services provided for school personnel in the aftermath of school shootings (Daniels et al., 2007).

After a traumatic incident it is important for the victims to share their experiences, become heard, and understood. It is important to offer support for victims so that they can learn about the normal reactions to traumatic experience and receive support in the recovery process. Following a traumatic event most people experience symptoms of PTSD. Symptoms can be very distressing and overwhelming. In most cases PTSD symptoms gradually decrease with the help of social and professional support.

4.1 *Posttraumatic stress symptom variation between groups*

The results from this study only partially supported the first hypothesis which predicted that the study group will have higher levels of PTSD symptoms in both the first and second measure. However, the second hypothesis was confirmed. The study group had more PTSD symptoms in the first measure but there was a change in opposite directions in the overall symptom levels in the groups. The study group's PTSD symptoms decreased and the control group's increased during the follow-up. When comparing the three categories from the PTSD diagnostic criteria it was found that re-experiencing had increased in both groups.

The increase in re-experiencing can be affected by different factors. First, when time passes from the initial traumatic event and basic security starts to rebuild, the traumatized individual can start to more progressively go through the event that has occurred. In the beginning of the healing process it is a normal reaction to avoid thoughts about the event that cannot be psychologically handled. The Jokela school personnel had to return to the school soon after the incident. Together with psychologists from the Red Cross Preparedness group they checked the school building. They were allowed to work through the fear and other feelings the building and the traumatic event had aroused. They had to face the crime scene, the place where the traumatic event occurred. In previous studies, confronting the fear has been found to be helpful in the process of recovery (Carlson & Dalenberg, 2000). It might trigger the process of normal crisis reactions. Facing the fear might have affected the fact that avoidance and arousal symptoms had decreased even though the nation was faced with another school shooting.

Other factors that might have affected the increase of re-experiencing in both groups could be the Kauhajoki school shooting and the high number of threats made to schools nationwide. The results

from this study support findings from a previous study on community level posttraumatic stress after school shootings. A previous study found that new threats to schools bring up the memories, increase the anxiety level, and lower the feeling of security (Palinkas et al., 2004). In this study both the study and control group reported different types of stress symptoms that the Kauhajoki school shooting had evoked.

The decrease in the study group's PTSD symptoms could have been affected by the crisis interventions the personnel received after the traumatic event. In the first four days after the shooting all except one member of the personnel received psychological debriefing. One goal of debriefing sessions is to give information on normal crisis reactions (Dyregrov, 1997; Palosaari, 2007; Saari, 2000). The knowledge of these reactions might have helped the personnel to deal with the new crisis situation that the nation was faced with. Also, over 50 % of the study group had started treatment by the second questionnaire. This also suggests that most of the school personnel had started to work through their traumatic experiences, which might have affected the decrease of PTSD symptoms on the second measure even though there was another shooting in Finland.

The findings of this study indicated that new threats to school communities might reduce the feelings of basic security in schools that are not directly affected by the shootings or threats. It seems that the Kauhajoki school shooting has affected the school personnel who were not directly exposed to the school shooting by increasing their symptoms of PTSD. For some it might be obvious that when the nation is faced with two shootings in a short period of time it affects the feeling of basic security in most school communities. This suggests that it is important to pay a closer look at all school personnel's welfare after school shootings. The close attention should not just be on the attacked school it should be taken into consideration in all schools.

4.2 *Exposure and posttraumatic stress symptoms*

A school shooting is a traumatic event that has many levels of exposure. The exposure extends from the school community to the whole district and school communities nationwide. In this study Jokela school personnel was divided into three different exposure group: extreme, significant, and moderate exposure. Subjects in the moderate exposure group were not present at school at the day of the shooting, subjects in the significant exposure group were present but were not directly involved while subjects in the extreme exposure group saw bodies, saw other being shot, were shoot at or were directly

involved in some other way. It was hypothesized that personnel who belonged to the extreme exposure group will have more PTSD symptoms than other groups, but this could not be confirmed, the findings were not statistically significant. However, the personnel who belonged to the extreme exposure and significant exposure groups had more symptoms of PTSD than the moderate exposure group. Furthermore, three out of four in the moderate exposure group did have some symptoms of PTSD.

One person in the significant exposure group and two in the extreme exposure group fulfilled the criteria for PTSD with the cut off score being 44. These findings support previous research that the exposure level to trauma affects the level of PTSD symptoms (Carlson & Dalenberg, 2000; Herman, 1992). These results also support previous research on development of PTSD. Previous studies have suggested that 9-20% of those exposed to traumatic event develop PTSD (Breslau et al., 1998; Kessler et al., 1995). However, in this study the sample sizes in different exposure groups were small which might have affected the direction of the results because parametric test are recommended to be used with bigger sample sizes.

