A Scoping Review of Stress Beliefs: Literature Integration, Measurement Issues, and Theoretical Concerns

Christopher J. Kilby[1*], Kerry A. Sherman[1], Viviana M. Wuthrich[1]

[1] Centre for Emotional Health, Department of Psychology, Macquarie University, Sydney, Australia

Christopher J. Kilby, christopher.kilby@mq.edu.au, ORCiD: 0000-0002-5783-6525

Kerry A. Sherman, kerry.sherman@mq.edu.au, ORCiD: 0000-0001-7780-6668

Viviana M. Wuthrich, viviana.wuthrich@mq.edu.au, ORCiD: 0000-0001-7227-229X

[*] Corresponding author: Christopher J. Kilby

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ABSTRACT

Background: Individual stress beliefs are associated with stress-related behavioral responses and health consequences. The Common-Sense Model of Self-Regulation may help in understanding the role of stress beliefs in these behavioral responses and consequences.

Purpose: To synthesize empirical studies exploring the relationship between stress beliefs and stress-related behavioral responses and health consequences using the Common-Sense Model as a guiding framework.

Method: Peer-reviewed journal articles on stress beliefs in PsycArticles, PsycINFO, PubMed, Scopus, and Sociological Abstracts were included if they were in English, reported on adult humans. Nineteen of the 1972 unique articles reporting on 24 studies met inclusion criteria. Study quality was assessed with existing reporting criteria.

Results: Four of the five Common-Sense Model representations were included across the review studies, namely Identity, Cause, Consequences, and Control. Consequences and Control-related stress beliefs are associated with stress-based health and behavioral outcomes. One study explored Identity-related stress beliefs with health outcomes, reporting no relationship. No study assessed the relationship between Cause-related stress beliefs and behaviors or health outcomes. No study has explored any aspect of Timeline-related stress beliefs. Study quality ranged from very low to very high.

Conclusions: There is limited evidence exploring stress-related beliefs and behaviors and health outcomes. According to the Common-Sense Model, the Timeline representations remains to be investigated in the stress context, and Identity and Cause are under-researched. This review highlights future directions for stress beliefs research.

Keywords: stress, belief, scoping review, individual differences, Common Sense Model

Stress can be described as a phenomenon containing several elements, including a stressor or stressful situation that triggers the sensation of stress, a 'stress response' comprising of a cognitive evaluation or appraisal that evaluates the stressor, a physiological, emotional, and behavioral response, and a set of physiological and psychological health outcomes associated with this stress response[1]. According to the Transactional Model of Stress, when a situation is deemed stressful or a stressor is identified, individuals interpret the available information from the stressor and determine their ability to cope with the situation through a cognitive appraisal process[2]. These appraisals influence behavioral[3], emotional[2], and physiological[4] responses to the stressful situation. Inter-individual differences in the stress response toward the same stressor can result in some individuals experiencing improvements, whilst others experience declines, in domains such as attention[5,6], memory[7], and physical health[8,9]. One emerging theoretical perspective that may help explain these inter-individual differences in appraisals and responses to stressful situations is stress beliefs[10,11].

By definition, stress beliefs are a form of lay belief or lay theory about stress held by an individual[12,13]. These beliefs may align with scientific theory and evidence, but can also be informed by past experience with situations both experientially and vicariously[14]. Lay beliefs are foundational components of many theories of health behavior, including the Common-Sense Model of Health and Illness (CSM)[15]. The CSM outlines that, when presented with a cue to health or illness (e.g., gaining weight, coughing, noticing a new dark patch of skin) lay beliefs about health and illness (referred to as representations) bias how an individual interprets these cues[16]. Meta-analytic research has found that illness-specific representations (e.g., representations about breast cancer) not only bias the interpretations of these cues, but also influence the way individuals respond to the illness[17,18]. The theory outlines five broad representations by which an individual's beliefs can be categorized,

including: Identity (the cues by which one identifies the aspect of health or illness in question); Cause (the causes of the aspect of health or illness in question); Timeline (whether the aspect of health or illness is chronic or acute, and whether it comes and goes or is stable); Consequences (the positive and negative consequences associated with the aspect of health or illness in question); and, Controllability (whether something can be done in response to this aspect of health or illness and whether those actions will be effective). The theory implies that if two individuals hold different representations about the same aspect of health or illness, they may interpret relevant cues to that aspect of health or illness in different ways. This is said to lead to different behavioral responses to that cue[16]. The CSM includes stress as both a possible Cause representation (e.g., stress causes heart disease) and Consequence (e.g., headaches make me feel stressed)[16]. Furthermore, research has highlighted the stress-illness rule in the CSM in which, under high levels of stress, individuals are more likely to attribute symptoms of illnesses that they believe are associated with stress to their perceived experience of stress rather than to the illness itself[19].

Applied to the context of stress, the CSM implies that representations about stress (hereafter, "stress beliefs") should change how an individual interprets various aspects of stressful situations, and that this difference in interpretation may lead to different behavioral and physiological responses that could have consequences for health. In the context of the Transactional Model of Stress, this would suggest that stress beliefs should be a preceding factor that influences appraisals. Research into the influence of stress beliefs on health have reported that, for those who were experiencing high levels of stress, holding the belief that stress negatively affects your health was associated with an increased risk of 8-year mortality[20] and 18-year risk of coronary incidents[21] compared to those individuals with similar levels of stress who did not hold this belief. These effects were maintained after controlling for a range of health-status and health behavior variables. However, both studies

opted for single item measures of stress beliefs that exclusively assessed consequence representations only (according to the CSM), and therefore, leaves open whether similar effects might be found with the other four stress-related representations.

Despite emerging research into stress beliefs, to date there has been no systematic or integrative review of these findings. Given that stress is involved in both health and illness, the CSM is an appropriate theoretical framework from which to understand inter-individual differences in stress beliefs and associated behavioral responses and health consequences, and to guide such an integrative review of this research. The aim of this scoping review is to systematically integrate the stress belief empirical research using the CSM representation categories as a guiding framework. This review will identify the extent to which stress belief research reflects the breadth of CSM representation categories and determine the extent to which stress beliefs are associated with behavioral responses and health outcomes. Empirical findings will also be assessed and interpreted within evidence-based reporting criteria for quantitative and qualitative research to evaluate the quality of research in this field and to inform future directions[22–24].

