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A model of Early Psychological Intervention for Direct and Indirect Road Victims

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Abstract

Road accidents are a major emergency in Europe, and several studies investigating road trauma victims have demonstrated their serious psychological consequences and their incidence related to several serious psychological disorders (e.g., anxiety disorders, depression, psychoactive substance abuse, Acute Stress Disorder and Post-Traumatic Stress Disorder).

The quality of assistance provided to the victims immediately after the event is crucial for both short- and long-term psychological consequences and can often explain the causes of post-traumatic morbidity. Based on these considerations, the paper presents a scientifically grounded early psychological intervention program that is specifically designed for road accident victims: ANIACARES.

ANIACARES provides psychosocial support to road trauma victims who suffered serious injuries and/or to their relatives. This model is inspired by the most-investigated protocols related to first-aid psychology, crisis intervention, and trauma-focused psychological interventions. ANIACARES aims to reduce the possible post-traumatic psychological effects, as well as to limit the decline in the life quality of family members, and of the seriously traumatized, by providing psychological counselling and support.

The program aims to support the victims during the different phases of the traumatic event to foster better emotion regulation strategies, to facilitate communication between victims and rescue personnel, to promote adherence to medical care, to promote the mourning process, to prevent the onset of post-traumatic psychopathologies, and to promote the resolution of conflicts. The validity of the model was evaluated by presenting the pre-and post-intervention results, focusing on several aspects of the individual's well-being investigated on 125 road trauma victims categorized as Direct Victims, Indirect Victims with seriously Injured family members, and Indirect Victims with a Deceased family member. Results allow to support the validity of ANIACARES; in fact, an improvement in the general conditions of psychological health and well-being of the victims has been shown and on dimensions which mood and affectivity, memory, and speech. The relevance of ANIACARES does not lie solely in developing "new" clinical techniques or procedures, but rather in structuring a specific model of psychological support and supportive intervention for a population that is too often overlooked and on which the possible outcomes are well known.

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1. Introduction

The World Health Organization (World Health Organization, 2018) estimated that about one million two hundred and fifty thousand people a year die worldwide because of road trauma and more than 50 million are injured. Therefore, road trauma is an important factor in social emergencies, as they are the eighth leading cause of death among the general population and the leading cause of death among young people between 5 and 29 years of age (WHO, 2018).

Several studies investigating road trauma victims have demonstrated their serious psychological consequences and their incidence related to anxiety disorders (such as amaxophobia), depression, psychoactive substance abuse (Craig et al., 2016, 2017; Ehring et al., 2006; Heron-Delaney et al., 2013; Kenardy et al., 2018; Mayou et al., 2002; McFarlane et al., 1997; O'Donnell et al., 2008; Shalev et al., 1998), and, above all, the prevalence of Acute Stress Disorder and Post-Traumatic Stress Disorder (Blanchard & Hickling, 2004; Bryant & Harvey, 1999; Dai et al., 2018; Harvey & Bryant, 1998, 1999; Lin et al., 2018). Road trauma psychological dimensions and implications have long been neglected, both by scientific research and public health services (Blanchard & Hickling, 2004; World Health Organization, 2001). Blanchard & Hickling (2004) in their book presentation "After the crash: assessment and treatment of motor vehicle accident survivors" (Blanchard & Hickling, 1997), which summarized English-language scientific literature about psychological consequences of a road accident, highlighted the scarcity of studies about evaluation and psychological treatment of road accident survivors, not only in the United States but also worldwide. Moreover, the authors numbered the presence of other 9 groups of researchers, besides them, studying psychological aspects of road trauma. Since then, the interest in the psychological consequences of road trauma, in the short and long term, has increased and several scholars have investigated the subject in-depth (Chatukuta et al., 2021; Giummarra et al., 2018; Palmera-Suárez et al., 2016).

There is evidence that single-session psychological intervention does not provide effective results, and more comprehensive and systematic interventions for victims in the post-traumatic period are needed (Bastien et al., 2020; Nhac-Vu et al., 2014). Road trauma circumstances and the quality of assistance provided to the victim immediately after the event are crucial for both short/long-term psychological consequences and can often explain the causes of post-traumatic morbidity (Cotti et al., 2004). There are several factors, intrinsic and extrinsic (e.g (i.) injury characteristics and hospital care predictive factors; (ii.) demographic factors; (iii.) family and social support; (iv.); compensation system processes and approach to recognizing the fault (v.); pre-injury health status) that may explain the causes of post-traumatic morbidity (Alharbi et al., 2019; Guest et al., 2016) and psychological support provided to the victim in the aftermath of the trauma could prevent or reduce posttraumatic morbidity (Abate et al., 2021; Guest et al., 2018)

The inference that improvement in psychological well-being depends on the flow of time is misguided; in fact, there is evidence that "time does not heal all wounds". Several studies showed that one up to 25% of the victims involved still showed high levels of psychological distress a year after the road crash (Barnes & Thomas, 2006; Gillies et al., 2003; Papadakaki et al., 2017; Schluter & McClure, 2006; Tøien et al., 2010). Similarly, an 18-month follow-up study among young road traffic victims showed that post-traumatic stress levels decreased 12 to 15 weeks after the road traffic injury from the initial assessments (collected 2 to 16 days after the trauma); however, no change was recognized at 18 months, when one-third of the victims still showed moderate to severe symptoms of PTSD (Mayou et al., 2000).

