Clinical Psychology Review xxx (xxxx) 101998

Contents lists available at ScienceDirect

Clinical Psychology Review

journal homepage: www.elsevier.com/locate/clinpsychrev

Review

Social support and posttraumatic stress disorder: A meta-analysis of longitudinal studies

Yabing Wang[a], Man Cheung Chung[b], Na Wang[b], Xiaoxiao Yu[c], Justin Kenardy[d,*]

[a] School of English Education, Guangdong University of Foreign Studies, Guangzhou, Guangdong, China
[b] Department of Educational Psychology, Chinese University of Hong Kong, Hong Kong
[c] School of Foreign Languages, Guangzhou College, South China University of Technology, Guangzhou, Guangdong, China
[d] School of Psychology, University of Queensland, Australia

ARTICLE INFO

Keywords:
Social support
PTSD
Meta-analysis
Longitudinal studies

ABSTRACT

Social support has long been associated with posttraumatic stress disorder (PTSD), but there is no consistent evidence on the strength and direction of this relationship. Whereas the social causation model claims that social support buffers against PTSD, the social selection model states that PTSD reduces social support resources. As the first meta-analysis of the prospective relationships between social support and PTSD, this study synthesized the available longitudinal data (75 samples including 32,402 participants) on these two constructs with a random-effects model. In total, three hundred and fifty-five effect sizes (including cross-sectional, prospective and cross-lagged coefficients) were included in the meta-analysis. With prior levels of the relevant outcomes controlled for, results showed that social support and PTSD reciprocally predicted each other over time with similar effect sizes: Social support predicted PTSD with $\beta = -0.10$; PTSD predicted social support with $\beta = -0.09$. Moderator analyses suggested that the effects held across most sample characteristics and research designs except for several moderators (gender, time lag, publication year, source of support). These findings provided strong evidence for both the social causation and social selection models, suggesting that the link between social support and PTSD is symmetrically reciprocal and robust.

1. Introduction

Researchers have long acknowledged that human development and self-perception is shaped by interpersonal interactions and environments (Andersen & Chen, 2002; Bandura, 2005; Bowlby, 1969; Bronfenbrenner, 2005). Specifically, countless theories in the field of sociology, anthropology and psychology underscored the influence of social relationships on physiological and psychological health, such as attachment theory (Bowlby, 1973), bio-ecological theory (Bronfenbrenner, 1979), stress-buffering theory (Thoits, 1986), and social support resource theory (Hobfoll, Freedy, Lane, & Geller, 1990). These theoretical underpinnings provided a framework for understanding the findings that supportive social networks were important in human development and protective in times of stress.

Empirical studies supported the protective role of social support on health outcomes including PTSD (Neria et al., 2007), depression (Rueger, Malecki, Pyun, Aycock, & Coyle, 2016), subjective well-being (Chu, Saucier, & Hafner, 2010), and burnout (Halbesleben, 2006). The link between social support and PTSD has been explored on a range of samples, including veterans, patients, firefighters, survivors of sexual abuse, disaster, and war (Banks & Weems, 2014; Carter et al., 2016; Dworkin, Ojalehto, Bedard-Gilligan, Cadigan, & Kaysen, 2018). Although abundant evidence consistently indicated negative concurrent and prospective associations between these two constructs (Bowlby, 1973; Johansen, Wahl, Eilertsen, & Weisaeth, 2007; Kuterovac-Jagodić, 2003; Lee, 2019; Phillips, LeardMann, Gumbs, & Smith, 2010; Robinaugh et al., 2011; Volgin & Bates, 2016), other studies have found non-significant (Baranyi et al., 2010; Brown, Madan-Swain, & Lambert, 2003; Meyer et al., 2012; Pinto et al., 2017; Tough, Siegrist, & Fekete, 2017) or even positive relationships (Kuterovac-Jagodić, 2003).

A number of quantitative metanalytic reviews have examined social support and PTSD (Ozer, Best, Lipsey, & Weiss, 2003; Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012; Wright, Kelsall, Sim, Clarke, & Creamer, 2013). These have found negative relation-

* Corresponding author at: McElwain Building (24A), Level 4, Room 408, St Lucia, Brisbane QLD4072, Australia.
E-mail addresses: yabingwang@gdufs.edu.cn (Y. Wang), man.chung@cuhk.edu.hk (M.C. Chung), NaWANG@link.cuhk.edu.hk (N. Wang), yuxx@gcu.edu.cn (X. Yu), j.kenardy@uq.edu.au (J. Kenardy).

https://doi.org/10.1016/j.cpr.2021.101998
Received 19 September 2020; Received in revised form 9 February 2021; Accepted 23 February 2021
0272-7358/

ships (r ranging from −0.28 to −0.40). However, these analyses were limited because of the smaller number of studies included ($k \leq 11$) and lack of longitudinal data (Vogt, Erbes, & Polusny, 2017). The number of studies included did not allow for inclusion of potentially impactful covariates, and the cross-sectional methodology did not allow for examination of temporal sequencing relationships (Fairbairn et al., 2018). Thus, there remains substantial uncertainty about the magnitude of effects in each direction from social support to PTSD and vice versa.

Another important question yet to be answered, which was also described in a recent overview (Vogt et al., 2017), is whether there is evidence for the direction of a relationship between social support and PTSD. Whilst some studies explored whether social support predicted lower levels of PTSD as a stress-buffer (Jacobsen et al., 2002), others examined whether PTSD could erode social support resources (Dodson & Beck, 2017). Till now, there is no synthesis of longitudinal studies examining social support and PTSD at different time points. Therefore, the aim of this study was to explore prospective relationships in both directions (i.e., social support - > PTSD & PTSD - > social support) by synthesizing longitudinal data.

1.1. Conceptualization of social support

Social support is a multidimensional construct and has had a range of definitions. One view was that it was in the form of emotional, informational, or practical assistance from families, friends or coworkers (Thoits, 2010). It may be received from others (received support) or simply perceived to be available when needed (perceived support), or it may simply refers to the size of social networks that individuals may rely on (embedded support) (Barrera Jr, 1986). It was also elsewhere (Schwarzer & Leppin, 1991) classified into functional (quality, availability) and structural support (network size, number of individuals that can be relied on).

Social support in this current review refers to actual or available social resources in times of need and groups involved that are perceived as positively supportive (Hobfoll & Stokes, 1988; Kaniasty & Norris, 2009). Note that social support is distinct from, albeit similar to, constructs such as attachment, parenting, relationship quality and negative social interaction (Rueger et al., 2016). Maternal care, for example, could be viewed as source of support only when it was measured as positive familial resources after trauma, as opposed to broad parenting tendencies involving parental beliefs, values, and goals. Social support is intended by the provider to be helpful, and thus distinct from intentional negative social interactions (Heaney & Israel, 2008). It should also be distinguished from behaviors initiated from the individuals themselves as a coping strategy (e.g., help seeking, self-disclosure).

1.2. Theoretical perspectives on the relation of social support and PTSD

In trauma literature, it has been contended that trauma impaired our psychological well-being because it compromised our social sense of self and relation with surroundings, others, or the world at large (Haslam, Jetten, Cruwys, Dingle, & Haslam, 2018; Pennebaker & Keough, 1999). Using the same logic, recovery or resilience occurs when individuals' sense of self and connection to others is restored or enhanced. This is referred to as the “social causation” theory wherein social resources (in this case social support) predict well-being and the lack of it leads to psychological distress (Johnson, Cohen, Dohrenwend, Link, & Brook, 1999).

Under the umbrella of this theory, a number of models have been proposed to explain the support-health process (Cohen & Wills, 1985). For example, the main-effects model suggested that social support contributed to well-being directly because it boosted our sense of predictability, self-worth and positive affect (Cohen, Underwood, & Gottlieb, 2000). The stress-buffering model, nevertheless, posited that support only (or primarily) protected people under traumatic events because it redefined the harm and demands of the situations (Cohen & Wills, 1985; Thoits, 1986). In the conservation of resources (COR) model (Hobfoll, 1988), social support could broaden individual's pool of resources and substitute other resources to withstand stress. The etiological model of PTSD proposed that social support, as a contextual factor, impacted PTSD via its influence on people's cognitive appraisal of trauma, emotional states and coping strategies (Joseph, Williams, & Yule, 1997). The social-cognitive processing model explained the protective role of social support on psychological well-being from the perspective of emotional adjustment (Lepore, 2001). Disclosure to others of feelings and thoughts provided an opportunity for trauma assimilation and developed skills to manage negative emotions, and thus facilitated a decrease in posttraumatic distress (Horowitz, 1976).

