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ORIGINAL PAPER

Is Self-compassion Associated with Sleep Quality? A Meta-analysis

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Abstract

Objectives Prior research has found that self-compassion is associated with a range of health and well-being outcomes, but the specific association between self-compassion and sleep quality remains poorly understood. The purpose of this study is to respond to this issue through conducting a meta-analysis to quantify the relationship between self-compassion and sleep quality.

Methods Systematic literature searches were conducted using the PsychInfo, Embase and Medline electronic databases to identify studies reporting on the relationship between self-compassion and sleep quality. Random effects meta-analysis was used to synthesise results.

Results Seventeen independent studies from 15 publications met criteria for inclusion in this review. All studies included self-reported sleep quality measures. No study reported objective measurements of sleep quality. Meta-analysis revealed evidence of a significant association whereby those with higher self-compassion reported fewer sleep problems $r = -0.32$, 95%CI [−.36, −.28]. In a subgroup ($n = 6$) of studies that delineated the positively and negatively worded items of the self-compassion scale (termed positive self-compassion and self-coldness, respectively), self-coldness was more strongly associated with poor sleep quality $r = 0.36$, 95%CI [.18, .52] than positive self-compassion $r = -0.15$, 95%CI [−.24, −.05].

Conclusions Our meta-analysis found that self-compassion is associated with self-reported sleep quality. Future research is needed to investigate directions of causality and to consider if self-compassion-based interventions might be effective in improving sleep quality.

Keywords Self-compassion · Sleep · Meta-analysis · Well-being · Self-care

Up to 50% of people experience persistent sleep disturbances, including difficulties initiating and maintaining sleep (LeBlanc et al. 2007; Walsh and Üstün 1999). Sleep disturbances are associated with a range of poor health outcomes, including increased systemic inflammation (Irwin et al. 2016), cognitive impairment (Banks and Dinges 2007), obesity (Cappuccio et al. 2008) and increased risk of death (Parthasarathy et al. 2015). Poor sleep quality also compromises psychological health, impacting daytime functioning (Morin and Benca 2012) and increasing the risk of developing mental disorders including depression, anxiety and substance use disorders (Hertenstein et al. 2019). While there is evidence that pharmacological treatments can be efficacious in treating sleep problems, they come with significant side effects, including risk of addiction and daytime drowsiness (Qaseem et al. 2016). Thus, there is a need to better understand modifiable psychological factors associated with a good night's sleep, indexed by sleep quality.

Subjective appraisals of sleep quality (such as sleep diaries and self-report questionnaires) do not correlate strongly with objective measures (such as actigraphy and polysomnography), with the former more strongly linked to psychological well-being and quality of life (Baker et al. 2018; Bei et al. 2015). Although numerous validated measures of subjective sleep quality exist, one frequently used scale is the Pittsburgh Sleep Quality Index (PSQI; Buysse et al. 1989).

Self-compassion is a promising psychological resource associated with a range of health behaviours, and emerging work

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shows that it is also relevant to sleep quality (Hu et al. 2018; Sirois et al. 2015). Self-compassion can be defined as a healthy way of relating towards the self that is based on self-kindness, mindful awareness and awareness of common humanity as opposed to self-criticism, over-identification with experiences and a sense of isolation (Neff 2003a). Self-compassion becomes salient during difficulties and shapes how an individual relates towards their suffering (Neff 2003a). Self-compassion is positively associated with a number of healthy behaviours including physical activity, healthy diet and medical adherence (Sirois and Hirsch 2019; Sirois et al. 2015; Terry and Leary 2011). Emotion regulation, defined as the process by which an individual shapes the emotions they experience, as well as when and how they express these emotions (Gross 1998), is thought to be a key mechanism by which self-compassion facilitates healthy behaviours, as self-compassion both ameliorates negative and enhances positive emotional states (Sirois et al. 2015; Terry and Leary 2011).

