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***ACUTE STRESS AND TRAUMA AT WORK:
PREVENTION AND RISK MANAGEMENT IN
THE BANKING SECTOR***

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SUMMARY

Background

Relevance of the topic and the necessity for scientific investigation

Robberies at the bank branches are potentially traumatic events. Many bank employees experiencing a robbery in their workplace suffer important negative consequences as numerous clinical symptoms of post-traumatic stress, worse physical health, impaired productivity and intention to leave their job, both immediately and up to six months after bank robbery. Despite decreasing in frequency, there is an ongoing risk in the bank branches: such events are difficult to predict, and primary intervention strategies may not completely eliminate the risk.

Motives for choosing a particular topic

Although bank robberies are potentially traumatic event, little is known about the psychological sequelae of those involved. Post-traumatic stress disorder (PTSD) literature has largely focused on victims of specific traumas, such as sexual violence, natural disaster, and military combat. PTSD in the occupational context is still under-investigated, and research mainly concerns specific occupational groups as emergency service personnel, police officers, firefighters, and health care workers.

Studies concerning the psychological consequences of bank robberies are limited, mostly based on convenience samples, and vary in outcomes measures and design substantially, thus making comparisons difficult.

Research problem and why it is worthwhile studying

Since only a minority of subjects experiencing such event in the workplace develop long-term clinically important symptoms and functional impairment, understanding the antecedents of occupational PTSD is a key goal of research. A better understanding of risk factors associated to post-traumatic stress reactions may improve early treatment and preventive intervention, thus reducing PTSD onset and worsening of symptoms.

Research objectives

The study has three main objectives. The first aim is to evaluate the impact of bank robbery on employees psychological well-being, thus investigating post-traumatic stress reactions. The second one is to better understand risk factors associated to the onset of post-traumatic symptomatology. Consequently, the third aim is to inform the development of new interventions and risk management strategies.

Research methodology

Nine hundred twenty-four employees of a primary Italian bank group, victims of 238 different robberies, voluntarily joined an employer-sponsored post-robbery support program:

- a structured and collective support interview (i.e. *psychological debriefing*) was conducted with robbery victims within 7-15 days after the event (T1) at the bank branch. A self-reported questionnaire collected socio-demographic information, number of bank robberies occurred during participants' working life, detailed description of the last robbery with closed and open-ended questions, assessment of post-traumatic stress reaction (Impact of Event Scale);
- a follow-up psychological assessment (through structured individual interviews) was conducted 45 days after the first session (T2). Interview investigated

victims' general health conditions and self-reported trajectory of post-traumatic symptoms after robbery, victims' evaluation of the intervention, assessment of post-traumatic stress reaction (Impact of Event Scale).

To accomplish with our objectives, the following statistical analysis were adopted:

- Absolute and relative frequencies or means and standard deviations, χ^2 and one-way ANOVA for categorical or continuous variables respectively.
- Logistic and linear multilevel regression to estimate the impact of predictive values on post-traumatic symptoms: random intercept mixed-effect regression models to account for subjects' clustering within robberies. Three hierarchical models were adopted (Model 1: pre-trauma risk factors; Model 2: peri-trauma risk factors; Model 3: subjective perception and reaction to robberies).
- Residual pseudo-likelihood test ($H_0: \sigma^2 = 0$) to assess the significance of unmeasured robbery-related factors; latent variable threshold model approach for the calculation of the variance partition coefficient.

Results

The final sample consisted in 595 subjects, victims of 238 different robberies. Correlates of early post-robbery reactions were age, being female, being cashier, geographical region, perception of robbers as out of control; after including feelings of fear, terror and hopelessness during the robbery, all the other variables lost statistical significance.

IES scores decreased during the follow-up ($\Delta_{T1-T2}=15.76$; $p<.001$). At T2, 14% of subjects reported a IES score >34 , a cut-off suggestive of Post-traumatic stress disorder (PTSD). In the multivariable model, age, being female, being cashier, presence of arms, being injured, were associated with PTSD diagnosis. After including early subjective reaction, IES score at T1 was the strongest predictor. Unmeasured robbery-related factors explained a

significant portion (24%) of IES variance at T1 after excluding small groups (number of colleagues <5).

Limitations

Possible selection bias due to the voluntary participation into the intervention program cannot be excluded. Information on non-occupational traumatic events occurred in subjects' life time and pre-existent psychiatric disorders, as well as perceived support after the event, could not be collected. Assessment of post-traumatic stress symptoms relied on self-report measure without a thorough clinical examination; thus, Impact of Event Scale did not include all criteria for Post-traumatic stress disorder stated by recent DSM-V.

Originality of the study

The study gives an original contribution to the existing literature of psychological sequelae following bank robbery: to date, this is the longitudinal study with the largest sample assessing prevalence and predictors of post-traumatic stress symptoms; logistic and linear multilevel regression provided a valuable understanding of risk factors; furthermore, no studies had previous investigated the role of group factor in the aftermath of post-traumatic reaction following bank robbery or acute stress at work.

Conclusion/Practical implication

Our findings showed that bank robbery is a potential traumatizing event associated with both immediate and long-term posttraumatic stress symptoms. Results suggested the weight of subjective variables, such as personal perception of robbery severity and early emotional reaction, in identifying persons at higher risk to develop PTSD. Our findings may help management and prevention of acute stress and trauma in the banking sector, contributing to

post-traumatic stress literature. Finally, group factors, an often overlooked dimension in post-traumatic stress literature, might affect the risk of PTSD, thus encouraging further research.

Structure of the thesis

Section I includes an introduction to the topic. Section II provides a review of the related empirical and theoretical literature. Section III describes the study, and contains Aims, Materials and Methods, Results, Discussion. Conclusions, perspectives and practical implications follow in Section IV. Section V lists references. Section VI concerns published and *in press* papers, experiences and conferences attended during the PhD program.

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Abbreviations

ABI	Associazione Bancaria Italiana (Italian Banking Association)
ASD	Acute Stress Disorder
CISD	Critical Incident Stress Debriefing
CISM	Critical Incident Stress Management
DSM	Diagnostic and Statistical Manual of Mental Disorders
EU-OSHA	European Agency for Safety and Health at Work
IES	Impact of Event Scale
ILO	International Labour Organization
NIOSH	National Institute for Occupational Safety and Health
OSSIF	Centro di Ricerca dell'ABI sulla Sicurezza Anticrimine (ABI Research Centre on Anti-Crime Security)
PTSD	Post-traumatic Stress Disorder
PTSS	Post-traumatic Stress Symptomatology

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SECTION I - INTRODUCTION TO THE TOPIC

1.1 Violence in the workplace: an overview

Workplace violence ranges from offensive language to homicide, with the wide variety of behaviors accounting for different definitions provided by institutions and researchers: as an example, the National Institute for Occupational Safety and Health (NIOSH, 1996) defines workplace violence as “*violent acts, including physical assaults and threats of assault, directed toward persons at work or on duty*”; the European Agency for Safety and Health at Work (EU-OSHA, 2002) describes more in detail violence at work as “*insults, threats, or physical or psychological aggression exerted by people from outside the organization, including customers and clients, against a person at work that endangers their health, safety or well-being*”.

Beyond different definitions, relevant authors and institutions agree in classifying workplace violence according to the source of violence itself (EU-OSHA, 2010; ILO, 2008; Chappel & Di Martino, 2000; 2006): *internal* workplace violence identifies the situations in which violence comes "from within", and takes place between workers, including managers and supervisors (e.g. mobbing, harassment, and various forms of interpersonal conflict); *external* or *third-party* violence refers to violence perpetrated by persons outside the organization, as customers, visitors, patients (e.g. bank robbery). A specific feature of third-party violence entails a substantially higher risk among some occupational sectors such as healthcare and social work, education, commerce, transport, public administration, defence, hotels and restaurants.

Several political and labor institutions, both at national and international levels, have gained attention to workplace violence since late 90's, thus increasingly recognize it as preventable (NIOSH, 2004): in this respect, influential landmark were the 1989 Council Directive (89/391) and subsequent government implementation for the basic provisions for healthy and safety workplace, and 2000 and 2002 EU 'anti-discrimination' directives, in which workplace violence broadened to incorporate dignity at work, human rights and discrimination (Council Directive 2000/43/EC and Council Directive 2002/73/EC); moreover, at the European level, European social partners (ETUC/CES, BUSINESSEUROPE, UEAPME and CEEP) signed a framework agreement aimed at tackling harassment and violence at work (European social dialogue, 2007), formally recognizing the adverse effects of harassment and violence on workers' health and wellbeing.

Nevertheless, the fifth European Working Conditions Survey (Eurofound, 2012), found a substantial number of workers exposed to third-party violence in the previous 12 months: 4% of working population resulted as being victims of violence (or threat of), with high level of contact with external clients or customers and being younger woman to be significant risk factors; both psychological and physical violence showed similar detrimental effects on employees health and well-being, as sleeping problems, stress, fatigue, depression to name a few. Of note, violence at work, particularly verbal violence and threatening behavior, is often underreported (NIOSH, 2004), despite the potential effect of verbal abuse rather than physical violence on stress and anxiety is widely accepted (Brunsden et al., 2012).

Scientists turned attention to the psychological consequences of acute and extreme stress at work only since 1990s (Kleber & van der Velden, 2009). Early interest was addressed to the psychological reactions from train accidents in the second half of the

nineteenth century (Trimble, 1981), and later on the consequences of the Second World War (Grinker & Spiegel, 1945). The growing body of research on acute stress and trauma at work during the last few decades has been essentially directed to occupations with predictable and foreseeable risk of being exposed to threat, injury and death: emergency services, military, acute medical services, police officers, train drivers have all had notable attention in the literature (McFarlane & Bryant, 2007).

1.2 Violence at work: bank robberies

Dealing with the public, delivering services and the exchange of money are extensively recognized risk factors to workplace violence (NIOSH, 1996; Giga & Hoel, 2003); as a consequence, due to inherent handling of cash and contact with public, bank employees result as considerably exposed to the risk of violence, particularly to the risk of robbery.

Number of annual bank robberies in Europe continues to decline (European Banking Federation, 2014): although differences across countries, 2013 showed an overall decrease of 11% compared to 2012, thus confirming the downward trend since the past 10 years. Similarly, Italian latest intersectoral report on predatory crime occurred in 2014 (ABI/OSSIF, 2015) showed a decrease of 36.5% of bank robberies compared to 2013; emerged risk index (number of robberies every 100 branches) fell from 3.9 in 2013 to 2.5, and it was lower as compared to Retail and Modern Distribution (18.0), Pharmacies (5.9), Postal offices (3.1). However, different risk indices across regions were found, with Sicily (8.2), Abruzzo (3.6), Liguria (3.6), and Campania (3.5), scoring the highest values. Comparing cities, the highest percentage of bank robberies was found in Milan, with 67 robberies per 100 bank branches.

