

**The Role of Stress Appraisal for Proactivity and Problem-Solving:
A Multi-Level Approach**

Andrea Espedido

BPsych (Hons), Macquarie University

Macquarie University, Department of Psychology

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Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

All procedures complied with Macquarie University Human Research Ethics standards (ethics approval reference numbers: 5201700839, 5201600175).

Signed: Andrea Espedido

Date: 26 September 2019

Authorship

Specific contributions to the conception, data collection, analysis and writing of the thesis components are outlined below:

The first empirical paper (Chapter 4) is accepted with the journal of Work and Stress (pending minor revision). I am the first author, and my principal supervisor, Dr Ben J. Searle, is the second author. My contribution was: Concept = 70%; Data collection = 100%; Data analysis = 80%; Writing = 80%; Total = 83%.

The second empirical paper (Chapter 5) is currently “in press” with the journal of Work and Stress. I am the first author, my principal supervisor, Dr Ben J. Searle, is the second author, and my associate supervisor, Dr Barbara Griffin, is the third author. My contribution was: Concept = 80%; Data collection = 100%; Data analysis = 85%; Writing = 70%; Total = 84%. Dr Ben J. Searle’s contribution was: Concept = 20%; Data analysis = 15%; Writing = 15%; Total = 13%. Dr Barbara Griffin’s contribution was: Writing = 15%; Total = 4%.

The third empirical paper (Chapter 6) is undergoing review following a response to “revise and resubmit” with the Journal of Managerial Psychology. I am the first author, and my principal supervisor, Dr Ben J. Searle, is the second author of this paper. My contribution was: Concept = 80%; Data collection = 100%; Data analysis = 90%; Writing = 80%; Total = 88%.

The fourth empirical paper (Chapter 7) is undergoing review following a response to “revise and resubmit” with Anxiety, Stress, and Coping. I am the first author, and my principal supervisor, Dr Ben J. Searle, is the second author of this paper. My contribution was: Concept = 80%; Data collection = 100%; Data analysis = 90%; Writing = 80%; Total = 88%.

The review paper on stress appraisal (Chapter 1) will also be submitted for publication following adaptation to a more generic audience. In its current form, the chapter

focuses on issues related to the present thesis and so is intended to be restricted in its scope. I am the first author of this review paper, and my principal supervisor, Dr Ben J. Searle, is the second author. My contribution to the review paper was: Concept = 80%; Writing = 90%; Total = 85%.

Except where indicated by specific reference, the work submitted is the result of my own investigation and the views expressed are my own.

Candidate:

Date: 26th September 2019

Publications Arising from this Thesis

Journal Articles

- Espedido, A., & Searle, B. J. (2020). Proactivity, stress appraisals, and problem-solving: A cross-level moderated mediation model. Accepted (pending minor revisions) with *Work & Stress*.
- Espedido, A., Searle, B. J., & Griffin, B. (in press). Peers, proactivity, and problem-solving: A multi-level study of team impacts on stress appraisals of problem-solving demands. *Work & Stress*. doi:10.1080/02678373.2019.1579767
- Espedido, A., & Searle, B. J. (2020). Stress appraisal, teams and innovation: A multi-level study. Manuscript undergoing review following a “revise and resubmit” submission with the *Journal of Managerial Psychology*.
- Espedido, A., & Searle, B. J. (2020). Daily proactive problem-solving and stress appraisals: The role of behavioral activation. Manuscript undergoing review following a “revise and resubmit” submission with *Anxiety, Stress, and Coping*.

Conference Papers

- Espedido, A., & Searle, B. J. (2018, April). *Peers and problem-solving: A multi-level study of team impacts on stress appraisals*. Paper presented at the 33rd Annual Conference for the Society for Industrial and Organizational Psychology, Chicago, IL. Bowling Green, OH: SIOP.
- Espedido, A., & Searle, B. J. (2017, July). *Proactivity in response to problem-solving demands*. Paper presented at the 12th Industrial and Organisational Psychology Conference, Sydney, NSW, Australia. Melbourne, Vic: Australian Psychological Society. **Winner: Best Paper Prize (symposium category).**

Espedido, A., & Searle, B. J. (2017, July). *Stress appraisals of problem-solving demands*.

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Abstract

Problem-solving demands can have both positive and negative implications for proactive behaviour. I examined whether these inconsistent effects were explained by the way in which people appraised (interpreted) their problem-solving demands. Drawing upon transactional theory, it was hypothesised that the effects of problem-solving demands on a range of proactive behaviours would be mediated by stress appraisal (i.e., challenge, threat, hindrance appraisal) and moderated by factors relevant to problem-solving at the person and team levels.

This is a thesis by publication, comprised of four empirical studies. Study 1 used diary study methodology to test relationships at the person and day levels, affirming that stress appraisal mediates the effects of problem-solving demands on a range of proactive behaviours. In light of the recognised role of teams for problem-solving, Studies 2 and 3 explored the impact of team characteristics on the stress appraisal process at the between-person level of analysis. Study 2 focused on the relationship between problem-solving demands and stress appraisal, demonstrating that team problem prevention amplifies the beneficial effects of problem-solving demands on positive (challenge) appraisal. Study 3 instead focused on the relationship between stress appraisal and proactive innovation, demonstrating that the relationship depends on both team problem prevention and leader threat appraisal. Whereas previous research, and Studies 1 and 3, explored stress appraisal as an antecedent of proactivity, Study 4 positions proactivity as an antecedent to stress appraisal, drawing on reinforcement sensitivity to identify moderators of this relationship. Results showed that daily proactive problem prevention behaviours interacted with personality (i.e., behavioural activation) to influence next-day stress appraisal. Collectively, this body of work demonstrates the critical role of stress appraisal at multiple levels of the organisation.

Introduction and Overview of Thesis

“There is nothing either good or bad, but thinking makes it so.”

– William Shakespeare, Hamlet

Lazarus and Folkman's (1984) seminal transactional theory suggests that it is not just objective stressors that determine outcomes, but rather the subjective way in which these stressors are appraised. In other words, stressors should not be conceptualised as inherently good or bad, rather their effects depend upon the meaning individuals attribute to them (Payne, 1988). Stress appraisal refers to an individual's interpretation of a stressor in terms of its personal relevance (Lazarus & Folkman, 1984). Supporting this theory, a body of empirical research has identified that stress appraisals affect key workplace outcomes such as proactivity, creativity (Ohly & Fritz, 2010), task performance (Drach-Zahavy & Erez, 2002), organisational retention, loyalty (Boswell, Olson-Buchanan, & Pine, 2004), and wellbeing (Searle & Auton, 2015). Given the range of critical outcomes linked to stress appraisals, there is an impetus to understand the circumstances that shape appraisals within organisations.

This thesis extends research on stress appraisals by examining antecedents and outcomes at multiple levels (i.e., the day, person, and team levels). A critical emphasis of transactional theory is that stress does not emanate solely from the individual or the environment, but from continuous transactions between them (Dewe, 1992). Similarly, multi-level theorists assert that employees do not operate in isolation; their behaviours and experiences both affect, and are impacted by, the context around them (Klein & Kozlowski, 2000). Nevertheless, despite the recognised multi-level nature of organisations, stress appraisal research remains predominantly focused on the individual level of analysis (Jamieson, Hangen, & Lee, 2018; Rodrigues, Sinval, Queirós, Marôco, & Kaiseler, 2019; Searle & Auton, 2015), perhaps due to the theoretical focus of the stress appraisal construct in explaining individual variability in responses to the same stressor (Lazarus & Folkman,

1984). Integrating stress appraisal research with multi-level theory is critical to understand transactions between the individual and their context, providing a more comprehensive picture of the stress appraisal process (Hitt, Beamish, Jackson, & Mathieu, 2007). Moreover, such an approach broadens the possibilities for intervention beyond individual-level stress management interventions, to include strategies that incorporate teams, leaders, and the management of daily work demands.

This thesis progresses current understanding by positioning stress appraisal as a mediator of the relationship between problem-solving demands and proactive behaviours. Although stress appraisals of “traditional” stressors such as time pressure and workload have been explored (Espedido & Searle, 2018; Webster, Beehr, & Love, 2011), appraisals of knowledge-related demands such as problem-solving have received less attention (Schmitt, Zacher, & Frese, 2012). Yet it will be useful to understand how problem-solving demands exert their effects since such demands are becoming more prevalent as workplaces become increasingly complex and dynamic (Moregeson & Humphrey, 2006). Relatedly, as workplaces become more complex it may not be sufficient to follow prescribed job roles; employees will be required to be proactive and innovative (Moreland & Argote, 2003). Understanding how problem-solving demands are appraised, and the implications of these appraisals for proactivity can equip organisations with ways to address novel and complex issues that arise.