In addition, it is well known that there is a severe and lasting burden of physical and psychological discomfort on victims who have been seriously injured in road trauma; it is evident that a significant number of victims not only fail to recover a year after the road trauma but also suffer from great disability and psychopathology, potentially inhibiting them from returning to regular behaviour (Chahraoui et al., 2015; Kovacevic et al., 2020; Papadakaki et al., 2017; Pozzato et al., 2020). According to Freedman and Shalev (2015), the spontaneous remission of symptoms may depend on having a time frame in which the symptomatology has not yet crystallized, and implementing early intervention and psychological support can be a valuable opportunity to prevent the consolidation of intrusive memories in chronic PTSD. Moreover, according to Hackmann and colleagues' study (2004), following a cognitive-behavioural therapy on 22 patients affected by PTSD, intrusive memories gradually faded away.

This highlights the importance of a comprehensive and holistic understanding of the psychological impact of road trauma; it also shows the importance of early examination and

treating psychological comorbidities to avoid long-term disability and prevent the potential impact on recovery.

ANIACARES—Early Psychological Interventions for Road Trauma Victims

ANIACARES is a model of early psychological intervention that provides psycho-social support to road trauma victims who suffered serious injuries and/or to their relatives and loved ones (Burrai et al., 2020). This model is inspired by the most-investigated protocols related to first-aid psychology, crisis intervention, and trauma-focused psychological interventions (Everly, 2012; Yeager & Roberts, 2015). ANIACARES aims to reduce the possible post-traumatic psychological effects, as well as to limit the decline in the life quality of family members, and of the seriously traumatized, by providing psychological counselling and support (Couyoumdjian et al., 2020).

The protocol provides eight psychological support sessions in line with the main objectives of the psychological first aid proposed by Ruzek and collaborators (2007). The period between each available session changes according to the individual needs and the agreement between the ANIACARES psychologist and the victim (more detailed information regarding the ANIACARES model and intervention phases are provided in Appendix A).

The first session can be identified as the "First-Aid Phase", and the second, third, and fourth session can be identified as the "Peri-Traumatic Phase"; these four sessions are generally completed within one month. The last four sessions can be identified as the "Post-Traumatic Phase", and they do not have a defined time frame but are deferred over time based on the needs and status of the victim.

A total of 100 psychologists, who were recruited for their expertise in psycho-traumatology and psychotherapy, were trained in the ANIACARES protocol. These psychologists can intervene either during the first aid and the peri-traumatic and/or post-traumatic phases (Burrai et al., 2020; Couyoumdjian et al., 2020).

As described in more detail below, the ANIACARES protocol may be applied and adapted to the first-aid, peri-traumatic, and post-traumatic phases related to a road crash. Regardless of when it is applied, ANIACARES operators, from the beginning, define and delimit the boundaries of the intervention. It is necessary to specify to the victims that this is an intervention focused on their trauma related to the road crash and the duration is limited in time; moreover, this is necessary to reduce abandonment ideas. Consistently, the final part of the ANIACARES protocol is intended to facilitate the victim's contacts with their social network or, if necessary, to facilitate links with local services (e.g., mental health services, social support services, and

road trauma victims' associations) or other recognized agencies that can offer long-term support in different ways. It is important to facilitate the victims' contact with their support network, whether affective, family, social, or working. Indeed, adequate social support allows the victim to talk about themselves, to elaborate a coherent reconstruction of what happened, to express the emotions experienced, and to perceive the sympathy and solidarity around them. Victims can utilize the ANIACARES service by calling the toll-free number (800.893.510), active 24 hours/day, 365 days/year. ANIACARES is available in the Italian cities of Rome, Milan, Florence, Campobasso, and Palermo. In the early phase of the intervention, the severity of road trauma was evaluated by the ANIACARES psychologist. ANIACARES is entirely financed by the Fondazione ANIA, founded in 2004 by the insurance companies. Fondazione ANIA dealt - until 2016 - with projects, activities, and training, and information interventions on road safety and in 2017 expanded its mission to deal tout-court with the protection of families and businesses. Fondazione ANIA is a laboratory in which to test innovative and strategic solutions to make a concrete contribution to the prevention and protection of young people, families, and the elderly.

1.1 Aim of the study

The study protocol and the scientific basis underlying the ANIACARES clinical intervention model supporting the road trauma victims will be presented, to investigate the validity of the model, by presenting the pre-and post-intervention results focusing on aspects of the individual's well-being on 125 road trauma victims.

Currently, there is no clear classification of road trauma victims. Taylor's (1999) model suggests a distinction between primary and secondary victims; however, it does not explore some of the distinguishing factors with indirect victims. In fact, within the typology "indirect victims" there is a profound difference between indirect victims of a seriously injured person and indirect victims of a deceased person. The latter has to deal with the grief that evokes emotional but also deep cognitive and behavioural responses that are the same across cultures (Onofri et al., 2015). The reactions, in particular, include crying, but also anger and self and hetero-directed aggression (Rosenblatt et al., 1976; Stroebe et al., 2007). Therefore, in line with the above descriptions, our second aim was to analyze the validity of the ANIACARES intervention across groups by testing for differences among direct victims, indirect victims with seriously injured family members, and indirect victims with deceased family members.

