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ARTICLE

Psychological Outcomes in Disaster Responders: A Systematic Review and Meta-Analysis on the Effect of Social Support

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Abstract Disaster response work is associated with various psychological outcomes. In post-disaster conditions, social support is generally observed to impact mental health, particularly for survivors. This review was conducted to survey the extent of social support effectiveness on disaster responder groups. Published quantitative social support studies on police, emergency medical responders, rescue and recovery workers, firefighters, and military responders were searched in various academic databases using keyword searches, a reference list search, and a citation search that resulted in 24 studies with 90 effect sizes being included in the final data base. Articles were coded and effect sizes were averaged using the Hedges–Vevea Random Effects model. Nineteen categories of psychological outcomes (for example, anxiety, depression, posttraumatic stress symptoms, and psychological distress) and eight classifications of support were coded. Social support was found to be associated with anxiety, burnout, depression, job control, job satisfaction, psychological distress, turnover intentions, and work engagement, with mean effect sizes from − 0.36 to 0.57. Most studies measured perceived social support and negative outcomes. Social support correlated with outcomes in police responders and rescue and recovery workers. This review discusses the breadth of effect of social support, as well as other elements, such as temporal factors, that may affect the effectiveness of social support in disaster responders.

Keywords Disaster responders · Meta-analysis · Post-disaster psychological outcomes · Psychological distress · Social support

1 Introduction

Disasters are collective experiences that affect people at the community and individual levels. Exposure to these events is associated with both negative (Bonanno et al. 2010; Goldmann and Galea 2014; Fullerton et al. 2015) and positive (Bonanno et al. 2010; Harada et al. 2015) psychological outcomes, which are observed in the general affected population. These outcomes are also observed in individuals who respond and provide assistance in the aftermath of disaster events (Benedek et al. 2007; Fullerton et al. 2013; Bromet et al. 2016). In studies that have investigated the correlates of these psychological outcomes, social support is found to be one of the most reliable factors associated with fewer negative and more positive outcomes. Hobfoll and Stokes (1988)—and later, Kaniasty and Norris (2009)—highlighted three facets of this construct: (1) receipt of actual assistance; (2) perception of availability of support; and (3) integration in a network of caring individuals. These facets of support are viewed to make unique contributions to psychological outcomes in the aftermath of disastrous events.

Notably, the Social Support Deterioration Deterrence (SSDD) model developed by Kaniasty and Norris

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(1993, 1995, 2009) suggests that perceived social support directly affects psychological outcomes while received social support influences perceptions of support; thus, receipt of support indirectly affects psychological outcomes. The SSDD model also posits that mobilization and utilization of social support are unequal and inequitable in times of disasters. Mobilization of social support is influenced by pre-disaster factors such as social status and other resources, which dictate the relative advantage/disadvantage in receiving social support. Although people with more severe exposure to disasters are typically expected to experience more psychological distress, they are also likely to receive more social support because they are perceived to need it more than those with less severe disaster exposure.

That social support is beneficial in the aftermath of disasters is well documented (Norris et al. 2002; Norris and Elrod 2006), but the degree to which it is beneficial for disaster responders is yet uncharted. Disaster responders are professionals tasked with the "protection and preservation of life, property, and the environment" (Prati and Pietrantoni 2010, p. 403) in the aftermath of catastrophic events. Aside from being support providers, these individuals are also support recipients. In addition, responders usually operate under a structure that embeds them in a group of individuals with shared experiences. Thus, in terms of social support, disaster responders have the unique context of systematically providing support while arguably systematically receiving support themselves. The gap lies in knowing how these support-related circumstances affect the association between social support and psychological outcomes.

This article presents a general picture of social support investigations among disaster responders. Social support is considered as one of the cornerstones of psychological recovery (Hobfoll et al. 2007), where increase in support is usually associated with lower risk for psychopathology (Goldmann and Galea 2014). But the effectiveness of social support is influenced by several factors, such as the sources of support (Halbesleben 2006) and culture (Chen et al. 2012). Temporal elements are also crucial in the context of disasters: social support is observed to deteriorate over time (Kaniasty and Norris 1995). This article identifies the different psychological outcomes associated with social support in disaster responder groups, and summarizes the strength of social support-outcome associations, while also considering some of the influencing factors mentioned earlier in this paragraph.

A number of meta-analyses have shown the link between social support and psychological outcomes. Meta-analyses on the correlates of posttraumatic stress disorder (PTSD) showed lack of social support as a risk factor, and having social support as a protective factor (Brewin et al. 2000; Ozer et al. 2003). These studies only focused on PTSD, however, and did not specifically target social support in disaster first responders. The meta-analysis by Prati and Pietrantoni (2010), on the other hand, targeted social support and first responder mental health outcomes. The current study differs from previous work in three major aspects: (1) our work specifically explores the strength of association of social support and psychological outcomes in the context of disasters; (2) this study casts a wider net in terms of how social support is defined and how psychological outcomes are covered; and (3) we attempt to synthesize these associations in terms of facets of support, type of responder, type of outcome, and support and outcome measurement time lags.