The occurrence of PTSD symptoms was high in this study. Of the Jokela school personnel 87.5% had at least some symptoms of PTSD four months after the shooting. Almost 80% had some symptoms of PTSD about year after the shooting. These findings suggest that most of the school personnel have to deal with great level of stress after a school shooting. This supports previous studies that it is important to support and to offer support for personnel after a traumatic event at their school (Newman et al, 2004). Previous studies have found that PTSD symptoms are not only distressing but they can also cause other psychological problems like depression and anxiety (Breslau, 2002). High stress levels also have negative effects on the physical health and can lead to burnout. These findings together with the knowledge that some personnel do not voluntarily seek support after violent incidents at their schools (Kondrasuk et al., 2005) suggest that it is essential to actively offer support services for personnel.

4.3 *Treatment and decrease in posttraumatic stress symptoms*

The fourth hypothesis that PTSD symptoms will be reduced over time in the group that started progressive treatment right after the traumatic event was supported. There was a significant change in the PTSD symptom levels. However, strong conclusions cannot be drawn from this study since sample size was small. Nevertheless, it supports the continuum of treatment plan that is used in Finnish psychological crisis work. The psychological debriefing is offered in multiple sessions, careful

evaluations of care needed are conducted and referrals to treatment are made (Hynninen & Upanne, 2006; Palosaari, 2007; Saari, 2000).

It is important to notice that the group that started progressive treatment right away after the traumatic event had higher levels of symptom at the start of the treatment. It might be argued that the people who have higher levels of PTSD symptoms will benefit more of the treatment no matter when the treatment has began. However, clinical experience show that those who start treatment later have more severe PTSD symptoms than those who have started treatment earlier. Previous research also shows that if PTSD goes untreated it might cause other psychological disorders like anxiety disorders and depression (Breslau, 2002; Khamis, 2008). Therefore it is important to start treatment as soon as the person is psychologically ready to go trough progressive treatment to ease the symptoms caused by the traumatic event.

4.4 *Perceptions of professional and social-support*

Most participants found the psychological debriefing beneficial in their recovery process. Some felt that the debriefing was the lifeline for their survival and that the session brought hope of surviving the crisis. This supports previous studies and clinical experience that most participants find the debriefing sessions supportive (Saari, 2000).

In Jokela the personnel were offered physical therapy to relieve bodily tension after the traumatic experience. Most participants found it helpful. However, they stated that it was not offered enough. Physical therapy can be both comforting and helpful in relieving the bodily tension posttraumatic stress can cause. In the future, research that examines the combination of psychotherapy and physical therapy as a treatment method after the traumatic experience should be conducted.

The support from family and friends was found helpful by most participants. However, there was a difference between the extreme exposure and the two other groups. The extreme exposure group did not find family and friends as supportive as the other two groups. One reason might be that a person exposed with severe exposure might feel more distant from their family and friends who have not experienced the same exposure. The study by Newman et al., (2004) found that some victims felt that they had to be careful about sharing the experience since the others thought that they should be over the incident already. If they are not, something must be wrong with them. It was also found that people

who were not directly affected wanted to act like the shooting never happened and the victims did not want to bring up the shooting unless they were sure others wanted to hear about it (Newman et al., 2004). It might be that in this study the extreme exposure group felt the same. Future studies are needed to better understand this.

Health care and psychological services were made available to the personnel of the Jokela school center. For example, there was a full time psychologist working with the personnel for a period of one year. In all exposure groups the support from the psychologist was perceived as being helpful. In addition, psychotherapy, psychiatric services, a music therapy group, and some hours of physical therapy were made available with no expense for the personnel. Still, the stress level of personnel was high. This suggests that even though there is a large amount of support offered in the aftermath of a school shooting some of the personnel might feel that it is not enough. These findings suggest that the reactions to a traumatic experience can be so overwhelming that no support can take away the pain and helplessness it has caused. These findings also suggest that it is important to plan an extensive and long-lasting support system for school personnel after a school shooting. Further, it is also important to make a careful longitudinal screening to follow up on the symptoms of PTSD and other health effects to better target services.

Some participants also stated that they would have needed more support on the day school began at the Jokela school center. Teachers especially wanted guidance on how to face the students and how to take the traumatic experience into consideration when starting normal school work. The Jokela school center had 16 psychologists and eight crisis workers supporting the staff and students on the first day of school. There was one person for each class. Some teachers found this insufficient. This suggests that the school needs several support personnel when the school starts again after a traumatic event. It seems that personnel need more information about the reactions students might have and how to handle the class situations when you are personally under extreme stress. This challenge is something that might be hard for the management to understand as the number of support persons might seem enough. However, after a school shooting the basic security is taken away from the whole school community. This leaves the teachers, who know how to handle teaching in a normal situation, alone with the fear of possibly collapsing in front of the students or colleagues. It is a great challenge for school personnel to handle the basic work when they have been faced with an extreme and unexpected stressor in their

work place. Teachers in Jokela had no peers in Finland from other schools on how to handle the situation.