2. Materials and Methods

2.1. Participants

The inclusion criteria for the research were: being a direct or indirect victim of a road trauma perceived as severe or very severe (i.e., a self-reported item where the victim defined the severity of road trauma in comparison to other stressful events in one's life); the road trauma must have occurred no later than one year before the first psychological support session; having carried out three or more ANIACARES psychological support sessions; no neurological and psychiatric history; no ongoing psychological and/or psychiatric treatment; no ongoing drug treatment; and no substance use/abuse.

The final sample included 125 victims: 76 (60.8%) females and 49 (39.2%) males, including three types of victims: a total of 44 (56.8% male) Direct Victims (DV; those who experienced the road trauma); a total of 35 (74.3% male) Indirect Victims with a seriously Injured family member (IVI); and 46 (54.3% male) Indirect Victims with a Deceased family member (IVD).

Descriptive statistics are presented in Table 1, which includes all the characteristics considered.

Table 1. Descriptive statistics of the study sample. Note DV = Direct Victims; IVI = Indirect Victims with a seriously Injured family member; IVD = Indirect Victims with a Deceased family member

Type of victims	Characteristic	*Groups*	*N (%) = 125*
DV	Age	M (SD)	34.93 (16.55)
		Min-Max	10-75
	Gender	Female	25 (56.8%)
		Male	19 (43.2%)
	First Road Trauma	Yes	25 (56.8%)
		No	18 (40.9%)
		Missing data	1 (2.3%)
	Severity of Road Trauma		M (SD)
		Female	4.08 (1.11)
		Male	3.95 (1.31)
		Missing data	-
IVI	Age	M (SD)	49.29 (15.9%)
		Min-Max	9-78

	Gender	Female	26 (74.3%)
		Male	9 (25.7%)
IVI	First Road Trauma	Yes	17 (48.6%)
		No	12 (34.3%)
		Missing data	6 (17.1%)
			M (SD)
	Severity of Road Trauma	Female	3.22 (1.53)
		Male	4.17 (1.16)
		Missing data	6
	Age	M (SD)	47.35 (14.9%)
		Min-Max	11-75
	Gender	Female	25 (54.3%)
		Male	21 (45.7%)
IVD	First Road Trauma	Yes	29 (63.0%)
		No	10 (21.7%)
		Missing data	7 (15.3%)
			M (SD)
	Severity of Road Trauma	Female	3.52 (1.47)
		Male	3.67 (1.49)
		Missing data	-

2.2. Materials

ANIACARES psychologist filled out a survey, on a confidential online platform, at two different times:

1. during the first aid, immediately after the first intervention, and
2. following the post-trauma support intervention.

The survey included a summary of demographic data (i.e., age, gender, kind of victim, first road trauma, and perceived severity of road trauma evaluated by 5-points Likert scale), followed by:

The Patient Health Questionnaire-2 (PHQ-2) (Wittkampf et al., 2007), consisting of the first two items of PHQ-9 (Kroenke, et al., 2001), is a useful instrument for assessing the presence or absence of depressive states and anhedonia as a "first-step" approach. The first two items from the Italian validation of PHQ-9 developed by Mazzotti and colleagues (2003) were used. Items

were assessed through a Likert scale ranging from 0 (Not at all) to 3 (Nearly every day); the total score of PHQ-2 ranged from 0 to 6: if the score is 3 or greater, major depressive disorder is likely (in this study the Spearman-Brown coefficient was = .807).

From the Mental State Examination (MSE)(Sommers-Flanagan & Sommers-Flangan, 2016) items have been designed. MSE is a useful instrument (or rather a stage in the diagnostic process) in the psychological and psychiatric assessment. The MSE can provide useful information for making a diagnosis establishing therapeutic developments. According to the MSE, the resources of the patient can be clarified to determine concrete and hopefully achievable goals. The MSE investigates several dimensions and represents a structured way of evaluating and describing a patient's current state of mind (e.g., appearance, attitude, behaviour, mood, affect thought process), through a 5-point Likert scale ranging from 1 (none) to 5 (a lot). However, in this study, only mood and affectivity, vigilance and restlessness, memory, and speech have been considered (Cronbach's alpha ranging from .409 to .900).

2.3. Procedure

Before and after the intervention, ANIACARES psychologists provide a victim assessment on an online confidential platform, focusing on the victim's mental status (i.e., cognitive, motivational, relational, and affective states), his/her current needs (both practical and psychological), and the prognostic medical elements that could be relevant for the intervention (e.g., limb amputation). ANIACARES data is treated as a "single case", i.e., the victim's clinical data are collected under baseline and after treatment conditions, which is essential for the overall assessment of treatment changes, indeed, the pre-post measurement can examine the broad impact of an intervention (Barlow et al., 2009). The surveys were administered and completed by the psychotherapist based on the treatment and responses provided by the victim. This hetero-assessment approach is aimed at avoiding further stress and traumatization to the victims, who have already been hard affected by the road accident.

Ethical approval was obtained from the Institutional Board of the Department of Psychology, Faculty of Medicine and Psychology, "Sapienza" University of Rome (IRB 2414/2019), in conformity with the principles of the Declaration of Helsinki.