Such decrease was arguably due to appropriate security countermeasures to protect against holdups: changes in the branch structure to reduce employees access to cash, delaying

systems, technological developments increasing use of cashless payments, external service providers and security guards, cooperation with police and authorities, have all proved effectiveness.

Unfortunately, despite decreasing in frequency, numerous bank robberies still occur, thus involving multiple victims; particularly, Italy holds highest rates among EU countries (Osservatorio Fiba Cisl, 2010).

Bank robbery has many potential victims: it may involve employees, clients, security guards, police officers. Victims may be threatened, injured, taken hostage, or even killed. In a previous study, we showed the severe frequency of violence occurred in a sample of 383 victims of bank robberies: 16% took part in or were witness to fights with robbers, 4,7% was injured, 10,2 % was witness to another person's injury, about 52% reported the presence of hostages, 80% reported the presence of at least one weapon (Fichera et al., 2014).

Employees victims of holdups may fear for their lives and experience helplessness and intense horror: as a life-threatening event, bank robbery is considered a potentially traumatic event affecting victims' mental health (Elklit, 2002).

However, studies concerning the psychological consequences of bank robberies are limited, despite existing data clearly show the detrimental impact on employees' mental and physical health, as well as on work performance, with both acute and long-term posttraumatic symptoms (Kamphuis & Emmelkamp, 1998; Miller-Burke et al., 1999; Elklit, 2002; Hansen & Elklit 2011; 2013; 2014; Fichera et al., 2014)

As recently posted by the International Society for Traumatic Stress Studies, bank robberies may represent a "neglected potential traumatic exposure" (Hansen, 2014), thus encouraging further research.

SECTION II: LITERATURE REVIEW

2.1 Acute stress and trauma at work: definitions

According to the transactional definition proposed by Lazarus (1981), stress refers to a discrepancy between the demands of the environment and the resources of the individual, and the dynamic interaction between the stressor and resources/coping strategies of the subject: “acute” means that this discrepancy occurs suddenly, and does not necessarily imply an extreme or abnormal event.

Acute stress at work can be experienced by a bank employee victims of robbery during work, as well as by a railway employee dealing with traffic accidents or suicide attempts. Other examples of acute stress at work may be the sudden job insecurity consequent to radical changes in the organizational structure, the death of a co-worker, the experience of accident by fire-fighters or police officers (Kleber & van der Velden, 2009).

While experiencing an acute stress, trauma may occur if the dynamic interaction between the stressor and resources is ruptured, bringing the victim to suffer the long-term consequences of his/her meeting with stress (Shalev, 1996). Victims of trauma can experience an extreme fear and threat to their life, feeling of intense powerlessness and hopelessness, general idea of a predictable and secure life as well as sense of vulnerability and control is disrupted, ability of reaction of a person is challenged, and the usual psychological mechanisms may be upset (Everly & Lating, 1995).

The American Psychiatric Association (2000, pag. 463), defines trauma as “the experience of an event that involves actual or threatened death or serious injury, or other threat to one’s physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death,

serious harm, or threat of death or injury experienced by a family member or other close associate”.

Traumatic experiences often involve a threat to life or safety, but any situation that involves overwhelming feelings can be traumatic: it's not the objective facts that determine whether an event is traumatic, but the subjective experience of the event. The more frightened and helpless the victim, the more likely he/her may be traumatized.

APA (2000) also provides a list of potentially traumatic events including physical assault, robbery, being taken hostage, witnessing death or serious injury by violent assault.

2.2 Psychological reactions following acute stress and trauma: Post-traumatic stress disorder (PTSD) and Acute stress disorder (ASD)

A range of psychological and physiological responses may develop after experiencing acute stress: common reactions involve cognitive (confusion, worry, shortened attention span, trouble in concentration), emotional (shock, fear, grief, anger, guilt, shame, feeling helpless, feeling numb, sadness), physical (tension, fatigue, edginess, insomnia, bodily aches pain, startling easily, racing heartbeat, nausea, change in appetite), and interpersonal domains (distrust, conflict, withdrawal, irritability, loss of intimacy, feeling rejected or abandoned).

Post-traumatic stress is a survival mechanism and such responses are *normal reactions to abnormal events* (Mitchell, 1983): they are part of the natural healing process of adjustment to a very powerful event.

These reactions gradually decrease over time, as the expected psychological outcome is recovery, not psychopathology. Many victims of traumatic event show great resilience and

manifest sub-clinical stress reactions that decrease over time while other recover without medical or psychological assistance (Bonanno, 2004; North, 2007).

Nevertheless, psychological difficulties following traumatic event can be serious and long lasting, according to the subjective perception of fear and threat to life, as well as overwhelming feeling, disruption of normal certainties, and other individual and event-related characteristics (risk factors are discussed on page 23).

One of the most debilitating effects of traumatic stress is Posttraumatic Stress Disorder (PTSD), a mental disorder resulting from exposure to an extreme, traumatic stressor.

Post-traumatic stress disorder (PTSD) was first accepted as a clinical diagnosis in 1980 (APA, 1980). After some changes, the last version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V 5th edition; American Psychiatric Association [APA], 2013), identifies the trigger to PTSD as exposure to actual or threatened death, serious injury or sexual violation. The exposure must result from one or more of the following scenarios (Criterion A), in which the individual a) directly experiences the traumatic event; b) witnesses the traumatic event in person; c) learns that the traumatic event occurred to a close family member or close friend (with the actual or threatened death being either violent or accidental); d) experiences first-hand repeated or extreme exposure to aversive details of the traumatic event (not through media, pictures, television or movies unless work-related).

The disturbance, regardless of its trigger, causes clinically significant distress or impairment in the individual's social interactions, capacity to work or other important areas of functioning. PTSD has four main cluster of symptoms:

- intrusion symptoms (Criterion B): the traumatic event is persistently re-experienced through recurrent, involuntary, and intrusive memories, traumatic nightmares, flashbacks to name a few;

- avoidance symptoms (Criterion C): persistent effortful avoidance of distressing trauma-related stimuli as people, places, conversations, activities, objects, or situations;
- negative alterations in cognitions and mood (Criterion D): examples are persistent negative beliefs and expectations about oneself or the world, markedly diminished interest in (pre-traumatic) significant activities, feeling alienated from others;
- alterations in arousal and reactivity (Criterion E): irritable or aggressive behavior, self-destructive or reckless behavior, hypervigilance, exaggerated startle response, problems in concentration, sleep disturbance.

One or two symptoms of each cluster are required to meet diagnostic criteria. Furthermore, according to Criterion F, symptoms must persist for more than one month, and (Criterion G), and must cause clinically significant distress or impairment in the individual's social interactions, capacity to work or other important areas of functioning.

PTSD incidence rates vary according to methodology (e.g. timeframe, DSM version): estimates in the general population is 5.4% for past 12-month PTSD (Miller, 2012), and 4 to 10% for life time prevalence PTSD based on DSM-IV and DSM-III-R respectively (Kessler et al., 2005, Kessler et al., 1995).

In high risk occupations, PTSD prevalence ranges from 9 to 13% in police officers (Robinson et al., 1997; Maia et al., 2007), 12 to 17% in firefighters (Guthrie & Bryant, 2005; Heinrichs et al., 2005; Perrin et al., 2007), 6 to 32% in rescue and emergency service workers (McFarlane et al., 2009) to 35% in U.S. soldiers returning from Iraq (Thomas et al., 2010).

Acute stress disorder (ASD) is defined in terms of four sets of symptoms. These are dissociative symptoms (e.g. a sense of numbing, derealisation, depersonalisation), persistent

re-experiencing of the traumatic event, marked avoidance of stimuli associated with the trauma which might cause distress, and symptoms of anxiety and heightened arousal (APA, 2013).

ASD was introduced in the DSM version fourth with a twofold aim: to detect post-traumatic symptomatology within the first month after the traumatic event, and to better identify victims with higher risk of developing PTSD (APA, 1994). Indeed, ASD diagnosis is limited to the four weeks immediately after a traumatic event, with disturbance lasting for at least three days.

There is a large overlap between the diagnostic criteria for ASD and PTSD (inclusion and symptoms criteria) with the key differences being the time period during which diagnosis can be made and the dissociative symptoms of ASD.

ASD may progress to PTSD after 1 month, as about half of people who develop PTSD had an initial ASD condition, but it may also be a transient condition that resolves within 1 month of exposure to traumatic event (APA, 2013). However, large proportion of individuals with PTSD did not initially meet criteria for ASD (McNally, 2003).

According to the DSM-5 (APA, 2013), ASD worldwide rates range from 20 to 50% among victims of interpersonal traumatic events (eg, assault, rape, and witnessing a mass shooting); ASD prevalence were 13-21% for victims of motor vehicle accidents, 14% after mild traumatic brain injury, 10% after severe burns, 6-12% after industrial accidents.

Additionally, victims of trauma are at higher risk for developing other psychiatric disorders, including depression, substance abuse, panic disorder, obsessive-compulsive disorder, sexual dysfunction, eating disorders.

2.3 Assessing post-traumatic stress symptoms in the workplace

A key variable in measuring post-traumatic stress reactions in the occupational context is to consider whether to focalize on the presence of symptoms or on a diagnosis (Adler et al., 2013): cut-off scores may not be representative of subclinical distress impairing workers health, and continuous values are more sensitive to changes compared to dichotomous outcomes; additionally, this is particularly prominent when assessing the effectiveness of support interventions (page 26). On the other hand, cut-off values offer rates to compare to control groups as colleagues who have not been involved in the traumatic event, and allow screening value to identify high-risk subjects.

The *gold standard* in the measurement of PTSD is the structured interview (Wilson and Keane, 2004). The Clinician Administered PTSD Scale (CAPS; Blake et al., 1990) and the Structured Clinical Interview for DSM-IV (SCID; First et al., 1996) are the most widely used. However, time consuming feature and expertise requirement may make them difficult to use in the occupational context.

Self-report measures, applied for large scale survey, are time and cost efficient and permit anonymity; among different questionnaires available, the most used are the Impact of Event Scale and the Impact of Event Scale Revised (IES; IES-R; Horowitz et al., 1979) as well as the Post-Traumatic Stress Disorder Checklist (PCL; Weathers et al., 1994). Both IES and PCL are based on Likert scales and have showed excellent psychometric properties. They are able to assess any traumatic event in the workplace, thus enabling comparisons with an extensive literature.