4.5 *Limitations and future directions*

Although the findings from this study are important there are some limitations. A larger sample would have benefited the study and participation rates were low especially in the control group. After a traumatic experience it might be overwhelming to fill out different forms. After the Jokela school shooting the school personnel had to fill out mandatory forms for different instances. The personnel gave feedback that it is overwhelming to do all that extra work. They may have felt that the study questionnaire was one more form which they had to fill out. Some of the Jokela school personnel gave feedback that it would have been easier for them to be interviewed instead of filling out a questionnaire. This feedback is important when considering future research. It might be beneficial to offer a choice to be interviewed instead of filling out a questionnaire.

The drop-out rates were especially high among teachers in the control group. Seventy-one percent of the teachers in the Jokela school center remained in the study also for the follow-up but only 27% of the teachers in the control schools remained. It is possible that teachers in the other schools did not find the participation to this study as important as teachers in Jokela school center since they were not exposed to the stressor school shooting. However, in Jokela the teachers might have felt that it is important to get evaluated and also to share their experiences to help others who might face a similar situation. The control group's size could have been expanded by visiting the schools that took part in the study. In this study the questionnaires were sent to the school principal and he took care of distributing the questionnaires to the participants. The participants might have had a better understanding of the importance of the study if the researcher had made the effort to meet the targeted group.

Other limitations included the phrasing of questions. There was no direct question about the exposure level to the shooting. The researcher asked a general question ("where were you when the event occurred?"), instead of listing different exposures like "did you see dead bodies, did you face the

shooter,”etc., to protect the study group from intentionally bringing up the traumatic experience. This allowed the participants to better protect themselves from overwhelming trauma intrusions. However, this may have affected the replies so that some who were at school did not report sensory exposure even though they might have had an exposure. This study did not take into consideration possible previous traumatic experiences. It concentrated only on the school shooting as a traumatic exposure.

Nevertheless, the results from this study showed that exposure to a school shooting has long-term effects on all school personnel. Most of the personnel at the attacked school experience some levels of PTSD symptoms. Even though the symptoms decrease over time the stress levels the personnel are dealing with are high. This is a central finding since stress can affect the overall health, lead to burnout or to negative coping skills. These findings suggest that it is important to plan a comprehensive and long-term treatment for school personnel in the aftermath of school shootings.

Despite the fact that there were different types of support services offered to school personnel in Jokela in the aftermath of the shooting, some members of the personnel felt that the support was not sufficient upon returning to school. This finding should be taken into consideration when planning and targeting support services for personnel after a violent incident at work place. This also suggests that it is important to make plans of screening procedures to examine crime victims for physical and psychological distress in order to determine the best way to target services.

4.6 *Conclusion*

In conclusion this study showed that most personnel experienced PTSD symptoms over a one year period after the school shooting. This study also showed that exposure and progressive treatment right after a traumatic event affects the level and changes in PTSD symptoms. In the future, valid assessment methods designed to screen personnel after a violent incident at work place should be developed. This way the intervention strategies can be applied to reduce long-term impact and the development of malignant coping skills. Intervention strategies should take into consideration both physical and psychological distress. Furthermore, the results clearly presents that a traumatic event does not just affect the attacked school but it affects the schools in the whole nation. Therefore, it is important to screen personnel of other work places that have similar work settings as well. This study also presents that the Jokela school personnel are working and dealing with a great level of stress. It is important to continue the support services for the Jokela school personnel and students.

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Appendix 1. Posttraumatic Stress Disorder Checklist Specific

PCL-S

Instructions: Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

Use Jokela school shooting as the stressful event

	Not at all	*A little bit*	*Moderately*	*Quite a bit*	*Extremely*
1. Repeated, disturbing *memories, thoughts, or images* of the stressful experience?	1	2	3	4	5
2. Repeated, disturbing *dreams* of the stressful experience?	1	2	3	4	5
3. Suddenly *acting or feeling* as if the stressful experience *were happening again* (as if you were reliving it)?	1	2	3	4	5
4. Feeling *very upset* when *something reminded you* of the stressful experience?	1	2	3	4	5
5. Having *physical reactions* (e.g., heart pounding, trouble breathing, sweating) when *something reminded you* of the stressful experience?	1	2	3	4	5
6. Avoiding *thinking about or talking about* the stressful experience or avoiding *having feelings* related to it?	1	2	3	4	5
7. Avoiding *activities or situations* because *they reminded you* of the stressful experience?	1	2	3	4	5
8. Trouble *remembering important parts* of the stressful experience?	1	2	3	4	5
9. *Loss of interest* in activities that you used to enjoy?	1	2	3	4	5