The four studies that comprise this thesis aim to progress a more integrated and complete understanding of the role of stress appraisal, by exploring its antecedents and outcomes at multiple levels. A combination of multi-level studies was used to provide complementary insights. The first and fourth studies applied diary study methodology among Australian employees to examine how study phenomena varied day-to-day, and how these factors interacted with more stable individual characteristics. The second and third studies

used leaders and employees nested within teams to shed light on the interplay between individual, team, and leader experiences.

To frame the four studies, this thesis begins with reviews of the literature on stress appraisal (Chapter 1) and proactivity (Chapter 2), identifying issues that necessitate further consideration. In Chapter 3, I then describe how the present thesis aims to address some of these issues and apply stress appraisal in the context of problem-solving and proactivity. Following this, Chapters 4 through 7 present the four empirical studies. To conclude, key findings of the thesis are synthesised alongside avenues for future research (Chapter 8).

Chapter 1 – A Review of the Stress Appraisal Literature

The stress appraisal construct has garnered support for its validity and utility within the health psychology domain as well as in occupational settings. The aim of this paper is to provide a comprehensive review of the conceptual and empirical literature on stress appraisal within workplace contexts. To the best of my knowledge, it is the first review paper to do so. Firstly, I outline key theoretical frameworks underpinning the stress appraisal literature. Secondly, I synthesise empirical research on the antecedents and outcomes of stress appraisal, at multiple levels of the organisation. Thirdly, I discuss some of the methodological issues associated with stress appraisal research and propose recommendations to address them. Finally, I outline suggested avenues for future research.

This review chapter provides a foundation for the present thesis, outlining ways to advance and extend the stress appraisal literature. Table 1.1 summarises some of the gaps in the stress appraisal literature that were identified in this review. It also provides comments as to why it may be worthwhile addressing these gaps and how the present thesis attempts to do so.

This paper will be submitted for publication following adaptation. In its current form, its scope is restricted to outline the issues addressed in the present thesis. Prior to submission to a journal, I plan to broaden the scope of the paper for a more comprehensive review, covering issues beyond the present thesis.

Table 1.1.*Potential Gaps Identified in the Literature and How the Present Thesis Seeks to Address these Gaps.*

Potential gaps in the literature and why they need to be addressed	How the present thesis seeks to address these gaps	Relevant chapter				
		Review paper	Study 1	Study 2	Study 3	Study 4
The stress appraisal construct appears largely absent from work stress theories (González-Morales & Neves, 2015). However, neglecting appraisal may have hidden costs given that it has been shown to influence a range of critical workplace outcomes (e.g., employee burnout, affect, turnover, creativity, performance).	The current review aims to synthesise seminal stress theories across the health and work domains as a preliminary step towards integrating stress appraisal into work stress models.	✓				
Few studies directly measure stress appraisal , and instead rely predominantly on categorising stressors as either a challenge or hindrance (Searle & Auton, 2015). This approach assumes that a stressor is interpreted in the same way by all individuals, despite research demonstrating substantial variability in the way people appraise their situation.	The empirical studies that comprise this thesis all measure stress appraisal directly, at the level of the individual.		✓	✓	✓	✓
Few researchers distinguish between the concepts of threat and hindrance , despite the emergence of studies supporting their conceptual and empirical distinction (e.g., Tuckey, Searle, Boyd, Winefield, & Winefield, 2015). Expanding the multi-dimensionality of stress appraisal to incorporate both threat and hindrance types is likely to provide a greater coverage of the construct.	I measured both threat and hindrance types of appraisal in the present thesis. Threat appraisal refers to anticipated personal harm/loss, as distinct from hindrance appraisal which signifies potential goal obstruction.		✓		✓	✓
There is a paucity of group-level research , despite theoretical indications that contextual factors play a critical role in shaping appraisals (Lazarus & Folkman, 1984). Further exploration of group-level factors may also increase the scope of stress interventions, beyond the individual, to include team and leader factors.	Applying multi-level methodology, I explored team (i.e., team problem prevention) and leader (i.e., leader stress appraisal) factors that moderate the relationships between stressors, appraisal, and outcomes.			✓	✓	

Table 1.1 (cont'd).*Potential Gaps Identified in the Literature and How the Present Thesis Seeks to Address these Gaps.*

Potential gaps in the literature and why they need to be addressed	How the present thesis seeks to address these gaps	Relevant chapter				
		Review paper	Study 1	Study 2	Study 3	Study 4
Few day-level studies have examined stress appraisal , despite extensive day-level research on other stress-related phenomena. Since appraisal is a dynamic construct, shifting as individuals re-evaluate their situation, measurement at the day-level may better capture its transitory nature (Prem, Ohly, Kubicek, & Korunka, 2017).	Empirical Studies 1 and 4 draw upon a diary study dataset to explore day-level effects across five consecutive working days.		✓			✓
The stress appraisal literature relies heavily on cross-sectional research designs. However, studies that use multiple time points allow assessment of directionality and mediational effects. This is particularly critical given that transactional theory positions appraisal as a mediator of the effects of stressors on outcomes (Lazarus & Folkman, 1984).	In Studies 1 and 4, we use multiple within-person measurements to test indirect effects and explore stronger causal conclusions.		✓			✓
There is a lack of stress appraisal research testing moderational hypotheses , yet transactional theory emphasises that appraisal emerges from interactions between the person and their environment (Lazarus & Folkman, 1984). Furthermore, cross-level moderation analyses may be particularly instrumental for integrating research across multiple levels.	The present thesis tests a range of cross-level moderations, integrating the role of day, individual, team, and leader factors in the appraisal process.		✓	✓	✓	✓
Stress appraisal research relies almost exclusively on self-report , which is susceptible to social desirability and common method bias. Further research using multiple data sources or objective data can help minimise these biases.	Studies 2 and 3 combine leader and team ratings to minimise biases in purely self-report research.			✓	✓	
Limitations associated with stress appraisal measures may impinge upon understanding of the appraisal construct. Common limitations include confounding between primary and secondary appraisal, confounding with measures of emotion, and the use of retrospective approaches to measure anticipatory appraisal types.	Throughout this thesis I used measures of appraisal that aim to circumvent some of the limitations noted in past research.		✓	✓	✓	✓

Review Paper 1 – Stress Appraisal at Work:**A Theoretical Integration, Empirical Review, and Prospective Commentary**

A. Espedido & B. J. Searle

Initially emerging from the broader health psychology literature, the stress appraisal construct has since been applied across workplace contexts with critical implications for employee wellbeing and behaviour. The authors begin by integrating seminal theories of stress across the health and occupational psychology domains. We note conceptual inconsistencies that suggest potential value in directly examining (rather than inferring) workplace stress appraisals, as well as drawing clearer distinctions between threat and hindrance types of appraisal. The authors subsequently review extant research on stress appraisals conducted specifically in work settings. A synthesis of empirical studies published since the 1980s reveals several key antecedents and outcomes of stress appraisal, demonstrating the value of appraisal for predicting the effects of a range of stressors on critical workplace phenomena. Methodological characteristics of the reviewed studies are outlined. To conclude, we propose specific avenues for future research across four key areas.

Keywords:

Stress appraisal; challenge-hindrance; work stress models; stress management

A recent survey revealed that 61% of adults cite work as a substantial source of stress (American Psychological Society, 2018). Moreover, work-related stress is estimated to account for 57% of lost workdays (Health and Safety Executive, 2018). A major focus of stress management is the identification of situational risk factors for psychological distress (Spector & Jex, 1988), including but not limited to the presence of job demands and the absence of resources (Bakker & Demerouti, 2018). However, these approaches all rely to some extent on a disputed assumption: that the situational factors are experienced in a similar manner by everyone who encounters them. Yet even among people performing the same job, there can be a wide variety of psychological and behavioural responses to the same working conditions (Rafferty & Restubog, 2010; Vine, Uiga, Lavric, Moore, Tsaneva-Atanasova, & Wilson, 2015). Such a result is consistent with the phenomenon of stress appraisal.

Stress appraisal refers to the process by which people evaluate the likely personal impact of events and situations they face (Lazarus & Folkman, 1984). As described in Lazarus and Folkman's transactional theory, the same situation or event carries the potential to be appraised quite differently by different people. For example, when given a new and difficult task to perform, some people may focus on the potential for harm or loss (threat appraisal), while others may focus on the potential for gain or growth (challenge appraisal). In workplace settings, stress appraisals have been found to influence the relationships between characteristics of work and key occupational outcomes such as coping and mental health (e.g., Gomes, Faria, & Lopez, 2016), affective states (e.g., Lin, Wu, Chen, & Chen, 2014; Oliver & Brough, 2002), and even aspects of performance such as proactivity (Ohly & Fritz, 2010) and creativity (Espedido & Searle, 2018). Stress appraisal has been described as a critical factor in understanding how people manage work and stress (González-Morales & Neves, 2015).