In the context of sleep, self-compassion might shape how an individual relates to a sleep disturbance, daily life stressors or ruminative thoughts. For example, while self-compassion might support night-time relaxation, self-critical thoughts could fuel restlessness and agitation and thus perpetuate an even poorer night's sleep (Butz and Stahlberg 2018; Hu et al. 2018). In support of this hypothesis, a number of recent studies have investigated the association between self-compassion and sleep quality and found a significant association (Butz and Stahlberg 2018; Hu et al. 2018; Kemper et al. 2015). For instance, Kemper and colleagues surveyed 213 trainee and professional health clinicians and found that self-compassion was associated with lower ratings of sleep disturbance, as measured by the Patient Reported Outcomes Measurement Information System (PROMIS), though the relationship was weaker than the association between sleep quality and psychological symptoms of distress (Kemper et al. 2015). Emerging work shows that self-compassion may play a protective role in ameliorating the negative effect of stressors on sleep quality (Butz and Stahlberg 2018; Hu et al. 2018). Thus, self-compassion may have a direct relationship with sleep quality, and concurrently dampen the impact that other important factors such as perceived stress, rumination and anxiety have on sleep quality.

Importantly, emerging research also indicates that brief self-compassion-based activities might lead to improvements in sleep quality. For example, in an experiment conducted by Butz and Stahlberg (2018), 143 college students were asked to think about personal problems for 3 min and were then randomised to complete either (i) a 20-min brief self-compassion meditation, (ii) a self-compassionate writing task or (iii) no instruction control (Butz and Stahlberg 2018). Participants then reported on their sleep quality the following day via the Sleep Problems Questionnaire (Jenkins et al. 1988). The authors found that those randomised to either of the self-compassion conditions reported significantly better sleep quality than the control condition, indicating that a brief self-compassion induction can contribute to improved sleep quality. This finding is important, because it shows that self-compassion is amenable to change and that improved self-compassion may facilitate better subjective sleep quality.

It is also possible that a bidirectional relationship exists between self-compassion and sleep quality. Sleep has been shown to have a complex and bidirectional relationship with other psychological factors such as depression (Baker et al. 2018). For instance, a recent observational study found that maladaptive emotion regulation (represented by worry and rumination scores) partially accounted for the relationship between sleep quality and subsequent depressive symptoms (O'Leary et al. 2017). Thus, it is conceivable that poor sleep quality may also reduce levels of self-compassion over time.

A distinction has been made between the positively and negatively worded items of the self-compassion scale (Brenner et al. 2017). Factor analyses have revealed that these items represent discrete latent factors, termed self-compassion and self-coldness, respectively (Brenner et al. 2017; Brown et al. 2016; Körner et al. 2015). Self-coldness entails being aggressive or harsh towards oneself in moments of failure or suffering (Brenner et al. 2017) (e.g. measured with the item: "I'm disapproving and judgmental about my own flaws and inadequacies"). Self-coldness appears to have more robust associations with psychological symptom measures such as depression and anxiety (Brenner et al. 2017; Körner et al. 2015), whereas positive self-compassion may be more strongly related to indices of positive well-being such as ego integrity (Phillips and Ferguson 2013). Since the majority of self-reported sleep measures, such as the Pittsburgh Sleep Quality Index (PSQI), measure symptoms of sleep disturbance, it is plausible that self-coldness may be a stronger predictor than self-compassion.

Despite emerging research associating self-compassion with less sleep disturbance, no meta-analysis has synthesised results to estimate the overall strength and direction of the relationship between self-compassion and sleep quality. The extent to which self-compassion and self-coldness distinctly relate to sleep disturbances likewise remains unclear. Hence, we aimed to review and quantitatively synthesise the research that reports on the association between self-compassion and sleep quality.

Method

Search Strategy and Selection Criteria

This review was guided by the PRISMA guidelines and pre-registered on the PROSPERO database (registration # CRD42019142128). Comprehensive searches were

conducted using three electronic databases: PsycInfo, EMBASE and Medline. As self-compassion and sleep quality are a relatively new field of research, we aimed to be broad in our search strategy to identify all published studies in the area. Thus, the search term "self-compassion" was paired with the word "sleep", and no limits were placed on search results at the database search phase. Both peer-review published and grey literature (dissertations and conference abstracts) were eligible, to reduce the risk of publication bias in results. After removing duplicates, all results were then screened manually by two independent reviewers (LB and EH) to identify studies published in English that report data on both self-compassion and sleep quality.