In contrary to the social causation model (social support - > PTSD), social selection (PTSD - > social support) model proposed that psychological distress might erode and compromise social support resources (Johnson et al., 1999). Individuals with PTSD, for example, would lose interest in interpersonal activities, become estranged and irritable and thus find it difficult to accept and value other's support (King, Taft, King, Hammond, & Stone, 2006). More importantly, their disrupted social roles and functions would make people around them become overburdened and eventually distance them (Carter et al., 2016). A natural consequence ensuing would be the compromise of available social support resources. Although the majority of extant studies are examining social causation theory, both of the two theories have some empirical evidence (Johnson et al., 1999; Kaniasty & Norris, 2008).

1.3. The current review

The primary goals of this review were to examine (a) whether there is a temporal association between social support and PTSD; (b) whether there is a cross-lagged effect between social support and PTSD when prior levels of the predicted variable (autoregressive/stability effect) are controlled for; (c) moderators that could account for variation in the relation; and (d) how the observed longitudinal relationships compare to cross-sectional associations. To do these, and also to enhance the validity of conclusions, this comprehensive quantitative review was based exclusively on longitudinal studies.

Fig. 1 presented the conceptual model, exemplary for the prediction of social support on PTSD. We firstly examined the stability coefficients for each variable (e.g. the correlation between social support at Time 1 and social support at Time 2). Secondly, we examined the cross-sectional coefficients between social support at Time 1 and PTSD at Time 1. Thirdly, we examined the cross-lagged regression coefficients between social support and PTSD controlling for the stability effect of PTSD (the correlation between PTSD at Time 1 and PTSD at Time 2).

We noticed that in many traditional meta-analyses of longitudinal studies (e.g. Reijntjes, Kamphuis, Prinzie, & Telch, 2010; van Geel, Goemans, Zwaanswijk, Gini, & Vedder, 2018), researchers only examined and compared prospective correlations, which, though more robust than cross-sectional associations, could not address the question of “which came first” (Fairbairn et al., 2018). In other words, a significant correlation between social support at Time 1 and PTSD at Time 2 does not indicate that social support precedes PTSD. Rather, it is implying a sustained cross-sectional correlation between these two constructs (Locascio, 1982). It is possible that prospective correlation might become statistically significant because of the high stability of the predicted variable. Cross-lagged regression coefficients, however, could more directly address this question because they account for confounding stability. This new way of effect size estimation is increasingly being applied in meta-analytic reviews (Fairbairn et al., 2018; Harris & Orth, 2019; Sowislo & Orth, 2013).

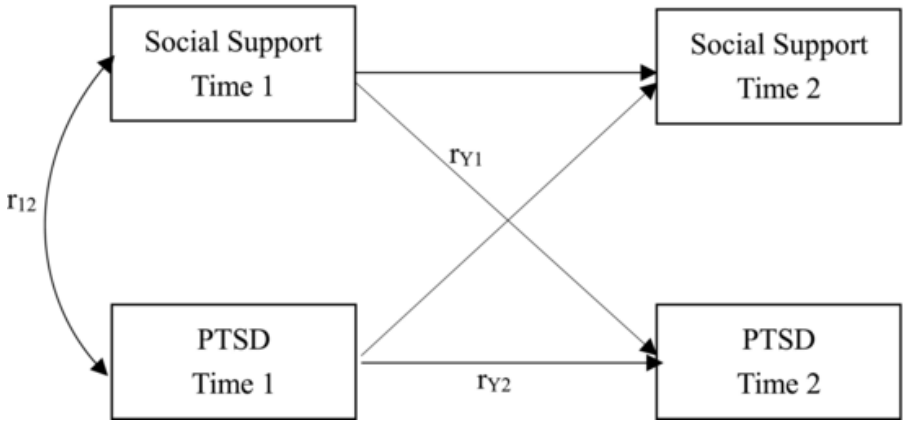

Fig. 1. Conceptual model of coefficients between socials support and PTSD meta-analyzed. $r_{Y1:}$ prospective coefficient (Social support T1 with PTSD T2); $r_{Y2:}$ stability coefficient of PTSD (PTSD T1 with PTSD T2); r_{12}: cross-sectional coefficients (Social support T1 with PTSD T1).

Potential moderators to be analyzed include age, gender, time lag, types of sample, types and sources of social support as well as measures of the two constructs. Even though previous studies tested the moderating role of age (Brown et al., 2003), gender (Cable, Bartley, Chandola, & Sacker, 2013), sample characteristics (Uchida, Kitayama, Mesquita, Reyes, & Morling, 2008; Wilson & Scarpa, 2014), types and sources of support (Duax, Bohnert, Rauch, & Defever, 2014; Martinez, Israelski, Walker, & Koopman, 2002; Platt, Lowe, Galea, Norris, & Koenen, 2016), the conclusions of these studies were based on limited sample size or cross-sectional research design. In comparison, the present meta-analytic approach can more robustly test not only these moderators but also others that would be impossible to measure in a single study (e.g. time lag, measures of constructs).

This review filled significant gaps in several ways. Firstly, concurrent and prospective correlations of social support and PTSD were estimated based on a large study number and heterogeneous study characteristics. Secondly, based on the estimation of these coefficients, cross-lagged regression coefficients between these two constructs would be generated, which would indicate any temporal direction of their relationship. Lastly, moderators (including both within-study and between-study variables) were tested, which would provide quantitative explanations of variation in the relationship between social support and PTSD.

2. Method

2.1. Selection of studies

We used the following four strategies to search the literature: (a) databases PsycINFO, PubMed, and Eric were searched according to the following parameters: support* OR "social network" OR "social relation" OR "social resource" OR "social environment" OR belong* OR connected* AND "posttraumatic stress" OR "post-traumatic stress" OR PTSD AND longitudinal OR prospective OR follow-up. The asterisk (truncation) allowed for variations of word endings (e.g. support* yielded articles with supports, supporting, supportive). Search terms were allowed to appear in the title or abstract. We did not set any limit on publication year, participants' age range, or publication status (unpublished studies such as dissertation were also included to address the publication bias) but restricted language to be English and participants to be human; (b) references in relevant review articles (Agaibi & Wilson, 2005; Chu et al., 2010; Johnson & Possemato, 2019; Long et al., 2018; Neria, Nandi, & Galea, 2008; Ozer et al., 2003; Tough et al., 2017; Wang, Wu, & Liu, 2003; Wright et al., 2013); (c) references of all articles included in this meta-analysis; (d) hand search for the key journals: *Psychological Trauma: Theory, Research, Practice and Policy, Clinical Psychology Review, Psychological Medicine, Traumatology, BMC Psychiatry, Journal of Traumatic Stress, Journal of Affective Disorder, Psychiatry Research and JAMA Psychiatry*. The search resulted in 2161 journal articles, 167 dissertations and 9 book chapters (see appendix A for the PRISMA flow diagram).

Studies would be included in the meta-analysis if the following criteria were fulfilled: (a) social support and PTSD were assessed explicitly. Social support could be in any form, tangible or intangible, with participants as recipients. But it had to be self-reported. Observational data source or parent report was excluded. Studies which considered relevant but distinct constructs (e.g. attachment, parenting style, relationship satisfaction/conflict) as support were excluded. Support measured as a coping strategy or spiritual support was also excluded. The construct of PTSD was either as a diagnosis or continuum of symptoms measured via questionnaires or interviews; (b) the study was quantitative, exploring the natural relationship between social support and PTSD. Thus, we excluded reviews and intervention studies wherein the relationship between social support and PTSD was potentially influenced by an intervention; (c) the study was longitudinal or prospective in nature. In other words, at least one construct was measured at least two time points; (d) the study reported zero-order correlation coefficient between social support and PTSD and provided enough information to compute effect sizes; (e) results presented in tables and texts were consistent rather than contradictory. For example, if the paper suggested a negative relation between social support and PTSD but tables in appendix indicated a reverse direction, it would be excluded. We included sample type regardless of its age, gender, ethnicity, and whether it was clinical or not. The inclusion of a broad age range was based on a review which suggested that social contextual risk factors of PTSD among children resembled those in the broader literature among adults (Vogt et al., 2017). If more than one study was based on the same sample, only the study with the most comprehensive coding information was included to ensure the independence of effect sizes.