Despite this, many of the popular models and frameworks used to study work stress

and apply its findings either neglect stress appraisal or else handle it poorly. We believe that research and practice on work stress would benefit if the nature and process of appraisal were better understood generally, and integrated better with other theories. To this end, we have prepared a review of the research literature that facilitates theoretical integration and understanding of relations between important psychological processes. First, we clarify key definitions to help frame the review. Next, we discuss several models of stress, identifying not only areas of compatibility that support theoretical integration, but also inconsistencies that warrant further attention. We then review the extant research on stress appraisals relevant to the work context¹, and attempt to highlight consistent patterns as well as gaps in knowledge. Afterwards, we discuss some of the methodological and measurement issues that characterise the reviewed research, highlighting some areas of dispute. The final section presents a constructive critique and synthesis, establishing a platform for future research.

Defining Key Terms: Stressors, Stress Appraisal, and Outcomes

A challenge in synthesising theoretical and empirical research is that key terms are often interpreted in different ways. For example, the term “stress” has been imbued with multiple meanings, referring sometimes to a situation or event (e.g., Hobfoll, 1989, Mikulincer & Florian, 1995; Gomes et al., 2016), sometimes to a person’s perception (e.g., Payne, Jick, & Burke, 1982), and sometimes to a person’s behavioural or physiological response (e.g., Kohler, Munz, & Grawitch, 2006). As we endeavour to integrate theoretical perspectives and diverse empirical findings, we seek to clarify some key terms to guide this discussion. As such, this review differentiates between *stressors*, *stress appraisals*, and *outcomes*.

Stressors, *stress appraisals*, and *outcomes* have been viewed as sequential stages in

¹ To the best of the authors’ knowledge there are no review papers on stress appraisals in the workplace setting. This may be because most stress appraisal research is grounded in the disciplines of clinical and health psychology (c.f. Skinner & Brewer, 2002).

the stress process (Lazarus & Folkman, 1984). Stressors refer to aspects of the work environment with the potential to trigger a stress response (Spector & Jex, 1998). Examples of identified workplace stressors include time pressure (Widmer, Semmer, Kälén, Jacobshagen, & Meier, 2012), responsibility (Webster, Beehr, & Love, 2011), organisational constraints (Spector & Jex, 1998), role conflict, and role ambiguity (O'Driscoll & Beehr, 1994). At the intermediary stage are stress appraisals, which refer to the subjective way in which objective stressors are interpreted (Lazarus & Folkman, 1984). Transactional theory emphasises that different individuals appraise stressors in their environment in unique ways, prompting distinct outcomes (Lazarus & Folkman, 1984). Outcomes represent the final stage of the stress process, defined as the consequences of stress (Leong, Furnham, & Cooper, 1996). Examples of outcomes explored in work stress research include burnout, engagement (Crawford, LePine, & Rich, 2010), coping (King & Gardner, 2006), affective states (Searle & Auton, 2015), and performance (Drach-Zahavy & Erez, 2002).

Theoretical Integration

Traditional stressor-strain models, including the more recent job demands-resources model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), work from an assumption that if something requires attention and depletes energy, it undermines wellbeing – regardless of how that thing is interpreted (Schaubroeck, Cotton, & Jennings, 1989). The literature is comprised of an extensive body of studies that utilise the job-demands resources model, providing a range of work redesign solutions to managing stress (Bakker & Demerouti, 2007; 2014; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). While these studies are meritorious and worthy of investigation, there exists a different approach which identifies alternative solutions. This alternative approach is comprised of two key frameworks: transactional stress theory, which originated from the general health and wellbeing literature, and the challenge-hindrance framework, originating from the work stress literature. Parallels

have often been drawn between transactional stress theory and the challenge-hindrance framework (e.g. Boswell, Olson-Buchanan, & LePine, 2004; Crawford, LePine, & Rich, 2010; LePine, Podsakoff, & LePine, 2005; Pearsall, Ellis, & Stein, 2009), yet there are conceptual inconsistencies. This section first outlines the two theoretical frameworks, before discussing the issues that emerge from the integration of these perspectives.

Theoretical Frameworks

Transactional stress theory. A central tenet of Lazarus and Folkman's (1984) transactional theory is that people evaluate all new events and situations, and may re-evaluate ongoing events and situations. *Primary appraisal* refers to judgements about what one personally has at stake in the situation (in terms of gain and loss), and it has several distinct forms. *Challenge appraisal* is the perception that the situation contains opportunity for some form of valued future gains: material rewards, social recognition, goal achievement, or skill mastery. Challenge appraisal is typically associated with favourable phenomena such as problem-focused coping (Moos, Brennan, & Fondacaro, 1990), positive affect (Searle & Auton, 2015), workplace creativity (Ohly & Fritz, 2010), and reduced burnout (Ben-Zur & Michael, 2007). *Threat appraisal* is the assessment that a situation carries the potential for some kind of future loss or harm, whether that be material loss, loss of status, physical harm or harm to the self-concept. Threat appraisal is associated with negative phenomena such as physiological stress (Harvey, Nathens, Bandiera, & LeBlanc, 2010; Schlotz, Hammerfield, Ehlert, & Gaab, 2011), negative emotions, avoidant coping strategies (Lengua & Long, 2002), absenteeism, and intention to quit (Fugate, Prussia, & Inicki, 2012).

Lazarus and Folkman (1984) differentiated challenge and threat appraisals as qualitatively distinct from *benign/positive appraisal* and *harm/loss appraisal*, in that challenge and threat appraisals are future-focused and so more likely to influence goal-directed behaviours. *Benign/positive appraisals* are perceptions of gains that have already

been received and cannot be taken away while *harm/loss appraisals* are perceptions of harms/losses that have already been incurred and cannot be prevented.

By contrast, *secondary appraisal* refers to judgements about whether one can bring about a desirable outcome from the event or situation. Secondary appraisal involves several related beliefs and judgements: how confident one feels about either achieving a specific goal in this situation (self-efficacy; Litt, 1988) and/or simply coping with the difficulties of the situation (coping self-efficacy; Chesney, Neilands, Chambers, Taylor, & Folkman, 2006), given perceptions of the availability and utility of resources in that situation (c.f. de Jonge & Dormann, 2006); and how much control one has, in terms of either changing the situation (perceived situational control; Bandura, 1988; Toup & Drewe, 2002) or of modifying one's behaviours to better handle the situation (perceived behavioural control; Ajzen, 1991). Secondary appraisal is important because the impact of a challenge appraisal or a threat appraisal can be greatly influenced by believing that achieving the desired goal from the situation will be easy, or that it will be hard. Nevertheless, it is typically the primary appraisal judgement that determines the type of goal for which secondary appraisal evaluations are made (Lazarus & Folkman, 1984).

A central tenet of transactional stress theory is that the same stressor can be interpreted differently, by different people, including in terms of challenge and threat appraisal (Lazarus, 1966). This variability between individual appraisal types could stem from differences in personal characteristics and contextual factors such as abilities, personality, and available social support (Mechanic, 1978). For example, individuals who are extraverted may be more likely to see the positive challenges in a situation, whereas individuals high in neuroticism are typically more sensitive to aspects of threat and harm (Mak, Blewitt, & Heaven, 2004). Therefore, stress appraisal may offer an explanation for why the same stressor can elicit different behavioural responses for different individuals. The

present thesis focuses predominantly on challenge and hindrance appraisals as these are more strongly tied to the challenge-hindrance framework. Nevertheless, we do acknowledge the importance of research exploring other types of appraisal such as benign/positive, harm/loss, and secondary appraisals.

Challenge-hindrance framework. Despite the assumptions made in traditional stressor-strain models, different stressors can have different impacts on different individuals (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010). The challenge-hindrance framework contributes to the occupational stress research by identifying that stress outcomes depend on the nature of the stressor (Cavanaugh, Boswell, Roehling, & Boudreau, 2000). Drawing from transactional theory, Cavanaugh et al. (2000) separate stressors into two categories, challenges and hindrances. *Challenges* are those stressors which are more likely to present opportunities for growth, gains, and achievement, such as workload (Albrecht, 2015), time pressure, and responsibility (Cavanaugh et al., 2000). *Hindrances* refer to stressors that have the potential to thwart goal achievement, such as role ambiguity (Rodell & Judge, 2009), role conflict (Balducci, Cecchin, & Fraccaroli, 2012), and organisational politics (Cavanaugh et al., 2000). Meta-analyses support that challenges are positively related with motivation (LePine et al., 2005), engagement (Crawford et al., 2010), job satisfaction, and organisational commitment (Podsakoff, LePine, & LePine, 2007), whereas hindrance stressors are associated negatively with these outcomes.