2.4. Statistical Analyses

Statistical analyses were performed using Statistical Package for Social Science (SPSS; version 25.0; IBM SPSS, Armonk, NY). Descriptive statistics were conducted for gender, age, the previous presence, and the severity of road trauma. Differences between victim groups were examined through repeated measure ANOVA (Generalized Linear Model; GLM), considering

the session as a within-subjects factor, the outcome of interest as a dependent variable, and the victim's groups as a between-subjects factor. Statistical significance was defined with a p-value of .05, ηp2 was defined as 0.01 small, 0.5 medium, and 0.14 large effect. In all post hoc pairwise comparisons, we used Bonferroni correction (as implemented in SPSS). All the statistical analyses were performed on de-identified data and were verified for normality.

3. Results

With respect to the PHQ-2 scale, there was a statistically significant main effect of the session ($F(1,111) = 66.72$, $p < .001$; $\eta p2 = .37$), while no statistically significant interaction effect of session*victim_group was found. Pairwise comparisons showed a higher mean difference in the "pre" session compared with in the "post" session ($M = 1.30$, $SE = .16$, $p < .001$; Table 2). The post-hoc test showed a higher mean difference in IVD compared with in both DV ($M = 1.27$, $SE = .29$, $p < .001$) and IVI ($M = 1.07$, $SE = .32$, $p < .05$).

From the MSE, the first item investigated was: "how the victim assesses the severity of this incident when compared to other stressful events he/she has experienced". The results showed a statistically significant main effect of the session ($F(1,103) = 51.76$, $p < .001$; $\eta p2 = .33$); also, there was a statistically significant effect of the interaction session*victim_groups ($F(2,103) = 5.74$, $p < .05$; $\eta p2 = .10$). Pairwise comparisons showed a lower mean difference in the "pre" compared to the "post" session ($M = -1.04$, $SE = .15$, $p < .001$; Table 2); on the other hand, the pairwise comparisons on the victim's groups showed that the IVD report in the "post" session had a higher mean difference ($M = .58$, $SE = .16$, $p < .05$) compared with DV.

The item "How the victim recovered after the road trauma", showed a statistically significant main effect of session ($F(1, 101) = 58.06$, $p < .001$; $\eta p2 = .365$); pairwise comparisons showed a lower mean difference in the "pre" ($M = -.94$, $SE = .12$, $p < .001$; Table 2) compared with in the "post" session.

The item "degree of restlessness of the victim" showed a statistically significant main effect of the session ($F(1,120) = 45.80$, $p < .001$; $\eta p2 = .27$), and moreover, there was a statistically significant interaction effect of the session*victim_group ($F(2,120) = 4.87$, $p < .05$; $\eta p2 = .07$). Pairwise comparisons showed a higher mean difference in the "pre" session ($M = .54$, $SE = .08$, $p < .001$; Table 2) compared with in the "post" session. Pairwise comparisons, concerning the session*victim_group, showed a lower mean difference in the "pre" session in the IVD compared to both the DV ($M = -5.17$, $SE = .19$, $p < .05$) and IVI group ($M = - 6.63$, $SE = .20$, $p < .05$).

The item "How did the victim's mood appear" showed a statistically significant main effect of the session ($F(1,112) = 48.97$, $p < .001$; $\eta p2 = .304$). There was no statistically significant interaction effect of session*victim_group, while a significant interaction effect of mood*victim_group was found ($F(4, 224) = 5.11$, $p < .05$; $\eta p2 = .084$). With respect to the "depressed" sub-dimension, the pairwise comparisons showed a lower mean difference in DV ($M = -.59$, $SE = .15$, $p < .05$; Table 2) compared with in the IVD.

The item "How vigilant did the victim appear", showed a statistically significant main effect of the session ($F(1,118) = 31.98$, $p < .001$; $\eta p2 = .21$), also, there was a statistically significant interaction effect of the session*victim_group ($F(2,118) = 5.24$, $p < .05$; $\eta p2 = .08$). Pairwise comparisons showed a higher mean difference in the "pre" session ($M = .45$, $SE = .08$, $p < .001$; Table 2) compared with in the "post" session. With respect to the pairwise comparisons of the session*victim_group, the DV reported a statistically significant higher mean difference ($M = .56$, $SE = .19$, $p < .05$) compared to the IVD group only in the "pre" session.

As far as the pre-road-trauma memories, there was a statistically significant main effect of the session ($F(1,111) = 11.74$, $p < .05$; $\eta p2 = .096$), while no statistically significant interaction effect of session*victim_group was found; and pairwise comparisons showed a higher mean difference in the "pre" session ($M = .24$, $SE = .07$, $p < .05$; Table 2) compared with in the "post" session; similarly, for post-road-trauma ($F(1, 113) = 18.20$, $p < .001$; $\eta p2 = .139$), showed no statistically significant interaction effect of session*victim_group; the "pre" session showed a higher mean difference ($M = .28$, $SE = .06$, $p < .001$; Table 2) compared with in the "post" session.

Finally, with respect to the "dynamics of the road trauma memories", there was a statistically significant main effect of the session ($F(1, 104) = 6.88$, $p < .05$; $\eta p2 = .062$), and pairwise comparisons showed a higher mean difference in the "pre" session ($M = .20$, $SE = .076$, $p < .05$) compared with in the "post" session; no statistically significant interaction effect of session*victim_group was found. The post hoc tests showed the same pattern in all three "memory dimensions", in which the DV reported a statistically significant higher mean difference compared with both the IVD and IVI groups (Fig 1, 2, and 3).