2.2. Coding of studies

We coded the following study characteristics: mean age at Time1, gender (proportion of female participants, ranging 0–1), country, sample size (excluding attrition rate), publication year, time lag in month (if more than two waves of data were collected, time lag between Time1 and Time2 assessments were used), sample type, trauma characteristics, type and source of support, measure of PTSD and effect sizes. If mean age was not reported but age range and proportion were provided, we would use the mean age of the group with the largest proportion or assign it according to the sample characteristic (e.g. 19 for college students). If more than one effect size for the same sample was provided in one study, they were averaged, which was the practice in previous meta-analyses (Harris & Orth, 2019; Sowislo & Orth, 2013)

and recommended in methodological guidelines (Lipsey & Wilson, 2001). Sources of support were coded into (a) *close* (family members, friends or significant others); (b) *general* (without specifying the givers); (c) *other* (e.g., unit, organization, etc). If more than one coefficient for support from the same classification (e.g., family and friend which were both "close" sources of support) was reported, we averaged them. This practice, albeit impeding us from examining the effect of specific source, was applied since studies focusing on certain types of support (e.g., unit support) were rare. Previous studies also reported a combination of similar sources (e.g., family and relative; counsellor and communities) or even all sources (Chu et al., 2010; Ozer et al., 2003). If studies reported independent effect size with more than one sample (e.g. female and male), they were coded separately. If studies tested the relationship between PTSD and lack of social support, their effect size would be reversed.

2.3. Calculation of effect sizes

This analysis would extract, calculate and report seven types of effect sizes (see Fig. 1): (1) the cross-sectional correlation between social support and PTSD at Time 1 (r_{12}); (2) the prospective correlation between social support at Time 1 and PTSD at Time 2 (r_{Y1}); (3) prospective correlation between PTSD at Time 1 and social support at Time 2; (4) the autocorrelation (stability coefficient) between social support at Time 1 and social support at Time 2; (5) the autocorrelation between PTSD at Time 1 and PTSD at Time 2 (r_{Y2}); (6) the cross-lagged regression coefficient between social support at Time 1 and PTSD at Time 2 (controlling for PTSD at Time 1); (7) the cross-lagged regression coefficient between PTSD at Time 1 and social support at Time 2 (controlling for social support at Time 1). In almost all studies, effect sizes (6) and (7) were not provided. We calculated them using the following formula recommended (Aloe, 2014; Cohen, West, & Aiken, 2013) and applied in previous meta-analyses (Fairbairn et al., 2018; Harris & Orth, 2019; Sowislo & Orth, 2013).

$$\beta_{Y1.2} = \left(r_{Y1} - r_{Y2} * r_{12}\right) / \left(1 - {r_{12}}^2\right)$$

$\beta_{Y1.2}$ represents the cross-lagged coefficient. For example, when we calculated it with PTSD at Time 2 as the outcome variable, r_{Y1} refers to the prospective correlation between social support at Time 1 and PTSD at Time 2; r_{Y2} refers to the autoregression between PTSD at Time 1 and PTSD at Time 2; r_{12} refers to the cross-sectional correlation between socials support at Time 1 and PTSD at Time 1. The cross-lagged coefficient with social support at Time 2 as the outcome variable was calculated accordingly.

2.4. Data analysis

All analyses were conducted using Comprehensive Meta-Analysis (CMA) Version 2.0, guided by the methods prescribed by (Hunter & Schmidt, 2004). To compare the effect sizes across studies, we used the random-effects model which accounted for not only sampling errors but also between-study variance and therefore was stricter than fixed-effects model (Raudenbush, 2009). To account for the skewed distribution, *r* coefficients were transformed to Fishers' *Z* with corresponding inverse variance weights (ω = n-3) and retransformed to *r* when reporting effect size point estimates (Lipsey & Wilson, 2001).

We firstly computed weighted mean effect sizes and heterogeneity of studies included. Moderator analyses were conducted when there was a high degree of heterogeneity ($I^2 \geq 75\%$; Q_w significant). We supplemented Q_w with I^2 because a significant Q_w, even though suggesting a heterogeneous distribution and significant between-study variance unexplained, could not tell us the magnitude of the dispersion (Lipsey & Wilson, 2001). We ran meta-regression analysis when the moderator was a continuous variable and sub-group analysis when it was categorical.

Then we tested whether there was publication bias, a tendency that significant results were more likely to be published and thus resulted in overestimation of effect sizes. To address this potential problem, we searched and included both published and unpublished (e.g. dissertation) studies wherein the relationship between social support and PTSD was not the only, or primary, research question. This strategy resulted in the inclusion of 7 (9%) studies unpublished and 64 (85%) studies that did not focus specifically on the relations of social support and PTSD. We also explicitly treated publication status (published vs unpublished) as a moderator in sub-group analysis to determine if effect sizes differed significantly (Sowislo & Orth, 2013).

Potential publication bias was further examined with funnel plot, Qrwin's Fail-safe *N*, and Kendall's τ. In the presence of bias, funnel plot would appear asymmetrical with a more condense cluster of studies on one side of the mean than the other (Sutton, 2009). Orwin's Fail-safe *N* tested the number of non-significant studies needed to change the significant effect size computed to non-significant (Orwin, 1983).

3. Results

3.1. Descriptive analyses

The meta-analytic dataset included 75 independent samples (7 dissertations and 68 journal articles; see appendix B for articles included and appendix C for study characteristics) including 32,402 participants. These studies were published/completed between 1988 and 2019, with the median in 2014. Sample sizes ranged from 29 to 2943 (M = 444, SD = 548, Mdn = 242). The average mean age of the participants was 33.2 (SD = 9.8, range = 10.7 to 63.3). The average proportion of female participants was 0.57 (0% to 100%). Almost all the studies were undertaken in Western countries (especially USA). The average time lag between T1 and T2 assessment was 0.72 years (SD = 0.8, Mdn = 0.5, range = 0.1 to 5). A total of 355 effect sizes were produced with 65 cross-sectional associations, 72 prospective associations between T1 social support and T2 PTSD, 34 prospective associations between T1 PTSD and T2 social support, 31 autocorrelations of social support, 66 autocorrelations of PTSD, 58 cross-lagged associations of T1 social support predicting T2 PTSD, and 29 cross-lagged associations of T1 PTSD predicting T2 social support.

Seventy two studies measured social support with self-report questionnaires and the other three with interviews. A wide range of scales were used to assess social support, including the Multidimensional Scale of Perceived Social support (Zimet, Dahlem, Zimet, & Farley, 1988), Crisis Support Scale (CSS; Joseph, Andrews, Williams, & Yule, 1992), Deployment Risk and Resilience Inventory (King, King, & Vogt, 2003), Interpersonal Support Evaluation List (ISEL; Cohen, Mermelstein, Kamarck, & Hoberman, 1985), Perceived Organizational Support (POS; Eisenberger, Fasolo, & Davis-LaMastro, 1990). Sixty seven studies measured PTSD with self-report scales and the remaining eight with interviews. Commonly used scales included the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993), Post-traumatic Diagnostic Scale (Foa, Cashman, Jaycox, & Perry, 1997), and Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979).

3.2. Initial analyses

Sensitivity analysis revealed that there was no statistical outlier on all the seven effect size types, thus no study was eliminated in the subsequent analyses. Our data also suggested an absence of publication bias. The roughly symmetrical funnel plots revealed that effect sizes were evenly distributed around the mean, which indicated that smaller ones were not biased toward larger ones. Fail safe number needed for non-significant results (ranging from 685 to 8650) were much larger than the criterion (5 k + 10) raised by Rosenthal (Rosenthal, 1991). Kendall's τ ranged from −0.03 to 0.16 ($p > 0.05$). We also tested if effect sizes

of dissertations differed from those of published articles and found that there were no significant differences in six of the seven types of effect sizes (*ps* > 0.05) except for the stability effect of social support ($p = 0.01$). However, we believe the differences were not due to publication bias, or at least the publication bias was not strong, given that the effect size of social support stability based on dissertations (ES = 0.73) was unexpectedly higher than those based on published studies (ES = 0.53).