2.4 Psychological reaction following bank robberies

When bank employees become victims of a hold-up, they may experience common post-traumatic stress reactions: as a potentially traumatic event, bank robbery can cause dismay, shock and disbelief, followed by reactions like fear and anger; during following days, employees may be angry with organizations for the risk they was exposed to and may fear that the robbery will happen again, blaming themselves for not having done enough; they can re-experience the event through nightmares, approach some clients suspiciously, feel continuously on their guard (Kleber & van der Velden, 2009).

Furthermore, most victims of bank robbery reported feelings of life threat, helplessness, and intense horror during the event, thus meeting removed A2 criterion for ASD and PTSD of previous DSM-IV (APA, 1994) (Hansen & Elklit, 2014; Fichera et al., 2014).

Beyond consequences on employees' health, difficulties in concentration and functioning may appear, as well as deterioration of work performance and engagement, poor quality relationships, negative attitudes and behaviours towards their workplace and absenteeism (Miller-Burke et al., 1999; Jones, 2002; Belleville, 2012; Van den Bossche et al., 2012).

Empirical evidence from longitudinal studies on victims of bank robbery, showed a tendency for the symptoms to peak in the acute phase, with a almost complete remission of symptoms in 4 weeks (Leymann, 1988; Kamphuis & Emmelkamp, 1999; Fichera et al., 2011; Hansen & Elklit, 2011; 2013).

Studies concerning the psychological consequences of bank robberies are limited, however data clearly show that bank robberies have an important impact on employees' mental and physical health, as well as on work performance, both immediately and up to six

months after the event: previous studies found 10 to 16% prevalence of ASD (Hansen & Elklit, 2011, 2013, 2014); 6.2 to 14% prevalence of PTSD (Belleville et al., 2012; Fichera et al., 2014; Hansen & Elklit, 2014); comorbidity of PTSD with major depressive disorder, increased absenteeism, work impairment, poorer physical health and increased use of medical services (Miller-Burke et al., 1999); significantly higher score on traumatization, somatization and psychological distress scales compared to the control group (Kamphuis & Emmelkamp, 1999);

Finally, Hansen and Elklit (2014), showed that 6.2% of employees were still suffering from PTSD six months after the bank robbery occurred.

2.4.1 Distinctive features of bank robbery

As observed by Hansen (2014), bank employees might be a special trauma population in reference to the *avoidance* criterion: since they have to return back to work, they do have difficulty avoiding the place of the traumatic event as well as difficulty avoiding talking and thinking about the robbery because.

A Danish national co-cohort study on bank employees victims of robbery found subclinical prevalence rates of ASD and PTSD (i.e. ASD and PTSD without avoidance symptoms) to increase from 11.1% to 14.0%, and from 6.2% to 18.1% for ASD and PTSD respectively (Hansen & Elklit, 2014). Such findings were similar to those found among victims of armed robbery or other nonsexual assault (Brewin et al., 2009; Elklit, 2002; Kleim et al., 2007).

Furthermore, by returning to the place where the event took place, victims of workplace robbery experience continuous exposure to triggers for distressing memories, fear, intrusive thoughts and hyper-vigilant behavior, given that an ongoing threat of violence is inherent to their job.

Psychologists and occupational physicians should be aware of this specific feature when assessing post-traumatic stress symptoms.

2.5 Predictors of PTSD

Post-traumatic stress reactions and symptoms severity are influenced by multiple factors: there is growing recognition that exposure to trauma may not be sufficient to explain the onset of PTSD, as individual vulnerability and trauma features do play an important role (Brewin et al., 2000).

Research has usually grouped risk factors into three categories: pre-trauma risk factors (present before the traumatic exposure), peri-trauma risk factors (occurring during the event), post-trauma risk factors (appearing after the event). Three important meta-analysis showed significant predictors of PTSD across different trauma exposures (Shalev, 1996; Brewin and coll., 2000; Ozer and coll., 2003): a) prior trauma, family history of psychopathology, being female, genetic and neuroendocrine factors, personality traits, reported childhood abuse, negative parenting experiences, lower education, age at trauma (*pre-trauma risk factors*); b) perceived life threat during the trauma, peri-traumatic emotional responses and dissociation, magnitude of the stressor (*peri-trauma risk factors*); c) lack of social support, additional life stress, maladaptive coping responses and strategies, negative perceptions related to the trauma, ASD severity, negative intervention of others as police, media, insurance companies, medical authorities (*post-trauma risk factors*).

Research has also shown that multiple factors rather than a single one may have a role in the onset of PTSD as well as in causing chronic disturbances, and suggested that peri-traumatic responses may be the strongest predictors of PTSD (Ozer et al., 2003).

However, observed studies did vary on sample and study characteristics, including both civilian and combat veterans, were not exclusively focused on victims of workplace violence and, above all, none of them included robberies, thus making results neither representative nor generalizable: risk factors involved in the onset of post-traumatic symptomatology after a bank robbery may differ from those related to other traumatic exposures.

2.6 Predictors of PTSD in victims of bank robbery

Only a few studies have investigated the psychological sequelae of bank robberies, and little is known about predictors of post-traumatic stress disorder consequent to this potentially traumatic event.

It has been shown that pre-trauma factors such as previous traumatic life events (Kamphuis & Emmelkamp, 1998), recent major life events (Hansen & Elklit 2011; 2013; Elklit, 2002), repeated exposures to robberies (McFarlane & Bryant, 2007; Fichera et al., 2014), co-existent psychological and psychiatric disorders (Marmar et al., 2006), increase the risk of post-robbery PTSD.

Similarly to the overall literature on trauma-related risk factors, discrepancies were found concerning the role of age and gender as predictors of PTSS after bank robbery. Hansen & Elklit (2011; 2013), Ladwig and colleagues (2002), Miller-Burke and colleagues (1999), Fichera and colleagues (2014) did not find younger age to be significantly associated with PTSS; being female was found to be a risk factor for PTSS in some studies (Hansen & Elklit 2011; 2013; Elklit, 2002) but not in others (Fichera et al., 2014; Miller-Burke et al., 1999).

Peri-traumatic risk-factors include trauma severity (Elklit, 2002; Brewin et al., 2000), dissociative response and negative emotions during the critical event (Kleber & van der Velden, 2009; Ladwig et al., 2002), perceived life threat (Kamphuis & Emmelkamp, 1998) perceived fear, terror and helplessness - DSM-V deleted criteria- (Elklit, 2002; Miller-Burke et al., 1999; Hansen & Elklit 2011; 2013; Fichera et al., 2014), proximity to the robber (Elklit, 2002; Miller-Burke et al., 1999), presence of customers witnessing the robbery, and the use of weapons (Kamphuis & Emmelkamp, 1998).

Physical contact with robbers, having taken part or witnessed to a scuffle, being injured during the robbery, were also found to be significant correlates of PTSD (Fichera et al., 2014)

Additionally, it has been suggested that victim's perception and emotional reactions (e.g. intense fear, horror and helplessness), may be more predictive of subsequent clinical course than the objective circumstances of the critical event (Elklit, 2002; Kamphuis & Emmelkamp, 1998; Fichera et al., 2014).

Finally, post-traumatic factors such as lack of social and emotional support from family, friends, colleagues and organizations (Miller-Burke et al., 1999; Kleber & van der Velden, 2009; Hansen & Elklit 2013), perceived safety in the workplace (Hansen & Elklit 2011; 2013) may play an important role in the development of PTSD (Kleber & van der Velden, 2009; Hansen & Elklit 2013).

2.7 Preventive interventions

All workers and employers should assess the risks for violence in their workplaces and take appropriate action to reduce or eliminate them. Although no definitive prevention strategy is appropriate for all workplaces, management commitment to violence prevention policies and programs, as well as employees participation in planning, developing, and implementing strategies is required. Furthermore, preventive policies should involve different disciplines and departments, as human resources, health and safety staff, occupational physicians and psychologists, unions, legal division, and should be tailored to specific organizational needs (NIOSH, 1996; 2004). In order to manage the consequences of workplace robberies and other workplace traumatic events, organizations developed multi-component crisis intervention approaches which offer support during pre-crisis phase (e.g. education and preparation), immediately after trauma (e.g. individual or collective emotional support with structured discussions), and in the post crisis period (e.g. follow-up and referral services) (Kleber & van der Velden, 2009).

To address the full range of causes related to violence, a multi-layered approach that includes strategies for primary, secondary and tertiary prevention must be implemented (Eurofound, 2014).

2.7.1 Primary prevention

At a primary level, the goal is to eliminate or reduce the risk; in this respect, ILO and PRIMA-EF have published best practice guidance and strategies to tackle violence at source (Chappel and Di Martino, 2000; 2006; Leka and Cox, 2008):

a) Information and communication

A participative strategy and a written statement of intent which involve all parties is suggested. Prevention policy must include clear definitions of violent behaviors, and a mandatory reporting system followed by prompt responses.

b) Work organization and job design

Preventive actions also depend on the way jobs are planned, providing effective means of avoiding aggression and violence between workers in their contact with the public. Examples are avoiding lone work, reducing face-to-face contact with the public, assigning tasks according to employees competence and level, checking visitors' credentials, ensuring sufficient staff, as well as regular removal of cash and valuables, and using non-cash alternatives.

c) Physical environment and layout

It concerns physical security measures, and includes controlled entrances, alarm systems, security screens and guards, adequate lighting, reception desks, emergency exits, installation of video surveillance systems, coded doors, elimination or limitation of no-exit areas and objects which could serve as projectiles, protective barriers and surveillance systems to alert colleagues if urgent help is needed., adequate location of cash-handling far as possible from entrances and exits.

d) Staff training

Specific training programs to increase awareness and to prepare workers to deal with violence at work. Training objectives are to foster interpersonal and communication skills to

prevent a potentially threatening situation, to better identify potentially violent situations and people, and not to behave in a threatening and violent way. Procedures are needed to defuse difficult situations, avoid violent confrontation, and help employees dealing with violent incidents. Fear of violence and coping with emotional response should also be addressed. Training programs targeting workplace violence is also related to enhanced perceptions of control, which in turn is associated with better health outcomes in victims who experienced violence at work (Schat & Kelloway, 2000).

e) Monitoring and evaluation

Ongoing review and checks concerning the effectiveness of the preventive measures taken are required, as well as a system through which employees can provide regular feedbacks.