2 Article Selection and Inclusion

Articles were identified through several methods (Fig. 1). A Boolean keyword search in PsycINFO (n = 138), PubMed (n = 276), and Web of Science (n = 193) was performed using the social support keywords: "social support," "received support," "perceived support," "social embeddedness," "social integration," "emotional support," "informational support," "practical support," "instrumental support," "social network," and "assistance"; responder keywords: "emergency first responder," "first responder," "emergency responder," "emergency worker," "police," "military," "fire fighter," "ambulance," "red cross," "red crescent," and "disaster responder"; and "disaster*." The 607 abstracts were then screened using the following criteria: (1) they must be quantitative studies on disaster first responders; (2) each must explicitly measure social support; (3) every study must measure at least one psychological outcome; and (4) the studies selected must also be carried out in the context of a "disaster", which was defined using the Emergency Database (EM-DAT) definition (Guha-Sapir et al. 2016). Studies that did not meet these criteria were excluded. This reduced the data base to 20 articles. After removing eight duplicates, the remaining articles were added to the 10 articles at hand to constitute an initial article pool. The reference lists of these 22 articles were examined to search for additional studies for possible inclusion. No new studies were found using this method. Using Google Scholar, manuscripts that cited the screened studies were checked for possible inclusion in the review. This resulted in 13 additional articles. One manuscript was excluded due to non-response from the author upon request for the full text. The full-text articles were then inspected for eligibility using the same criteria used in the screening procedure, and 10 potential articles were excluded, which resulted in 24 studies being included in the final review.

Effect sizes on formal support, such as debriefing and psychotherapy, were excluded because this article is

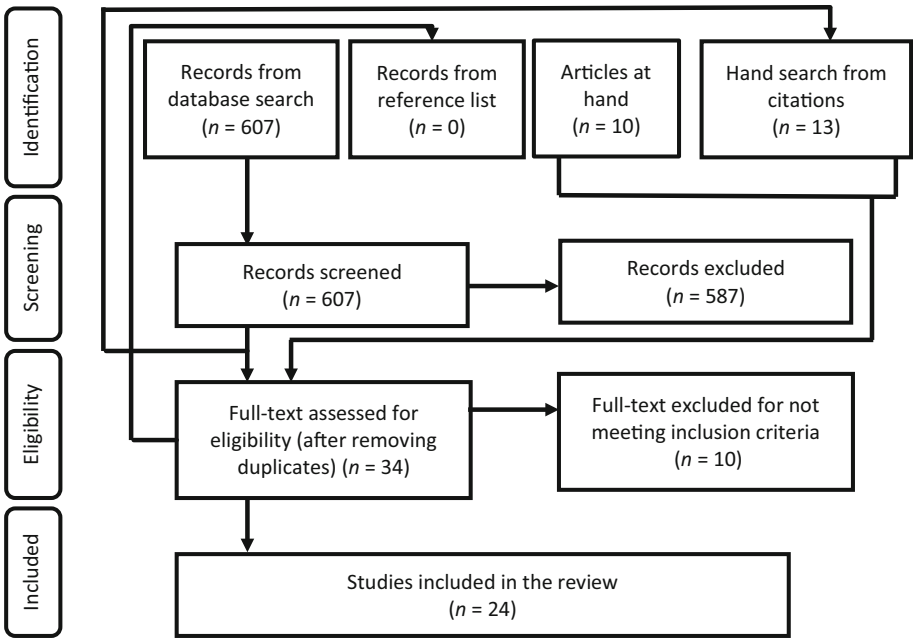

Fig. 1 Process of article search, screening, and inclusion (Moher et al. 2009) of studies used in a meta-analysis of psychological outcomes in disaster responders. Screening of the manuscripts used the following inclusion criteria: (1) quantitative studies on disaster responders; (2) studies that explicitly measure social support; (3) studies that measure at least one psychological outcome; and (4) studies in the context of a disaster. The following exclusion criteria were applied: (1) studies where social support was in the form of formal support, such as psychotherapy; and (2) studies where social support is the outcome rather than the predictor

focused on social support from nonprofessional support providers. Also excluded are studies where social support is the outcome variable. An exception was made for Schwarzer et al. (2016), where social support and the psychological outcome variables were measured at the same time, despite social support being framed as an outcome.

3 Coding of Articles

Articles were coded according to year of publication, responder/sample, sample size, disaster, social support measure, outcome measure, and effect size. Responder types were clustered into five based on the number of studies: emergency medical responders; firefighters; police; rescue and recovery workers; and, others, which includes military responders and disaster responders that were aggregated (for example, combined police, firefighters, and emergency medical responders). Social support measures were then categorized according to the facet of support: general/undifferentiated social support, received social support, perceived social support, social support need, social support utilization, lack of support, and negative support. Measures of frequency of contact, time spent with others, and those that are relationship-based were coded as general/undifferentiated support. Social support-seeking and social-support coping were coded under support utilization. Outcomes were also coded as positive or negative psychological outcomes. Absence or reduction of negative outcomes/symptoms were coded as positive outcomes.

Variations in the time lag between the disaster occurrence and the measurements were observed. This prompted the addition of two codes. First is the disaster-social support measurement time lag, which is the number of months between the disaster and the measurement of social support. A pre-disaster measurement was given a negative code (for example, measurement at 10 months before the disaster was coded "−10"). Another is the social support-outcome measurement time lag, which is the number of months between the measurement of social support and the psychological outcomes. Studies where social support and the psychological outcome were measured concurrently were given a code of "0." In cases where measurement spanned for several months, or was done in two time points, the median number of months was derived. One week was coded as "0.25"; 3 weeks, "0.75."