Theoretical Issues

Although attempts have been made to integrate transactional theory with the challenge-hindrance framework (Webster et al., 2011; Searle & Auton, 2015; Tuckey, Searle, Boyd, Winefield, & Winefield, 2015), there are some points of contention which are discussed below.

Operationalisation of appraisal. Within the challenge-hindrance framework,

stressors are categorised as either a challenge or a hindrance. Stress is operationalised by reporting the experienced level of stress in these challenge/hindrance categories (e.g., Cavanaugh et al., 2000; LePine et al., 2005). However, this method assumes that a given stressor is interpreted uniformly by all individuals as either a challenge or hindrance. This is inconsistent with transactional theory (Lazarus & Folkman, 1984) as well as empirical findings, which suggest not only that a stressor can be interpreted differently by different people, but also that the same stressor can be appraised simultaneously as both challenging and hindering (Webster et al., 2011; Searle & Auton, 2015). Lazarus (1991) also argues that the appraisal process is dynamic. Stress appraisals can shift over time as people re-evaluate their situation and their capacity to cope (Lazarus, 1966). For example, a retail worker may initially interpret the pressure to upsell products as a challenge, as it provides a means for recognition and reward. Over time however, the pressure to upsell products may be perceived as a hindrance as it can attract complaints or take time away from normal duties (Tuckey et al., 2015). Due to both between and within-person variability (Smith & Kirby, 2009), the direct measurement of appraisal may be of value, instead of solely focusing on pre-determined categorisations of stressors. Measuring appraisal is likely to provide a more objective, direct empirical test of the stress process (González-Morales & Neves, 2015).

Distinguishing between threat and hindrance appraisal. A potential source of confusion arises from a lack of distinction between the concept of *threats* originating from transactional stress theory, and the concept of *hindrances* outlined in the challenge-hindrance framework. Whereas threats refer to anticipated personal harm (Lazarus & Folkman, 1984), hindrances refer to barriers that obstruct goal attainment (Cavanaugh et al., 2000). Despite this conceptual difference, the terms threat and hindrance are often used interchangeably in the work stress literature (e.g., Kuhnel, Sonnentag, & Bledow, 2012; LePine et al., 2005; Mawritz, Folger, & Latham, 2014; Pearsall et al., 2009; Podsakoff et al., 2007; Rodell &

Judge, 2009; Van den Broeck et al., 2010; Webster, Beehr, & Christiansen, 2010; Webster et al., 2011). However, in the aforementioned studies, the term ‘threat’ did not refer to potential harm or loss, but rather to the obstruction of goal pursuit which is more closely related to the hindrance concept. Although challenge and hindrance appraisal concepts capture elements of goal attainment and restriction, the concept of threats to the self has received less attention in occupational theory and methodology. This may impinge upon a thorough understanding of the nature and response to threat in workplace settings. Yet, threat is a critical component of transactional theory, and some researchers have shown that the majority of stressors (in a retail context) were appraised as a threat and fewer were viewed as challenges and hindrances (Tuckey et al., 2015).

Theory supports the value in further distinguishing between threats and hindrances. Lazarus and Folkman (1984) postulate that threat appraisals are linked with emotions such as anxiety, fear, and worry because they signal potential harm to the self or personal losses. Lazarus and Folkman (1984) did not explicitly describe hindrance appraisal in their initial theoretical formulation, but Lazarus later wrote that “Frustration is often treated as an emotion, but like challenge and threat, I regard it as an appraisal” (1991, p. 827). It has been proposed that hindrance appraisal, as distinct from threat appraisal, is akin to Lazarus’ description of frustration (Searle & Auton, 2015) because frustration is linked to being hindered from achieving goals (e.g., Dollard, Doob, Miller, Mowrer, & Sears, 1939). Given their unique affective associations, further research may consider measuring both threat and hindrance appraisal.

Summary

A core aim of the present paper is to extend recent advancements in the occupational stress literature. Through integrating dominant theoretical perspectives (i.e. transactional stress theory and challenge-hindrance framework), it identifies areas that warrant further

attention. The findings suggest potential merit in directly measuring appraisal (rather than assuming appraisal types a priori) and distinguishing between threats and hindrance for a better coverage of the appraisal construct.

Empirical Review

As noted in the previous section, stress appraisal has garnered less attention in workplace contexts, despite its conceptual and practical utility (Tuckey et al., 2015). We now review the available empirical research on stress appraisal conducted specifically in work settings. This section organises the reviewed research by three levels of analysis: individual, day, and group. We recognise that most research has been focused at the individual level, with a paucity of day and group-level research. This may emanate from the theoretical focus of the stress appraisal construct on explaining individual differences in responses to the same stressor (Lazarus & Folkman, 1984).

Individual Level of Analysis

Individual-level studies can be organised in terms of *antecedents* and *outcomes*, with further sub-categorisations under each section. Research on the antecedents of stress appraisal reinforces the notion that stressors, despite being labelled as challenges or hindrances, can be appraised in multiple ways by different individuals. Research on the outcomes of stress appraisal was initially focused on wellbeing but has since expanded to identify implications for behaviour and performance.

Antecedents. Transactional theory suggests that stress appraisal is preceded by factors relating to both the environment and the person (Lazarus, 1984). Consistent with this notion, research on the antecedents of appraisal can be categorised in terms of environmental factors (i.e., organisational resources, challenge stressors, hindrance stressors, specific situations/events) and personal characteristics.

Environmental factors: Organisational resources. Researchers theorise that people scan the environment for resources (e.g., supervisor or peer support) when making appraisals (Folkman & Lazarus, 1985; Helgeson, 1993; Vaux, 1998). Indeed, a number of organisational resources have been shown to impact upon stress appraisals. For example, Nielsen and Daniels (2012) studied an organisation undergoing a change merger. Leaders who were provided with resources such as change management training exhibited higher levels of challenge appraisals of the change. Moreover, other researchers have found that resources such as supervisor support, group cohesion (Steinhardt, Dolbier, & Gottlieb, 2003) and co-worker involvement (Babin & Boles, 1996) can alleviate negative appraisals of stress. Similarly, perceived organisational support is also related to lower levels of negative stress perceptions (Jones, Flynn, & Kelloway, 1995).

Environmental factors: Challenge stressors. Stressors such as time pressure, workload, goal difficulty, and responsibility have consistently been classified as ‘challenges’ under the challenge-hindrance framework (e.g., Cavanaugh et al., 2000; LePine et al., 2005; Pearsall et al., 2009; Schmitt, Zacher, & Frese, 2012). The case for their *a priori* categorisation as challenges is that they “create especially high performance opportunities, and therefore, a strong sense of accomplishment if one is able to overcome the difficult situations they present” (Webster et al., 2011, pp. 506), nor is it necessarily wrong to expect such demands can be associated with challenge appraisals, particularly when those demands are aggregated together. Liu and Li (2018) found a positive relationship between a range of challenge stressors and challenge appraisal. Similarly, Malik (2015) found that time pressure, a prototypical challenge stressor (Widmer et al., 2012) was also positively related to challenge appraisal.

However, researchers who have explored relationships between so-called “challenge stressors” and multiple types of appraisal affirm that these stressors can be interpreted in a

range of ways. Gerich (2017) found that quantitative demands and time pressure could be interpreted as both challenging and hindering. Similarly, time pressure can be perceived by employees as both a challenge and a hindrance (Searle & Auton, 2015). Moreover, workload and responsibility have been appraised as both a challenge and a hindrance, to different degrees, by different individuals, although responsibility appears primarily appraised as a challenge (Webster et al., 2011). While there is some evidence that some stressors may tend to be appraised in certain ways (e.g., responsibility as a challenge, Webster et al., 2011), there remains substantial within-person variability in appraisal, indicating the value of measuring appraisals.

Environmental factors: Hindrance stressors. Organisational constraints, interruptions, role ambiguity, role conflict, and interpersonal conflict have typically been categorised as hindrances (e.g., Cavanaugh et al., 2000; LePine et al., 2005; Rodell & Judge, 2009), despite research indicating that these stressors can also be interpreted as a challenge and/or threat. Pindek and Spector (2016) measured both challenging and hindering aspects of organisational constraints and found that people reported substantial levels of both. Similarly, interruptions (Gerich, 2017), role ambiguity, and role conflict (Webster et al., 2011) are shown to be appraised simultaneously as a challenge and hindrance. Gonzales-Navarro, Llinares-Insa, Zurriaga-Llorens, and Lloret-Segura (2017) also demonstrated that interpersonal conflict could be appraised as both a challenge and a threat. Therefore, “hindrance” stressors may be experienced not just as hindering, but also as challenging and threatening. This suggests that challenge-hindrance categorisations are likely to be too simplistic.