Studies were considered for inclusion if they reported quantitative data on both sleep (either self-report or objective physiological data) and self-compassion (self-report) measured with psychometrically validated scales. Studies were eligible for inclusion if their sample had a mean age 18 or over, and studies of children or adolescent samples with a mean age under 18 were excluded. Because this review focused on the relationship between sleep quality and self-compassion, an inclusion criterion was that the association was reported either as a correlation coefficient (e.g. Pearson's *r*) or in-text description. To be eligible for inclusion in the meta-analysis, a reported correlation coefficient and the corresponding sample size was required. Authors were contacted to obtain this information if it was not reported. Both cross-sectional and interventional studies were eligible for inclusion. For the intervention studies, we obtained the overall baseline correlation between self-compassion and sleep quality pooled across conditions (e.g. pooled across intervention and control groups).

Data Extraction

Data on the year, place of publication, sample size, study design (cross-sectional or intervention), participant characteristics (study setting, proportion female and mean age) and outcome measures were extracted for all studies by two independent judges (LB and EH) with excellent reliability ($\kappa = .98$). Disagreements were resolved by consensus.

Study Quality Assessment

A modified version of the Agency for Healthcare Research and Quality (AHRQ) methodology checklist was used to assess study quality, in accordance with current recommendations (Zeng et al. 2015). The full AHRQ includes a checklist of 11 items, where each is rated as being present (1/1), absent (0/1) or unclear (.5/1). In our study, three items were removed because they were deemed not relevant to cross-sectional analyses (e.g. "clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained"). Quality was rated independently by two authors (LB and CB) with good inter-rater reliability ($\kappa = .93$) and disagreements were resolved by consensus. Recent work has recommended reporting study quality as a domain matrix rather than aggregating a numerical value of study quality for each included study (O'Connor et al. 2015). While this approach prohibits an analysis modelling between-study variance in outcome based on a numerical value of study quality, the matrix approach is recommended as it offers a more precise representation of the quality of included studies (Losilla et al. 2018).

Statistical Analyses

To synthesise the quantitative data, we performed a random effects meta-analysis using the *Metafor* package in R (Viechtbauer 2010). The correlation coefficient Pearson's *r* was chosen as the effect size measure of the relationship between self-compassion and sleep due to its interpretability and good statistical properties (Rosenthal and DiMatteo 2001).

Most self-reported sleep quality scales (e.g. PSQI) are organised such that a higher score indicates poorer sleep quality. Poor sleep quality incorporates a range of sleep problems, including difficulties getting to sleep (sleep onset latency), night-time awakenings and early rising (Buysse et al. 1989). Only one included study (study 2 of Butz and Stahlberg 2018) used a sleep measure scored in the reverse direction. For uniformity, this was reverse-scored so that in all cases, a higher sleep score indicates a greater level of sleep disturbance.

Pearson's *r* is not normally distributed, and so, all *r* values were transformed to Fisher's *z* to compute an aggregate effect size estimate across studies and were then reconverted back to *r* for interpretation of the final result (Rosenthal and DiMatteo 2001). To investigate inter-study differences in results, heterogeneity was measured using the Q and I^2 statistics. A non-significant Q statistic supports the null hypothesis that the pooled effect size represents a unitary effect. The I^2 statistic describes the percentage of variation between studies due to heterogeneity rather than chance and values of 25%, 50% and 75% representing low, medium and high levels of heterogeneity, respectively (Higgins et al. 2003). Heterogeneity was modelled using a priori determined potential moderators including self-compassion measure (SCS vrs SCS-SF), sleep quality measure and participant mean age. Publication bias was assessed via inspection of the funnel plot, Egger regression and the Kendall rank correlation test.