Methods

This scoping review followed PRISMA scoping review guidelines. Studies were eligible for this review if they were: focused on adult humans free of any psychological morbidity (e.g., post-traumatic stress disorder); written in English; empirical and peer-reviewed qualitative or quantitative work; and addressing a belief about stress in healthy adult humans. Only papers discussing beliefs about stress in general were included, ensuring that the reviewed beliefs were exclusively about stress in general, rather than a stress-related aspect of some other situation or phenomenon. For example, beliefs about war stress in Soviet soldiers[25] may reveal beliefs that are more related to the situation of

war than to the phenomenon of stress, and therefore, would not be included in this review. Studies were also excluded if they were published reviews, as well as grey literature or dissertations to ensure only high-quality peer-reviewed original research were included in this review. The second author (KAS) reassessed the eligibility of 30% of articles as a measure of inter-reviewer reliability; no discrepancies emerged. This review was not pre-registered. A meta-analysis was not undertaken due to the different measurement and theoretical approaches to the operationalization of stress beliefs. In many instances the different approaches to measuring stress beliefs were featured in only one paper.

Six different online journal article databases were searched to identify relevant studies in October 2018 including PsycInfo, PsycArticles, PubMed, Medline, Sociological Abstracts, and Scopus. The general structure of the search phrase was BELIEF TERM + STRESS TERM. Given that beliefs, thoughts, expectations, attitudes, and mindset are semantically similar, all four were treated as 'belief' terms. The reference lists of included articles were also hand searched for additional references. Papers from disciplines outside of the human sciences (e.g., engineering) were excluded from search results as the subject matter in these areas are not humans but rather may be mechanical, mathematical, or other non-human based subject matters. Given that this review is focusing on human stress, it was inappropriate to include papers from these fields outside of the human sciences. As such, the final search term consisted of: (belief* OR believ* OR thought* OR think* OR expect* OR attitud* OR mindset*) AND (*stress*).

As part of this scoping review, study quality was assessed. For quantitative studies the quality criteria were based upon select STROBE[22] and CASP[23] guidelines focusing on the rationale, design, and measurement of beliefs. Higher quality studies: i) reported rationales that included a mechanism explaining how stress beliefs might influence some stress-related outcome; ii) used one of the two validated measures of stress

beliefs; either the Stress Mindset Measure[11] or the Beliefs About Stress Scale[10]; iii) measured a variety of stress beliefs; iv) tested the proposed mechanism; v) evaluated the impact of stress beliefs on some stress-related outcome; and, vi) utilized a longitudinal design as this provides stronger evidence for predictive relationships between variables than cross-sectional or correlational studies. For qualitative studies, high quality was based on accepted guidelines from previous work[24] defined as having: i) clearly outlined and justified aims and research approach; ii) a detailed account of the interview process; iii) sufficient data to address the research question; iv) a method of analysis outlined; v) a detailed account of the theoretical framework; vi) consideration of socio-cultural norms; and, vii) a verification of analytical results such as asking the original participants or a separate sample of participants to confirm the accuracy of the analytical results. For both study types, studies received a 1 for meeting a criterion and a 0 for not meeting that criterion. Quantitative studies were scored out of 6 and the qualitative study was scored out of 8.

In this review, beliefs identified across the included studies and the evidence supporting or challenging the theoretical link between stress beliefs and health outcomes were integrated into the five broad representations outlined by the Common-Sense Model. This approach allowed for the critical examination and identification of gaps in the stress belief literature to date. Finally, to document existing stress belief measures, summary information corresponding to standard reporting practices is presented.

Results

Initially, 3429 articles were identified. After duplicates had been removed (*N*=1443 removed), article titles and abstracts were screened for inclusion and exclusion criteria, resulting in the removal of an additional 1871 articles. The 101 remaining articles were

retrieved and the whole paper was screened for inclusion and exclusion criteria, in which a further 82 papers were excluded, producing the final set of 19 articles (see Figure 1). The 19 included articles reported on 24 different studies. Some articles reported multiple studies, and two articles reported on the same sample[26,27], with Crum et al. (2018) reporting on a subset of participants who consented to be genotyped of Crum et al. (2017). These 24 studies represented a total sample size of 40926 participants (range *N*= 42 to 28,753; Male = 61%). Across all studies, there was a mean age of 33 years, with a range between 19 years and 75 years. Studies were based in either Germany (*n* = 3), America (*n* = 9), the United Kingdom (*n* = 5), Australia (*n* = 2), Israel (*n* = 4) or Japan (*n* = 1). There were a range of methodologies employed across the 24 studies, with some utilizing multiple methodologies. Nine studies used longitudinal designs with self-report questionnaires[10,11,20,21,28–31]. Fourteen studies employed cross-sectional designs with self-report questionnaires[11,12,37,38,26,27,31–36]. One study used cross-sectional designs with one-on-one interviews using thematic analysis[39].

A summary of the details and findings of included papers is provided in Table 1 and summaries of how beliefs were measured in each study can be found in Table 2. All studies reported some rationale for why stress beliefs may influence health and behavior. Specifically, 20 (83%) presented a theoretical link by which stress beliefs may influence these outcomes. The other four studies (17%) presented prior research linking stress to the outcome of interest but did not discuss this in the context of a specific theory[21,30,34,38,39].