Environmental factors: Specific situations/events. Other researchers have explored appraisals of specific situations or events, as opposed to routine job stressors. Harrowfield and Gardner (2010) asked employees to recall a single stressful situation that occurred at

work. They only explored challenge appraisals but found substantial inter-individual variability in appraisal. Vine et al. (2016) explored appraisals of an emergency situation with highly skilled individuals in an experimental study. A sample of pilots were exposed to a simulated engine failure, which was interpreted as both challenging and threatening to different degrees, by different individuals. In a longitudinal study, Rafferty and Restubog (2016) explored challenge, threat, and harm/loss appraisals of a change restructure, finding substantial variation in appraisal. Collectively, these studies demonstrate that specific situations / events can be interpreted in multiple ways.

Personal characteristics. Both transitory and stable person factors, have been shown to impact stress appraisal. In terms of transitory factors, van Steenbergen, Ellemers, Haslam, and Urlings (2008) demonstrated the impact of cognitions on the way people appraise the task of combining their work and family roles. In an experiment, female employees were exposed to one of two messages: the first message emphasised that the creation of multiple roles can help to grow one's capacity (expansion perspective), the second emphasised that adopting multiple roles can have a taxing and draining effect (scarcity perspective). Those who were exposed to the expansion perspective were more likely to appraise the combining of work and family roles as a positive challenge. In terms of more stable characteristics, King and Gardner (2006) observed that the ability to self-manage emotions was linked to greater challenge appraisal, and reduced threat appraisal. Mikulciner and Florian (1995) also identified that attachment style impacted appraisal in the defence force. Military personnel with ambivalent and avoidant attachment styles tended to view their environment as more threatening, compared to those with a secure attachment style. Collectively, these findings emphasise the role of person factors in shaping appraisal.

Outcomes. Various health, wellbeing, behaviour, and performance outcomes have been explored in relation to stress appraisals.

Health and wellbeing outcomes. Transactional theory proposed that coping behaviour choices were likely to be influenced by stress appraisals (Lazarus & Folkman, 1984). For example, Lazarus and Folkman predicted that task- and problem-focused coping behaviours (seen as desirable because they involve the application of practical strategies to remove or alleviate the cause of stress) were more likely to occur following challenge appraisals. Avoidance coping (seen as maladaptive, since they fail to deal with stressors directly) was predicted to more often result from threat appraisals. Research has consistently supported these predictions, showing challenge appraisal is linked with problem-focused (Fadel, 2012; Searle & Auton, 2015) and task-focused coping (González-Navarro et al., 2017) as well as reduced avoidance (Gardner & Fletcher, 2009). On the other hand, threat appraisal is consistently linked with avoidance coping (Gardner & Fletcher, 2009). Findings regarding emotion-focused coping (actions taken to reduce the negative emotional impact of stressors) are mixed, being linked to both challenge (Fadel, 2012) and threat appraisal (Cash & Gardner, 2011, Gonzales-Navarro et al., 2017). As Lazarus and Folkman (1984) theorise, this may be because emotion-focused coping strategies are ambivalent in that they aim to reduce distress, but do not deal directly with the source of the distress.

Stress appraisal in the workplace has also been shown to influence affective and motivational states. Challenge appraisal is consistently linked with desirable affective and motivational states such as positive affect (Cash & Gardner, 2011), reduced anger (Searle & Auton, 2015), work motivation, and persistence (Liu & Li, 2018; Parker, Bell, Gagné, Carey, & Hilpert, in press). Threat appraisal has been consistently related to negative affect (Gardner & Fletcher, 2009; King & Gardner, 2006), whereas hindrance appraisal is associated with anger (Searle & Auton, 2015), reduced work motivation and decreased persistence (Liu & Li, 2018, Parker et al., in press). This supports transactional theory which links challenge

appraisal to positive affective-motivational responses, and threat appraisal with negative responses.

Stress appraisal also has implications for job attitudes and cognitions. Paškvan, Kubicek, Prem, and Korunka (2016) observed that stress appraisal mediated the effects of work intensification on job satisfaction. Perceptions of challenge alleviated the negative effects of work intensification on job satisfaction. In contrast, hindrance appraisal has been linked to job dissatisfaction, turnover intention (Webster et al., 2011) and venture exit intention among entrepreneurs (Zhu, Burmeister-Lamp, and Hsu, 2017).

Stress appraisal also has direct effects on employee strain and burnout. Webster et al. (2011) observed that hindrance appraisal was associated with physical and psychological strain. On the other hand, challenge appraisal was related to reduced burnout (Gomes Faria, & Gonçalves, 2013) and less perceived stress (Gomes et al., 2016), yet it was still linked to physical strain (Webster et al., 2011). This indicates that although the effects of challenge appraisal are not as detrimental, employees can still experience strain as a result.

Behaviour and performance-related outcomes. Finally, there is evidence that appraisal influences employee behaviour. Rafferty and Restubog (2016) followed employees who went through an organisational restructure in a longitudinal study. They found that those who appraised the restructure as a threat at the start of the study were more likely to have left the organisation two years later. Parker et al. (in press) explored the effects of appraisal on prosocial behaviour, finding that those who appraised performance-based pay requirements as a challenge tended to display more prosocial behaviour. Other individual-level research also supports the link between stress appraisal and performance. Police officers' performance has been shown to improve when they appraise stressful situations as a challenge, and diminish when they appraise situations as a threat (Larsson, Kempe, & Starrin, 1988). González-Morales & Neves (2015) found that challenge appraisal (labelled opportunity

appraisal in their study) is linked to enhanced supervisor-rated performance (via affective commitment) whereas threat appraisal is linked to impaired performance (via reduced commitment).

Day Level of Analysis

Although research affirms substantial day-level variation in stress-related phenomena (e.g., Nezlek, Krjtz, Rusanowska, & Holas, 2019), not enough research has examined stress appraisal constructs at the day-level. The few studies to do so suggest that stress appraisal has meaningful relations to stressors and outcomes at the day-level. Two diary studies demonstrated daily effects of appraisal on affective states and fatigue. On days when employees reported feeling challenged, they also reported more positive affect (Searle & Auton, 2015, Tuckey et al., 2015). In contrast, on days when employees felt more threatened, they reported more anxiety and anger, whereas when they felt hindered they indicated feeling more tired and fatigued (Tuckey et al., 2015).

Stress appraisal has also been shown to mediate the effects of daily stressors on work outcomes. Ohly and Fritz (2010) demonstrated that challenge appraisals mediated the relationship between daily demands (i.e., time pressure, control) on daily creativity and proactivity. In Prem, Ohly, Kubicek, and Korunka's (2017) diary study, challenge appraisal mediated the effects of learning demands and time pressure on learning, whereas hindrance appraisal mediated the effects of learning demands on vitality over working week.

Stress appraisal has also been shown to have moderating effects at the day-level. For example, service employees were less likely to find emotional self-management exhausting on days when they appraised their situation to be challenging (Huang, Chiaburu, Zhang, & Li, 2015). Although day-level research is limited, especially in terms of moderating effects, the available findings indicate that day-to-day variation in appraisal is a promising area for further exploration with possible implications for targeted management interventions.

Group Level of Analysis

Very few studies have explored stress appraisal at the group level. This could be attributed to the practical, ethical, and analytic complexities (e.g., increased costs, greater number of participants required, and a need to recruit in-tact teams) associated with group research (Kozlowski, Chao, Grand, Braun, & Kuljanin, 2013). It may also emanate from difficulties in developing multi-level theory, which requires synthesis across fragmented disciplines. Nevertheless, the few studies conducted at the group-level affirm that team and leader characteristics can play a role in the stress appraisal process. LePine, Zhang, Crawford, and Rich (2016) found that charismatic leadership influences followers' appraisals, such that followers of charismatic leaders viewed challenge stressors as more challenging than do followers of uncharismatic leaders, and these appraisals in turn appeared to influence performance. This demonstrates that team leader behaviours have the potential to shape employee appraisals, and in turn, employees' behavioural responses to work stressors.

However, even when leaders lack charisma, group-level characteristics can still influence stress appraisals. Team problem-prevention has recently been found to impact the way in which individuals appraise their problem-solving demands, with high problem-prevention team climates helping individual team members to view high demands as more challenging (Espedido, Searle, & Griffin, in press). This suggests that steps to create positive climates and norms within groups can influence individual employees in how they react to potentially stressful work demands.