Results

Study Characteristics

After removing duplicates, our search yielded a total of 69 results and ultimately 17 of these met criteria for inclusion in

this meta-analysis (see PRISMA flow diagram in Fig. 1), with a combined sample size of 1830 participants. Data were derived from 14 peer-reviewed journal articles and one dissertation (Bricklin-Small 2017). Three of the included studies were independent samples reported within one larger journal article (Butz and Stahlberg 2018). Eight studies used a cross-sectional design (Bricklin-Small 2017; Butz and Stahlberg 2018; Hu et al. 2018; Jeste et al. 2019; Kemper et al. 2015; Kim and Ko 2018; Sirois et al. 2019; Vaillancourt and Wasylkiw 2019) and the remaining nine were intervention studies where baseline correlations between self-compassion and sleep quality were analysed (Butz and Stahlberg 2018; Christopher et al. 2018; Dvorakova et al. 2017; Frank et al. 2015; Hwang et al. 2019; Trent et al. 2018, Trent et al. 2019a, b). All studies included only self-reported sleep quality measures, including the Pittsburgh Sleep Quality Index (seven studies), the Insomnia Severity Index (three studies), the Patient Reported Outcomes Measurement Information System (three studies), the Lifestyle Questionnaire (three studies) and the Sleep Problem Scale (one study). Interestingly, 12 of the 15 publications (80%) were published in the past 2 years, demonstrating the rapid and recent expansion of the field. The mean of included study mean ages was 38.70, and the mean percentage of females across included studies was high (66.5%). A summary of included study characteristics can be found in Table 1.

Quantitative Synthesis of Results

A random effects meta-analysis indicated an overall significant association between self-compassion and sleep quality whereby higher self-compassion was associated with fewer disturbing sleep symptoms, $r = -.32$, 95%CI [−.36, −.28], as seen in the forest plot in Fig. 2.

Cochrane's Q revealed no evidence of heterogeneity in effect sizes across studies $q\,(16) = 16.81$, $p = 0.40$. The I^2 statistic was 3.2 (95%CI: [0.00, 68.52]), indicating that an estimated 3.2% of observed variation in effect sizes could be due to heterogeneity rather than chance. Since there was no significant between-study variance in effect sizes, moderator and subgroup analyses were not conducted.

Moderators of Overall Result

Non-significant heterogeneity can still be modelled using meta-regression (Field and Gillett 2010), so we considered if