Fifteen studies (63%) used validated scales to measure stress beliefs. Twelve studies used the Stress Mindset Measure[11,26,27,31,36–38]. Although there are four forms of the Stress Mindset Measure (General[11], Specific[11], Control[31], and Japanese[38]), the interpretation from the different forms are the same, and therefore, the research utilizing the

Stress Mindset Measures is discussed collectively. Two studies used the Beliefs About Stress Scale, which measures beliefs about both the nature of stress and perceived control over stress[10,30]. One study used a validated scale of general locus of control, the Internality, Powerful Others, and Chance Scale by[40], which does not explicitly assess stress beliefs. However, this scale was adapted for the context of stress for the purposes of one study[33]. Eight studies (33%) used scales that were developed for the purpose of their study and were not previously validated[13,20,21,28,29,32,34,35]. One (4%) study used a qualitative design and therefore did not employ the use of a scale, but rather used semi-structured interview questioning coupled with thematic analysis to identify participants stress beliefs[39].

Quality criteria scores for the quantitative articles ranged from 2 out of 6[13,21] to 6 out of 6[30,31] (M = 3.8, SD = 1.4). The most frequently met criteria were criterion i) the inclusion of a rationale for why stress beliefs relate to the target outcome (78%), criterion iii) the measurement of multiple stress beliefs (78%), and criterion v) the evaluation of the effect of the stress beliefs on the target outcome (83%). Only 39% of all articles empirically assessed their proposed rationale (criterion iv)[20,30–33,36,37], making criterion iv the least met and therefore most in need of improvement in this field. The quality score for the one qualitative article in this review was 8 out of 8[39]. See Table 3 for a study-by-study breakdown of the quality assessment.

Two studies explored Identity-related stress beliefs[32,39]. These beliefs focused on the way that individuals described their understanding of stress as a phenomenon. One qualitative paper highlighted that individuals believe stress could be identified as being an aspect of their workplace (e.g., being overworked), a response (e.g., feeling anxious), or a response specifically due to an aspect of the workplace (e.g., feeling anxious because of being overworked)[39]. Another study highlighted that people hold beliefs that the nature of stress changes as a function of age, such that some individuals believe that how they identify

stress may be different in the future to how they identify stress now[32]. Only one of these studies examined the influence of these beliefs on stress-related consequences, but it was found that these beliefs were unrelated to the level of stress people reported experiencing at both an objective and subjective level[32]. Neither study explored the role of covariates.

Studies discussing Cause-related stress beliefs focused on sources of general occupational stress[13,39]. Neither study explored how these beliefs influence the stress response, nor the role of covariates.

Consequence-related stress beliefs was the most researched representation. There is consistent evidence that consequence-related beliefs influence how information is interpreted from stressful situations[11,27,31,36,37]. Collectively, these studies suggest that the Consequence-related stress beliefs may be influencing how a broad range of information is interpreted. However, there is some variation in exactly what stress beliefs appear to be influencing from study to study. For example, Kilby and Sherman[36] found evidence that, after controlling for relevant covariates, Consequence-related stress beliefs bias how challenging a stressful situation is perceived to be, but this finding was not replicated by Crum et al[27]. A number of studies found a cross-sectional association between Consequence-related stress beliefs and trait perceived stress[11,31,36], in cases where covariates were included, this effect existed over and above covariates[11,36].One study implementing a longitudinal design failed to find this association in a 6-8 week follow-up after controlling for covariates[10].

In relation to the association between consequence-related beliefs with health and behavioral outcomes, stress beliefs appear to function as self-fulfilling prophecies. Specifically, study participants generally reported experiencing consequences of stress that are in alignment with their own beliefs about the consequences of stress[10,11,20,27,29–31,34,35,38].One cross-sectional study found that Consequence-related stress beliefs were

not directly related to psychological wellbeing, but rather were indirectly related through proactive coping and somatic complaints[31]. Moreover, it appears that the association between beliefs and behavioral and health outcomes only holds for negative Consequence-related stress beliefs, as all three studies that examined the relationship between positive Consequence-related stress beliefs and mental and physical health consequences failed to find evidence to support this relationship[10,29,30].

Two studies have looked at the effect of manipulating beliefs about general Consequence-related stress beliefs[11,27] and found that manipulations promoting positive beliefs via a priming video produce changes in both how information is interpreted (in the context of attentional biases towards happy faces)[27] as well as behavioral and health outcomes (regarding affect and work performance)[11]. Therefore, beliefs about the consequences of stress appear to be a targetable category of belief for interventions that could produce meaningful changes.

There were six studies exploring beliefs about the way individuals can control or respond to feelings of stress[10,13,28,30,33,39]. This category encapsulates beliefs about the level of control one has over stress[10,13,30,33,39] and whether one believes they either have the capacity to cope, or if coping will be effective[13,28]. One study documented a cultural divide in how individuals perceive their control over stress, with those of an Eastern background perceiving more control than those of a Western background[33]. One study demonstrated that beliefs about the level of control itself, after controlling for covariates, appear to be unrelated to perceived stress levels[10] or somatic complaints[30] at a 12-week follow-up. Another study found that believing that you can control your stress does appear to be associated with a lower dependence on at least one health-endangering coping strategy (i.e., smoking)[28].

Discussion

This scoping review systematically synthesized the research on different stress beliefs and their relationships with health and behavior. The CSM was used as a framework to guide this synthesis as it provides a well-established and commonly used taxonomy of five categories of beliefs about health and illness cues referred to as representations. This review found evidence of stress beliefs within four of the five categories (Identity, Cause, Consequence, and Control). However, there were no papers discussing Timeline-based stress beliefs, representing a category of beliefs yet to be explored.

One possible reason for the omission of Timeline-based stress beliefs could be due to the absence of a study that aims to identify the types of stress beliefs held by a general population. As such, most studies investigated stress beliefs that were not selected based upon prior empirical research or theoretical frameworks. This scoping review identified only one high quality qualitative study that specifically aimed to identify people's beliefs about stress within the workplace[39]. However, while beliefs about stress in the workplace may generalize to other stressful situations, the question remains whether there are other beliefs that are held generally about stress. Given that there could be any number of stress beliefs, and that beliefs do not need to agree with the scientific understanding of stress[14], further qualitative work may supplement our understanding of what stress beliefs are commonly held by the general public.