Although conducted at the individual-level analysis, other research alludes to the value of exploring group factors in the stress appraisal process. Paškvan et al. (2016) demonstrated that employees' perceptions of their organisational climate (i.e., participative climate) impacted the effects of work stressors on cognitive appraisal. Specifically, a favourable participative climate alleviated the harmful effects of work intensification on

challenge and threat appraisal. Mühlhaus and Bouwmeester (2016) conducted a qualitative study among management consultants and found that social factors impacted appraisals. Employees who held a social identity as high-performing professionals were generally more likely to state that they viewed stressors as challenges, which was also linked to greater social inclusion. However, those who held a social identity as high performing professionals, but who were also unable to meet job standards, typically appraised stressors as threats. This shows that a range of group-level climate factors can influence individual stress responses, but such influences may be subject to boundary conditions. Further group-level research using multi-level designs may more accurately identify the circumstances that shape appraisal.

Summary

This empirical review highlights the explanatory power of stress appraisal, linking numerous stressors and outcomes at multiple levels. Challenge, threat and hindrance appraisals represent distilled pathways that help predict the effects of an array of stressors. Therefore, further research on stress appraisal in the workplace is warranted, particularly at the day and group levels where it is currently lacking. Such research could help managers and practitioners anticipate ways to promote positive appraisals.

Methodological Issues

There are several key methodological, measurement, and analytical challenges related to the study of stress appraisal.

Reliance on Cross-Sectional Designs and Self-Report Measures

An issue in the stress appraisal literature is that the majority of research is carried out using cross-sectional designs (e.g., Cash & Gardner, 2011; Fadel, 2012; Gardner & Fletcher, 2009; Gerich, 2017; Gomes et al., 2013, 2016; Harrowfield & Gardner, 2010; LePine et al., 2016; Lin et al., 2014; Malik, 2015; Mühlhaus & Bouwmeester, 2016; Paškvan, et al., 2016;

Rodney, 2008; Webster et al., 2011). Cross-sectional designs do not allow researchers to ascertain the directionality of effects. This is particularly problematic as many of the cross-sectional studies aimed to test mediational hypotheses, whereby stressors influence outcomes via appraisals. Research with more robust designs (longitudinal and experimental) is needed to more accurately assess the extent to which stressors precede appraisals, which in turn impact upon business outcomes.

Stress appraisal research uses self-report almost exclusively to measure all study variables (exceptions are Espedido & Searle, 2018; González-Morales & Neves, 2015; LePine et al., 2016; Nielsen & Daniels, 2012). Measuring job characteristics with self-report is potentially problematic because the extent to which that self-report already contains the individual's appraisal is unclear. Furthermore, reliance on self-report introduces common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For example, the same factors that could lead someone to perceive time pressure as a hindrance, might also lead them to perceive the level of time pressure as very high, and also may inflate their sense of distress.

Self-report is also susceptible to social desirability bias, whereby individuals attempt to appear likeable by adjusting others' perceptions (Rosenfield, Giacalone, & Riordan, 1995). In the context of stress appraisal, individuals who view things as a challenge are more likely to be perceived as positive and resilient (Tugade & Frederickson, 2004). As a result, employees may be more inclined to inflate their ratings of challenge while under-rating appraisals of threat or hindrance. Further research using objective measures or multiple sources of data (e.g., supervisor and team member ratings) is warranted to minimise common method and social desirability bias.

Difficulties Associated with the Measurement of Appraisal

A potential reason why simple challenge-hindrance categories have predominated is that measuring appraisal phenomena directly can be quite difficult (Searle & Auton, 2015).

Recognising these difficulties, this section aims to provide constructive criticism to help refine the measurement of appraisal.

Appraisal as the ratio between perceived threat and coping. A common approach, popularised by Tomaka, Blascovich, Kelsey, and Leitten (1993), operationalises appraisal as the ratio between perceived threat and the ability to cope. Challenge appraisal is indicated by a low threat to coping ratio, whereas threat appraisal is inferred from a high threat to coping ratio. Although this approach is still influential in recent research (e.g., Vine et al., 2016), it has several limitations. Firstly, it confounds primary and secondary appraisals, which are treated as related but qualitatively distinct within transactional theory (Lazarus & Folkman, 1984). Although secondary appraisal is important, a clear indication of primary appraisals of challenge and threat may be needed to identify, for example, whether a person is likely to engage in approach or avoidance. To better understand the integrative nature of primary and secondary appraisal, both can be measured.

Another limitation of the ratio method is that it fails to make a qualitative distinction between threat and challenge appraisal. While threat appraisal refers to harm / loss, it fails to recognise that challenge appraisal represents the perception of potential goal attainment and growth (Searle & Auton, 2015). A minor threat that one feels capable of handling may elicit a very different response from an opportunity one wishes to capitalise upon. A related limitation of this method is that it reduces appraisal to a single dimension, ranging from challenge appraisal to threat appraisal. Such a method is unable to capture the experience whereby one sees both opportunity for gain and risk of loss at the same time.

Appraisal as emotion. Ferguson, Matthews, and Cox (1999) use measures of appraisal that involve rating events in relation to items about how “exhilarating” and “exciting” they are. Similarly, Gomes et al. (2013, 2016) measure threat appraisal in terms of how “disturbing” the situation is, while challenge appraisal is measured in terms of how

“exciting” the situation is. However, Lazarus and Folkman (1985) emphasise that emotions such as “excitement” comprise the emotional response to appraisal, rather than the appraisal itself. Furthermore, findings by Tuckey et al. (2015) show that although appraisals are predictably associated with certain affective states, much of the variance in those states is unrelated to stress appraisal.

Retrospective appraisal. Several measures of appraisal ask respondents to assess the impact of previously experienced life events (e.g., Bhagat, McQuaid, Lindholm, & Segovis, 1985; Miralles, Navarro, & Unger, 2015; Scheck, Kinicki, & Davy, 1997). This is problematic because retrospective measures are subject to memory biases (Bolger, Davis, & Rafaeli, 2003). In particular, time can shape our interpretation of events as a result of their outcomes, creating misleading indications of the relationship between appraisals and outcomes. Furthermore, measuring appraisal retrospectively is also inconsistent with construct definitions of challenge, threat and hindrance appraisal which emphasise their anticipatory nature. Consistent with transactional theory, we recommend measures of appraisal that are administered prior to the outcome of events, and which reference future rather than past consequences (Lazarus & Folkman, 1984).

Directions for Future Research

The present theoretical and empirical review endeavours to provide a platform for future research. We outline specific recommendations for further research below.

Further Integration of Stress Appraisal into Occupational Psychology Frameworks

The present review provides a starting point for integrating stress appraisal into the challenge-hindrance framework. However, future studies may seek to further integrate the stress appraisal construct into the challenge-hindrance framework and other occupational models such as the job-demands resources model (Demerouti et al., 2001). Including an appraisal concept in work stress models is likely to have theoretical and practical utility,

given that stress appraisals exert effects on outcomes, above and beyond the direct effects of stressors themselves (González-Morales & Neves, 2015). Theory and empirical research also support expanding the multi-dimensionality of the stress appraisal construct, to include both threat and hindrance appraisal (Tuckey et al., 2015). Given their unique antecedents and outcomes, distinguishing between threats and challenges may help to more fully capture the stress appraisal construct. Occupational researchers could also consider measuring some of the other types of appraisal referenced in Lazarus and Folkman's (1984) transactional theory, such as benign/positive, harm/loss and secondary forms of appraisal, which are largely absent from the occupational literature.

Day Level Research

Exploring stress appraisals at the day level is likely to have several benefits. Firstly, Lazarus and Folkman (1984) argue that appraisal is dynamic, shifting as individuals continually re-evaluate their situation. As such, measurement at the day-level allows for more accurate assessment of the transitory, malleable nature of appraisal (Prem et al., 2017). Secondly, although between-person research sheds light on why different individuals may respond uniquely to the same event (Lazarus & Folkman, 1984), day-level research provides an explanation for why a person's stress responses fluctuate on a daily basis. Therefore, both individual and day-level research can provide complementary insights into stress appraisal phenomena. Thirdly, short-term stress appraisals are closer to real time and thus less susceptible to recall bias or memory issues (Bolger et al., 2003).

Exploration of Group Level Factors

Future research may explore the influence of group-level factors such as team and leader behaviour. It can build upon previous individual-level research by instead employing multi-level designs, with participants nested within teams or organisations, to provide a more accurate measure of group characteristics (Klein & Kozlowski, 2000). Appraisal is likely to

be only partially explained by individual phenomena. There is evidence to support the notion that group factors have the potential to influence appraisals, particularly in light of the growing interdependency of workplaces (Tornau & Frese, 2013).

Exploring group-level antecedents and outcomes of stress appraisal is likely to have practical value. Such endeavours will support researchers to understand how to promote beneficial appraisals, by highlighting the circumstances in which positive appraisals thrive and negative appraisals are alleviated. Focusing on team and leader behaviours can also provide alternative points of intervention, that are arguably more within managers' control (Erhart, Schneider, & Macey, 2014). Researchers assert that individual-level models are "too simplistic to model complex phenomena such as those studied in organizational behaviour" (Bliese & Jex, 2002, p. 265). Examining antecedents and outcomes of stress appraisal at multiple levels will be a critical area for progressing stress appraisal research.