4 Calculation of Effect Sizes and Method of Meta-analysis

A significant number of studies included in the review have multiple measures of social support and psychological outcomes, some with measurements in more than one time points. A unique combination of social support type, psychological outcome, and social support/outcome measurement time lag was considered one effect size. Within study effect sizes were combined using the Fixed-Effects model (Hedges and Olkin 1985; Hedges and Vevea 1998) because this method limits the generalizability of the combined effect only to the study sample. The meta-analyses of the different study effect sizes were conducted using the Hedges–Vevea Random Effects model (Hedges and Vevea 1998) as, in contrast to the Fixed-Effects model, combined effect sizes

using this approach allows for generalization of effects to populations outside the study. The Pearson Product Moment Correlation Coefficient was used as the base effect size as it was the most common effect size across the different studies, and is less prone to interpretation error (Field and Gillett 2010). Odds ratios were transformed to Pearson's r correlation coefficient using Eq. 1 (Field and Gillett 2010), where $r = Pearson\ correlation\ coefficient$ and $OR = odds\ ratio$. Beta weights were converted to Pearson's r correlation coefficient using Eq. 2, which was derived from Eq. 3 (Gardner 2010), where $t = \frac{b}{SE_b}$, r^2 is the overall coefficient of determination, N is the sample size, and p is the number of predictors,

$$r = \frac{OR^{0.5} - 1}{OR^{0.5} + 1} \tag{1}$$

$$r = \sqrt{\frac{\left(\frac{b}{SE_b}\right)^2 (1 - R^2)}{N - p - 1}} \tag{2}$$

$$r^2 = \frac{t^2 (1 - R^2)}{N - p - 1} \tag{3}$$

Heterogeneity of effect sizes was tested using the Chi square test of homogeneity, with $df = n - 1$. Data were analyzed using Field and Gillett's (2010) SPSS syntax.

5 Results

Twenty four studies with 90 effect sizes were included in the final analysis (for a summary, see Table 1). Publication years ranged from 1995 to 2017, with more than 50% of the studies published after 2010. Police officers were the most researched disaster responders, studied by more than 76% of the studies reviewed. Thirty-three percent of the studies were on the 9/11 Attack, making it the most studied disaster. More than half of the studies were conducted in the United States.

Measurement of post-disaster social support ranged from 1 week after the event to more than 10 years after. Only two studies had pre-disaster social support measures. Most of the studies had concurrent measures of social support and psychological outcome, with only six studies having a time lag ranging from 3 weeks to more than 10 years. Considering the wide variation in measurement time lags, separate meta-regression analyses were performed on disaster-social support measurement time lag and social support-outcome measurement time lag. No relationship was found between measurement time lag and effect size.

Almost half of the studies measured perceived social support, making it the most studied facet of social support in this review. This was followed by general/undifferentiated support with five studies and 10 effect sizes, and support utilization with four studies and 10 effect sizes. Nineteen categories of psychological outcomes were observed. Of the 90 obtained effect sizes, only 14 were associations between social support and positive outcomes, such as resilience and posttraumatic growth. The other 76 effect sizes included normative negative outcomes, such as turnover intentions and perceptions of job demands; general psychological distress that may indicate psychopathology; or clinical outcomes such as posttraumatic stress symptoms (PTSS), depression, and anxiety. PTSS and psychological distress are the most studied outcomes. A summary of the number of effect sizes per social support facet and psychological outcome is found in Table 2.

To obtain the overall magnitude of social support effectiveness on psychological outcomes, a meta-analysis on the absolute value of the 90 effect sizes was performed. This resulted in a weighted average effect size of 0.19 ($p < 0.001$) with a Fail-Safe N of 50,293. Effect sizes were found to be homogeneous. But it is not assumed that positive and negative psychological outcomes fall on the same continuum; hence, separate meta-analyses were conducted on each of the outcome categories (Table 3). Compassion satisfaction, gratitude, job control, job satisfaction, life satisfaction, posttraumatic growth, resilience, work engagement, and reduction of posttraumatic stress symptoms were coded as positive outcomes, and all others coded as negative outcomes. Effect sizes were synthesized according to the five clusters of responders specified in the previous section. Social support was found to have an effect on both positive ($\bar{r} = 0.39, p < 0.001$) and negative psychological outcomes ($\bar{r} = -0.15, p < 0.005$) in the police, and on negative outcomes ($\bar{r} = -0.27, p < 0.001$) in search and rescue workers and other responders ($\bar{r} = -0.19, p < 0.001$), with small to medium effect sizes. The 13 effect sizes associated with positive outcomes in police responders came from only three studies. Effect sizes associated with negative outcomes in rescue workers and other responders came from four studies each.

Syntheses of effect sizes according to type of social support show perceived support to be associated with positive psychological outcomes ($\bar{r} = 0.41, p < 0.001$) and negative outcomes ($\bar{r} = -0.2, p < 0.001$), and received support with negative outcomes ($\bar{r} = -0.24, p < 0.001$). Fail-Safe N for received support indicates that the estimates are not robust. The 13 effect sizes involved in estimating the average effect size of perceived support on positive outcomes were obtained from just three studies.