Across the four stress-related CSM representation categories where research had been conducted, studies assessing the relationship of stress beliefs with behavioral responses and health outcomes generally reported that the way beliefs influence stress-related health and behavioral outcomes mimic the beliefs people hold about stress. For example, believing stress is a positive experience was associated with reports of more positive experiences of stress[27,36]. Similarly, believing stress was associated with poorer health or greater negative affect was associated with objectively poorer health[20,21] and greater experienced negative

affect during times of stress[29]. This suggests that expectations may, in some way, bias or predispose the individual to experiencing or interpreting their experience in a way that may be consistent with their beliefs. This notion is not only in alignment with the CSM[16] but also with a range of other theories such as the Self-fulfilling Prophecy[41], the Confirmation Bias[42], and Representativeness Heuristic[43]. All of these theories, in one way or another, argue that the way we process information from a situation is biased by our existing beliefs or understand of that situation. Although this evidence suggests associations between stress beliefs and health outcomes, it is unlikely that the beliefs directly influence the outcomes. The Transactional Model of Stress[2] would propose that the way in which a stressful situation is interpreted influences the way that we respond to that situation, and that maladaptive responses are associated with poorer health outcomes. This is also in alignment with the CSM which posits that our representations influence how we interpret cues relating to the aspect of health or illness in question, such as stress[16]. Thus, it may be that the associations between stress beliefs and health outcomes are mediated by how stressful situations are interpreted, and then how we respond to the situation based off that interpretation.

This review identified two psychometrically validated scales of stress beliefs, namely the Stress Mindset Measure[11] and the Beliefs About Stress Scale[10]. However, these measures do not assess all beliefs identified in this systematic review. For example, the Stress Mindset Measure focusses on beliefs about the consequences of stress, but does not address Identity, Cause, Timeline, or Control. The Beliefs About Stress Scale improves upon the Stress Mindset Measure by also assessing beliefs about one's ability to control stress[10,30]. However, the Beliefs About Stress Scale does not measure beliefs relating to Identity, Cause, or Timeline. As such, there is a need to develop additional psychometrically valid measures to address all facets of stress-related beliefs.

Another need in this field is to explore factors that lead to the development of certain beliefs about stress. Although general frameworks regarding belief formation would argue that beliefs are a result of our personal context (e.g., socioeconomic status, social context, and culture), upbringing, and lived and vicarious experiences [14], no study has explored how these factors relate to stress belief formation. This is particularly important as there is a complex interplay between these factors and the experience of, and exposure to, stress (for a review, see [44]). Moreover, no study has considered whether such factors are better predictors than stress beliefs of individual differences in the responses made under stress. It could be argued that such factors may shape stress beliefs, and, in turn, those beliefs influence the responses made in response to the stressful situation. If so, then any association between these initial factors and the responses made under stress would become diminished if stress beliefs were changed. However, this is an empirical question that needs to be explored in future research.

If an intervention were to be built based upon stress beliefs, it must first be questioned whether there is a certain pattern of stress beliefs that maximally improve the stress response. An exclusively positive pattern of stress belief is supported by the reviewed literature as being associated with exclusively positive outcomes. However, such a pattern of beliefs may not be optimal in the presence of a highly threatening stressor. Similarly, exclusively negative beliefs about stress may not be beneficial in all stressful situations. Rather, it may be that a balanced perspective is needed. This is yet another area for future research to explore.

Moreover, not all studies controlled for covariates in their analyses. This is an important limitation in this field to address as there may be other factors underlying the stress response. In the case of stressor appraisals, one systematic review has highlighted that, amongst other variables, there is considerable evidence for the association between stressor appraisals with emotion regulation and neuroticism [45]. Future research exploring stress beliefs should

consider including such variables, along with other variables of theoretical importance such as negative affective states, to assess whether stress beliefs hold a unique association with the stress response over and above these other documented factors.

Inherent in any scoping review is the possibility of reporting bias due to incomplete retrieval of research. While every precaution was taken to ensure all relevant studies were included, it is possible that studies used unique or uncommon phrasings to express the idea of stress beliefs, and thus may not have been retrieved in our systematic search. Nevertheless, the comprehensive set of keywords included in the search strategy should have identified most relevant studies. Further, this review adopted the CSM as a framework by which to evaluate the stress belief literature to date, as it is a recent and commonly used model in research focusing on health beliefs and health outcomes. This highlighted areas yet to be explored in this literature. However, the use of alternative theories or models, such as the Health Belief Model, may have yielded different conclusions due to their use of different belief categories. Nevertheless, this is still the first study to utilize a framework to evaluate the stress belief literature. It is likely that, while alternative models may suggest the presence or absence of different categories of beliefs, the finding that there is the potential for additional stress beliefs to exist is likely to be retained.

This synthesis has revealed that, while the quality of quantitative studies is moderately high (scoring an average of 3.8 out of 6), there were three criteria which the majority of studies failed to meet. The least met criterion was that studies did not test the hypothesized relationship between stress beliefs and their chosen outcome. Not only was this the least met quality criterion, it is also one of the most important for furthering the theoretical understanding of stress beliefs. Additionally, most studies failed to use established stress belief measures or a longitudinal design. Overcoming these limitations will further strengthen the quality of work in this field.

This is the first review to catalogue known stress beliefs using the CSM as a guiding framework. This review has proposed, based on both the CSM and the synthesized evidence of the review, that stress beliefs may influence how information from stressful situations is interpreted, which in turn influences the behavioral responses to stress and the health consequences related therein. This is an important theoretical development in the stress belief literature as it provides a model by which the influence of stress beliefs can be integrated into existing stress theory. Further, the influence of stress beliefs on behavioral responses and health consequences related to stress have not been examined for all identified stress beliefs, nor has the proposed pathway (stress beliefs influencing information processing which in turn influences behavior and health) been explored in depth by any one study. This review highlights the need for longitudinal research evaluating the relationship between all facets of stress beliefs with how information is interpreted from stressful situations, the behavioral responses to that stressful situation, and the health consequences that follow.