In the banking sector, as risk of robbery may not be completely eliminated, prevention strategies ensure bank robbery occurs as infrequently as possible. Interventions at primary level aim at minimizing the risk of robbery and assault, and includes cash-handling policies, physical separation of employees from client, security devices and services as timed and delaying systems, external security guard. Essential measure is employees training, concerning safety procedures, stress management and aggression regulation.

2.7.2 Secondary prevention

Secondary level prevention occurs immediately after violence has taken place and provide support to minimize the harmful effects of the acute stress. Organizations are required to implement clear procedures to be followed after the event, in order to reduce sources of stress, prevent further harm and limit the damage suffered. It is also important to prevent possible guilty feelings that may appear in the victims, and may in turn prevent from making

a complaint. Several studies showed the importance of psychological and practice support and recognition after an extreme event in the workplace, and how little these elements are received by organization as well as by superiors (Day & Livingstone, 2001; Van der Ploeg & Kleber, 2003). Secondary intervention elements also include concrete and practical assistance offered to the victim (e.g. to support bank employee during contact with police and bank inspectors after robbery), emotional reaction and posttraumatic stress disturbances monitoring over a period of 4 up to 12 months, victims involvement into specific support programs.

In order to provide the victim with psychological support immediately after the acute stress, crisis intervention programs have been established: common features are immediate intervention, stabilization and mitigation of distress symptoms, restoration of adaptive independent functioning, facilitation of understanding, problem solving focusing, brevity, encouragement of self-resilience (Flannery & Everly, 2000). Any systems providing early intervention support victims with information and confrontation about stigma issues that frequently create barriers to care (McFarlane et al., 2007).

In the occupational sector, Critical Incident Stress Management is widely adopted (Kleber & van der Velden, 2009). Critical Incident Stress Management (CISM; Everly & Mitchell, 1999) is a comprehensive crisis intervention system consisting of multiple crisis intervention components which functionally span the entire temporal spectrum of a crisis. CISM interventions range from the precrisis phase through the acute crisis phase, and into the post-crisis phase.

CISM includes: 1) pre-crisis preparation; 2) large scale demobilization procedures for the entire workforce 3) individual acute crisis intervention; 4) brief small group discussions, called *defusing*, to assist in acute symptom reduction; 5) longer small group discussions

known as Critical Incident Stress Debriefings (CISD; Mitchell, 1983); 6) family crisis intervention procedures; 7) organizational development interventions; and, 8) referrals for additional psychological assessment and treatment where indicated.

Critical Incident Stress Debriefing (CISD; Mitchell, 1983) was originally designed to assist emergency services personnel severe stressful situations that included line of duty death, serious injury, deaths of children. CISD is a seven-stage model usually occurring within 2 to 7 days after the traumatic event aimed at providing support, normalizing post-traumatic reactions and facilitating their recovery; CISD is developed for small homogeneous groups who have encountered a potentially traumatic event, and emphasizes participants processing of the experience within a cognitive-emotional-cognitive framework. CISD is a structured and supportive group interview, it is co-led by trained debriefing personnel, and it last on average from one to 3 hours: it includes 1) introduction to rules and goals 2) brief overviews of the facts 3) discussion of participant's thoughts by the time of the event 4) reaction phase focuses on emotions experienced (anger, frustration, sadness, loss, confusion, and other emotions may emerge) 5) discussion of arisen post-traumatic symptoms 6) Teaching: normalizes reactions and symptoms experienced by participants; explanations of the participants' reactions and stress management information are provided 7) summary of all the issues raised during the interview; final explanations, information, action directives, guidance, and thoughts are presented to the group.

Group cohesion, catharsis, imitative behavior, sharing of information, social support, and adaptive coping have been addressed as drivers for the beneficial outcomes of CISD. However, as shown by a Cochrane Review (Rose et al., 2002), no evidence support the benefit of a single session debriefing, with many authors suggesting to adopt a comprehensive, systematic and multi-component approach to crisis intervention, as it could be CISM model.

Variations of the CISM model have been adopted by numerous and different organizations in a wide variety of workplace settings (Flannery & Everly, 2000).

Psychological debriefing, together with different component of CISM, are also used in support program with victims of bank robbery (Hansen & Elklit, 2011; Tabanelli et al., 2013; Fichera et al., 2014).

2.7.3 Tertiary prevention

Although organizations are required to anticipate any possible traumatic exposures and to adopt early intervention strategies, consequences of traumatic event can be serious and long-lasting: tertiary prevention is aimed at promoting and supporting recovery, thus focusing on the treatment of employees who suffer from severe stress consequences as well as on the rehabilitation after a period of sickness absenteeism (Kompier & Kristensen, 2001).

In addition to any potential use of drugs, common psychological intervention aimed at ameliorating psychological distress following traumatic events are Trauma focused cognitive behavioural therapy (TF-CBT), TF-CB Group Therapy, Cognitive Processing Therapy, Eye Movement Desensitization and Reprocessing (EMDR), Supportive Counseling.

To my knowledge, no studies have investigated the efficacy of tertiary prevention on work-related PTSD on a sample of bank employees victims of robbery.

SECTION III - THE STUDY

3.1 Introduction

Post-traumatic stress disorder (PTSD) literature has mainly focused on victims of specific traumas, such as sexual violence, natural disaster, and military combat. PTSD in the occupational context is still under-investigated, and researchers have focused on specific occupational groups as emergency service personnel, police officers, firefighters, and health care workers (Kleber & van der Velden, 2009).

Studies concerning the psychological consequences of bank robberies are limited and vary in outcomes measures and design substantially, thus making comparisons difficult. However, existing data clearly show the detrimental impact on employees' mental and physical health, as well as on work performance, with both acute and long-term posttraumatic symptoms (Kamphuis & Emmelkamp, 1998; Miller-Burke et al., 1999; Elklit, 2002; Hansen & Elklit 2011; 2013; 2014; Fichera et al., 2014).

3.2 Aims

Since only a few people experiencing a critical event in the workplace develop clinical symptoms and functional impairment, key research goal is understanding the antecedents of occupational PTSD.

The aims of the present study are:

a) to evaluate the impact of bank robbery on employees psychological well-being, thus investigating post-traumatic stress reactions;

b) to better understand risk factors associated to the onset of post-traumatic symptomatology both immediately (ASD) and after 2 months (PTSD);

c) to inform the development of new interventions and risk management strategies.

3.3 Materials and Methods

3.3.1 Sample

We examined 924 employees of a primary Italian bank group, victims of 238 different robberies and voluntarily joining an employer-sponsored post-robbery support program (Figure 1). Robberies took place from February 2010 to December 2014 in 229 different bank branches in the whole national territory.

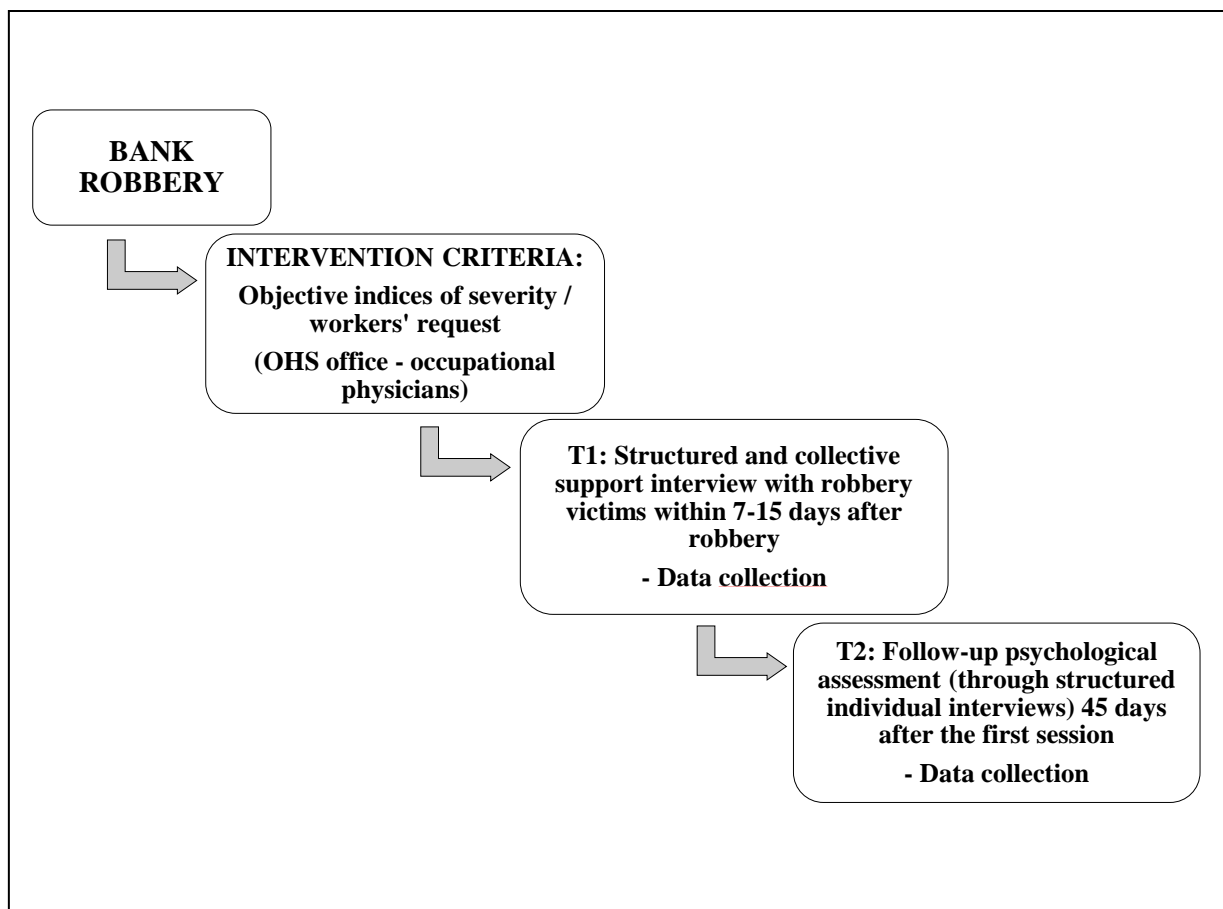
3.3.2 Measures

The bank company provides employees with a support program to manage the potential traumatic effects of robberies. The program includes various phases which are similar to some included in the *Critical Incident Stress Management* proposed by Everly and Mitchell (1999). It includes 1) a primary training on safety behaviors to be followed during the robbery; 2) a post-robbery support program.