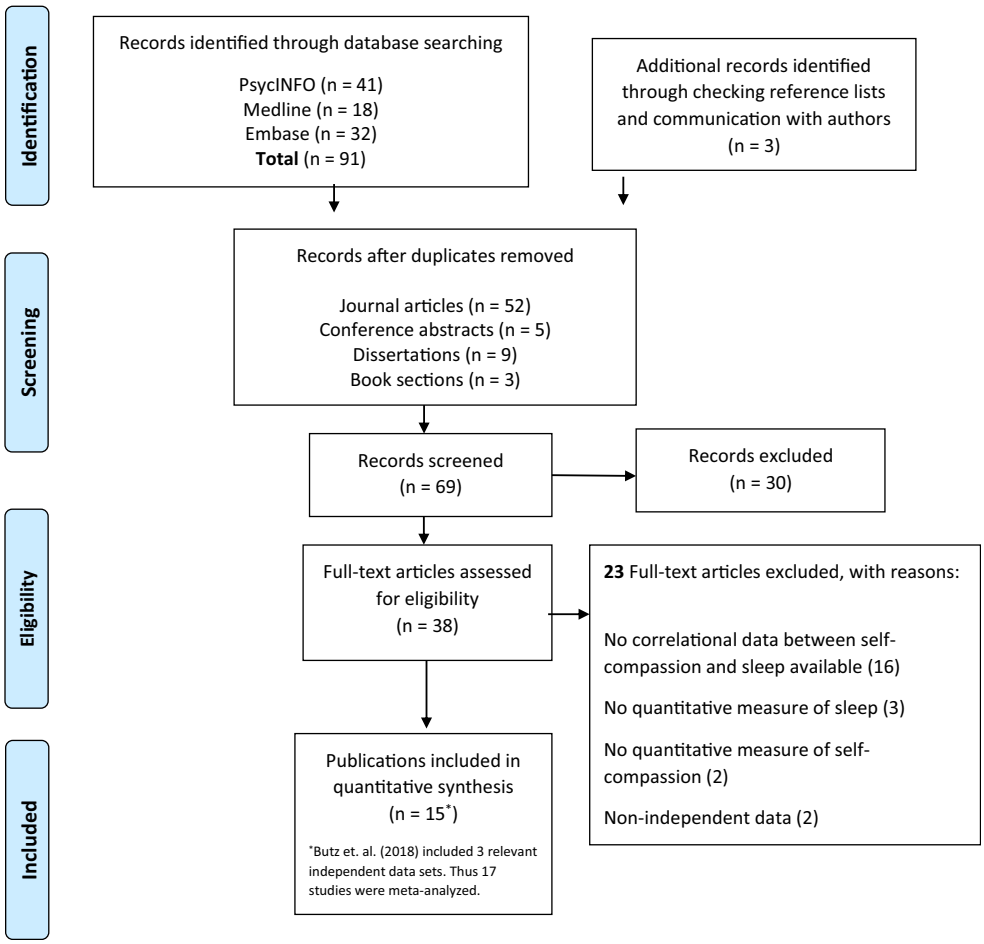

Fig. 1 PRISMA flow diagram of publications included in this meta-analysis

Table 1 Characteristics of included studies

Reference	Country	Sample size	Participants	Mean age	% female	Study design	Sleep measure	Self-compassion measure	Pearson's *r*
Bricklin-Small (2018)	USA	183	College students	20.6	72.7	Cross-sectional	PSQI	SCS	−0.28
Butz and Stahlberg (2018) study 1	Germany	65	College students	21.4	75	Cross-sectional	ISI	SCS-SF	−0.31
Butz and Stahlberg (2018) study 2	Germany	88	College students	22.6	45.5	Intervention	SPS	SCS	−0.35
Butz and Stahlberg (2018) study 3	Germany	30	Day patients with major depressive disorder	42.5	50	Intervention	ISI	SCS-SF	−0.45
Christopher et al. (2018)	USA	61	Law enforcement officers	44	10	Intervention	PROMIS	SCS-SF	−0.34
Dvorakova et al. (2017)	USA	109	College students	18.2	66	Intervention	PSQI	SCS-SF	−0.37
Frank et al. (2015)	USA	31	Educators	40.7	77.8	Intervention	PSQI	SCS	−0.64
Hu et al. (2018)	USA	142	College students	20.07	54.9	Cross-sectional	PSQI	SCS-SF	−0.23
Hwang et al. (2019)	Australia	177	Educators	43	86	Intervention	PSQI	SCS-SF	−0.29
Jeste et al. (2019)	USA	92	Senior housing community residents	83.6	67	Cross-sectional	PROMIS	SCS	−0.32
Kemper et al. (2015)	USA	213	Health professionals	28.3	73	Cross-sectional	PROMIS	SCS-SF	−0.27
Kim and Ko (2018)	Korea	203	Seniors	76.3	65	Cross-sectional	ISI	SCS	−0.45
Sirois et al. (2019)	UK	134	Community sample	30.22	77.4	Cross-sectional	PSQI	SCS	−0.36
Trent et al. (2018)	USA	22	Frontline professionals	42.7	81.8	Intervention	LQ	SCS-SF	−0.22
Trent et al. (2019a)	USA	44	Education professionals	50.5	95.5	Intervention	LQ	SCS-SF	−0.10
Trent et al. (2019b)	USA	78	Frontline professionals	40	75.6	Intervention	LQ	SCS-SF	−0.24
Vaillancourt and Wasylkiw (2019)	Canada	158	Nurses	33	57.6	Cross-sectional	PSQI	SCS	−0.29

USA United States of America, *PSQI* Pittsburgh Sleep Quality Index, *SCS* Self-Compassion Scale, *ISI* Insomnia Severity Index, *SCS-SF* Self-Compassion Scale Short-Form, *SPS* Sleep Problem Scale, *PROMIS* Patient Reported Outcomes Measurement Information System, *UK* United Kingdom, *LQ* Lifestyle Questionnaire

Note: Sample size represents the total sample analysed for which correlational data between self-compassion and sleep was available

between-study differences in results could be explained by measures and participant age. Self-compassion measure (SCS versus SCS-SF) was not a significant moderator of results QM (1) = 3.25, $p = .07$. The non-significant trend favoured the full-length self-compassion scale. Likewise, measure of sleep quality was not a significant moderator QM (4) = 7.00, $p = .14$. Mean age also did not moderate results QM (1) = 2.70, $p = .10$.