3.3. Effect size analyses

The seven types of effect sizes we computed were all significant. Social support was moderately associated with PTSD when they were measured at the same time (weighted mean correlation: −0.26; $p < 0.001$). These two variables could prospectively predict each other, with moderate magnitude ($r = -0.24$, $p < 0.001$ for social support predicting PTSD; $r = -0.22$, $p < 0.001$ for PTSD predicting social support). Stability effects of both variables were large ($r = 0.55$, $p < 0.001$ for social support and $r = 0.63$, $p < 0.001$ for PTSD). The two cross-lagged effects computed (see the equation provided earlier) —which were the key effects in this study—were also significant ($\beta = -0.10$, $p < 0.001$ with PTSD as the outcome; $\beta = -0.09$, $p < 0.001$ with social support as the outcome). The 95% confidence interval of the weighted cross-lag effect overlapped greatly, which indicated that the two effects did not differ from each other significantly and thus a reciprocal prospective relationship existed between these two variables. Because the three pairs of effect sizes were based on largely different numbers of studies (e.g., $k = 58$ for cross-lagged effects of social support on PTSD; $k = 29$ for cross-lagged effects of PTSD on social support), we repeated the computation using the same smaller set of studies (e.g., 29 studies were used to re-compute the cross-lagged effects of social support on PTSD) and found that the coefficients did not change virtually. Heterogeneity statistics were also shown in Table 1. For most of the effect sizes in this, *Q* was significant indicating that the variance of effect sizes was greater than that resulted from sampling error alone.

3.4. Moderator analyses

We subsequently analyzed the same set of potential moderators that might explain the above between-study variations of cross-lagged effects. A summary of the moderating results was shown in Table 2 (social support predicting PTSD) and Table 3 (PTSD predicting social support). Publication type, sample type, trauma characteristics (van der Velden's study measured potential traumatic events without specification of trauma type and was thus removed when the moderating effect of trauma characteristics were analyzed), type, source and measure of social support, as well as measure of PTSD were dummy coded as categorical moderators. Subgroup analysis showed that none of these variables had significant moderation effect ($Q_{between}$ ranging from 0.002 to 2.987, $p > 0.05$) except for source of support ($Q_{between} = 6.243$, $p < 0.05$) indicating that PTSD predicted less support from close ones than from general or other sources (e.g., organization). Overall, the findings suggested that the reciprocal relationships between social support and PTSD held with different publication status (journal papers vs dissertations), for civilian and military samples no matter if their trauma was group or individual, intentional or unintentional, interpersonal or non-interpersonal, for perceived or received social support no matter if it was the general support or trauma-specific support measured in the studies, and no matter if PTSD was measured by questionnaires or interviews.

We then conducted meta-regression analyses to see if publication year, gender (proportion of female), time lag between assessments, and age at assessment could influence the cross-lagged associations. Results (also shown in Table 2 and Table 3) revealed a significant moderating effect of gender and time lag on the prediction of social support on PTSD ($\beta = 0.057$, $p < 0.001$ for gender; $\beta = -0.011$, $p < 0.01$ for time lag), with the negative cross-lagged influence of social support on PTSD weakening as the proportion of female participants increased and time lag between assessments shortened. Publication year, gender and time lag significantly predicted the variability in the PTSD effect on social support ($\beta = 0.006$, $p < 0.01$ for publication year; $\beta = 0.141$, $p < 0.001$ for gender composition; $\beta = -0.019$, $p < 0.001$ for time lag) such that the effect attenuated with more recent studies, when the proportion of females participated increased, and when the time lag between two assessments was briefer.

4. Discussion

The aim of the study was to synthesize prospective studies on the relationship between social support and PTSD. To do so, we analyzed 355 effect sizes derived from 67 published and unpublished studies done between 1988 and 2019 with a total of 32,402 participants. The samples varied greatly in terms of their country and age. Consistent with our hypotheses, we found moderate cross-sectional associations between social support and PTSD (weighted $r = -0.26$), suggesting that traumatized individuals with lower levels of social support fare worse. Meta-analyses of prospective correlations further revealed that the relationship between social support and PTSD was not only concurrent but also enduring over time, with both *r*s > 0.2. Most importantly, we

Table 1
Summary of weighted effect sizes for the link between Social Support (SS) and PTSD.

Effect	*k*	N	Weighted mean Effect Size	95% CI	Hetereogeneity			Publication bias	
					Q	τ^2	I^2	Classic Fail safe *N*	Kendall's τ
Cross-sectional effect	65	28,284	−0.26***	[−0.30, −0.22]	794.30***	0.027	91.94	3748	−0.015
Prospective effects									
→SS PTSD	72	30,395	−0.24***	[−0.28, −0.21]	590.97***	0.018	87.99	5985	−0.025
→PTSD SS	34	17,085	−0.22***	[−0.27, −0.16]	455.48***	0.026	92.76	4950	−0.157
Stability effects									
SS	31	15,672	0.55***	[0.51, 0.60]	469.60***	0.030	93.61	5569	0.159
PTSD	66	31,413	0.63***	[0.60, 0.67]	1095.96***	0.034	94.07	8650	0.014
Cross-lagged effects									
→SS PTSD	58	26,950	−0.10***	[−0.12, −0.08]	98.63**	0.002	42.21	3235	−0.033
→PTSD SS	29	15,244	−0.09***	[−0.13, −0.05]	173.58***	0.010	83.87	685	−0.027

Note. *k* = number of studies included in the meta-analysis; N = sample size included in the analysis; *Q* = weighted squared deviations; τ^2 = between-studies variance/total heterogeneity; I^2 = percentage of total heterogeneity by total variability; Classific Fail safe *N* and Kendall's τ = statistic used in the publication bias test.

** $p < 0.01$.

*** $p < 0.001$.

Table 2
Moderator analysis of the cross-lagged effect of social support on PTSD.

Categorical moderators	N effect sizes	r	95%CI	$Q_{between}$
Publication type				0.691
Journal papers	53	−0.10***	[−0.12, −0.08]	
Dissertations	5	−0.13**	[−0.21, −0.05]	
Sample type				0.002
Civilian	43	−0.10***	[−0.12, −0.08]	
Military	15	−0.10***	[−0.13, −0.07]	
Intentional trauma				0.155
Intended	44	−0.10***	[−0.12, −0.08]	
Unintended	12	−0.11***	[−0.15, −0.06]	
Group trauma				1.834
Group	29	−0.11***	[−0.13, −0.09]	
Individual	27	−0.08***	[−0.11, −0.06]	
Interpersonal trauma				0.002
Interpersonal	37	−0.10***	[−0.12, −0.08]	
Non-interpersonal	19	−0.10***	[−0.13, −0.07]	
Type of SS				0.935
PS	36	−0.10***	[−0.12, −0.08]	
RS	12	−0.10***	[−0.15, −0.05]	
Multi	10	−0.12***	[−0.15, −0.08]	
Source of SS				2.987
Close	26	−0.08***	[−0.12, −0.05]	
Gel	28	−0.12***	[−0.14, −0.09]	
Others	4	−0.09***	[−0.13, −0.05]	
Measure of SS				1.837
General	46	−0.11***	[−0.13, −0.09]	
Trauma-specific	12	−0.08***	[−0.12, −0.04]	
Measure of PTSD				0.111
Questionnaire	55	−0.10***	[−0.12, −0.08]	
Interview	3	−0.11***	[−0.16, −0.06]	
Continuous moderators	β	SE	95%CI	$Q_{between}$
publication year	−0.001	0.001	[−0.003, 0.002]	0.355
% female	0.057	0.017	[0.026, 0.089]	12.58***
Time lag	−0.011	0.004	[−0.020, −0.003]	7.352**
Age	−0.001	0.001	[−0.003, 0.001]	1.986

Notes. N effect sizes: number of effect sizes; r & β: effect size indices; CI: confidence interval; $Q_{between}$: statistic used in heterogeneity test; SE: standard error.
** $p < 0.01$.
*** $p < 0.001$.

found significant prospective effects in both social support-PTSD (β = −0.10) and PTSD-social support (β = −0.09) links even after controlling for large autoregressive and moderate concurrent correlations.

4.1. Effect of social support on PTSD

The prospective effect of social support on PTSD provided strong evidence for central theories in the field of stress-distress including the social causation theory, stress-buffering model (Cohen & Wills, 1985), and social support resource theory (Hobfoll et al., 1990; Johnson et al., 1999). As was outlined in the introduction, all of these theories supported the position that individuals with more social support were relatively resistant to the detrimental effects of traumatic events.