Effect sizes on social support associations with specific psychological outcomes were pooled according to measurement time lag between the two variables (Table 4). This analysis focused on the effect sizes of presence of

Table 1 Summary of studies included in the review

Authors (Year)	Design	Time frame*	Sample (*n*)	Location	Social support measures	Outcomes measures
Alvarez and Hunt (2005)	Longitudinal[a]	38 days[b]	Rescue workers (114)	USA	Interpersonal support evaluation list (Cohen et al. 1985)	Beck Anxiety Inventory (Beck et al. 1988), Beck Depression Inventory-II (Beck et al. 1996), Brief Symptom Inventory (Derogatis and Spencer 1993), PTSD Symptom Scale (Foa et al. 1993)
Ask and Gudmundsdottir (2014)	Longitudinal	13 months	Rescue workers (130)	Denmark	Crisis Support Scale (Joseph et al. 1992)	Harvard Trauma Questionnaire (Mollica et al. 1992)
Bacharach and Bamberger (2007)	Cross-sectional	n.s.	Firefighters (1110)	USA	Supervisory support[c]	Depression Anxiety and Stress Scale (Antony et al. 1998), Impact of Event Scale-Revised (Weiss 2007)
Biggs et al. (2014)	Longitudinal	11 months	Police (1623)	Australia	Supervisor support (Caplan et al. 1980), work culture support[c]	Intrinsic Job Satisfaction (Warr et al. 1979), Job Demands and Job Control (Wall et al. 1995), Turnover Intentions (Brough and Frame 2004), Utrecht Work Engagement Scale (Schaufeli et al. 2006), General Health Questionnaire-12 (Goldberg 1972)
Chang et al. (2008)	Cross-sectional	3 months	Rescuers (193)	Taiwan, China	Ways of Coping Questionnaire (Folkman and Lazarus 1988)	Chinese Health Questionnaire (Cheng and Williams 1986), Impact of Event Scale (Horowitz et al. 1979)
Chang and Taormina (2011)	Cross-sectional	n.s.	Military rescuers (102)	China's mainland	Life Status Review Scale (Stamm et al. 1998)	Professional Quality of Life Scale (Stamm 2005), Resilience Scale (Wagnild and Young 1993)
Cone et al. (2015)	Longitudinal[a]	9 months	Police (2204)	USA	Absence of support[c]	PTSD Checklist (Weathers et al. 1993)
Dougall et al. (2001)	Longitudinal	12 months	Rescue and recovery workers (159)	USA	Social Support Questionnaire (Fleming et al. 1982)	Symptom Checklist-90-R Global Severity Index (Derogatis and Cleary 1977)
Ehring et al. (2011)	Cross-sectional	4 months	Recovery workers (267)	Pakistan	Social Support Inventory (Timmerman et al. 2000)	Bradford Somatic Inventory (Mumford et al. 1991), Impact of Event Scale (Horowitz et al. 1979), Maslach Burnout Inventory (Maslach et al. 1986), Pakistan Anxiety and Depression Questionnaire (Mumford et al. 2005)
Feder et al. (2016)	Longitudinal	9–10 years	Police (4487)	USA	Medical Outcomes Study-Social Support Survey (Sherbourne and Stewart 1991)	PTSD Checklist (Weathers et al. 1993)
Huang et al. (2013)	Cross-sectional	n.s.	Rescuers (923)	China's mainland	Social support rating scale[c]	Clinician-Administered PTSD Scale (Blake et al. 1995)
Jenkins (1996)	Longitudinal	1 month	Emergency medical workers (36)	USA	Absence of support, perceived support, support need, support utilization, undifferentiated	Symptom Checklist-90-R (Derogatis and Cleary 1977)
Jenkins (1997)	Longitudinal	2.5 months	Emergency dispatchers (68)	USA	Network size, support utilization	Brief Symptom Inventory (Derogatis and Spencer 1993), Impact of Event Scale (Horowitz et al. 1979)

Table 1 continued

Authors (Year)	Design	Time frame*	Sample (*n*)	Location	Social support measures	Outcomes measures
Leppma et al. (2017)	Cross-sectional	n.s.	Police (113)	USA	Interpersonal Support Evaluation List (Cohen et al. 1985)	Alcohol use[c], Gratitude Questionnaire-6 (McCullough et al. 2002), Posttraumatic Growth Inventory (Tedeschi and Calhoun 1996), Satisfaction with Life Scale (Diener et al. 1985)
Marmar et al. (2006)	Cross-sectional	n.s.	Police (717)	USA	Sources of Support Scale (Perilla et al. 2002)	Mississippi Combat Scale-Civilian (Vreven et al. 1995)
Murphy et al. (2004)	Longitudinal	6 months	Firefighters (73)	USA	Perceived support[c]	Impact of Event Scale (Horowitz et al. 1979)
Pietrzak et al. (2014)	Longitudinal	10 years	Police (4035)	USA	Network size[c]	PTSD Checklist (Weathers et al. 1993)
Schenk et al. (2016)	Cross-sectional	3 months	Medical rescuer (337)	China's mainland	Social support items[c]	Impact of Event Scale-Revised Chinese version (Wu and Chan 2003)
Schwarzer et al. (2014)	Longitudinal	4 years	Police (2943)	USA	Frequency of contact[c]	PTSD Checklist (Weathers et al. 1993)
Schwarzer et al. (2016)	Longitudinal	9 years	Police (2204)	USA	Modified Social Support Scale (Ritvo et al. 1997)	PTSD Checklist (Weathers et al. 1993)
Shepherd et al. (2017)	Cross-sectional	n.s.	First responders (138)	New Zealand	Brief COPE (Carver 1997)	Connor-Davidson Resilience Scale (Connor and Davidson 2003), PTSD Checklist (Weathers et al. 1993)
Tak et al. (2007)	Cross-sectional	1 month	Firefighters (525)	USA	Supervisor support dissatisfaction[c]	Center for Epidemiologic Studies Depression Scale (Radloff 1977)
Tam et al. (2004)	Cross-sectional	2 months	Healthcare workers (652)	Hong Kong, China	Support inadequacy[c]	Chinese Health Questionnaire (Cheng and Williams 1986)
Weiss et al. (1995)	Cross-sectional	n.s.	Emergency services personnel (367)	USA	Scale from the National Vietnam Veterans Readjustment Study (Kulka et al. 1988)	Impact of Event Scale-Revised (Weiss 2007), Mississippi Combat Scale-Combat (Keane et al. 1988)

n.s. not specified

*Beginning and end of data collection

[a]Only cross-sectional data were used in the analysis

[b]Average

[c]Researcher-made scale

Table 2 Number of effect sizes of associations of social support type and psychological outcomes in disaster responders