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Table 1. Summary of papers included for review

Citation	Sample	Belief	Method	Results	Effect size
				Identity	
Thomae. (1981). GER	174 older aged participants†	Unchangeability of life stress	Self-report questionnaires	Stress belief unrelated with objective or perceived stress	*n.r.*
Kinman, & Jones. (2005). UK	45 employees†	What is stress	Interviews	A stimulus, stimulus-response, or a response	K=.76
				Cause	
Furnham. (1997). UK	134 employees†	Causes of occupational stress	Self-report	Found five categories of beliefs about the cause of workplace stress: conflict and satisfaction, career development, demographic subgroups, danger and intimidation, and authority	Variance explained: Conflict: 21.2% Career development: 8.6% Minorities: 7.3% Danger/intimidation: 5.7% Authority: 5.1%
Kinman, and Jones. (2005). UK	45 employees from a range of occupations†	Causes of occupational stress	Interviews	Pressure, new technology, and media hype	*n.r.*
		What is a stressful job		Being placed under physical danger, being responsible for others, working with others who are stressed, job security, and mundane work.	
				Consequence	
Daniels, Hartley, & Travers. (2006). UK	42 UK university staff members††	Impact of stress on work	Self-reported questionnaires	Believing stress impacted work increased number of reported stressful situations.	*n.r.*
	101 teachers at a UK secondary school††	Impact of stress on positive and negative affect		Believing stress elicited negative affect or impacted work increased negative affect under stress	*n.r.*
				Believing stress elicited positive affect unrelated to levels of positive affect under stress.	
Furnham. (1997). UK	134 employees†	Manifestations of workplace stress	Self-report	Found five categories of beliefs about the manifestations of workplace stress: Intolerance and lack of patience, anxiety and fear of interaction, denial, depression and intolerance, and loss of energy	Variance explained: Intolerance: 29.5% Anxiety: 9.9% Denial: 8.1% Depression: 6.6% Loss of energy: 6.2%

Table 1(cont.). Summary of papers included for review

Citation	Sample	Belief	Method	Results	Effect size
Furnham. (1997). UK	134 employees†	Consequences of stress	Self-report	There were four categories of beliefs relating to consequences of stress: Physical and external consequences, powerlessness and lack of control, self-destruction, and loss of self-esteem	Variance explained: Physical/external: 26.0% Lack of control: 10.2% Self-destruction: 7.0% Loss of self-esteem: 6.4%
Keller et al. (2012). USA	28,753 participants of the National Health Interview Survey††	Belief that stress negatively impacts health	Self-report and national death records	Strong belief that stress negatively affected health and having high levels of stress increased mortality risk by 43%, compared to those not holding belief. Effects maintained after controlling for covariates.	OR=1.43
Kinman, & Jones. (2005). UK.	45 employees from a range of occupations†	Effects of occupational stress Valence of consequences	Interviews	Mental health, behavior, physical health, cognitive functioning. Initially reported stress eliciting negative consequences, but some later reported positive consequences as well.	*n.r.*
Febles, and Ogden. (2005). UK	548 patients at a London-based GP†	Negative mood Specific somatic symptoms Non-specific somatic symptoms Social symptoms	Self-reported questionnaires	Regardless of the belief, viewing any health symptom as a symptom of stress was associated with an increased intention to seek medical help	Negative mood: *r*=.229 Specific somatic: *r*=.189 Non-specific: *r*=.228 Social symptoms *r*=.241
Nabi et al. (2013). UK	7268 participants in the British Whitehall II cohort study††	Belief that stress negatively impacts health	Self-report	Believing stress negatively affected health a lot increased coronary incidence rate by 1.49 time compared to those not holding the belief. Effects maintained after controlling for covariates.	OR=1.49
Parker, Finkel, & Indice. (1993). USA	346 undergraduates†	Relationship between stress and 26 health problems	Self-reported questionnaires	Participants associated stress more strongly with common health problems than infrequent or severe health problems. The type of problem associated with stress was moderated by ethnicity.	*n.r.*

Table 1(cont.). Summary of papers included for review

Citation	Sample	Belief	Method	Results	Effect size
Ben-Avi, Toker, & Heller. (2018). Israel	Study 1: 348 USA community members (MTurk)†	Valence of consequences	Self-reported questionnaires	Positive beliefs were associated with lower perceived burnout, which was associated with greater perceived promotability in others. Results maintained after controlling for covariates.	*n.r.*
	Study 2: 207 MBA students†	Valence of consequences	Self-reported questionnaires following stress mindset manipulation	Positive beliefs were associated with higher levels of perceived presenteeism in others, which was associated with greater perceived promotability. Results maintained after controlling for age, age and mood, or managerial style (covariates differed depending on the analysis).	Presenteeism: η^2=.03 Somatic symptoms: η^2=.03
	Study 3: 135 Israeli community members†	Valence of consequences	Self-reported questionnaires following stress mindset manipulation	Replicated Study 1 results via a stress mindset manipulation, controlling for mood and managerial style.	Positive vs negative: η^2=.05 Positive vs control: d=0.25 Negative vs control: d=.03
	Study 4: 292 USA community members (MTurk)†	Valence of consequences	Self-reported questionnaires following stress mindset manipulation	Stress-is-enhancing manipulation lead to more favorable perceptions of burnout and somatic symptoms compared to a stress-is-debilitating manipulation. However, presenteeism in others did not differ between the groups after accounting for covariates. Positive beliefs lead to lower perceived somatic symptoms, which lead to greater perceived intentions to help others. There was no mediating effect for presenteeism or burnout.	Burnout: η^2=.04 Somatic symptoms: η^2=.02 Presenteeism: η^2=.01
Crum, Akinola, Martin, & Fath. (2017) USA[a]	124 American first year psychology students†	Valence of consequences	Self-reported questionnaires and cognitive tasks	Following a challenging (but not threatening) stress induction, positive beliefs lead to increases in positive affect and increased DHEA5 levels, a greater attentional bias towards happy vs angry or neutral faces, and greater levels of cognitive flexibility. No effect for negative affect, cortisol, or attentional biases for negative stimuli.	Positive affect: η^2=.04 Negative affect: η^2=.00 Attentional bias: η^2=.09 Flexibility: η^2=.04 DHAE5: η^2=.11 Cortisol: η^2<.01
Crum, Akinola, Turnwald, Kaptchuk, & Hall (2018). USA[a]	107 American first year psychology students†	Valence of consequences	Self-reported questionnaire, and biological measures	Carriers of a low activity variation of catechol-O-methyltransferase were more sensitive to stress-is-enhancing manipulations in terms of positive affect, attentional bias, and cognitive interference	Positive affect: η^2=.05 Negative affect: *n.r.* Attentional bias: η^2=.06 Interference: η^2=.06