10. Feeling *distant or cut off* from other people?	1	2	3	4	5
11. Feeling *emotionally numb* or being unable to have loving feelings for those close to you?	1	2	3	4	5
12. Feeling as if your *future* somehow will be *cut short*?	1	2	3	4	5
13. Trouble *falling or staying asleep*?	1	2	3	4	5
14. Feeling *irritable* or having *angry outbursts*?	1	2	3	4	5
15. Having *difficulty concentrating*?	1	2	3	4	5
16. Being "*superalert*" or watchful or on guard?	1	2	3	4	5
17. Feeling *jumpy* or easily startled?	1	2	3	4	5

PCL-S for DSM-IV (11/1/94) Weathers, Litz, Huska, & Keane National Center for PTSD - Behavioral Science Division

Appendix 2. Social support offered at 4 months in different exposure level groups

	Moderate (N = 4)		Significant (N = 10)		Extreme (N = 10)		Combined (N = 24)	
	N	%	N	%	N	%	N	%
Debriefing								
Offered	4	100%	10	100%	10	100%	24	100%
Participated	4	100%	10	100%	9	90%	23	96%
From Family								
Not offered					1	10%	1	4%
Too Little			1	10%	2	20%	3	13%
Enough	4	100%	9	90%	7	70%	20	83%
Too Much								
From Other Relatives								
Not offered			1	11%			1	4%
Too Little			1	11%	7	70%	8	35%
Enough	4	100%	7	78%	3	30%	14	61%
Too Much								
From Friends								
Not offered								
Too Little	1	25%	1	10%	4	40%	6	25%
Enough	3	75%	9	90%	6	60%	18	75%
Too Much								
From Colleagues								
Not offered								
Too Little			1	10%	2	20%	3	13%
Enough	4	100%	8	80%	8	80%	20	83%
Too Much			1	10%			1	4%
From Crisis Workers During the 1st Week of After Care								
Not offered								
Too Little			3	30%			3	14%
Enough	4	100%	6	60%	8	100%	18	82%
Too Much			1	10%			1	4%
From Psychologists Working at the School								
Not offered								
Too Little			2	20%	3	38%	5	25%
Enough	2	100%	7	70%	3	38%	12	60%
Too Much			1	10%	2	25%	3	15%
From Physiotherapist Working at the School								
Not offered			1	10%			1	5%
Too Little	1	50%	7	70%	6	75%	14	70%
Enough	1	50%	2	20%	2	25%	5	25%
Too Much								
From Occupational Doctor								
Not offered								
Too Little	1	50%	1	14%	2	22%	4	22%
Enough	1	50%	6	86%	7	78%	14	78%
Too Much								
From Somewhere Else								
Not offered								
Too Little			1	50%			1	14%
Enough			1	50%	5	100%	6	86%
Too Much								

Appendix 3. Experiences of social support at 4 months in different exposure level groups

	Moderate		Significant		Extreme		Combined	
Support	N	%	N	%	N	%	N	%
Debriefing								
Took	4	100%	10	100%	9	90%	23	96%
Helpful	4	100%	8	80%	8	89%	20	87%
From Family								
Unhelpful					2	20%	2	8%
Cannot Say	1	25%			2	20%	3	13%
Helpful	3	75%	10	100%	6	60%	19	79%
Annoying								
From Other Relatives								
Unhelpful					2	20%	2	
Cannot Say	2	50%			3	30%	5	
Helpful	2	50%	8	100%	4	40%	14	
Annoying					1	10%	1	
From Friends								
Unhelpful	1	25%					1	4%
Cannot Say			1	10%	4	40%	5	21%
Helpful	3	75%	8	80%	6	60%	17	71%
Annoying			1	10%			1	4%
From Colleaques								
Unhelpful								
Cannot Say					3	30%	3	13%
Helpful	4	100%	9	90%	7	70%	20	83%
Annoying			1	10%			1	4%
From Crisis Workers During the 1st Week of After Care								
Unhelpful								
Cannot Say			2	20%	1	13%	3	14%
Helpful	4	100%	7	70%	7	87%	18	82%
Annoying			1	10%			1	5%
From Psychologists Working at the School								
Unhelpful								
Cannot Say			3	33%			3	16%
Helpful	2	100%	6	67%	8	100%	16	84%
Annoying								
From Physiotherapist Working at the School								
Unhelpful	1	50%					1	6%
Cannot Say								
Helpful	1	50%	9	100%	7	100%	17	94%
Annoying								
From Occupational Doctor								
Unhelpful								
Cannot Say			1	14%			1	6%
Helpful	2	50%	6	86%	9	100%	17	94%
Annoying								
From Somewhere Else								
Unhelpful								
Cannot Say	1	100%					1	13%
Helpful			1	50%	5	100%	6	75%
Annoying			1	50%			1	13%