Psychological outcomes	GenSS	RSS	PSS	Net	Use	Need	Abs	NegSS	Total no. of ES
Alcohol use			1						1
Anxiety	1		4		1	1	1		8
Burnout	1		1						2
CS	1								1
Depression	1		4		1	1	1	1	9
Gratitude			1						1
Hostility	1		1		1	1	1		5
Job control			3						3
Job demands			3						3
Job satisfaction			3						3
Life satisfaction			1						1
OC symptoms	1		1		1	1	1		5
Psych. distress	1	1	10	1	2			1	16
PTG			1						1
PTSS	2	1	9	3	3		4		22
Resilience	1				1				2
Stress			1						1
Turnover intentions			3						3
Work engagement			3						3
Total no. of ES	10	2	50	4	10	4	8	2	90

CS compassion satisfaction, *GenSS* general/undifferentiated social support, *RSS* received social support, *PSS* perceived social support, *Net* social integration/embeddedness and network size, *Use* support utilization and coping, *Need* social support need, *Abs* absence of support, *NegSS* negative social support, *OC* obsessive-compulsive, *PTG* posttraumatic growth, *PTSS* posttraumatic stress symptoms, *ES* effect size

support on the outcomes. Negative support, support need, absence of support, and support utilization were excluded as these facets of support belong to a different taxonomy; in addition, previous analyses have shown that these factors have no effect on psychological outcomes. All 19 outcomes had concurrent measures, while only 10 outcomes had a time difference between social support measurement and outcome measurement, allowing for an observation of effects of social support across time.

Consistent with the previous analyses, concurrent associations show social support to have the largest effect sizes on positive outcomes: job satisfaction ($\bar{r} = 0.57, p < 0.001$) and work engagement ($\bar{r} = 0.42, p < 0.001$). Work-related outcomes also have larger effect sizes than the other psychological outcomes. Anxiety ($\bar{r} = -0.19, p < 0.001$) and psychological distress ($\bar{r} = -0.32, p < 0.001$) are the only clinical outcomes associated with social support. Furthermore, psychological distress is the only outcome for which a time-lagged effect of social support was observed ($\bar{r} = -0.2, p < 0.001$).

6 Discussion

Responding to disasters takes a psychological toll on the responder, and common knowledge suggests the benefits of social support in these circumstances. This review shows that although having social support is helpful, the benefits of social support are within bounds. This is, first and foremost, shown by effect sizes that are small to medium, leaving a large amount of variance in psychological outcomes that cannot be explained by social support. In addition, the effects of social support on psychological outcomes were observed in some conditions but not in others, which suggests that the psychological benefits of social support are not absolute.

Studies included in the review utilized a wide variety of instruments to measure social support. One explanation is that researchers may have a different understanding of what constitutes social support. Distinctions between the different facets of support are imperative, as each facet has a unique contribution to psychological outcomes. These effects are also magnified by disasters. These types of critical events challenge resources, including social resources such as social support. The Social Support Deterioration Deterrence (SSDD) model suggests that in the aftermath of disasters, people have unequal and

Table 3 Summary of effect sizes in positive and negative psychological outcomes

	Positive outcomes						Negative outcomes					
	n	*K*	$\bar{r}$ [95% CI]	*p*	χ^{2b}	Fail-Safe N	*n*	*k*	$\bar{r}$ [95% CI]	*p*	χ^{2b}	Fail-Safe N
Responder type												
Emergency medical workers							3	23	− 0.04 [− 0.09 to − 0.003]	0.068	6.1	− 20
Firefighters							3	7	− 0.09 [− 0.19 to 0.01]	0.078	6.87	131
Police responders	3	13	0.39 [0.31 to 0.47]	0.001	23.31	10,585	10	24	− 0.15 [− 0.25 to − 0.05]	0.005	18.29	4549
Rescue and recovery workers							4	14	− 0.27 [− 0.37 to − 0.16]	0.001	15.13	786
Others[a]	1	2	0.19 [− 0.18 to 0.5]	0.317	1	3	4	7	− 0.19 [− 0.25 to − 0.13]	0.001	6.46	124
Social support facet												
General/undifferentiated SS							4	8	− 0.02 [− 0.23 to 0.2]	0.864	2.78	53
Received SS							2	2	− 0.24 [− 0.3 to − 0.17]	0.001	0.25	28
Perceived SS	2	12	0.41 [0.33 to 0.49]	0.001	18.97	10,586	11	38	− 0.20 [− 0.25 to − 0.14]	0.001	41.37	10,702
Social integration							3	4	0 [− 0.06 to 0.06]	1	0	− 4
Support use and coping	1	1	0	–	–	–	3	9	− 0.08 [− 0.22 to 0.07]	0.298	5.75	13
Absence of support							4	8	− 0.13 [− 0.43 to 0.2]	0.442	2.41	226
Support need							1	4	0 [− 0.19 to 0.19]	1	0	− 4
Negative SS							2	2	0.02 [− 0.25 to 0.29]	0.89	1	− 2