The volume and speed of the victim's speech were also evaluated; there was no statistically significant result in speed, while the volume showed a statistically significant main effect of the session ($F(1, 117) = 13.88$, $p < .001$; $\eta p2 = .106$), no statistically significant interaction effect of session*victim_group was found, and the pairwise comparisons showed a lower mean difference in the "pre" ($M = -.27$, $SE = .073$, $p < .001$; Table 2) compared with in the "post" session.

Table 1. Pre and Post Mean (M) and Standard Error (SE) for each statistically significant dimension

	Pre		**Post**	
	M	SE	M	SE
PHQ-2	3.28	.17	1.98	.13
How the victim assesses the severity of this incident when compared to other stressful events he/she has experienced	3.61	.14	4.66	.07
How the victim recovered after the road trauma	2.14	.12	3.07	.11
Degree of restlessness of the victim	2.02	.08	1.48	.06
How did the victim's mood appear	1.77	.04	1.47	.04
How vigilant did the victim appear	2.18	.08	1.73	.07
Pre-road-trauma memories	1.70	.10	1.46	.09
Post-road-trauma memories	2.06	.11	1.78	.10
Dynamics of the road trauma memories	2.04	.14	1.83	.13
Speech volume	3.61	.08	3.88	.04

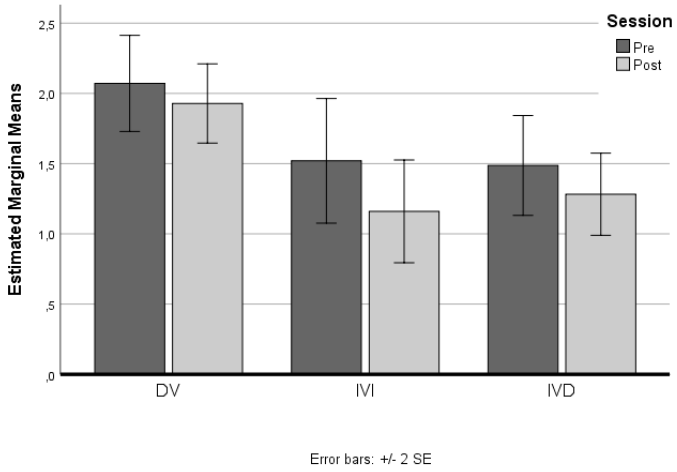

Figure 1. The post-hoc tests regarding Pre-Road Trauma Memories

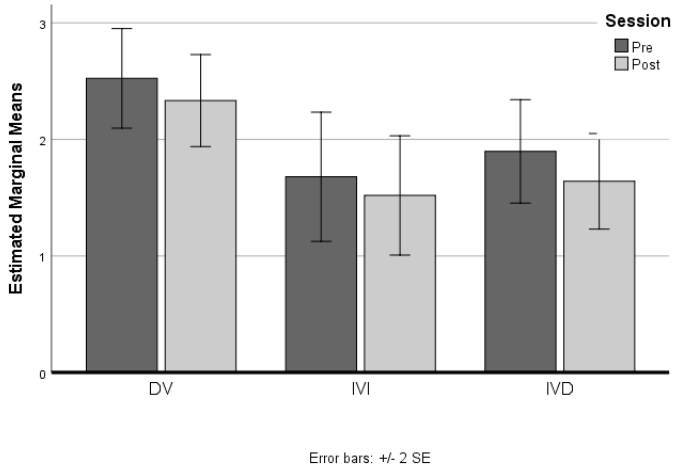

Figure 2. The post-hoc tests regarding the Dynamics of the Road Trauma

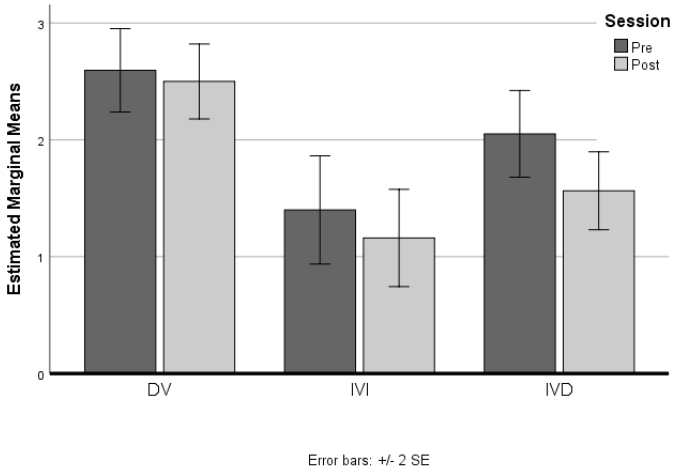

Figure 3. The post-hoc tests regarding the Post-Road Trauma Memories

4. Discussion

This study aimed to explain the design and validity of a new model of early psychological intervention for road trauma victims. Results support the validity of ANIACARES; in fact, an improvement in the general conditions of psychological health and well-being of the victims was shown. As ANIACARES is a specifically designed road victim support protocol; it considers the inherent characteristics of road trauma and the specific needs of both the direct and indirect victims involved (i.e., IVI and IVD). For this reason, in ANIACARES, importance was given to identifying, during the baseline, the individual linked risk factors—for example, to the tendency to maintain anxiety, depressed mood, and anhedonia—to guide the victims toward the most appropriate available treatment option.