Table 1(cont.). Summary of papers included for review

Citation	Sample	Belief	Method	Results	Effect size
Crum, Salovey, & Achor. (2013) USA	Study 1 and 2: 338 employees† † (same sample reported over two studies)	Valence of consequences	Self-reported questionnaires	Study 1: Stronger positive stress beliefs was associated with lower perceived stress, intolerance of uncertainty, avoidant-based coping, negative affect, and greater optimism, resilience, mindfulness, approach-based coping, wellbeing (mental and physical), and work performance.	Perceived stress: *r*=-.34 Optimism: *r*=.23 Resilience: *r*=.31 Uncertainty: *r*=-.16 Mindfulness: *r*=.21 Approach coping: *r*=.27 Avoidant coping: *r*=-.17 Negative affect: *r*=-.25 Mental health: *r*=-.25 Physical health: *r*=-.15 General wellbeing: *r*=.20 Work performance: *r*=.15
	Study 3: 63 students††	Valence of consequences	Self-reported questionnaires and cortisol	Study 2: Only those in the stress-is-enhancing manipulation reported increases in work performance and negative affect after controlling for coping style. Positive beliefs associated with greater desire for feedback, and medial (vs low or high) cortisol levels after controlling for covariates.	Negative affect: η^2=.02 Work performance: η^2=.04 Feedback: r^2=.09 Cortisol: *n.r.*
Horiuchi, Tsuda, Aoki, Yoneda, & Sawaguchi, (2018). Japan	124 students†	Valence of consequences	Self-reported questionnaires	Negative beliefs had an indirect effect on irritation/anger through emotional expression and support seeking (but not cognitive reinterpretations or problem solving). Negative beliefs did not relate to anxiety, depression, nor helplessness. Positive beliefs were not related with outcome.	*n.r.*
Kilby, & Sherman, (2016). AUS	124 students†	Valence of consequences	Self-reported questionnaires	After controlling for covariates, stronger positive beliefs associated with greater challenge appraisal but was unrelated to threat appraisals.	Challenge: η^2=.07 Threat: η^2=.01
Keech, Hagger, O'Callaghan, & Hamilton, (2018). AUS	218 students††	Valence of consequences	Self-reported questionnaire and implicit associations test	Stress mindset were cross-sectionally negatively associated with perceived stress and physical wellbeing. Proactive coping mediated stress mindset with psychological wellbeing and perceived stress. Somatic symptoms mediated stress mindset with physical wellbeing and academic performance. Implicit beliefs were unrelated with outcomes.	Psy[b] wellbeing R2=.45 Perceived stress R2=.64 Physical wellbeing R2=.19 Academic R2=.09

Table 1(cont.). Summary of papers included for review

Citation	Sample	Belief	Method	Results	Effect size
Laferton, Stenzel, Fischer. (2018). GER	445 students††	Valence of consequences	Self-reported questionnaires	After controlling for covariates, positive and negative stress beliefs were not associated with perceived stress levels 6-8 weeks later	*n.r.*
Fischer, Nater, & Laferton. (2016). GER	363 students††	Valence of consequences	Self-reported questionnaires	Controlling for covariates, stronger negative stress beliefs were associated with more intense somatic symptoms 6-8 weeks later, mediated by elevated stress levels. No association between positive stress beliefs and somatic symptoms.	Negative beliefs: η^2= .02 Positive beliefs: *n.r.*
			Controllability		
Lafterton, Stenzel, & Fischer. (2018). GER	445 students††	Control over stress	Self-reported questionnaires	After controlling for covariates, beliefs about control over stress at baseline were not associated with perceived stress at follow-up	*n.r.*
Fischer, Nater, & Laferton. (2016). GER	363 students††	Control over stress	Self-reported questionnaires	Controlling for covariates, beliefs about one's control over stress at baseline were not associated with somatic symptoms at follow-up	*n.r.*
Furnham. (1997). UK	134 employees†	The alleviation of stress	Self-report	Four categories of beliefs relating to the alleviation of stress were identified: Inner control, self-help, seeking professional help, and shame	Variance explained - Inner control: 18.6% Self-help: 12.5% Seeking help: 9.1% Shame: 6.7%
Kawanishi. (1995). USA	193 Anglo-Saxons and 275 Japanese†	Controllability	Self-reported questionnaires	Japanese (vs Western) more likely to attribute stress and coping to one's actions or luck rather than external forces	*n.r.*
Kinman & Jones. (2005). UK	45 employees†	Stress management strategies	Interviews	76% of participants reported individual strategies (e.g., time management), 24% of participants reported organizational strategies (e.g., more control).	*n.r.*
Shadel & Mermelstein. (1993). USA	83 participants in a clinic-based smoking cessation program††	Effectiveness of smoking to cope with stress Self-efficacy to cope with stress	Self-reported questionnaires	Lower urge to smoke when stressed only if they believed that smoking was not an effective coping strategy, and that they could cope with stress. Other combinations of these beliefs promoted the urge to smoke.	Effectiveness of smoking to cope with stress: R^2=.16 Self-efficacy to cope: R^2=.27

Note. [a] These studies report on the same sample. [b] Psychological wellbeing. Crum et al. (2018) reports on a subset of the participants from Crum et al. (2107). † Cross-sectional. †† Longitudinal.

Table 2. Description of measures used in studies.