The post-robbery support program was designed by a multidisciplinary team including psychologists, occupational physicians and the health and safety managers of the bank trust. Within 7-15 days after robbery an occupational physician conducted a structured and collective support interview (i.e. *Critical Incident Stress Debriefing*) with robbery victims, in which they recall what happened during the traumatic event, express and share thoughts, emotion and symptoms related to the trauma, and identify efficient strategies to face stress. Interviews took place at the bank branch during the regular working time and participation is

on a voluntary basis. Victims may both request an individual interview with the occupational physician and a referral to a certified psychologist. A follow-up psychological assessment (through structured individual interviews) was conducted 45 days after the first session. All company employees participated in training programmes on traumatic stress management. All occupational physicians were trained and supervised by expert psychologists at conducting assessment interviews and offering support to victim of robbery.

Figure 1. Phases of Post-robbery Support Program



A self-reported questionnaire (“Baseline Questionnaire”) was prepared for the present study and administered to each participant before the beginning of the group interview session (T1). At follow-up (T2), individual interviews (“Follow-up interviews”) were administered to participants. The *Impact of Event Scale (IES)*, for the assessment of post-traumatic stress reactions and post-traumatic stress disorder (PTSD) was also administered both at T1 and T2.

Baseline questionnaire: we collected socio-demographic information (i.e. gender, age, work seniority, job title), the number of bank robberies occurred during participants' working life and a detailed description of the last robbery with closed and open-ended questions. Descriptors included the duration, number of robbers, direct interaction with robbers, the number of victims involved, weapons used, if robbers appeared to be upset and out of control, physical contact/aggressions, hostages, physical injuries reported by the victim or someone else, and whether victim was frightened and felt hopeless during the robbery. Additionally we included an open-ended question in which subjects were asked to mention further traumatic features which were not listed in the questionnaire.

Follow-up interview: the semi-structured interview was conducted around four themes: 1) Victims' general health conditions and self-reported trajectory of post-traumatic symptoms after robbery; 2) Victims' evaluation of the intervention focusing on relief of post-traumatic reactions; 3) Victims' assessment of key efficacy factors of the support program; 4) Victims' assessment of critical factors and adverse effects of the support program. We categorized subjects' answers based on content analysis.

Impact of Event Scale (IES; Horowitz et al., 1979): is a 15 item self-report measure of post-traumatic symptoms. The score ranges from 0 to 75. Higher scores indicate more severe symptoms. IES showed strong agreement with PTSD clinical diagnosis and it is sensitive to clinical changes (Sundin & Horowitz, 2009). Although it has been suggested that IES should not be used as a measure of post-traumatic stress disorder (PTSD) because it does not measure hyperarousal symptoms, the results summarized by Sundin and Horowitz (2009) supported of IES' reliability and validity. They conclude that the number of studies showing high correlation between IES score and PTSD diagnosis, validates the use of IES as a

screening of PTSD. Neal and colleagues (Neal et al., 1994) also found the IES to be the most useful dichotomous measure, compared to the CAPS-1 (Weathers et al., 1994) and the MMPI-PTSD (Keane et al., 1984). We adopted a cutoff point of 35 to define PTSD cases (Neal et al., 1994; Wohlfarth et al., 2003).

3.3.3 Statistical analysis

Means and standard deviations or absolute and relative frequencies were computed for continuous or categorical variables respectively.

The role of potential risk factors was estimated with logistic and linear multilevel regression: we modeled a series of random intercept mixed-effect logistic regression models to account for subjects' clustering within robberies; subject-level factors were entered as fixed effects.

According to the literature on risk factors (see Brewin et al., 2000 for a review), two hierarchical models were specified:

- Model 1 included pre-trauma risk factors (age, gender, job task, number of robberies experienced, geographical region);
- Model 2 added peri-trauma risk factors related to robbery features (duration of robbery, number of colleagues, presence of arms, number of robbers, perception of robbers as out of control, episodes of violence as physical contact with robber, being victim of scuffle or being injured, presence of hostages).

Furthermore, since victim's subjective perception and emotional reactions to the critical event may be more predictive of subsequent clinical course than the objective circumstances, and since the initial reaction to the traumatic event might mediate subsequent development of PTSD, we added a third hierarchical model:

- Model 3 added subjective experience of fear, terror and hopelessness, and early post-traumatic reactions (i.e. IES score at T1).

For each specification, the significance of unmeasured robbery-related factors has been assessed with the residual pseudo-likelihood test ($H_0: \sigma^2 = 0$). The portion of variance in the outcome measure explained by unmeasured robbery-related factors was calculated with the variance partition coefficient. We adopted a latent variable threshold model (Long & Freese, 2006) approach for the calculation of the variance partition coefficient (Snijders, 2003):

$\frac{\sigma_u^2}{\sigma_e^2 + \sigma_u^2}$, where σ_e^2 is level 1 residual variance ($\sigma_e^2 = 3.29$ for logit models) and σ_u^2 is level 2 residual variance (estimated).

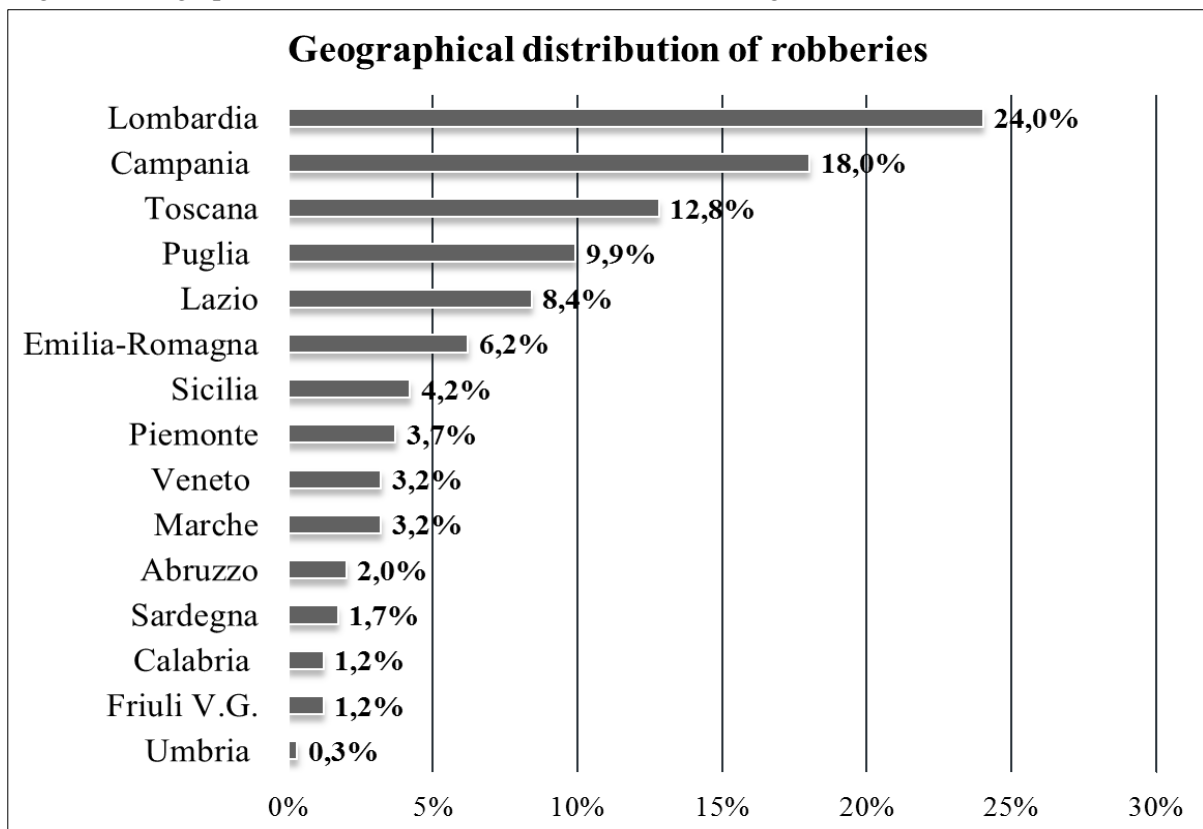
Statistical analysis were performed with SAS 9.2. and IBM SPSS Statistics 22.

3.4 Results

3.4.1 Description of robberies

We excluded from the analysis 301 subjects because they were either absent at T1 or T2, and 28 subjects due to incomplete data collection. The final sample consisted in 595 subjects, victims of 238 different robberies. Among them 314 subjects were women (52.8%), mean age was 42.8 years old (SD=9.13, min 21 - max 62), and mean work seniority was 16.6 (SD=10.0, min 1 - max 41), while the mean number of bank robberies occurred during participants' working life was 2.33 (SD=1.89, min 1 - max 13). Sample was composed of managers (47,7%), cashiers (29,1%), branch directors (15,4%) and other professional roles (7,8%). Lombardy region held the highest number of robberies among the sample. Geographical distribution of robberies is shown in figure 2.