Moderational Analyses are Needed

A lot of research has focused on testing mediational hypotheses since appraisal is conceptualised as the intermediary step between stressors and outcomes. Yet transactional stress theory emphasises that appraisal is a product of interactions between the person and their environment (Lazarus & Folkman, 1984). Thus, further research exploring moderational hypotheses is warranted. Cross-level moderation analyses may be particularly instrumental for integrating research across multiple levels. For example, team and organisational level factors could be positioned as cross-level moderators of the relationship between stressors and appraisal. This would be beneficial as it would help us more accurately measure how contextual factors impact on the appraisal process. For example, leaders can utilise knowledge about team-level impacts to better support individuals who may be susceptible to appraising demands as a threat.

Conclusion

The aim of this paper was to review the multidisciplinary literature that comprises current understanding of stress appraisal in the workplace. Beginning with a theoretical review, we aimed to integrate seminal stress theories in the psychology and occupational domains. Our impression of current theory is that work stress models may benefit from a shift towards the meaning individuals attribute to stressors, rather than solely the objective stressors themselves. We also note that distinguishing between threats and hindrances may help to provide greater coverage of the appraisal construct, enhancing its predictive utility. The empirical review revealed a need for more day- and team-level research, as well as some critical issues related to the measurement of appraisal. Addressing these limitations will help us to advance understanding of stress appraisal at work, and ultimately enable organisations to manage workplace stress effectively.

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Chapter 2 – A Review of the Proactivity Literature

The overarching aim of this thesis is to examine the role of stress appraisal in the context of proactivity and problem-solving. Having examined the stress appraisal literature in Chapter 1, this chapter focuses on providing an overview of the proactivity literature. Firstly, I discuss the proactivity construct and distinguish it from other workplace constructs. Secondly, I expound the impetus for research on proactivity alongside a discussion of the impacts of proactivity on employees, teams, and organisations. Finally, I outline the rationale for the behavioural approach to proactivity adopted in this thesis.

Defining Proactivity

Across the many definitions presented in the literature, three criteria are commonly used to classify proactive behaviours (Wu & Parker, 2011). Firstly, proactive behaviours are self-starting (Frese & Fay, 2001; Griffin, Neal, & Parker, 2007; Parker, Bindl, & Strauss, 2010). That is, they are initiated by the person, of their own active will, rather than by forces in the external work environment. Secondly, proactive behaviours are future-focused (Grant & Ashford, 2008; Parker et al., 2010; Parker & Collins, 2010; Parker, Williams, & Turner, 2006; Wu & Parker, 2011). The Merriam-Webster dictionary definition of proactivity recognises an anticipatory element whereby employees act in advance of future opportunities, problems, and needs. Similarly, Grant and Ashford (2008) assert that proactivity involves envisioning potential future situations to plan necessary action. Thirdly, proactivity is change-oriented (Parker & Collins, 2010). This requires taking control to facilitate impactful changes to oneself or the work context (Thomas, Whitman, & Viswesvaran, 2010).

Proactivity as a distinct construct. Clarifying the uniqueness of the proactivity construct highlights its contribution over and above other job effectiveness variables. A distinguishing characteristic of proactivity is that it is active. This differentiates it from adaptivity, which involves merely responding and adjusting to changes, whereas proactivity

involves initiating changes (Parker et al., 2010). Proactivity is also distinct from creativity. Creativity refers to the novel generation of ideas, yet an individual can be creative but make no active effort to implement ideas (Bindl & Parker, 2010). Therefore, activation is key for proactivity, distinguishing it from related constructs such as adaptivity and creativity.

Recently, proactivity has been conceptualised to have a broader scope than related constructs like extra-role or citizenship behaviours. Early researchers argued that proactivity refers to extra-role or citizenship behaviours because in-role behaviours are typically non-voluntary and not self-starting (Van Dyne & LePine, 1998). However, this definition is limited as people define the scope of their roles differently with studies suggesting that proactive individuals tend to view their roles more broadly (Frese & Fay, 2001; Parker, Wall, & Jackson, 1997). Moreover, Parker et al. (2006) argue that any task can be carried out more or less proactively, irrespective of whether it is in-role or extra-role. Therefore, proactivity is not synonymous with extra-role or organisational citizenship behaviours. Another defining characteristic of proactivity is that it has a cognitive component (Bateman & Crant, 1993). Implementing change requires deliberate decision-making and goal generation (Bindl & Parker, 2010). This sets proactivity apart from more affective constructs such as empathy and well-being. As such, proactivity is a unique performance-related construct, distinct from other employee behaviours (such as adaptivity, creativity, extra-role behaviour, and affective constructs).

The Impetus for Research on Proactivity

Traditional models of work performance have assumed that successful employees adhere to their job role, follow instructions, and carry out prescribed tasks efficiently (Griffin et al., 2007). However, the nature of work has changed which presents key practical reasons to research proactivity. Workplaces are increasingly dynamic and uncertain (Strauss, Griffin, & Rafferty, 2009) with a lack of predictability in work systems, structures (Bindl & Parker,

2010) and demands (Williams, Parker, & Turner, 2010). When work behaviours cannot be pre-specified, proactivity becomes more important (Thomas et al., 2010). Frese (2008) asserts that there is a need for performance-relevant constructs that are *active*, like proactivity, given the complexity of the modern work environment.

Impacts on individual employees. Research indicates that proactivity typically enhances performance (for meta-analysis see Thomas et al., 2010). Among real estate professionals, Crant's (1995) longitudinal study found that proactive behaviour enhanced objective measures of performance such as salary, houses sold, commission rates, and listing agreements nine months later (even after controlling for other predictors such as intelligence and personality). Specific proactive behaviours have also been repeatedly associated with performance, including proactive relationship building (Ashford & Black, 1996), information seeking (Morrison, 1993), personal initiative (Bledow & Frese, 2009), voice (Van Dyne & LePine, 1998), positive framing (Ashforth, Sluss, & Saks, 2007), and network building (Thompson, 2005). Proactivity is also related to increased innovation, particularly the translation of ideas into implementation (Rank, Pace, & Frese, 2004). Proactivity may have these performance benefits because it involves taking a longer-term view (Tornau & Frese, 2013) and an active approach to constructing situations that enhance functioning (Seibert, Crant, & Kraimer, 1999).

Proactivity also appears to be a consistent predictor of career success (for meta-analysis see Fuller & Marler, 2009). Across diverse occupations and organisations, Seibert et al. (1999) observed that career initiative can facilitate improved career outcomes (i.e., increased salary and promotions). Similarly, Blickle, Witzki, and Schneider (2009) demonstrated that individuals who proactively seek relationships with mentors and senior colleagues have a greater chance of salary progression and promotion after two years. This link may be because people high in personal initiative tend to have clearer career plans and

improved implementation of career plans, resulting in greater employability (Frese, Fay, Hilburger, Leng, & Tag, 1997).

Proactive behaviours also appear to increase satisfaction (for meta-analysis see Thomas et al., 2010). Career initiative and individual innovation were linked with increased career satisfaction after two years (Seibert et al., 2001). Proactive information seeking (Morrison, 1993), voice, proactive personality (Thomas et al., 2010), relationship building, feedback seeking, and positive framing (Wanberg & Kammeyer-Mueller, 2000) are examples of proactive behaviours associated with satisfaction. Likewise, employees who display proactivity are more likely to report higher levels of affective commitment (Thomas et al., 2010), positive affect, and lower levels of absenteeism (Greenglass & Fiksenbaum, 2009). Being proactive enables employees to achieve improvements and customise their work situation, which can enhance person-environment fit (Kristof-Brown, Zimmerman, & Johnson, 2005), thereby increasing satisfaction and commitment to the organisation.

Impacts on teams. Scarce research has examined the effects of proactivity at the team level (Bindl & Parker, 2010). However, the few studies to do so indicate beneficial effects. The leadership literature, in particular, reinforces the benefits of leader proactivity for the team. For example, more proactive managers typically set more challenging goals, which has been shown to increase sales performance (Crossley, Cooper, & Wernsing, 2013). Proactivity is also theorised to be necessary for critical aspects of transformational leadership, such as identifying opportunities, inspiring followers, and persisting to achieve a vision despite obstacles (Bateman & Crant, 1999). In turn transformational leadership cultivates team cohesion and effective performance (Crant & Bateman, 2000).