Based on substantial sample sizes from a large set of longitudinal studies, this finding carried important empirical implications. It was consistent with findings from primary studies (e.g., Dirkzwager, Bramsen, & Van Der Ploeg, 2003) that supported the protective effect of social support on PTSD. The present study is important because it is the first review reporting prospective effect of social support on PTSD when ruling out prior levels of PTSD. Despite that social support as a protective factor was well-established in the onset of PTSD, this study further confirmed that it also contributed to the maintenance of PTSD symptoms and, importantly, the sustained effect held above and beyond PTSD severity assessed at Time 1.

Though the weighted effect size (−0.10) was small according to Cohen's criteria ($r \leq 0.20$ small; $0.20 \leq r \leq 0.50$ medium; $r \geq 0.80$ large), the criteria did not apply to cross-lagged coefficients (Adachi & Willoughby, 2015) especially in the context of this research with substantial stability of PTSD ($r = 0.64$). In addition, this effect remained uninfluenced by most of the moderators (e.g., sample type, age) tested, which further suggested its robustness and generalizability. It should be mentioned that the magnitude of the present prospective effect was similar to those emerged among other constructs, such as self-esteem on social relationships (Harris & Orth, 2019) and attachment on substance use (Fairbairn et al., 2018).

Overall, the results have important clinical implications for family counsellors, educators, and therapists on improving social support and social skills in order to combat PTSD. Support, regardless of types, from organizations (e.g., colleagues, leaders, hospital staff) was as buffering as that from family members and friends. Attention and care should be allotted to traumatized individuals' (especially those with PTSD) social relationships.

Table 3
Moderator analysis of the cross-lagged effect of PTSD on social support.

Categorical moderators	N effect sizes	r	95%CI	$Q_{between}$
Publication type				0.011
Journal papers	26	−0.09***	[−0.14, −0.05]	
Dissertations	3	−0.08	[−0.22, 0.05]	
Sample type				0.594
Civilian	19	−0.08*	[−0.14, −0.02]	
Military	10	−0.11***	[−0.16, −0.06]	
Intentional trauma				0.263
Intended	21	−0.07**	[−0.12, −0.02]	
Unintended	6	−0.09*	[−0.16, −0.02]	
Group trauma				2.396
Group	16	−0.10***	[−0.14, −0.06]	
Individual	11	−0.04	[−0.11, 0.04]	
Interpersonal trauma				0.082
Interpersonal	18	−0.07**	[−0.12, −0.02]	
Non-interpersonal	9	−0.08**	[−0.14, −0.02]	
Type of SS				1.353
PS	18	−0.09**	[−0.15, −0.03]	
RS	6	−0.07*	[−0.13, −0.02]	
Multi	5	−0.13**	[−0.21, −0.06]	
Source of SS				6.243*
Close	15	−0.11***	[−0.15, −0.07]	
Gel	12	−0.09*	[−0.17, −0.01]	
Others	2	−0.03	[−0.08, 0.02]	
Measure of SS				0.014
General	20	−0.09***	[−0.13, −0.06]	
Trauma-specific	9	−0.09	[−0.18, 0.01]	
Measure of PTSD				2.88
Questionnaire	28	−0.09***	[−0.13, −0.04]	
Interview	1	−0.15***	[−0.21, −0.09]	
Continuous moderators	β	SE	95%CI	$Q_{between}$
publication year	0.006	0.002	[0.002, 0.010]	8.113**
% female	0.141	0.020	[0.101, 0.181]	48.25***
Time lag	−0.019	0.005	[−0.030, −0.008]	12.826***
Age	−0.000	0.001	[−0.003, 0.002]	0.125

Notes: N effect sizes: number of effect sizes; r & β: effect size indices; CI: confidence interval; $Q_{between}$: statistic used in heterogeneity test; SE: standard error.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

4.2. Effect of PTSD on social support

In terms of the prospective effect of PTSD on social support, the findings supported the proposal, as described in the introduction, that psychological distress might erode and compromise social support resources (e.g., social selection theory; Johnson et al., 1999). Compared

with social causation theory which postulated how social support protected against PTSD, social selection theory was less investigated and yielded inconsistent findings. This result echoed some studies (King et al., 2006; Lui, Glynn, & Shetty, 2009; Nickerson et al., 2017) but failed to support others (Barnes, Nickerson, Adler, & Litz, 2013; Platt et al., 2016; Sumner, Wong, Schetter, Myers, & Rodriguez, 2012). We extended literature not only by examining prospective effects of PTSD on social support for the first time, but also by examining them while controlling for prior levels of social support.

This finding is not hard to understand given that PTSD was often associated with interpersonal difficulties (King et al., 2006). It could be that trauma distorted the individuals' perception of their available support, leading them to be less receptive of other's help, or that symptoms of PTSD estranged others in the social network (King et al., 2006). Their lack of social support seeking might also result from PTSD symptoms (e.g., withdrawal, angry outburst, avoiding, negative cognition and emotions). It could also be related to the distress of living with or caring for individuals with psychiatric disorders (Carter et al., 2016).That is why partners of veterans often reported high levels of burden and distress (meta-analysis by Lambert, Engh, Hasbun, & Holzer, 2012), which led to familial discord and reduced intention to provide further care and support. Literature also documented that mobilization of social support was routinely followed by declines in that support (Kaniasty & Norris, 2004).

The erosion of social support resources among PTSD victims carried important clinical implication for their family members and therapists. It is the most vulnerable people that are in need of the most care and warmth. Members of social network, upon acknowledging this aspect, are expected to reinforce, or at least resume, support toward those showing severe posttraumatic symptoms. Manifestation of these symptoms is implying care needed rather than trouble caused.

4.3. Moderator analyses

These two effects held across most study characteristics examined in moderator analyses with the exception of gender, time lag, publication year and source of support.

With regard to the gender effects, counterintuitive though they may seem, the results are to some degree consistent with another meta-analysis which found general benefits of social support on depression across gender (Rueger et al., 2016), suggesting that social support for men was as important as it was for women. It is also noteworthy that even though women usually possess larger social networks and emotionally intimate relationships than men, they are more prone to psychiatric disorders (Berry & Welsh, 2010). One possible explanation is that social capital carries with it not only privileges but also demands (Ferlander, 2007) and that women are less able to transform available social capital to actual benefits (Osborne, Ziersch, & Baum, 2008). Following a trauma it may be that these effects are magnified, due to the shame that is associated with rape and domestic violence (Vidal & Petrak, 2007).

The importance of social support was demonstrated across a range of types of support. It has been proposed that perception of support (especially emotional support) availability was more consistently buffering than actual helping behaviors received (Christens, Speer, & Peterson, 2011; Chu et al., 2010) and that the diversity of social network was more protective against PTSD than perceptions of available support (Platt, Keyes, & Koenen, 2014). However, in the present study little evidence was found to support this. One possible reason is that although the majority of scales ($k = 36$; e.g., MSPSS) measured perceived support exclusively, many scales ($k = 10$; e.g., CSS) measured multi-layer (including perceived, received and embedded) support. The overlap made it difficult to test the "pure" contribution of a specific type of support. Another important factor was related to the measurement validity. It has been proposed that received support was often context-oriented and perceived support often self-biased (Wethington & Kessler, 1986).

In terms of the sources of social support, this study found that PTSD predicted reduced support from closer connections than from distant or other sources. The distress and burden felt by families and partners due to day-to-day interaction may offer possible explanations. For members of distal support system (e.g., relatives), however, maintaining occasional support is relatively less energy- or time-consuming and thus easier. With regard to the role of social support, the present study found that the buffering effect of support held across a range of social sources, further indicating the robustness of the results. In literature, findings were inconclusive in that while some studies reported family and peer support as the most protective source on mental health (Helsen, Vollebergh, & Meeus, 2000; Rueger et al., 2016), some studies reported that teacher and school support was more protective for children and adolescents than family support (Chu et al., 2010). A full understanding of the effects of different sources of support requires a cross-cultural perspective given that cultural background (individualistic vs collectivistic) may influence the ways individuals perceive or seek social support (Markus & Kitayama, 1991).

Overall, whilst the moderator analyses do provide new information about the relationship variation between the two constructs, more research is needed to examine the strength and stability of the moderation effects with a more fine grained lens.

4.4. Limitations and future directions

This study is the first meta-analysis of the prospective association between social support and PTSD. Although it took into consideration stability effects, and thereby moved one step closer to a causal relationship, it did not necessarily indicate causality because of the possibility that a third variable may explain this link (Fairbairn et al., 2018).