$\bar{r}$ weighted mean effect size, *SS* social support, *n* number of studies, *k* number of effect sizes, χ^2 homogeneity of effect sizes

[a]Others = military, emergency dispatchers, combined sample of emergency services personnel

[b]$df = k - 1$, Fail-Safe N = Rosenthal Fail-Safe N

Table 4 Summary of effect sizes of concurrent and time-lagged associations of social support and psychological outcomes in disaster responders

Psychological outcomes	Concurrent associations						Time-lagged associations					
	n	*k*	$\bar{r}$ [95% CI]	*p*	χ^{2a}	Fail-Safe N	*n*	*k*	$\bar{r}$ [95% CI]	*p*	χ^{2a}	Fail-Safe N
Alcohol use	1	1	0	–	–	–						
Anxiety	3	3	− 0.19 [− 0.24 to − 0.14]	0.001	0.736	53	1	2	0 [− 0.27 to 0.27]	1	0.00	− 2
Burnout	2	2	− 0.21 [− 0.31 to − 0.11]	0.001	0.1	10						
Compassion satisfaction	1	1	0	–	–	–						
Depression	3	3	− 0.15 [− 0.24 to − 0.06]	0.002	2.37	29	1	2	0 [− 0.27 to 0.27]	1	0.00	− 2
Gratitude	1	1	0.69	–	–	–						
Hostility							1	2	0 [− 0.27 to 0.27]	1	0.00	− 2
Job control	1	2	0.27 [0.22 to 0.33]	0.001	1	185	1	1	0.22			
Job demands	1	2	0 [− 0.27 to 0.27]	1	0.00	− 2	1	1	0			
Job satisfaction	1	2	0.57 [0.54 to 0.61]	0.001	1	1008	1	1	0.44			
Life satisfaction	1	1	0.58									
OC symptoms	1	2	0 [− 0.27 to 0.27]	1	0.00	− 2						
Psychological distress	7	11	− 0.32 [− 0.41 to − 0.23]	0.001	19.75	1323	2	2	− 0.2 [− 0.24 to − 0.15]	0.001	0.003	37
PTG	1	1	0									
PTSS	9	10	− 0.05 [− 0.27 to 0.17]	0.664	2.46	22	3	5	− 0.05 [− 0.14 to 0.04]	0.261	5.1	12
Resilience	1	1	0.36									
Stress	1	1	− 0.22									
Turnover intentions	1	2	− 0.36 [− 0.4 to − 0.33]	0.001	1	346	1	1	− 0.3			
Work engagement	1	2	0.42 [0.39 to 0.45]	0.001	0.81	476	1	1	0.35			

$\bar{r}$ weighted mean effect size, *OC* obsessive-compulsive symptoms, *PTG* posttraumatic growth, *PTSS* posttraumatic stress symptoms, *n* number of studies, *k* number of effect sizes, χ^2 homogeneity of effect sizes

[a] $df = k - 1$, Fail-Safe N = Rosenthal Fail-Safe N

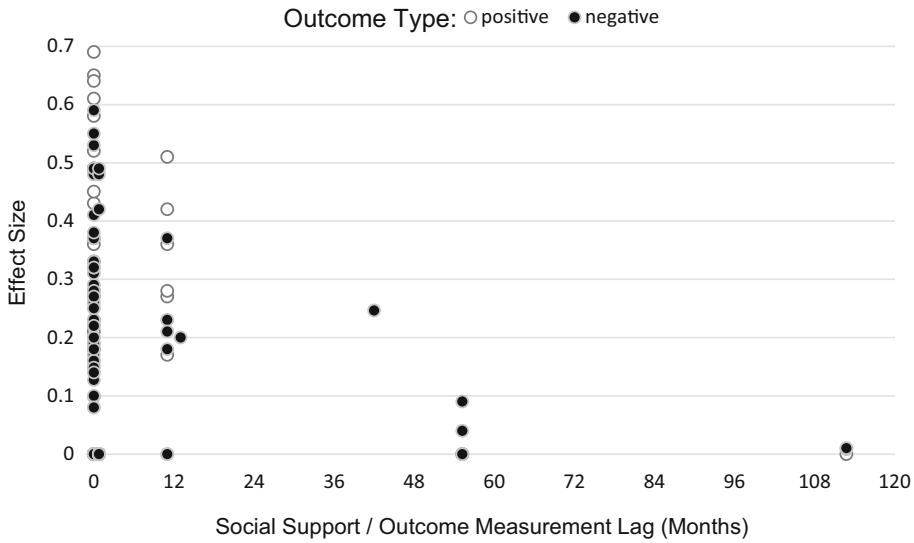

Fig. 2 Absolute value of reported effect sizes (k = 147) across social support-psychological outcome measurement time lag (months)

inequitable access to and utilization of support, which may, in turn, influence people's perception of support (Kaniasty and Norris 2009). Perceptions of support directly influence emotional distress but receipt of actual support may only have indirect effects. People who receive support may also not necessarily feel supported, as explained by the Stress-Support Matching Hypothesis (Curtona and Russell 1990), which suggests that support is only effective if it answers the need. Furthermore, the Social Support Effectiveness model (Rini and Dunkel Schetter 2010) suggests that whether social support is helpful or harmful depends on the degree to which the particular supportive behaviors address the need in terms of both quality and quantity. These models of explaining social support dynamics, which are anchored on empirical observations, highlight the need to study social support not as a global construct, but as a multidimensional one.