Positive Self-compassion Versus Self-coldness

Six studies included information on the distinct effects of positive self-compassion and self-coldness (negative self-compassion). There was a small, significant association between positive self-compassion and sleep quality, $r = -.15$, 95%CI [−.24, −.05]. There was a stronger association between self-coldness and sleep quality, $r = .36$, 95%CI [.18, .52].

Study Quality

The reporting quality of included studies was relatively high (see Table 1). The most common domain that studies failed to report on was discussing participant exclusions from analysis, with only 5 of the 17 included studies providing this information. Another area of concern was that nearly half (8/17) of the studies failed to report on their strategy for handling missing data. Other domains, such as participant response rates (reported by 14/17 studies) and scale reliability coefficients (reported by 15/17 studies), were well documented by the majority of studies.

Risk of Publication Bias

Egger regression and rank correlation test for funnel plot asymmetry were both non-significant in the primary analysis,

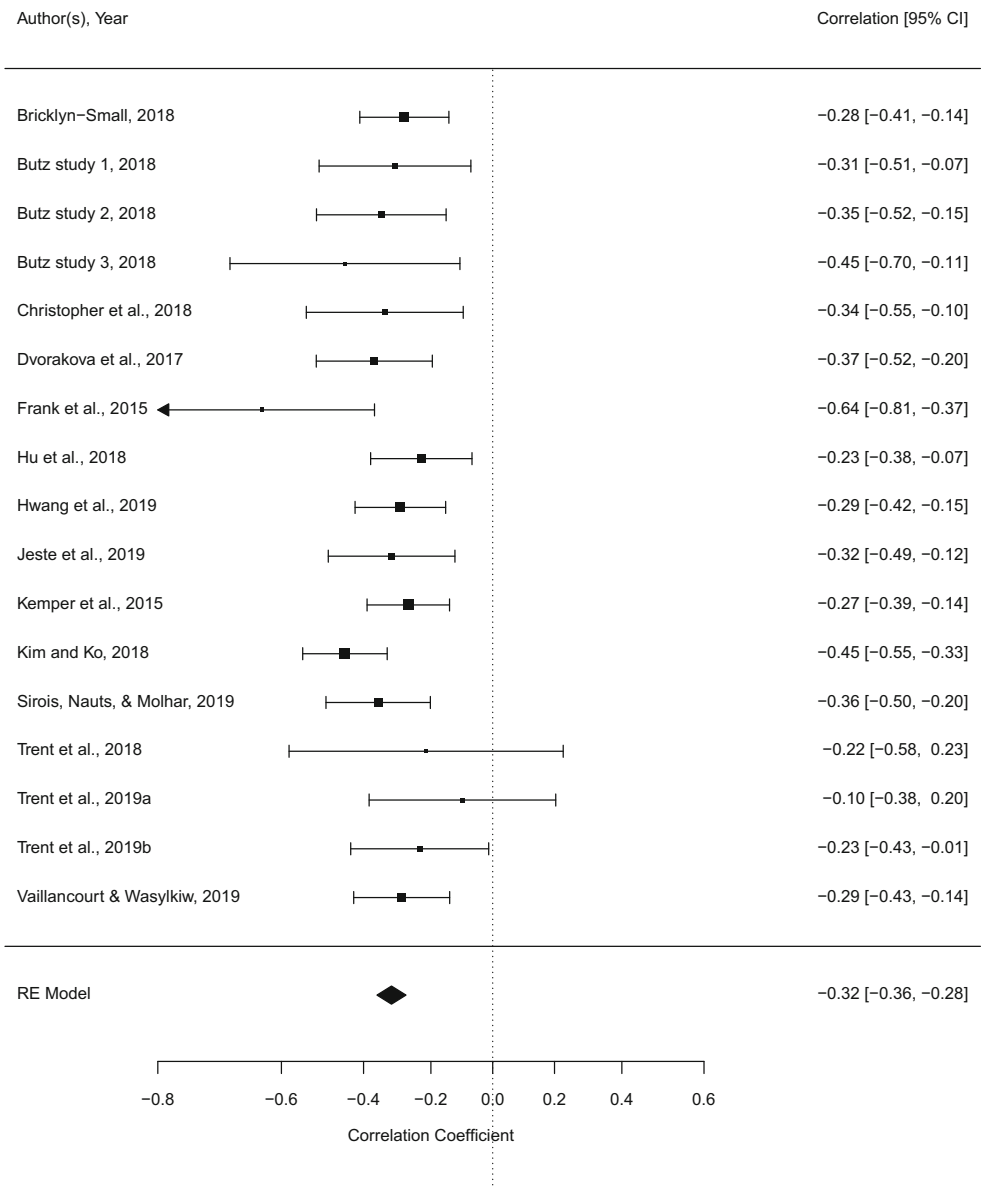

Fig. 2 Forest plot of observed associations between self-compassion and sleep quality in the included studies

indicating no evidence of publication bias ($Z = -.45$, $p = .65$; Kendall $\tau = -.09$, $p = .66$).

Discussion

This meta-analysis investigates the association between self-compassion and sleep quality. In a synthesis of 17 studies, we found evidence of a significant association between self-compassion and subjective sleep quality, whereby high self-compassion is associated with better sleep quality. Our overall effect size estimate ($r = -.32$) indicates that self-compassion and self-reported sleep quality share 32% (i.e. approximately one third) of common variance. When investigating the distinct associations between positive self-compassion and self-coldness and sleep quality, we found that self-coldness was a stronger predictor of sleep quality than positive self-compassion, although both associations were significant.

Self-compassion has been identified as being an emotional regulation strategy that can self-soothe distressing symptoms and reduce general suffering (Diedrich et al. 2016; Finlay-Jones et al. 2015). Sleep disturbances constitute a specific form of distress and can have a substantial negative impact on daily life functioning and overall health (Hertenstein et al. 2019; Morin and Benca 2012). While our findings are correlational and do not point to directions of causality, self-compassion may be a psychological resource that might facilitate greater subjective sleep quality and potentially enable people to relax and downregulate self-critical thoughts and emotions that interfere with good quality sleep. Indeed, early experimental work supports this hypothesis, whereby brief self-compassion exercises before bedtime have been found