In terms of assessment limitations most of the studies included relied on self-report measures of the constructs. Although the majority of the measures showed good reliability and validity, correlations of the constructs may be inflated due to shared method variance (Sowislo & Orth, 2013) and results of retrospective recollection may be influenced by self-report bias. Future research would benefit from inclusion of multiple measure methods (e.g., observation to measure received support) and diagnostic interviews.

Relatedly, this study did not account for the time since focal trauma because such information was missing from the majority of included studies. This variable is important given that the trajectory of trauma symptoms can vary based on the time of assessment since event. However we did not include this because (a) most of studies focused on posttrauma social support, neglecting aspects that may be present before or during traumatic events (e.g., in the case of complex trauma) (Vogt et al., 2017). It is possible that pre-trauma social support was predictive of perceptions of and reactions to trauma exposure, as was evidenced among Hurricane victims (Chan, Lowe, Weber, & Rhodes, 2015); (b) most of studies did not report how long since trauma PTSD and social support were assessed. Presumably, social support immediately following the trauma may have more effect than when provided long after it. Another assessment issue relates to the averaged coding of (a) correlation coefficients of different time points which may carry different implications based on the trajectory of posttraumatic symptoms; (b) similar sources of social support. Future studies should consider examining the impact of social support at specific time points.

Furthermore, although this review was based on a large dataset, it is possible that more studies would be meta-analyzed if unpublished data other than dissertations or if studies published in languages other than English were collected. Broadening the searching criteria may yield studies in more cross-cultural contexts rather than in predominant Western countries. It would be interesting to compare the effect of social support found in this review with that in Asian countries wherein

cooperation and interrelationship was highly valued (Chen, Leung, Li, & Ou, 2015).

Finally, we were not able to comprehensively address the mechanisms that explain the association between social support and PTSD. Apart from the models outlined in the introduction, it would be interesting to test for other models. For example, in a clinical treatment setting social support might influence PTSD via treatment response. There is evidence that social support was particularly important for better treatment engagement and adherence (Keller, Zoellner, & Feeny, 2010). Therefore, whether process evaluations within intervention for PTSD would yield the same results as the present study remains unknown. We encourage researchers to explore mediating mechanisms of the prospective effects.

5. Conclusions

This meta-analysis provided the first quantitative synthesis of research on the prospective relationship between social support and PTSD. It showed reciprocal significant effects in both directions (i.e., social support- > PTSD and PTSD- > social support), which held across different sample types and research designs. The results suggested that social causation and social selection models were compatible rather than competitive, both of which were needed to understand the complex relationship between social support and PTSD (or maybe general mental health). Although assumptions and evidence about the effect are widespread, the current review advanced the field of stress-distress by providing robust and generalizable support. Building on this finding, future studies can investigate it in more detail (e.g., mediators and moderators).

Role of funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Contributors

Prof. Justin Kenardy brought the research idea, guided and revised the manuscript. Yabing Wang wrote the first draft of the manuscript which was also revised by Prof. Man Cheung Chung. Na Wang and Xiaoxiao Yu assisted in literature search and screen. All authors have approved the final manuscript.

Declarations of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cpr.2021.101998.

References

Adachi, P., & Willoughby, T. (2015). Interpreting effect sizes when controlling for stability effects in longitudinal autoregressive models: Implications for psychological science. European Journal of Developmental Psychology, 12(1), 116–128.

Agaibi, C. E., & Wilson, J. P. (2005). Trauma, PTSD, and resilience: A review of the literature. Trauma, Violence & Abuse, 6(3), 195–216.

Aloe, A. M. (2014). An empirical investigation of partial effect sizes in meta-analysis of correlational data. The Journal of General Psychology, 141(1), 47–64.

Andersen, S. M., & Chen, S. (2002). The relational self: An interpersonal social-cognitive theory. Psychological Review, 109(4), 619–645.

Bandura, A. (2005). The evolution of social cognitive theory. Great minds in management (pp. 9–35).

Banks, D. M., & Weems, C. F. (2014). Family and peer social support and their links to psychological distress among hurricane-exposed minority youth. American Journal of Orthopsychiatry, 84(4), 341–352. https://doi.org/10.1037/ort0000006.

Baranyi, A., Leithgöb, O., Kreiner, B., Tanzer, K., Ehrlich, G., Hofer, H. P., & Rothenhäusler, H.-B. (2010). Relationship between posttraumatic stress disorder, quality of life, social support, and affective and dissociative status in severely injured accident victims 12 months after trauma. Psychosomatics, 51(3), 237–247.

Barnes, J., Nickerson, A., Adler, A. B., & Litz, B. T. (2013). Perceived military organizational support and peacekeeper distress: A longitudinal investigation. Psychological Services, 10(2), 177–185.

Barrera, M., Jr. (1986). Distinctions between social support concepts, measures, and models. American Journal of Community Psychology, 14(4), 413–445.

Berry, H. L., & Welsh, J. A. (2010). Social capital and health in Australia: An overview from the household, income and labour dynamics in Australia survey. Social Science & Medicine, 70(4), 588–596.

Bowlby, J. (1969). Attachment and loss: volume I: attachment. London: The Hogarth Press and the Institute of Psycho-Analysis.

Bowlby, J. (1973). Attachment and loss: Vol. 2. Separation: Anxiety and anger. London: Hogarth Press.

Bronfenbrenner, U. (1979). The ecology of human development. Cambridge: Harvard university press.

Bronfenbrenner, U. (2005). Making human beings human: Bioecological perspectives on human development. Thousand Oaks: Sage.

Brown, R. T., Madan-Swain, A., & Lambert, R. (2003). Posttraumatic stress symptoms in adolescent survivors of childhood cancer and their mothers. Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies, 16(4), 309–318.

Cable, N., Bartley, M., Chandola, T., & Sacker, A. (2013). Friends are equally important to men and women, but family matters more for men's well-being. Journal of Epidemiology and Community Health, 67(2), 166–171.

Carter, S. P., DiMauro, J., Renshaw, K. D., Curby, T. W., Babson, K. A., & Bonn-Miller, M. O. (2016). Longitudinal associations of friend-based social support and PTSD symptomatology during a cannabis cessation attempt. Journal of Anxiety Disorders, 38, 62–67. https://doi.org/10.1016/j.janxdis.2016.01.008.

Chan, C. S., Lowe, S. R., Weber, E., & Rhodes, J. E. (2015). The contribution of pre- and postdisaster social support to short-and long-term mental health after Hurricanes Katrina: A longitudinal study of low-income survivors. Social Science & Medicine, 138, 38–43.

Chen, T., Leung, K., Li, F., & Ou, Z. (2015). Interpersonal harmony and creativity in China. Journal of Organizational Behavior, 36, 648–672.

Christens, B. D., Speer, P. W., & Peterson, N. A. (2011). Social class as moderator of the relationship between (dis) empowering processes and psychological empowerment. Journal of Community Psychology, 39(2), 170–182.

Chu, P. S., Saucier, D. A., & Hafner, E. (2010). Meta-analysis of the relationships between social support and well-being in children and adolescents. Journal of Social and Clinical Psychology, 29(6), 624–645.

Cohen, P., West, S. G., & Aiken, L. S. (2013). Applied multiple regression/correlation analysis for the behavioral sciences. London: Taylor & Francis.

Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. M. (1985). Measuring the functional components of social support. In S., I. G. (Ed.), et al., Social support: Theory, research and applications (pp. 73–94). Dordrecht, the Netherlands: Springer.

Cohen, S., Underwood, L. G., & Gottlieb, B. H. (2000). Social support measurement and intervention: A guide for health and social scientists. New York: Oxford University Press.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. Psychological Bulletin, 98(2), 310–357.

Dirkzwager, A. J., Bramsen, I., & Van Der Ploeg, H. M. (2003). Social support, coping, life events, and posttraumatic stress symptoms among former peacekeepers: A prospective study. Personality and Individual Differences, 34(8), 1545–1559.

Dodson, T. S., & Beck, J. G. (2017). Posttraumatic stress disorder symptoms and attitudes about social support: Does shame matter?. Journal of Anxiety Disorders, 47, 106–113.

Duax, J. M., Bohnert, K. M., Rauch, S. A. M., & Defever, A. M. (2014). Posttraumatic stress diorder symptoms, levels of social support, and emotional hiding in returning veterans. Journal of Rehabilitation Research and Development, 51(4), 571–579.

Dworkin, E. R., Ojalehto, H., Bedard-Gilligan, M. A., Cadigan, J. M., & Kaysen, D. (2018). Social support predicts reductions in PTSD symptoms when substances are not used to cope: A longitudinal study of sexual assault survivors. Journal of Affective Disorders, 229, 135–140.