The pre–post comparisons showed that, after the intervention, the victims felt recovered and considered their health state to be better.

The eight-session ANIACARES format is supported by the evidence that psychological debriefing based on a single session has not been shown to be effective for victims of road traffic injuries (de Jongh et al., 2011), whereas a more systematic and comprehensive intervention appears to be necessary for victims in the post-traumatic period (Nhac-Vu et al., 2014). The ANIACARES psychologists' specific training "solves" the fact that health professionals working on trauma patients' skills differ from country to country and that the level of training and the degree of professionalism involved show wide variability (Katsaragakis et al., 2010; OECD, 2011).

The role of the ANIACARES psychologist is not to establish what exactly happened (e.g., the dynamics of the road trauma) but to help victims tolerate the feelings, emotions, and reactions they experience without being overwhelmed. The victim has to accept that the trauma is not their fault, that it was not caused by any flaw of their own, and that no one deserves what happened.

Our results appear to substantiate this finding, highlighting the importance of providing psychological support to indirect victims, within a year from the traumatic event, limiting the negative consequences on the quality of life experienced equally by different types of road trauma victims. The validity of the ANIACARES protocol may lie in its integrated model that benefits from a combination of different instruments and techniques, adapted to the needs of individual victims, and offering a suitable intervention with respect to trauma processing. Indeed, the treatment does not have to be unique among victims but should consider the specific needs and characteristics of everyone.

Looking at the results of the present research, there was a statistically significant effect of the session in mood (e.g., anhedonia and depressive symptoms) with a lower mean difference in the "post" session, suggesting an improvement in the symptomatology and treatment efficacy. Our results showed no statistically significant effect of the interaction between session and victim group on the PHQ-2; however, the post-hoc tests on the victim group showed higher mean differences in IVD than in both DV and IVI. This finding could suggest the importance of providing a psychological support intervention also to the indirect victims of trauma who experience similar or even more severe symptomatology than the direct victims, filling a gap in the currently available literature more oriented to the treatment of direct victims. Indeed, anhedonia and depressive states are often symptoms following a road trauma and promote the onset of PTSD. Anhedonia, also known as "emotional numbness", often leads to difficulty in taking pleasure in activities, events, or experiences (e.g., sports and social interactions), causing the avoidance of social situations, self-loathing, depletion of libido, and chronic pain. Exposure to trauma generates an inflammatory reaction in response to stress through neuroendocrine mechanisms that contribute to the onset of PTSD symptoms and depression (Mehta et al., 2020).

The high severity of injuries experienced by direct victims appears to affect the likelihood of experiencing more severe psychological disorders (e.g., emotional distress). Injuries have direct effects on fears of dying and, consequently, on feelings of anxiety as well as depressive states and have a direct effect on peri-traumatic dissociation (Hours et al., 2010; Mayou et al., 2002; Nhac-Vu et al., 2014). However, the severity of the incident that occurred is inevitably assessed

as more severe by family members of those who have lost a family loved one. The family members of the victim often report at least one type of negative impact on family life. Among these impacts, the most frequent are psychological, relational, and financial; in fact, especially when the direct victim is a men costs (often unmeasured) requiring economic reorganization to the new context emerge. The strength of emotional ties with the victim appears to predict the risk of suffering negative impacts on family life. A study by Huang (2016) reported that family members of road trauma victims who were more emotionally dependent on the victims were found more likely to experience major disruptions to family life.

There was also a statistically significant difference in the degree of restlessness between direct and indirect victims of a seriously injured person compared to indirect victims of a deceased person showing lower scores in the "pre" session. This is consistent with Bowlby's (1980) theorization of the stages of grief, wherein, during the first phase, the person experiences dizziness and disbelief related to the event and may not record the death event as it is too painful, unacceptable, and incomprehensible. This theoretical model also explains why indirect victims of a deceased person are less vigilant in the "pre" session than direct victims.

With respect to memory, victims remember the details of the incident better in the "post" session than in the "pre" session. In typical conditions, the more adrenaline is produced, the more accurate the memory is with respect to that event (McGaugh, 2000); however, this is not as true for a shock that is considered inevitable and in which the system becomes overloaded and collapses (Van Der Kolk, 2020), such as in a road crash. Indeed, traumatic traces of memory do not organize according to a logical and coherent narrative, but rather in sensory and emotional fragments (in the form of images, sounds, and physical sensations) (McKinnon et al., 2015; Van der Kolk & Fisler, 1995) that need to be reorganized.

In addition, the emotional brain (e.g., limbic system and brainstem) reflects its altered activation through changes in emotional arousal, physiology, and muscular action. Under ordinary conditions, the memory systems—rational and emotional—work together to provide an integrated response. High arousal (e.g., caused by a road trauma) creates an imbalance between these two areas and disconnects other brain areas involved in the effective storage and integration of incoming information (e.g., the hippocampus and thalamus (Van Der Werf et al., 2003).