Measure	Belief	Subscale	CSM[a]	Example Item	No. items	Range	Interpretation of higher score	Reliability
				Validated Scales				
Stress Mindset Measure – General[11,26,27,36,37]	Valence of consequences	Nil	3	"The effects of stress are negative and should be avoided"	8	0 to 4	Stronger belief that stress has positive consequences	α = 0.86
Stress Mindset Measure – Specific[11]	Valence of consequences	Nil	3	"The effects of this stress are negative and should be avoided"	8	0 to 4	Stronger belief that current stress has positive consequences	α = 0.80
Stress Mindset Measure – Japanese[38]	Valence of consequences	Stress-is-enhancing	3	"The effects of this stress are negative and should be avoided"	4	0 to 4	Stronger subscale endorsement	α = 0.74
		Stress-is-debilitating	3		4			α = 0.79
Stress Mindset Measure - Stress Control[31]	Valence of consequences	Nil	3	"Stress can be used to enhance my performance and productivity"	15	1 to 6	Stronger belief that stress has positive consequences	α = 0.93
Beliefs About Stress Scale[10,30]	General beliefs about stress	Positive beliefs	3	"being stressed enables me to work in a more focused manner"	4	4 to 16	Stronger belief that stress is positive	α = 0.87 test-retest: .74
		Negative beliefs	3	"Being stressed makes me less resilient"	8	8 to 32	Stronger belief that stress is negative	α = 0.80 test-retest: .81
		Control beliefs	4	"Being stressed is something I am able to influence positively using my thoughts"	3	3 to 12	Stronger belief that stress is controllable	α = 0.73 test-retest: .61
Internality, Powerful Others, and Chance Scale[33]	Control over stress	Nil	4	"Successful coping depends mostly on the help from others"	6	1 to 5	Stronger endorsement of that item's content	Not applicable
				Unvalidated Scales				
No name provided[32]	Unchangeability of life stress	Nil	1	"All of my plans are getting more and more restricted due to poor health"	10	Not reported	Stronger belief that stress is unchanging	Not reported
No name provided[28]	Stress and smoking	Smoking to cope with stress	4	Extent smoking is thought to help cope with stress	5	5 to 50	Stronger belief that smoking helps one to cope with stress	α = 0.89

Table 2 (cont.). Description of measures used in studies.

Measure	Belief	Subscale	CSM[a]	Example Item	No. items	Range	Interpretation	Reliability
No name provided[28]	Stress and smoking	Self-efficacy to cope with stress	4	Ability to cope with stress without smoking	3	3 to 30	Stronger belief that one can cope without cigarettes	$\alpha = 0.96$
No name provided[29]	Impact of stress on work performance	Nil	3	"How does dealing with this many issues in an hour affect your work performance?"	6	-6 to 6	Stronger belief that stress negatively affects work	$\alpha > .87$
No name provided[29]	Impact of stress on negative affect	Nil	3	Frequency of stressors eliciting negative affect.	3	-3 to 3	Stronger belief that stress increases negative affect	$\alpha > .76$
No name provided[29]	Impact of stress on positive affect	Nil	3	Frequency of stressors eliciting positive affect.	2	-2 to 2	Stronger belief that stress increases positive affect	$\alpha > .71$
No name provided[34]	Stress symptomology	Nil	3	Reflecting a symptom that may be associated with stress (e.g., chest pain)	25	1 to 3	Stronger endorsement of that item's symptom being characteristic of stress	Not reported
No name provided[35]	Stress and health problems	Nil	3	Agreement that stress causes specific health problems	26	1 to 5	Stronger endorsement of stress causing that health problem	Not reported
No name provided[13]	General beliefs about occupational stress	Causes of work stress	2	"The risk of redundancy is a very stressful factor"	27	1 to 7	Stronger endorsement of that item's content	Not reported
		Manifestations of work stress	3	"A stressed person will cry more"	19	1 to 7	Stronger endorsement of that item's content	Not reported
		Consequences of work stress	3	"A stressed person will miss work because of over-sleeping"	22	1 to 7	Stronger endorsement of that item's content	Not reported
		Alleviations of works stress	4	"Whether the person believes it is possible to eliminate the problem"	24	1 to 7	Stronger endorsement of that item's content	Not reported
National Health Interview Survey[20]	Stress negatively impacts health	Nil	3	"During the past 12 months, how much effect has stress had on your health - a lot, some, hardly any, or none?"	1	0 to 1	Categorical response option endorsement represents extent to which stress is believed to negatively impact health	Not applicable
British Whitehall II Cohort Study[21]	Stress negatively impacts health	Nil	3	"To what extent do you feel that the stress or pressure you have experienced in your life has affected your health?	1	0 to 1	Categorical response option endorsement represents extent to which stress is believed to negatively impact health	Not applicable

Table 3. Quality of included papers

Quantitative studies							
	Rationale for how beliefs affect outcome	**Validated beliefs measure**	**Measured multiple beliefs**	**Evaluated the plausibility of their rationale**	**Evaluated impact of beliefs on outcome**	**Multiple time points**	**Quality score (/6)**
Thomae. (1981). Germany	✓	×	×	✓	✓	×	3
Shadel & Mermelstein. (1993). USA	✓	×	✓	×	✓	✓	4
Daniels, Hartley, & Travers. (2006). UK	✓	×	✓	×	✓	✓	4
Fischer, Nater, & Laferton. (2016). Germany	✓	✓	✓	✓	✓	✓	6
Lafterton, Stenzel, & Fischer. (2018) Germany	✓	✓	✓	×	✓	✓	5
Kawanishi. (1995). USA	✓	✓	×	✓	×	×	3
Febles, & Ogden. (2005). UK	×	×	✓	×	✓	×	2
Parker, Finkel, and Indice. (1993). USA	✓	×	✓	×	×	×	2
Keller, et al. (2012). USA	✓	×	×	✓	✓	✓	4
Nabi, et al. (2013). UK	×	×	×	×	✓	✓	2
Furnham. (1997). UK	✓	×	✓	×	×	×	2
Crum, Salovey, & Achor. (2013) USA	✓	✓	✓	×	✓	✓	5
Crum, Akinola, Martin, & Fath. (2017) USA	✓	✓	✓	×	✓	×	4
Crum, Akinola, Turnwald, Kaptchuk, & Hall (2018)	×	✓	✓	×	✓	×	3
Kilby, & Sherman. (2016) Australia	✓	✓	✓	✓	✓	×	5
Keech, Hagger, O'Callaghan, & Hamilton, (2018). AUS	✓	✓	✓	✓	✓	✓	6
Ben-Avi, Toker, & Heller. (2018). Israel	✓	✓	✓	✓	✓	×	5
Horiuchi, Tsuda, Aoki, Yoneda, & Sawaguchi. (2018). Japan	×	✓	✓	×	✓	×	3
Need of improvement (/18)	4	8	4	11	3	10	