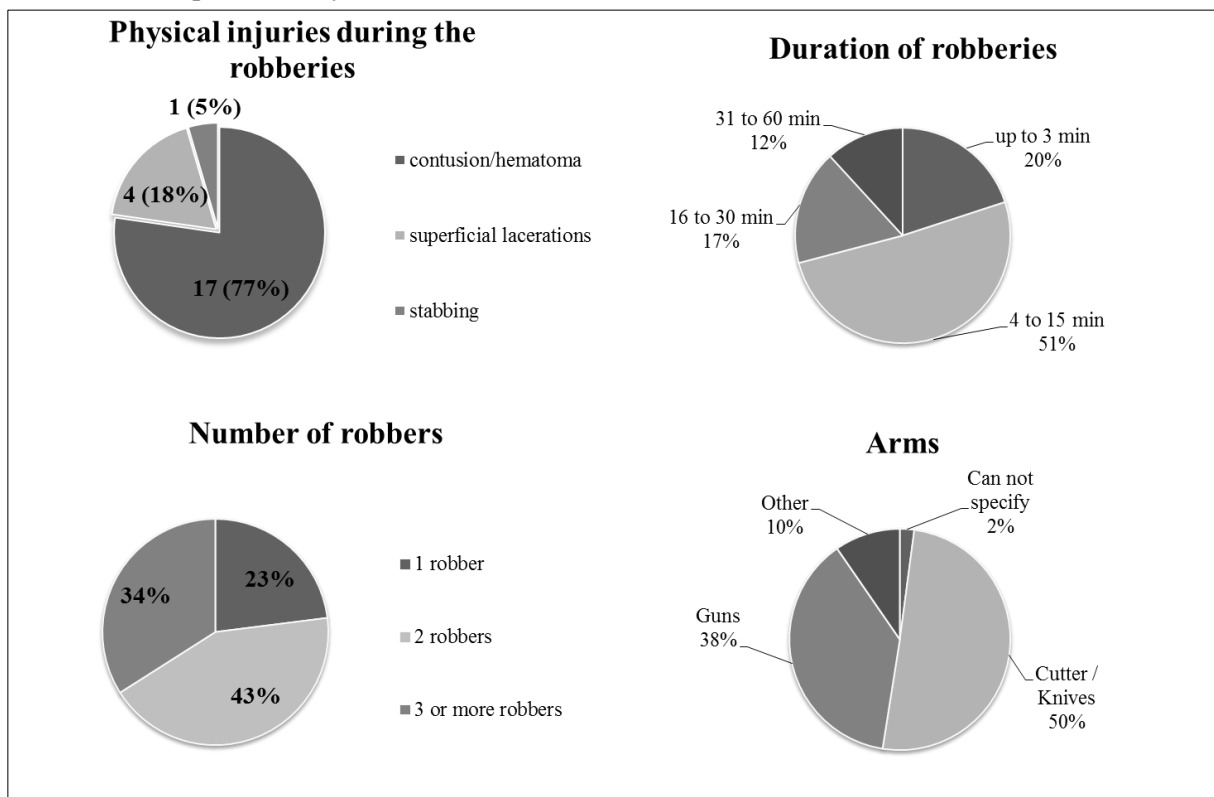
Figure 2. Geographical distribution of robberies across Italian regions.



The mean duration of the critical event was 20.3 minutes (SD=25.7, min 1 - max 180); for 462 subjects (77.6%) the robbery was perpetrated by two or more robbers; 233 (61%) were directly involved in the interaction with the robbers; 64 (10.8%) were alone at the bank branch during the assault; 480 employees (82.9%) referred the presence of at least one weapon (i.e. cutters or knives, 50% of subjects; guns, 38%, and other kind of arms for 10%).

Nearly half of the sample (45.9%) perceived that robbers were upset and out of control. Ninety-seven employees (16.3%) took part or were witnesses of fights with robbers, 22 (3.7%) were injured during the robbery, 258 (43.4%) referred the presence of hostages during the robbery. Figure 3 shows features of robberies concerning type of injuries, duration of robberies, number of robbers and kind of weapons used by robbers.

Figure 3. Features of robberies in relation to type of injuries, duration of robberies, number of robbers and kind of weapons used by robbers.



Concerning emotional reactions, 122 subjects (21.1%) felt frightened and hopelessness during the robbery, 266 (45.9%) reply “partly true”, and 191 (33%) “false”; 269 subjects (46.8%) referred the presence of other traumatic features related to the robbery not included in the previous question (e.g. irreverence of robbers, verbal violence, loud noises, vulnerability of the structure, appearance of robbers...).

Twenty-seven victims (4.5%) requested a post-debriefing individual support session.

3.4.2 Early post-traumatic stress reactions

The IES mean score of the total sample at T1 was 30.52 (SD=18.38). Correlates of baseline IES score are shown in Table 1. In Model 1 age, being female, being cashier, and geographical region resulted as significant predictors of early posttraumatic reactions; when adding robbery features (Model 2), only perception of robbers as out of control was found to be a risk factor, while previous predictors maintained statistical significance; after including feelings of fear, terror and hopelessness (Model 3), previous variables lost statistical significance.

Table 1. Predictors of early post-robbery reactions (IES at T1): multilevel linear regression; random intercept mixed-effect to account for subjects' clustering within robberies. Three hierarchical models are adopted.

	Model 1	Model 2	Model 3
	<i>Estimates</i>	<i>Estimates</i>	<i>Estimates</i>
Age	0.29*	0.30*	0.56
Being female	7.40***	7.73***	6.48
Cashier	8.88***	8.70**	13.2
Number of robberies experienced	0.58	0.57	0.88
Region: Center	-8.29**	-8.75**	-0.65
Region: North	-8.68**	-8.77**	-1.35
Number of colleagues	-	-0.26	-8.06
Presence of arms	-	1.36	3.42
Number of robbers	-	0.14	2.52
Duration of robbery	-	0.04	0.05

Robbers perceived as out of control	-	6.08**	4.62
Physical contact with robbers	-	2.14	1.16
Scuffle (taking part or being present)	-	0.78	2.79
Being injured	-	4.09	4.45
Presence of hostages	-	1.09	4.09
Feeling fear, terror and hopelessness: “yes”	-	-	19.2***
Feeling fear, terror and hopelessness: “No”	-	-	-7.21

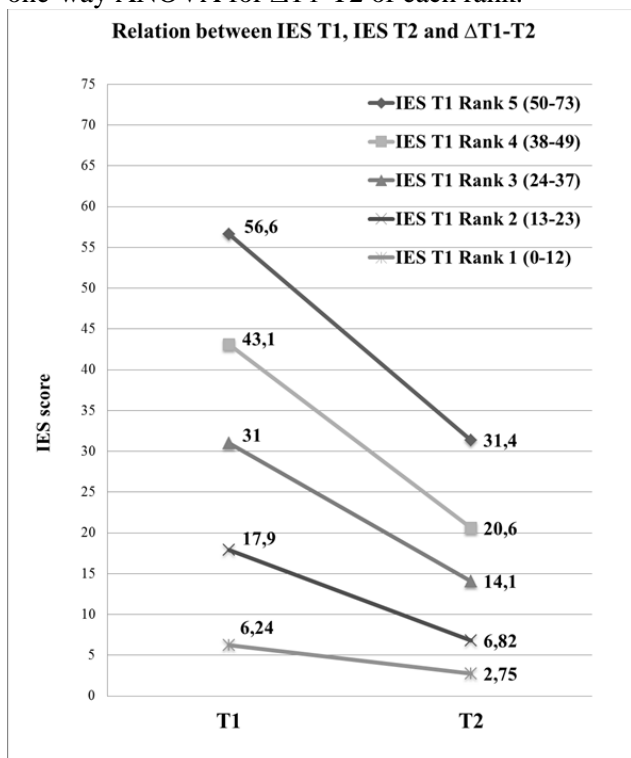
Model 1: individual characteristics as pre-trauma risk factors (age, gender, job task, number of robberies experienced, geographical region); Model 2: it adds peri-trauma risk factors in terms of robbery features (duration, number of colleagues present, presence of arms, number of robbers, perception of robbers as out of control, episodes of violence as physical contact with robber, being victim of scuffle or being injured, presence of hostages); model 3: it adds subjective perceptions and reactions (experience of fear, terror and hopelessness); *estimates* represent β coefficients. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

3.4.3 PTSS at T2

One hundred and thirty subjects (24%) reported no symptoms for the entire length of the follow-up; 214 (36%) completely recovered, 214 (36%) partially recovered, 30 (5%) reported no changes in symptoms severity, 6 (1%) worsened.

Eighty-four subjects (14%) reached the IES cut-off point for PTSD at T2. Overall IES scores decreased during the follow-up ($\Delta_{T1-T2}=15.76$; $p<.001$). Figure 4 illustrates the downward trend of IES scores divided into five ranks.

Figure 4. Relation between IES T1 ranks, IES T2 and $\Delta T1-T2$; p values represent significant levels of one-way ANOVA for $\Delta T1-T2$ of each rank.



IES T1 Rank	$\Delta T1-T2$	p
Min- Max	Mean (SD)	
1 (0-12)	3,49 (4,31)	
2 (13-23)	11,1 (8,49)	
3 (24-37)	16,9 (11,8)	<.0001***
4 (38-49)	22,5 (15,6)	
5 (50-73)	25,2 (16,9)	

Table 2 summarizes significant correlates of PTSD diagnoses: physical contact with robbers, perception of robbers as out of control, being injured during the robbery, being

worried by other issues related to robbery, feeling terror and, hopelessness, individual interview required, number of robberies during working life.

Table 2. Significant correlates of PTSD diagnoses (T2); *p* values represent significant levels of χ^2 for categorical variables, one-way ANOVA for continuous variables.

	PTSD N=84 (14,1%) n (%)	No PTSD N=511 (85,9%) n (%)	<i>p</i>
Physical contact with robbers (N=220)	39 (17.7)	181 (82.3)	.040
Robbers appeared out of control (N=273)	47 (17.2)	226 (82.8)	.015
Being injured during the robbery (N=38)	12 (31.6)	26 (68.4)	.001
Worried by other issues related to robbery (N=269)	57 (21.2)	212 (78.8)	<.0001
Feeling terror and, hopelessness			
“True” (N=122)	36 (29.5)	86 (70.5)	<.0001
“Partly true” (N=266)	35 (13.2)	231 (86.8)	
“False” (N=191)	10 (5.24)	181 (94.8)	
Individual interview required (N=27)	10 (37.0)	17 (63.0)	.0005
	Mean (sd)	Mean (sd)	<i>p</i>
Number of robberies during working life	2.75 (2.40)	2.25 (1.79)	.026

The majority of subjects (88.1%) who reached the cut-off point for PTSD were included in the last two ranks of IES at T1: subjects scoring more than 38 on IES at T1 may develop PTSD at T2 (Tab. 3).

Table 3. PTSD incidence across each IES T1 rank; *p* values represent significant levels of χ^2 .

IES T1 ranks	IES T1 ranks	IES T1	PTSD	No PTSD	<i>p</i>
N	Mean (SD)	ranks	N=84	N=510	
		Min – Max	(14,1%)	(85,9%)	
118	6,24 (3,64)	0-12	0	118 (21,1%)	
125	17,9 (3,04)	13-23	3 (3,57%)	122 (23,9%)	
118	31,0 (3,81)	24-37	7 (8,33%)	111 (21,8%)	<.0001***
116	43,1 (3,57)	38-49	24 (28,6%)	92 (18,0%)	
117	56,6 (5,29)	50-73	50 (59,5%)	67 (13,1%)	

Table 4 shows predictors of PTSD at T2. In Model 3, IES score at T1 is the strongest predictor of subsequent PTSD: each unit change in IES score contributes to an increase risk of 1.13 of developing PTSD. Furthermore, being cashier, being injured and the presence of arms were statistically significant risk factors (Model 3).

Table 4. Predictors of PTSD incidence at T2: multilevel logistic regression (confidence interval 95%); random intercept mixed-effect to account for subjects' clustering within robberies. Three hierarchical models are adopted.