Eisenberger, R., Fasolo, P., & Davis-LaMastro, V. (1990). Perceived organizational support and employee diligence, commitment, and innovation. Journal of Applied Psychology, 75(1), 51–59.

Fairbairn, C. E., Briley, D. A., Kang, D., Fraley, R. C., Hankin, B. L., & Ariss, T. (2018). A meta-analysis of longitudinal associations between substance use and interpersonal attachment security. Psychological Bulletin, 144(5), 532–555.

Ferlander, S. (2007). The importance of different forms of social capital for health. Acta sociologica, 50(2), 115–128.

Foa, E. B., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: The posttraumatic diagnostic scale. Psychological Assessment, 9, 445–451.

van Geel, M., Goemans, A., Zwaanswijk, W., Gini, G., & Vedder, P. (2018). Does peer victimization predict low self-esteem, or does low self-esteem predict peer

victimization? Meta-analyses on longitudinal studies. Developmental Review, 49, 31–40.
Halbesleben, J. R. (2006). Sources of social support and burnout: A meta-analytic test of the conservation of resources model. Journal of Applied Psychology, 91 (5), 1134–1145.
Harris, M. A., & Orth, U. (2019). The link between self-esteem and social relationships: A meta-analysis of longitudinal studies. Journal of Personality and Social Psychology.
Haslam, C., Jetten, J., Cruwys, T., Dingle, G., & Haslam, S. A. (2018). The new psychology of health: Unlocking the social cure. Florence: Routledge.
Heaney, C. A., & Israel, B. A. (2008). Social networks and social support. In Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.), Health behavior and health education: Theory, research, and practice (4, pp. 189–210). CA: Johon Wiley & Sons.
Helsen, M., Vollebergh, W., & Meeus, W. (2000). Social support from parents and friends and emotional problems in adolescence. Journal of Youth and Adolescence, 29, 319–335.
Hobfoll, S. E. (1988). The ecology of stress. New York: Hemisphere.
Hobfoll, S. E., Freedy, J., Lane, C., & Geller, P. (1990). Conservation of social resources: Social support resource theory. Journal of Social and Personal Relationships, 7(4), 465–478.
Hobfoll, S. E., & Stokes, J. P. (1988). The process and mechanics of social support. In Duck, S. W., Hay, D. F., Hobfoll, S. E., Ickes, B., & Montgomery, B. (Eds.), The handbook of research in personal relationships (pp. 495–517). London: Wiley.
Horowitz, M. (1976). stress response syndrome. Northvale, NJ: Jason Aronson.
Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of event scale: A measure of subjective stress. Psychosomatic Medicine, 41(3), 209–218.
Hunter, J. E., & Schmidt, F. L. (2004). Methods of meta-analysis: Correcting error and bias in research findings. Thousand Oaks: Sage.
Jacobsen, P. B., Sadler, I. J., Booth-Jones, M., Soety, E., Weitzner, M. A., & Fields, K. K. (2002). Predictors of posttraumatic stress disorder symptomatology following bone marrow transplantation for cancer. Journal of Consulting and Clinical Psychology, 70(1), 235–240.
Johansen, V. A., Wahl, A. K., Eilertsen, D. E., & Weisaeth, L. (2007). Prevalence and predictors of post-traumatic stress disorder (PTSD) in physically injured victims of non-domestic violence: A longitudinal study. Journal of Consulting and Clinical Psychology, 70(1), 235–240.
Johnson, E. M., & Possemato, K. (2019). Correlates and predictors of mental health care utilization for veterans with PTSD: A systematic review. Psychological Trauma Theory Research Practice and Policy, 11(8), 851–860.
Johnson, J. G., Cohen, P., Dohrenwend, B. P., Link, B. G., & Brook, J. S. (1999). A longitudinal investigation of social causation and social selection processes involved in the association between socioeconomic status and psychiatric disorders. Journal of Abnormal Psychology, 108(3), 490–499.
Joseph, S., Andrews, B., Williams, R., & Yule, W. (1992). Crisis support and psychiatric symptomatology in adult survivors of the Jupiter cruise ship disaster. British Journal of Clinical Psychology, 31(1), 63–73.
Joseph, S., Williams, R., & Yule, W. (1997). Understanding post-traumatic stress: A psychosocial perspective on PTSD and treatment. Chichester, England: Wiley.
Kaniasty, K., & Norris, F. H. (2004). Social support in the aftermath of disasters, catastrophes, and acts of terrorism: Altruistic, overwhelmed, uncertain, antagonistic, and patriotic communities. In Ursano, R., Norwood, A., & Fullerton, C. (Eds.), Bioterrorism: Psychological and public health interventions (3, pp. 200–229). Cambridge: Cambridge University Press.
Kaniasty, K., & Norris, F. H. (2008). Longitudinal linkages between perceived social support and posttraumatic stress symptoms: Sequential roles of social causation and social selection. Journal of Traumatic Stress, 21(3), 274–281.
Kaniasty, K., & Norris, F. H. (2009). Distinctions that matter: Received social support, perceived social support, and social embeddedness after disasters. In Neria, Y., Galea, S., & Norris, F. H. (Eds.), Mental health and disasters (Vol. 2009, pp. 175–200). Cambridge: Cambridge University Press.
Keller, S. M., Zoellner, L. A., & Feeny, N. C. (2010). Understanding factors associated with early therapeutic alliance in PTSD treatment: Adherence, childhood sexual abuse history, and social support. Journal of Consulting and Clinical Psychology, 78(6), 974–979.
King, D., King, L., & Vogt, D. S. (2003). Manual for the Deployment Risk and Resilience Inventory (DRRI): A collection of measures for studying deployment-related experiences of military veterans. Boston, MA: National Center for PTSD.
King, D. W., Taft, C., King, L. A., Hammond, C., & Stone, E. R. (2006). Directionality of the association between social support and posttraumatic stress disorder: A longitudinal investigation. Journal of Applied Social Psychology, 36(12), 2980–2992.
Kuterovac-Jagodić, G. (2003). Posttraumatic stress symptoms in Croatian children exposed to war: A prospective study. Journal of Clinical Psychology, 59(1), 9–25.
Lambert, J. E., Engh, R., Hasbun, A., & Holzer, J. (2012). Impact of posttraumatic stress disorder on the relationship quality and psychological distress of intimate partners: A meta-analytic review. Journal of Family Psychology, 26 (5), 729–737.
Lee, J.-S. (2019). Perceived social support functions as a resilience in buffering the impact of trauma exposure on PTSD symptoms via intrusive rumination and entrapment in firefighters. PLoS One, 14(8).
Lepore, S. J. (2001). A social–cognitive processing model of emotional adjustment to cancer. In Baum, A., & Andersen, B. L. (Eds.), Psychosocial interventions for cancer (pp. 99–116). Washington, DC: American Psychological Association.
Lipsey, M. W., & Wilson, D. B. (2001). Practical meta-analysis. New York: Sage Publications, Inc..
Locascio, J. J. (1982). The cross-lagged correlation technique: Reconsideration in terms of exploratory utility, assumption specification and robustness. Educational and Psychological Measurement, 42(4), 1023–1036.
Long, K. A., Lehmann, V., Gerhardt, C. A., Carpenter, A. L., Marsland, A. L., & Alderfer, M. A. (2018). Psychosocial functioning and risk factors among siblings of children with cancer: An updated systematic review. Psycho-oncology, 27(6), 1467–1479.
Lui, A., Glynn, S., & Shetty, V. (2009). The interplay of perceived social support and posttraumatic psychological distress following orofacial injury. Journal of Nervous and Mental Disorders, 197(9), 639–645. https://doi.org/10.1097/NMD.0b013e3181b3b127.
Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. Psychological Review, 98, 224–253.
Martinez, A., Israelski, D., Walker, C., & Koopman, C. (2002). Posttraumatic stress disorder in women attending human immunodeficiency virus outpatient clinics. AIDS Patient Care and STDs, 16(6), 283–291.
Meyer, E. C., Zimering, R., Daly, E., Knight, J., Kamholz, B. W., & Gulliver, S. B. (2012). Predictors of posttraumatic stress disorder and other psychological symptoms in trauma-exposed firefighters. Psychological Services, 9(1), 1.
Neria, Y., Gross, R., Litz, B., Maguen, S., Insel, B., Seirmarco, G., … Cook, J. (2007). Prevalence and psychological correlates of complicated grief among bereaved adults 2.5–3.5 years after September 11th attacks. Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies, 20(3), 251–262.
Neria, Y., Nandi, A., & Galea, S. (2008). Post-traumatic stress disorder following disasters: A systematic review. Psychological Medicine, 38(4), 467–480.
Nickerson, A., Creamer, M., Forbes, D., McFarlane, A., O'donnell, M., Silove, D., … Bryant, R. (2017). The longitudinal relationship between post-traumatic stress disorder and perceived social support in survivors of traumatic injury. Psychological Medicine, 47(1), 115–126.
Orwin, R. G. (1983). A fail-safe N for effect size in meta-analysis. Journal of Educational Statistics, 8(2), 157–159.
Osborne, K., Ziersch, A., & Baum, F. (2008). Who participates? Socioeconomic factors associated with women's participation in voluntary groups. Australian Journal of Social Issues, 43(1), 103–122.
Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. Psychological Bulletin, 129(1), 52–73.
Pennebaker, J. W., & Keough, K. A. (1999). Revealing, organizing, and reorganizing the self in response to stress and emotion. In Ashmore, R., & Jussim, L. (Eds.), Self and social identity (II, pp. 101–121). New York: Oxford.
Phillips, C. J., LeardMann, C. A., Gumbs, G. R., & Smith, B. (2010). Risk factors for posttraumatic stress disorder among deployed US male marines. BMC Psychiatry, 10(1), 52.
Pinto, R. J., Morgado, D., Reis, S., Monteiro, R., Levendosky, A., & Jongenelen, I. (2017). When social support is not enough: Trauma and PTSD symptoms in a risk-sample of adolescents. Child Abuse & Neglect, 72, 110–119.
Platt, J., Keyes, K. M., & Koenen, K. C. (2014). Size of the social network versus quality of social support: Which is more protective against PTSD?. Social Psychiatry and Psychiatric Epidemiology, 49(8), 1279–1286.
Platt, J. M., Lowe, S. R., Galea, S., Norris, F. H., & Koenen, K. C. (2016). A longitudinal study of the bidirectional relationship between social support and posttraumatic stress following a natural disaster. Journal of Traumatic Stress, 29(3), 205–213.
Raudenbush, S. W. (2009). Analyzing effect sizes: Random-effects models. In Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.), The handbook of research synthesis and meta-analysis (2, pp. 295–316). New York, NY: Russel Sage Foundation.
Reijntjes, A., Kamphuis, J. H., Prinzie, P., & Telch, M. J. (2010). Peer victimization and internalizing problems in children: A meta-analysis of longitudinal studies. Child Abuse & Neglect, 34(4), 244–252.
Robinaugh, D. J., Marques, L., Traeger, L. N., Marks, E. H., Sung, S. C., Beck, J. G., … Simon, N. M. (2011). Understanding the relationship of perceived social support to post-trauma cognitions and posttraumatic stress disorder. Journal of Anxiety Disorders, 25(8), 1072–1078.
Rosenthal, R. (1991). Meta-analytic procedures for social research. Beverley Hills, CA: Sage.
Rueger, S. Y., Malecki, C. K., Pyun, Y., Aycock, C., & Coyle, S. (2016). A meta-analytic review of the association between perceived social support and depression in childhood and adolescence. Psychological Bulletin, 142(10), 1017–1067.
Schwarzer, R., & Leppin, A. (1991). Social support and health: A theoretical and empirical overview. Journal of Social and Personal Relationships, 8(1), 99–127.
Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. Psychological Bulletin, 139 (1), 213–240.
Sumner, L. A., Wong, L., Schetter, C. D., Myers, H. F., & Rodriguez, M. (2012). Predictors of posttraumatic stress disorder symptoms among low-income Latinas during pregnancy and postpartum. Psychological Trauma Theory Research Practice and Policy, 4(2), 196–203.
Sutton, A. J. (2009). Publication bias. In Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.), The handbook of research synthesis and meta-analysis (2, pp.