Our study attempted to fill a gap in the current literature that has primarily focused on studying the consequences experienced by direct victims of a road trauma; few studies, in fact, have analyzed the psychological consequences experienced by the relatives of victims (Bryant et al., 2004; Tierens et al., 2012). Studies suggest that the indirect experience of a traumatic event leads

to less severe symptomatology than direct experience of the traumatic event (Lerias & Byrne, 2003); instead, the indirect victims, particularly relatives of deceased victims, experience psychological distress and impaired global functioning (e.g., loss of interest activities, anxiety, anger, and resentment) (FEVR, 1997).

Importantly, the greater is the impact of the traumatic event on family members is, the closer they are to the victim (e.g., partner, child, sibling); moreover, the family members support the emotional stability and compliance of the surviving victim.

Victims turn their attention to family members, worrying about their condition, their emotional stability, and the weight of the traumatic event (i.e., anticipating the "physiological" guilt toward family members often associated with disabling outcomes of the road trauma). These "worries" play an adaptive function linked to the perception of how much the family members represent a secure emotional and affective base. It seems necessary to consider the needs of family members especially in an emergency condition by providing a space for attention and reassurance.

The psychological intervention addressed to relatives is useful both in the short and long term. The traumatic emergency in which family members are involved represents a critical moment of psycho-emotional hyper-stimulation.

The condition of fragility and sensitivity experienced by the family member, closely connected to the traumatic experience, shows how much the stimuli, communications and learnings experienced can affect the psychic structure of the family, reaffirming the importance of a correct approach to the family member.

What distinguishes the experience of the family member compared to the direct victim is carrying the responsibility, experiencing taking action, and trying to mitigate a sense of helplessness that follows the traumatic experience.

The psychological attention given to indirect victims falls directly on the psychological situation of the direct victim, who receives, implicitly and indirectly, signals of family members' distress.

The psychological intervention of emotional stabilization towards family members is also carried out through the facilitation of relationships and communications with different professionals. As already mentioned, psychological intervention addressed to relatives also has a medium-to long-term impact, influencing the effects of the traumatic event on family relationships. Trauma is an "earthquake" that affects the family network in which rebalancing processes are activated and in which immediate intervention leads to greater compliance and success of the rehabilitation process of the victim.

The relevance of ANIACARES does not lie solely in developing "new" clinical techniques or procedures but rather in structuring a specific model of psychological support and supportive intervention for a population that is too often overlooked and on which the possible outcomes are well known (Barnes & Thomas, 2006; Holbrook & Hoyt, 2004; Holtslag et al., 2007; Mayou & Bryant, 2001). The ANIACARES model is well adapted to emergency response needs, where it is necessary to flexibly focus on clear intervention objectives and achieve results in a short time frame.

First, one of the main benefits of ANIACARES consists of a simple and linear communication with the victims in exposing their psychological and relational functioning. Second, the application and efficacy of ANIACARES in this context may encourage the spread of evidence-based intervention in the National Health System. The ANIACARES model intended to promote an early psychological intervention for road trauma victims providing access to assistance to care that would otherwise not be offered by the National Health System. In addition, intervening in the peri- and post-traumatic phase could prevent the onset of psychosomatic issues that could compromise health, work performance, and social relationships.

Indeed, there are several benefits in the diffusion of ANIACARES, as well as similar projects: limiting the impact of victims' emotional distress, which, in turn, could limit the onset of psychopathologies related to the traumatic event; encouraging compliance with medical care and facilitating the recovery process, as well as lightening the workload of hospital staff and the rescue service, who can better focus on their own tasks, and "delegating" to specialists the psychological support and assistance needed by the victims, with positive repercussions both on the health of the patients and on the entire health service.

However, the study has certain limitations. First, the impossibility of having a control group of victims who suffered a road trauma but have not benefited from ANIACARES. The recruitment of a control group, in fact, would have required the psychologist to collect information on the clinical status of the victims twice and after some time but without providing the intervention. This would lead to the condition in which the psychologist cannot provide a psychological intervention to a demanding subject. The difficulty of creating a control group is justified by preventing a violation of the psychologist's deontological duty to provide an intervention aimed at protecting the beneficiaries.

Secondly, it is not possible to find another sample of road trauma victims as a control group who, instead, benefited from a psychological support intervention different from

ANIACARES. Indeed, support projects are available, but most of them take the form of one-time interventions or are not focused on supporting road trauma victims.

Finally, the evaluation of the ANIACARES model efficacy was conducted through the psychologist's clinical assessment without the administration of tests and/or questionnaires. This form of evaluation can be defined as an idiographic assessment where the emphasis is on specific variables that can better help to describe the individual. In this case, "the victim" is the point of reference for both identifying the relevant variables and interpreting the data (Hood & Johnson, 2002). Not by chance is called "process" or "psychodiagnostic situation" the path of clinical assessment, and "testing" the moment of evaluation when the psychologist can agree with the person, in order to have more indications on which to orient the intervention (Caporale & Roberti, 2013), indeed, "testological diagnosis may represent an aspect of the clinical diagnosis, but the clinical diagnosis can also take place without any in-depth examination through tests" (Caporale & Roberti, 2013).

Despite the limitations highlighted in this study, the results still provide a general picture of the psychological impact of interventions in the support and assistance for road trauma victims. This research, however, provides the background for initial research on the topic, which will necessarily need to be substantiated with future studies.