	Model 1	Model 2	Model 3
	O.R. (95% CI)	O.R. (95% CI)	O.R. (95% CI)
Age	1,04 (1,00-1,09)*	10,5 (0,99-1,10)	1,03 (0,98-1,09)
Gender	1,50 (0,83-2,71)	2,81 (1,04-4,15)*	1,05 (0,45-2,45)
Cashier	2,17 (0,12-1,00)*	2,01(0,21-1,19)	2,78 (0,14-0,96)*
Region: Center	0,50 (0,23-1,11)	0,49 (0,20-1,20)	0,86 (0,33-2,23)
Region: North	0,49 (0,22-1,07)	0,59 (0,24-1,50)	0,95 (0,35-2,58)
Number of robberies exp.	1,13 (0,99-1,29)	1,10 (0,93-1,30)	1,07 (0,38-1,31)
Number of colleagues	-	10,5 (0,94-1,17)	1,12 (0,98-1,27)
Arms	-	1,46 (0,61-3,50)	3,13 (1,13-8,61)*
Number of robbers: one	-	0,55 (0,08-3,78)	1,56 (0,20-12,0)
Number of robbers : two	-	0,68 (0,33-1,42)	0,79 (0,34-1,83)

Robbers out of control	-	1,28 (0,38-1,61)	1,03 (0,42-2,13)
Physical contact with robbers	-	1,35 (0,35-1,57)	1,19 (0,39-2,24)
Scuffle (taking part or being present)	-	1,07 (0,43-2,67)	1,19 (0,29-2,44)
Being injured	-	6,67 (0,05-0,49)**	9,09 (0,02-0,53)**
Presence of hostages	-	1,14 (0,42-1,85)	1,51 (0,29-1,49)
IES score at T1	-	-	1,13 (1,09-1,17)***

Model 1: individual characteristics as pre-trauma risk factors (age, gender, job task, number of robberies experienced, geographical region); Model 2: it adds peri-trauma risk factors in terms of robbery features (duration, number of colleagues present, presence of arms, number of robbers, perception of robbers as out of control, episodes of violence as physical contact with robber, being victim of scuffle or being injured, presence of hostages); model 3: it adds early post-traumatic reactions (IES score at T1); CI, confidence interval. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Unmeasured robbery-related factors explained a significant portion of the variance in post-traumatic early reaction (IES at T1):

- the variance partition coefficient in IES score approximated 33% in the intercept-only model; 32% in Model 1; 35% in Model 2; 7% in Model 3.

After excluding small group (number of colleagues < 5), the robbery-related variance increased up to 24%.

Four hundred ninety-three subjects (83%) felt that the program provided emotional support and mitigated post-traumatic reactions (Fig. 5). Among them, the opportunity to share with colleagues the same feelings and reactions (49%), of expressing their mood with someone who encouraged them to do it (34.3%), of learning from the health care specialist the physiologic of their symptoms (21.8%), of feeling social support by the company (10.4%), were considered the main useful features of the program (Fig. 6). Finally, 15 subjects (2.5%) reported discomfort related to re-experiencing trauma.

Figure 5. Perception of usefulness of post-robbery support program by employees involved.

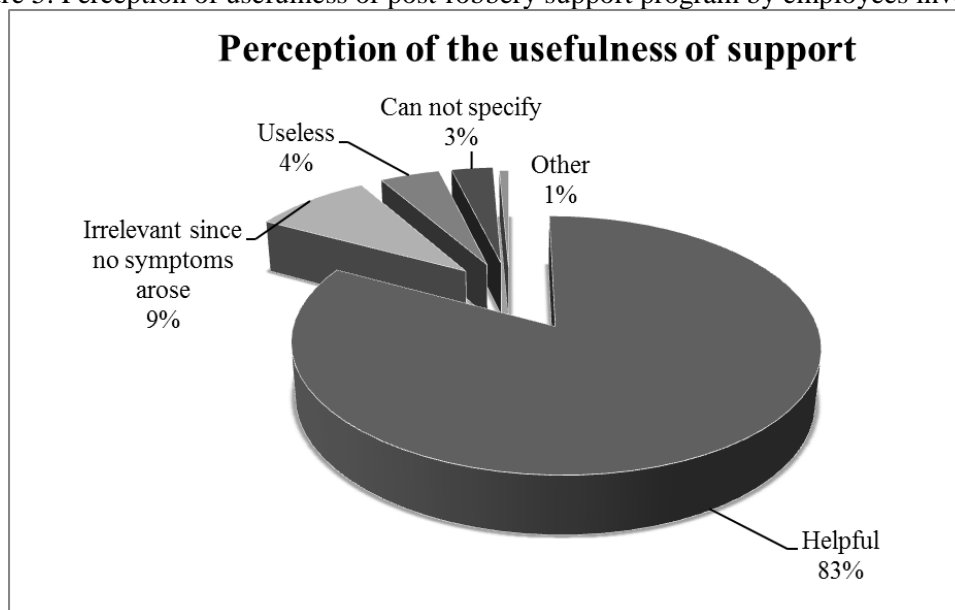
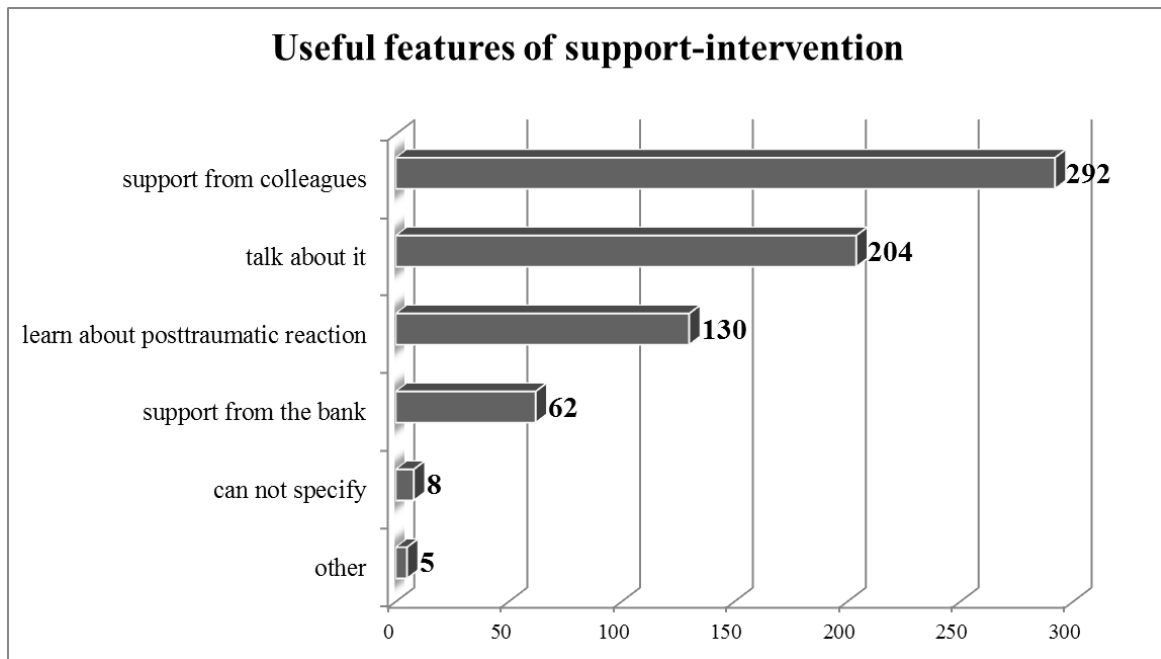


Figure 6. Useful features related to the support program as specified by employees. Multiple answers were allowed.



3.5 Discussion

3.5.1 Post-traumatic stress reaction following bank-robbery

The present study confirmed that bank robbery is a traumatic event for employees, in line with previous researches (Miller-Burke et al., 1999; Hansen & Elklit, 2011; 2013; 2014; Fichera et al., 2014).

IES scores at one week after the event are similar to those found during the same timeframe in victims of serious injuries (Feinstein & Doleny, 1991), natural disasters (Chemtob et al., 1997) and technological disasters (Malt et al., 2003).

Consistent with previous studies among bank employees victims of robbery, most subjects partially or fully recovered during the follow-up period compared to the first days after robbery (Fichera et al., 2011; 2014; Hansen & Elklit, 2011; 2013).

Nevertheless, 14% of our sample reached the IES cut-off point for PTSD diagnosis about two months after the traumatic event. This percentage is lower compared to those found after other forms of nonsexual assault (20-30%; Brewin et al., 1999; Kleim et al., 2007) but it is similar to PTSD prevalence found in police officers and firefighters exposed to duty-related stressors (Robinson et al., 1997; Heinrichs et al., 2005; Perrin et al., 2007).

Despite comparison across studies are hampered by differences in study design and source populations, it's interesting to notice that victims of bank robberies seem to be at risk for PTSD similarly to traditional high risk occupations.

3.5.2 Predictors of PTSD

Similarly to previous occupational post-traumatic researches, we found that peri-traumatic risk factors such as physical injuries and the presence of arms increased the

likelihood of developing PTSD (Ozer et al., 2003; Kamphuis & Emmelkamp, 1998). Coherently with previous study on a partial share of current sample (Fichera et al., 2014), being cashier resulted as a risk factor for PTSD onset, may due to the direct and frequent interaction with robbers, which in turn implies cash and arms interaction.

Differently from age and gender, these variables held statistical significance after including IES at T1 in Model 3: early post-traumatic reactions did not represent a mediating variable since these predictors may affect other trauma-related features as perception of unsafety in the workplace.

Previous experiences of robbery, physical contact with robbers, having taken part or witnessed to scuffles, which resulted as significant correlates of PTSD (tab. 2), did not result as PTSD risk factors in the multilevel logistic regression (tab. 4). These results are in contrast with previous findings (Rothbaum et al., 1992, McFarlane & Bryant, 2007). However, comparison are difficult since previous research did not account for subjects' clustering within robberies, thus only considering individual-level analysis.

Theories on the pathophysiology of PTSD posits the key role of early emotional reactions in predicting long term consequences. In particular, Harvey and Briant (1998) underline that acute symptoms following the trauma may increase cognitive avoidance and suppression of thoughts about the event, that can lead to psychiatric disorders. In our study the IES score at seven days after robbery remained the most important correlate of two months PTSD incidence in the fully adjusted multivariable model. This is consistent with a recent study by Hansen and Elklit (2013; 2014), who found early post-traumatic symptoms severity (i.e. ASD severity) to be the strongest predictor of PTSD in a sample of 371 employees victims of bank robbery.