Having stated this, it is worth noting that the majority of the studies focused on perceived social support. Congruent with the SSDD model, perceived support—having direct effects on psychological outcomes—has the largest effect size among the facets of support. Perceived support comes in the form of appraisal of support quality and availability, and it has long been shown that appraisal of risk and protective factors such as social support in the context of disasters is closely associated with post-disaster outcomes (Bonanno et al. 2010). Such forms of appraisal are also found to be clinically useful in treating post-disaster psychological distress, as in the case of cognitive behavioral therapies (Hamblen et al. 2017). However, it is also important to study more concrete facets of support—received support and social embeddedness, which can be externally controlled as a form of intervention.

Other than support facet, the effect size of social support on psychological outcomes also varied across type of responder. The observed effect size in police responders has been corroborated by social support studies on police officers outside the disaster context as well (Stephens et al. 1997; de Terte et al. 2014). The absence of observed effect in other clusters of responders, however, does not necessarily mean social support is ineffective in these groups. These results must be interpreted in the context of small numbers of studies, differences in support measures, and other moderating variables that are not accounted for in this review.

In spite of the small number of effect sizes involved, it is important to note that social support affects work-related psychological outcomes at medium to large effect sizes. Work-related outcomes are normative, as opposed to clinical outcomes. They are also less intense than clinical outcomes, which could require professional help, such as psychotherapy. What these results suggest is that the effectiveness of social support decreases as the psychological outcome becomes more clinical in nature. It is clear that social support has the potential to alleviate symptoms, but given the present evidence, it should not replace the more specialized forms of treatment of clinical syndromes in disaster responders. This demonstrates one of the limitations of social support effectiveness.

Differences in the effect sizes of social support in psychological outcomes were also observed between concurrent and time-lagged measurements, where effect sizes in time-lagged measurements were lower than those in concurrent measurements, which runs contrary to the findings of Prati and Pietrantoni (2010). This was observed both at the individual study level (for studies with time-lagged measurements) and at the meta-analytic level. To test this

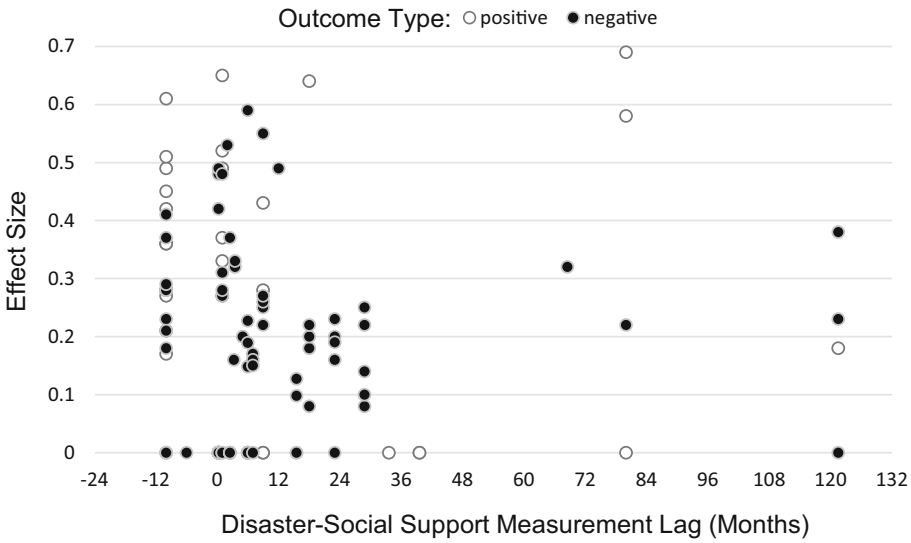

Fig. 3 Absolute value of reported effect sizes (k = 88) of concurrent measurements across disaster-social support measurement time lag (months)

observation further, the absolute values of the 147 reported effect sizes (before they were combined at the individual study level) were plotted against the lag between the measurement of social support and of the psychological outcomes (Fig. 2), where a pattern of effect sizes approaching zero is observed as the lag increases. Admittedly, there are very few studies included with longer support / outcome measurement time lags, which possibly accounts for the absence of correlation between the two variables.

In the same fashion, the absolute values of the 88 reported effect sizes on concurrent measurements were plotted against the time of measurement relative to the disaster (Fig. 3) in order to check for patterns of effect size changes in concurrent measurements. This generated a more dispersed scatterplot, but further inspection revealed a pattern of effect size reduction from 10 months prior to disaster until 28.8 months after, with a correlation approaching significance ($k = 71, r = -0.23, p = 0.054$). Furthermore, effect sizes 80 months post-disaster seem to follow the pre-disaster effect size dispersion pattern. With a small number of effect sizes involved and with the innate limitations of meta-analytic reviews, these observations are far from conclusive. But they support the idea of post-disaster social support deterioration. In addition, support deterioration may possibly naturally discontinue sometime around 28.8 months after the disaster. These observations are worth looking into in future studies, as it is crucial to know patterns of decline and rebound of social support effectiveness in order to know when to intervene.