to lead to improved sleep quality, as measured by the Sleep Problems Questionnaire (Butz and Stahlberg 2018). It is also possible that the relationship between self-compassion and sleep quality is mediated by other psychological factors such as perceived stress (Hu et al. 2018; Kemper et al. 2015) or rumination (Butz and Stahlberg 2018). In addition, self-compassion has been shown to be linked to an important sleep-related behaviour, bedtime procrastination, partly through the use of cognitive reappraisal, which is itself an adaptive emotion regulation strategy (Sirois et al. 2019).

A growing number of research groups have found that self-coldness exhibits stronger associations with psychopathology, including symptoms of depression, anxiety and stress than positive self-compassion (Brenner et al. 2017; Körner et al. 2015; Muris et al. 2018). Our finding that self-coldness is more strongly associated with sleep quality than positive self-compassion echoes this idea, but the result should be interpreted with caution. First, data on the distinct association between sleep quality and positive self-compassion and self-coldness was only available for a subset of six of our included studies (combined $n = 536$). Within this subset, three studies used validated measures of sleep disturbance (Frank et al. 2015; Kim and Ko 2018; Vaillancourt and Wasylkiw 2019), whereas the remaining studies—conducted by a single research group—used a single-item measure of positive sleep quality (Trent et al. 2018, 2019a, b). Thus, data on the relationship between sleep quality and positive self-compassion compared with self-coldness is quite limited and based on heterogeneous measures of self-reported sleep quality. More research using validated measures of sleep quality is needed to help clarify this issue.

While all studies included in this meta-analysis measured self-compassion with either the 26- or 12-item Self Compassion Scale, there was heterogeneity in measures of sleep quality. The most widely used sleep scale was the 19-item PSQI, used in seven studies. Other scales utilised include the eight-item sleep subscale of the Patient-Reported Outcomes Measurement Information System (PROMIS; $k = 3$), the Insomnia Severity Index (ISI; $k = 3$) and a single-item measure of sleep quality, rated on a four-point scale ($k = 3$). While we found no evidence of between-study heterogeneity in effect sizes, it should be noted that these measures vary in quality and depth. The PSQI is a gold-standard measure incorporating seven components of sleep quality (Buysse et al. 1989). It is validated for both community and clinical populations and has good psychometric properties (Carpenter and Andrykowski 1998). While the PSQI's length could be problematic in intervention-based research where sleep quality is one of a number of secondary outcomes, where feasible, we recommend its use in future studies investigating self-compassion and sleep quality. This will facilitate cross-study comparisons and enable higher quality research in the emerging field of self-compassion and sleep quality.