5. Conclusions

ANIACARES has the added value of supporting victims in the different phases of the traumatic experience (psychological first aid, peri- and post-traumatic phase) with the aim of assessing the predictors and, thus, preventing the possibility of psychopathological outcomes (Burrai et al., 2020; Couyoumdjian et al., 2020).

The results of the research—conducted on both the direct and indirect victims of road traffic who were able to benefit from ANIACARES—highlight an improvement in their general health conditions and psychological well-being.

To the best of our knowledge, this study is the first to provide data on a sample of direct and indirect road trauma victims who followed a highly structured pathway of psychological support and assistance.

Data availability statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy considerations.

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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Appendix

ANIACARES is a model of early psychological intervention that provides psychosocial support to the victims who suffered from serious injuries and/or to their relatives and loved ones. ANIACARES psychologists may intervene both during the first-aid phase or later (during the peri- and post-traumatic phases). The different phases of the ANIACARES intervention are described below.

First-Aid Phase

During the Psychological First Aid phase, the ANIACARES psychologist may intervene in different places. In this phase, collaboration with hospital and/or police staff is essential to help the victims and understand their first aid needs. During hospital interventions, the psychologists support and facilitate communication between the victims and hospital staff to facilitate medical care for the direct victims. Non-adherence to therapy is a behaviour resulting in serious consequences (Surcinelli et al., 2012) and studies have shown that the complexity of the therapeutic regime, especially a high frequency of daily drug treatments, hurts compliance (Bedell et al., 2000; Schroeder et al., 2004).

The mission of ANIACARES psychologists, at this phase, is to limit and/or to contain the hyperarousal reactions of the victim (e.g., emotional containment, normalization, and grounding techniques) (Wheeler, 2007). ANIACARES psychologists are also trained to support medical and police staff in communicating the death of the direct victim to their relatives. It should be highlighted that proper communication may reduce emotional dysregulation and may represent a form of secondary prevention (Stewart, 1999).

Peri-Traumatic Phase

Intervention in the peri-traumatic phase is focused on distress management and the prevention of Post-Traumatic Stress Disorder (PTSD), depression, and other trauma-related disorders (Burrai et al., 2020; Couyoumdjian et al., 2020). During the peri-traumatic phase, ANIACARES psychologists conduct multiple intervention sessions applying evidence-based techniques (e.g., psychoeducation and cognitive restructuring). For example, psychoeducation helps victims to understand how their exposure to traumatic events may have an impact on their functioning and how this impact can be reduced and what strategies can be adopted to address such experiences (Whitworth, 2016).

This approach has been proven to be effective in reducing the negative effects of the trauma (Oflaz et al., 2008; Whitworth, 2016). The cognitive restructuring was developed from Cognitive-Behavioural Therapy (CBT) and is recognized as an effective treatment for PTSD

and depression (Cuijpers et al., 2013; Harvey et al., 2003; Howlett & Stein, 2016). The ANIACARES protocol adopts stress management strategies to encourage the use of more adaptive emotional regulation strategies to promote victim resilience. Victims are provided with procedures aimed at developing coping skills to address problems related to the critical event (problem-focused), or strategies to manage dysfunctional emotions (emotion-focused).

Post-Traumatic Phase

During the post-traumatic phase, ANIACARES psychologists carry out psychological support activities and brief evidence-based psychotherapeutic interventions mainly focused on acute stress and post-traumatic symptoms. For these disorders, the APA Clinical Practice Guideline (American Psychological Association, 2017) recommends several evidence-based interventions, such as Trauma-Focused Cognitive-Behavioral Therapy (TF-CBT)(Mannarino et al., 2014) and Eye Movement Desensitization and Reprocessing (EMDR) (Shapiro, 2001, 2014; Shapiro & Solomon, 1995).

TF-CBT was originally designed for sexually abused children and their caregivers (Cohen et al., 2004) and, since then, has become one of the chosen methods for the treatment of trauma. EMDR is a psychotherapeutic approach developed by Francine Shapiro (1989) for treating traumatic memories and the related stress symptoms in people who experienced trauma (Castelnuovo et al., 2019; Novo-Navarro et al., 2018; Watts et al., 2013). EMDR therapy has been validated by many randomized controlled trials and also by several meta-analyses (Bisson et al., 2013; Lee & Cuijpers, 2013; Watts et al., 2013), which demonstrated the positive effects of eye movements, including a rapid decline in emotional distress; EMDR is recommended by the National Institute for Health and Care Excellence (National Collaborating Centre for Mental Health, 2005) for the treatment of PTSD in adults and by World Health Organization (World Health Organization, 2013) for the treatment of PTSD in children, adolescents, and adults.

Conclusion Phase

From the beginning of the intervention, it is essential to define the boundaries of the ANIACARES protocol, specifying to the victims that this is an intervention focused on their road trauma and the duration is limited in time to reduce neglect ideas. The ANIACARES conclusion is intended to facilitate the victim's contacts with their social intercourse or, if necessary, to facilitate links with local services (e.g., mental health services, social support services, road victims' associations) or other recognized agencies that can offer long-term support in different ways.

It is important to facilitate victims' contact with their support network as affective, family, social and working. Indeed, adequate social support allows the victim to talk about themselves to elaborate a coherent reconstruction of what happened, including the emotions experienced and perceiving the empathy and solidarity around them.

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