Individual studies have long observed the long-term effects of social support on psychological outcomes (Holahan and Moos 1981; Kaniasty and Norris 2008), but the deterioration of effect over time has not yet been thoroughly studied. This brings to light another possible property of social support: its effectiveness and relevance may decrease over time. This is especially important in the context of disasters, where social support is observed to deteriorate over time as revealed by the SSDD model employed by Kaniasty and Norris (2009). Along with the deterioration of support is the possible deterioration of its effect. This is not very surprising but should be pointed out, nevertheless. Social support has long-term effects on psychological outcomes, and the strength of these effects may depend on when the support is provided.

The results further the debate on the role that social support plays in effecting psychological change. Traditionally, social support is framed to have main effects or stress-buffering effects on psychological outcomes (Cohen et al. 2000). The main effects model suggests that even in the absence of stressful events, social support contributes to positive outcomes. The stress-buffering model, on the other hand, suggests that social support in itself has little effect on mental health in times of calm whereas it substantially reduces the negative impact of stressful experiences such as disasters. This effect was observed in this review: presence of support was linked to reduction of negative outcomes, and absence of support had a non-significant mean effect size.

On the other hand, social support being positively associated with favorable psychological outcomes after disaster exposure does not fit the stress-buffering frame. However, it fits a positive outcome-enhancement frame. Both buffering and enhancement effects are statistical moderation patterns (Jose 2013), and with the assumption that the effect sizes observed are conditional to the disaster exposure, social support may enhance positive outcomes and buffer the negative effects of disaster exposure that results in lower levels of negative outcomes. In the absence of pre-disaster measures, this is speculation, but is worth exploring further.

It is interesting to note that our results differ from those of Brewin et al. (2000) and Ozer et al. (2003) in terms of the association of social support with PTSD. These authors reported weighted effect sizes of 0.43 and − 0.28, respectively compared to finding no effect in this meta-analysis. However, Brewin et al.'s work synthesized effect sizes of lack of support in the context of general traumatic experiences. On the other hand, the current study focuses its analysis on the presence of support on a group of professionals impacted by a specific form of traumatic exposure. Similar to the current analysis, Ozer et al.'s work analyzed the effect sizes of the presence of support, but it differs from the current study in two ways. First, it is focused on perceived social support, whereas the current study examined perceived support along with received support, undifferentiated support, and social embeddedness. Second, Ozer et al.'s meta-analysis synthesized the effect sizes of two types of samples: the general population and combat-exposed adults. Just as in Brewin et al.'s meta-analysis, these samples were also exposed to broad types of trauma. These key differences in the inclusion of facet of support, type of sample, and type of exposure may explain why the previous meta-analyses found associations between social support and PTSD, in contrast to the absence of such association found in the present analysis.

This review comes with several limitations. First, there are overlaps in some effect sizes in terms of the sample and measures involved. Second, there is also a wide variation of the number of studies and consequently, effect sizes, involved in the analyses. In addition, some syntheses involved effect sizes as few as two, which impact the accuracy of the estimates. Finally, the studies involved in this analysis heavily focused on the 9/11 attacks; hence, generalization of results to disaster responders in general should be done with caution. The inclusion of the number of studies, the number of effect sizes, and the Rosenthal Fail-Safe N should indicate the robustness of the analyses and would contextualize the estimates. Because of the nature of the analyses, qualitative studies and a number of quantitative studies were excluded.

Notwithstanding these limitations, this review shows the topography of the research area, which may help inform the territories that need to be charted. In contrast to Prati and Pietrantoni's (2010) work, the present review focuses on responders in the context of disasters. This is an important distinction to make. Disasters are critical events that challenge the coping capacity of communities, which consequently increase reliance on external sources of support. This effect of overwhelming collective internal resources is a distinct characteristic of a disaster, distinguishing it from other forms of critical incidents. This review, therefore, sets itself apart from previous work, such that it examines the strength of association between social support—a form of external resource—and psychological outcomes in disaster responders—people who both provide and receive support—in situations where (social) support is highly needed.

7 Conclusion

This study examined the effects of social support on various psychological outcomes in disaster first responders. Social support was observed to have varying degrees of association with these outcomes, which may be contingent on the facet of support and other factors associated with the type of responder and other temporal factors. Along with the evidence for usefulness of support, the limitations of this resource were also presented. With these observed conditions that influence the helpfulness of social support, future studies should look into the facets of support that can be used for intervention, and the conditions that may optimize the effectiveness of these supportive behaviors and interactions.

Social support is spontaneous and naturally occurring. As such, it presents itself as a sustainable form of psychosocial intervention for buffering the negative consequences of disasters in responder groups. As this article illustrates, social support may even enhance positive outcomes in the aftermath of disaster exposure. However, good intentions do not always lead to desirable results, and providing support does not always result in positive psychological consequences. Social support may also benefit some types of disaster responders but not others. These differences may be influenced by several factors, such as differences in organizational structure, organizational culture, and the economic benefits of the profession. Future research should look into how these different variables moderate the effectiveness of supportive interactions.

Studies should also pay careful attention to the different components of social support and explore how these components influence outcomes in different types of responders. For example, researchers should look into the effectiveness of the different forms and sources of social support for police officers. These efforts could then inform the development of social support-based interventions, such as peer support programs or programs that focus on their work partners. It is not only important to know who can support disaster responders, but what form of social support works, and when best to provide these supportive behaviors. Social support is a potent element of post-disaster psychological recovery, but it is important to understand its nuances to optimize its potency.

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