Limitations and Future Research

We included both cross-sectional and interventional studies in this meta-analysis to estimate the strength of the relationship between self-compassion and sleep quality. However, our study does not investigate directions of causality, and the interesting question of whether self-compassion-related interventions might lead to improvements in sleep quality, meditated through enhanced self-compassion, is a question that remains unanswered. The potential influence of sleep quality on self-compassion also cannot be excluded. We recommend that future randomised controlled trials of self-compassion-based interventions consider including sleep quality as an outcome measure. A recent meta-analysis of mindfulness meditation on sleep quality found evidence of moderate salutary effects of mindfulness compared with nonspecific active controls (Rusch et al. 2019). The construct of self-compassion overlaps with the construct of mindfulness, but it is distinct in that it explicitly includes the facets of common humanity and self-kindness (Neff and Dahm 2015). While the construct of mindfulness and mindfulness-based training programs such as mindfulness-based stress reduction often implicitly include coverage of relating to compassion and self-kindness (Neff and Dahm 2015; Rosch 2007), an explicit focus on self-compassion might be helpful in downregulating distressing thoughts and emotions relating to sleep symptoms. Thus, it would be interesting to consider the relative effects of self-compassion-based training on sleep compared with established effects reported for mindfulness meditation.

Notably, no studies examined the relationship between self-compassion and sleep quality using objective assessments of sleep such as polysomnography or actigraphy. As there tend to be discrepancies between objectively and subjectively measured sleep quality (Bei et al. 2015), it would be interesting to see if the relationship between self-compassion and sleep holds using objective sleep quality measures. While the field of self-compassion research is dominated by use of the self-report SCS (Neff 2003b) or SCS-SF (Raes et al. 2011), to improve validity, it could be useful to consider other ways of measuring the construct, for instance through direct measurement of observed self-compassionate responses or observational ratings (Strauss et al. 2016).

We found evidence of a small to medium-strength correlation between self-compassion and sleep problems ($r = -0.32$), and prior research has found stronger relationships between sleep quality and psychopathology such as symptoms of depression, anxiety and stress (Benca et al. 1992; Kim and Ko 2018). Sleep disturbance is a key feature of many clinical disorders, including depression and anxiety, which helps explain these stronger associations. This also indicates that it is

important to consider other psychological factors in addition to self-compassion when understanding an individual's sleep (Calkins et al. 2013).

As research is still emerging, any clinical implications are largely speculative at this stage. Future research examining a potential causal relationship between self-compassion and sleep quality, or any difference in the relationship between positive self-compassion, self-coldness and sleep quality may provide useful clinical directions. For example, an important consideration would be whether decreasing self-coldness (as opposed to increasing positive self-compassion) would be a useful clinical intervention for improving subjective sleep quality or whether addressing both positive and negative facets of self-compassion would be equally useful when designing clinical interventions to improve sleep quality. Furthermore, studies investigating relationships between self-compassion and sleep quality in child and adolescent samples would be a valuable avenue to pursue in future research.

In sum, our meta-analysis of 17 studies found evidence of a significant association between self-compassion and self-reported sleep quality. Future research is needed to expand on these early results, and specifically to investigate directions of causality in order to better understand the nature of the relationship between self-compassion and sleep quality. Investigating the potential role of self-compassion-based therapies in enhancing sleep quality is also worth considering in future research.

Authors' Contributions LB: collaborated in study design, conducted the literature search and data analysis and wrote the first draft of the paper. EH: collaborated with the study design, assisted with the literature search and writing of the paper. HL: collaborated with the design and writing of the study.

CB: collaborated in study design and writing and editing of the final manuscript. All authors approved the final version of the manuscript for submission.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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