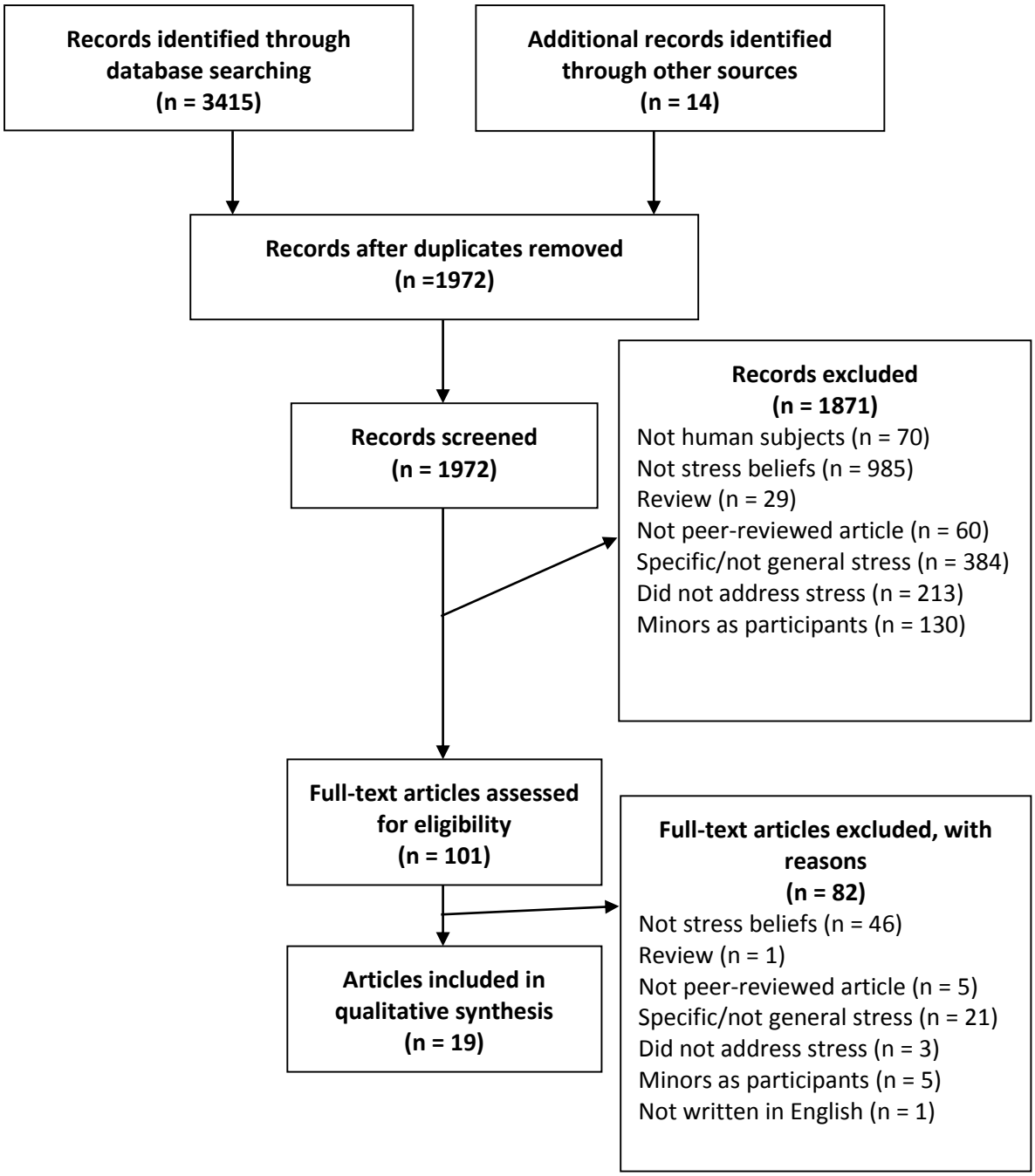
Qualitative study									
Study	**Aims outlined**	**Approach described**	**Clear account of process**	**Sufficient data**	**Method of analysis outlined**	**Theoretical framework**	**Socio-cultural factors**	**Verification of analysis**	**Score**
Kinman, & Jones, (2005). UK	✓	✓	✓	✓	✓	✓	✓	✓	8

Note. Need of improvement represents the number of studies that did not meet a particular criterion.

Figure Captions

Figure 1. PRISMA diagram

Figure


Records identified through database searching (n = 3415)
Additional records identified through other sources (n = 14)
Records after duplicates removed (n =1972)
Records screened (n = 1972)
Records excluded (n = 1871)
Not human subjects (n = 70)
Not stress beliefs (n = 985)
Review (n = 29)
Not peer-reviewed article (n = 60)
Specific/not general stress (n = 384)
Did not address stress (n = 213)
Minors as participants (n = 130)
Full-text articles assessed for eligibility (n = 101)
Full-text articles excluded, with reasons (n = 82)
Not stress beliefs (n = 46)
Review (n = 1)
Not peer-reviewed article (n = 5)
Specific/not general stress (n = 21)
Did not address stress (n = 3)
Minors as participants (n = 5)
Not written in English (n = 1)
Articles included in qualitative synthesis (n = 19)