435–452). New York, NY: Russel Sage Foundation.
Thoits, P. A. (1986). Social support as coping assistance. Journal of Consulting and Clinical Psychology, 54(4), 416–423.
Thoits, P. A. (2010). Stress and health: Major findings and policy implications. Journal of Health and Social Behavior, 51(1_suppl), S41–S53.
Tough, H., Siegrist, J., & Fekete, C. (2017). Social relationships, mental health and wellbeing in physical disability: A systematic review. BMC Public Health, 17 (1), 414.
Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. Clinical Psychology Review, 32(2), 122–138.
Uchida, Y., Kitayama, S., Mesquita, B., Reyes, J. A. S., & Morling, B. (2008). Is perceived emotional support beneficial? Well-being and health in independent and interdependent cultures. Personality and Social Psychology Bulletin, 34(6), 741–754.
Vidal, M. E., & Petrak, J. (2007). Shame and adult sexual assault: A study with a group of female survivors recruited from an East London population. Sexual and Relationship Therapy, 22(2), 159–171.
Vogt, D., Erbes, C. R., & Polusny, M. A. (2017). Role of social context in posttraumatic stress disorder (PTSD). Current Opinion in Psychology, 14, 138–142.
Volgin, R., & Bates, G. (2016). Attachment and social support as predictors of posttraumatic stress and posttraumatic growth. Traumatology, 22(3), 184–191.
Wang, H. H., Wu, S. Z., & Liu, Y. Y. (2003). Association between social support and health outcomes: A meta-analysis. The Kaohsiung Journal of Medical Sciences, 19(7), 345–350.
Weathers, F. W., Litz, B., Herman, D. S., Huska, J. A., & Keane, T. M. (1993). The PTSD checklist: Reliability, validity, & diagnostic utility. Boston, MA: National Center for Posttraumatic Stress Disorder.
Wethington, E., & Kessler, R. C. (1986). Perceived support, received support, and adjustment to stressful life events. Journal of Health and Social Behavior, 71 (1), 78–89.
Wilson, L. C., & Scarpa, A. (2014). Childhood abuse, perceived social support, and posttraumatic stress symptoms: A moderation model. Psychological Trauma Theory Research Practice and Policy, 6(5), 512–518.
Wright, B. K., Kelsall, H. L., Sim, M. R., Clarke, D. M., & Creamer, M. C. (2013). Support mechanisms and vulnerabilities in relation to PTSD in veterans of the Gulf War, Iraq War, and Afghanistan deployments: A systematic review. Journal of Traumatic Stress, 26(3), 310–318.
Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. Journal of Personality Assessment, 52, 30–41.

Yabing Wang got her BA in English Linguistics and Literature (Dalian University of Foreign Languages, China), MA in English Pedagogy (Shanghai International Studies University, China) and PhD in Educational Psychology (Chinese University of Hong Kong).She is now a lecturer in the School of English Education, Guangdong University of Foreign Studies.

Man Cheung Chung earned his BA in Psychology and Sociology (University of Guelph, Canada), PhD in Psychology (University of Sheffield, UK) and PhD in Philosophy (University of Durham, UK). He is Associate Fellow of the British Psychological Society, a Chartered Scientist and Psychologist. He is currently Professor of Psychology at the Chinese University of Hong Kong.

Na Wang earned her BA in English (Central China Normal University, China) and MA in Educational Psychology (The Chinese University of Hong Kong, HK). She is currently pursuing her PhD in Educational Psychology at The Chinese University of Hong Kong.

Xiaoxiao Yu got her BA in English Education (Changchun Normal University, China) and MA in Teaching Chinese to Speakers of Other Languages (MTCSOL) from Sun Yat-sen University, China. She has over 10 years of teaching experience and is now a lecturer in the School of Foreign Languages in Guangzhou College, South China University of Technology.

Justin Kenardy got his BS with honors and PhD in the University and Queensland. He is known for his interdisciplinary research work on the psychological aspects of traumatic injury, which is situated at the intersection of psychology, mental health, and physical health including the development and application of preventative, integrative and novel intervention approaches. He is a research, practice and teaching innovator, He provides service to the profession of psychology through his numerous roles in the Australian Psychological Society, to the field of research through his roles with Queensland Health, the NHMRC, and ISTSS, and to the community as a non-executive director for Synapse. He is a Fellow of the Academy of Social Sciences Australia, Fellow of the Australian Psychological Society, and recipient of both the Australian Psychological Society's President's Award for Distinguished Contribution to Psychology and the Ian Campbell Prize for Outstanding Contribution to Clinical Psychology.