3.5.3 Predictors of early post-traumatic stress reactions

Coherently with literature (Tolin and Foa, 2006; Elklit, 2002), socio-demographical predictors of early post-traumatic reactions (baseline IES scores) were gender (being women) and age (senior workers). Being cashier was also predictive of PTSS possibly due to the frequency in which these workers are directly involved in the interactions with robbers compared to other colleagues. However, when adding perceived fear, terror and hopelessness during the robbery, it absorbed all the significance of previous variable: pre-trauma risk factors and perception of robbers as out of control may all contribute to the subjective perception of fear.

This is consistent with a study on predictors of ASD in response to bank robbery by Hansen and Elklit (2011), in which perceived helplessness and perceived life threat mostly accounted for ASD variance.

Different authors agree in considering victims' perception of seriousness of the threat more significant than the objective circumstances (Kleber & van der Velden, 2009; Brewin & Holmes, 2003). Our findings are consistent with this hypothesis. Nonetheless, even if A2 criterion was removed from recent DSM-V, it may still have predictive value in identifying employees at higher risk of developing PTSD.

3.5.4 Looking beyond the individual level

We also found that among groups of robbery victims with more than 5 colleagues, 24% of the variance in the outcome measure was explained by unmeasured robbery-related factors after adjustment for a number of observed robbery-related characteristics in the fully adjusted model. This finding suggest that group factors might affect the risk of PTSD, an often overlooked dimension in post-traumatic stress research. Indeed, as a traumatic events witnessed by different subjects, bank robbery is configured as a collective trauma.

Research on collective trauma has exclusively focused on victims of collective violence and massive trauma as Gaza conflict and September 11 2001 attacks (Erikson, 1994; Updegraff et al., 2008), and no studies have involved occupational trauma. However, international data have clearly attested how shared culture buffers members from at least some of the disruptive impact and consequences of the traumatic event.

Organizational cultures and identity can affect the way in which stress is experienced, leading to differential expression of personal difficulties and vulnerabilities after the event, emulation of colleagues, perceived social stigma, responsiveness to treatment sense of responsibility, guilt or failure. Additionally, group cohesion in the workplace and supportive leadership may provide an important buffer: epidemiological evidence in other therapeutic areas suggests that perceived social support might result in reduced stress-related neuroendocrine response, enhanced health and better quality of life (Neri et al., 2011).

Future researches should evaluate the role of support networks in robbery-related PTSD prevention.

These findings, together with the specificity in meeting avoidance criteria as shown by Hansen and Elklit (2011; 2013; 2014), indicates that bank employees may be a special trauma population.

Ethical considerations prevented us to conduct a two arms parallel trial. As such, the evaluation of program efficacy is beyond the scope of current study. However, most literature support early interventions to prevent or reduce post-traumatic psychological impairment, though studies in specific occupations settings are limited and evidence is mostly based on civilian and military settings (McFarlane & Bryant, 2007). Structured assistance programs for victims of workplace traumatic events have reported positive and satisfactory feedbacks from employees, despite solid studies on efficacy and effectiveness are still insufficient (Kleber &

van der Velden, 2009). Consistent with the existing evidence (Miller-Burke et al., 1999), most subjects partially or fully recovered and the majority of them (83%) expressed satisfaction with the intervention during the follow-up period.

The study gives an original contribution to the existing literature of psychological sequelae following bank robbery: to date, this is the longitudinal study with the largest sample assessing prevalence and predictors of post-traumatic stress symptoms (371 subjects in Hansen & Elklit, 2014; 411 in Hansen and colleagues, 2014). Random intercept mixed-effect models accounting for subjects' clustering within robberies provided a valuable understanding of risk factors; furthermore, no studies had previously investigated the role of group factor in the aftermath of post-traumatic reaction following bank robbery or acute stress at work.

The present study has some limitations. First we cannot rule out possible selection bias due to the voluntary participation into the intervention program. Despite interventions are usually arranged with the branch manager in order to ensure that as many subjects as possible can take part in the program, some employees may be absent due to different reasons. Consequently we may have over or underestimated the prevalence of post-robbery PTSD. However similarities in PTSD rates and risk factors observed in our study and previous researches support the internal validity of our results. Second we could not collect information on non-occupational traumatic events occurred in subjects' life time and pre-existent psychiatric disorders, as well as perceived support after the robbery, which may affect workers' susceptibility to post-robbery PTSD. Finally, the PTSD diagnostic procedure relies on self-report without a thorough clinical examination. Nevertheless diagnosis based on

self-report IES score has proven excellent accuracy compared to structured clinical interviews studies showing high correlation between IES score and PTSD diagnosis (Sundin & Horowitz, 2009).

SECTION IV: CONCLUSIONS AND PRACTICAL IMPLICATION

4.1 Conclusions and practical implications

We observed modifiable and susceptibility factors associated with PTSD onset after workplace robbery in a large longitudinal cohort study. Our findings showed that bank robbery is a potential traumatizing event associated with both immediate and long-term posttraumatic stress symptoms, contributing to post-traumatic stress literature.

Results suggested the weight of subjective variables, such as personal perception of robbery severity and early emotional reaction, in identifying persons at higher risk to develop PTSD.

Though the decreasing in frequency of bank robberies, these findings may be generalized to other high risk sectors as large scale retail distribution or pharmacies.

These findings provide important implications for the management and prevention of acute stress and trauma in the banking sector:

- it's important not to focalize only on objective indices of robbery severity in establish intervention priority but also to consider and investigate the subjective perception of threat of every single worker. To date, the support program starts according to objective criteria of severity and violence (e.g. number of robberies experienced in the branch, duration of robbery, injuries, presence of hostages), to the presence of pregnant employees, apprentices, workers with different degrees of disability, or by workers' request;

- it is possible to identify persons at higher risk to develop PTSD according to the intensity of early reactions; by providing a cut-off value (i.e. IES T1 score>24) a relatively simple procedure to address priority in support intervention and targeting resources may be implemented;
- occupational health and safety personnel and supervisors should be trained to recognize any signs and manifestations of post-traumatic stress reactions thus encouraging employees to seek support within the occupational health services: stress reactions and disorder may also appear with victims who would rather avoid (professional) assistance;
- a pre-exposure resilience training should be addressed to improve stress management and help employees dealing with aversive emotional reactions; first sessions may be addressed to cashiers in southern regions.
- supervisor should pay specific attention to cashiers, senior workers, female workers especially if already exposed to previous robberies;
- relevant features of robbery are physical contact with robbers, perception of robbers as out of control, being injured, presence of arms, concerns for other issues related to robbery, request of individual interview;
- a 3 step program should be implemented to monitor employees' trajectory of symptoms after 6 months;
- all company staff involved should be aware that the absence of a diagnosis does not imply the absence of difficulties in the adaptation with acute stress. This is particularly relevant when additional psychosocial risks are present in the workplace.

4.2 Further studies

An important issue in occupational health research is the evaluation and monitoring of proactive interventions as well as the dissemination of best practice examples. The positive evaluation of support program by employees encourages to assess its efficacy with a randomized controlled trial.

Collective trauma literature in the occupational sector is limited. We found that group factors might affect the risk of PTSD, thus encouraging further research.

By returning to the place where the event took place, victims of workplace robbery experience continuous exposure to triggers for distress and an ongoing threat of violence is inherent to their job. Studies are also required to investigate the role of perceived lack of safety in the workplace (i.e. *Psychosocial safety climate*; Dollard & Bakker, 2010)

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**SECTION VI: LIST OF ACTIVITIES CARRIED OUT DURING THE PHD
PROGRAM (2012-2015)**

Published paper

- Fattori, L. Neri, E. Aguglia, A. Bellomo, A. Bisogno, et al. Estimating the Impact of Workplace Bullying: Humanistic and Economic Burden among Workers with Chronic Medical Conditions. *BioMed Research International*. Volume 2015 (2015). <http://dx.doi.org/10.1155/2015/708908>.
- G. P. Fichera, A. Fattori, L. Neri, M. Musti, M. Coggiola and G. Costa. Post-traumatic stress disorder among bank employee victims of robbery. *Occupational Medicine* 2015;65:283–289.
- Donatella Camerino, Paul Maurice Conway, Alice Fattori, Maria Grazia Cassitto, Silvia Punzi, Giuseppe Paolo Fichera, Olga Menoni, Paolo Campanini. Context specificity in the assessment of psychosocial risk at work: an empirical study on Italian call centre workers. *Med Lav* 2014; 105, 2: 130-138.

In press paper

- Fattori, A., Potter, R., Dollard, M. Organisational Toolkits for Psychosocial Risk Management: A Critical Review. In Dollard, M.F., Shimazu, A., Bin Nordin, R., Brough, P., Tuckey, M.R. (Eds.) *Psychosocial Factors at Work in the Asia Pacific vol.II* (Feb. 2016)

Conferences

- 79th National Congress of Italian Society of Occupational Medicine and Industrial Hygiene (Società Italiana di Medicina del Lavoro ed Igiene Industriale; SIMLII)
Milan, November 25th - 27th 2015

Best Practice per la gestione dei rischi psicosociali nei luoghi di lavoro
Fattori A, Potter R, Costa G

- 17th Congress of the European Association of Work and Organizational Psychology (EAWOP)
Oslo May 20th-23rd 2015
Experiencing a potentially traumatic event within the workplace: looking beyond the individual level
Alice Fattori, Giuseppe Paolo Fichera, Luca Neri, Giovanni Costa

- 5th International Congress of Occupational Health - Work Organization and Psychosocial Factors (ICOH-WOPS)
Adelaide (AU) September 16th - 19th 2014
Incidence and correlates of post-traumatic stress disorder (PTSD) following workplace robbery: a longitudinal cohort study among bank employees
Fichera GP, Fattori A, Musti M, Coggiola M, Costa G

- 9th International Congress on Workplace Bullying and Harassment
Milan June 17th - 20th 2014
Item generation of a new “multi-dimensional inventory of work-environment hostility” (MIWEH).
Gugiari MC , Fattori A, Castellini G, Boari P, Boschetti M, Manfredi E, Costa G, Neri L.

Visiting PhD Student

University of South Australia - Asia Pacific Centre for Work Health and Safety -
Magill Campus, Adelaide
August – November 2014

Professional partnership project (in progress)

WHO Global Plan Of Action For Workers' Health (Gpa) 2008-2017

Best Practice for Psychosocial Risk Management - Annex 2: Working Group GMP3