Team member proactivity also has associated benefits. In a study of maintenance work groups (Hyatt & Reddy, 1997), the team's proactive behaviour improved their collective performance (i.e. faster response times). Druskat and Kayes (2000) conducted a

study with MBA student project teams. Proactive problem-solving predicted team learning and performance outcomes. Similarly, Kirkman and Rosen (1999) found that proactivity (e.g., whether they sought new methods) was related to supervisor-rated team productivity and customer service, as well as team member job satisfaction and commitment. Recent research also indicates that team proactivity can be a mechanism through which risk-taking norms and team efficacy enhance team creativity (Shin & Eom, 2014).

Impacts on organisations. Less research has focused on the impacts of proactivity on organisations. García-Morales, Ruiz-Moreno, and Llorens-Montes (2007) studied the effects of technological proactivity – an organisation’s commitment to search for and invest in new technologies. They found that organisational technology proactivity enhanced organisational learning and innovation in both the technological field and the pharmaceutical field. Other studies have shown that the proactivity of small business owners is related to organisational success (Frese & Fay, 2001), whilst non-proactive (reactive) strategies predict reduced profit (Frese, Van Gelderen, & Ombach, 2000).

The Behavioural Approach to Proactivity

In early research, proactivity was often viewed as a stable, dispositional tendency (c.f. proactive personality, Bateman & Crant, 1993; Crant, 1995; Seibert et al., 1999). Embedded within the very definition of proactivity is the notion that it is self-initiated and voluntarily chosen (Grant & Ashford, 2008). Lerner and Tetlock (1999) assert that people do not merely react to situations, rather they can actively influence their surrounding environment. This is consistent with Bandura’s (1986) social cognitive theory which argues that people have the personal agency to initiate actions and exercise forethought. Given that proactivity appears to be initiated from within individuals, it is understandable that proactivity could appear to be predominantly driven by dispositional tendencies (Bateman & Crant, 1993).

Notwithstanding these contributions, personality approaches have limitations. They assume that certain individuals will be proactive across time and contexts but pay little attention to the influence of situational factors (Grant & Ashford, 2008). The approach does not explain why an employee may engage in proactivity on some occasions but not others (Wu & Parker, 2011). Practically, viewing proactivity as less malleable offers limited scope for intervention. For practitioners, the focus has largely been on exploring the personality characteristics of proactive individuals to inform recruitment and selection (Grant & Ashford, 2008), arguably neglecting opportunities for coaching and development.

Behavioural approaches acknowledge the role of situational factors. Within this research stream, proactivity refers to observable activities that are malleable, shaped not just by personality but also by the environment (Griffin et al., 2007). The approach may have its early origins in Frese and Fay's (2001) concept of personal initiative. Personal initiative is a *behaviour syndrome* whereby employees engage in proactive behaviours. In other words, proactive behaviours refer to self-starting actions, whereas personal initiative refers to the persistent displays of such actions over time. They are very similar constructs in that they both fall under the same broad category of proactivity (Griffin et al., 2007). Since the concept of personal initiative emerged, there has been a proliferation of research aiming to describe proactive behaviours (Griffin et al., 2007).

Some researchers have distinguished between different types of proactive behaviours (Parker & Collins, 2010). Specific types of proactive behaviours identified in the literature include voice: speaking about issues to bring about change (Van Dyne & LePine, 1998), individual innovation: implementing new and useful improvements (Scott & Bruce, 1994), problem prevention: anticipating and addressing potential issues (Frese & Fay, 2001), and job crafting: altering aspects of the job to better fit one's skills, abilities, and interests (Wrzesniewski & Dutton, 2001). Proactive behaviours could also involve network building,

taking charge to initiate change (Morrison & Phelps, 1999), selling critical issues to leaders (Dutton & Ashford, 1993), and expanding one's role (Parker, Wall, & Jackson, 1997).

Although these behaviours are generally conceptualised as desirable for the organisation, it is important to note that proactivity without boundary conditions could have unintended negative consequences (Grant & Ashford, 2008). For example, initiating changes without limitations and proper preparation can cause disruptions among teams (Wu & Parker, 2011).

Some researchers also suggest that some forms of proactivity are more inherently negative (Belschak, Den Hartog, & Fay, 2010; Searle, 2009). Proactivity is commonly defined as any self-starting, future-focused behaviour, directed towards change (Grant & Ashford, 2009; Parker et al., 2006; Parker et al., 2010; Parker & Collins, 2010; Thomas et al., 2010; Wu & Parker, 2011). This means that any such behaviour, irrespective of whether it is positive or negative, could be classed as proactive (Bolino, Valcea, & Harvey, 2010). Bolino et al. (2010) assert that some types of proactive behaviours may have substantial benefits and very few drawbacks, whereas other types of proactive behaviours present significant harm to organisations. Undermining is an example of a more overtly negative behaviour which has been considered to be proactive by past researchers (Duffy, Ganster, and Pagon, 2002; Duffy Shaw, Scott, and Teper, 2006; and Searle, 2009). Undermining refers to "behavior intended to hinder, over time, the ability to establish and maintain positive interpersonal relationships, work related success and favorable reputation" (Duffy et al., 2002, p. 332). We argue that undermining is a negative behaviour that fits the conceptual definition of proactivity because it is self-initiated as it involves a clear intent to harm (Frazier & Bowler, 2012), it is future-focused as the effects occur gradually over time (Duffy et al., 2002), and it is directed towards change as it aims to disrupt others' success at work. Although this thesis focuses on undermining, we acknowledge that this is only one type of negative proactive behavior and that other types exist (including proactive rule-breaking). Nevertheless, investigating a

negative form of proactivity, such as undermining, in conjunction with positive forms of proactivity is likely to yield a more complete perspective of the benefits and costs of proactive behaviours.

Differentiating between types of proactivity has advantages. As Grant and Ashford (2008) assert, being proactive will require different kinds of actions depending on the situation. Research indicates that specific proactive behaviours have different antecedents and outcomes. Focusing on specific behaviours rather than a broad proactivity construct yields greater analytical and predictive power (e.g., Bandwidth-fidelity dilemma, Cronbach & Gleser, 1965). Moreover, examining proactive behaviours at multiple levels is relevant given that the modern work environment is characterised by increasing interdependency (Tornau & Frese, 2013), yet past studies have typically looked at a single proactive behaviour at the individual level (Parker & Collins, 2010). The present thesis includes multiple proactive behaviours at the individual, team, and organisational level. By distinguishing between types and levels of proactivity, we can examine key drivers of particular outcomes in diverse areas.

A limitation of behavioural approaches is that the examination of different behaviours has emerged from diverse research domains and theoretical perspectives (e.g., proactive career initiative has been explored in the careers domain, feedback seeking has been explored in the organisational socialisation domain; Crant & Bateman, 2000). Grant and Ashford (2008) comment that much of the proactivity literature is marked by a lack of integration among disciplines (Parker & Collins, 2010). This makes it more difficult to understand how the behaviours may relate, and the underlying common processes and antecedents. In response to these criticisms, some researchers have developed higher order categories that draw upon the similarities between types and levels of proactive behaviour (Belschak & Den Hartog, 2010; Grant & Ashford, 2008; Griffin et al., 2007; Parker & Collins, 2010).

Parker and Collins (2010) used an empirical approach to integrate proactivity research by categorising behaviours. Factor analytic results indicated that behaviours could be classified under three higher order categories relating to the intended target. Proactive work behaviours are directed towards change in the internal organisation (e.g., voice behaviours, taking charge, individual innovation, and problem prevention). Proactive person-environment fit behaviours are targeted towards changing an individual's fit within the organisational environment (e.g., career planning, feedback seeking). Proactive strategic behaviours focus on improving the organisation's fit with the external market (e.g., selling relevant issues to key leaders; Ashford, Rothbard, Piderit, & Dutton, 1998).

The advantages of focusing on higher order categories is that this may provide insight into common underlying processes of behaviours that may appear superficially different. This thesis aims to capitalise on this advantage by focusing on specific behaviours within one higher category of proactivity: proactive work behaviours. Parker and Collins (2010) argue that behaviours within the same higher order category are likely influenced by similar antecedents and general processes, thereby providing a useful starting point for exploring common underlying mechanisms.

A potential underlying mechanism that may hold considerable promise for clarifying our understanding of proactivity is stress appraisal. Stress appraisal refers to one's interpretation of a situation with respect to its anticipated personal impact (Lazarus & Folkman, 1984). The anticipatory nature of appraisal is relevant to the proactivity domain given that proactivity is about initiating future change (Grant & Ashford, 2008) and cognitive states are critical for the performance of such voluntary behaviours (Parker et al., 2006). Gillespie and Gates (2013) identify that proactivity may be a means of coping with and preventing stress, reflecting a link between proactivity and stress-based phenomena. Finally, in their review paper Wu and Parker (2011) advocated for future research that more directly

links the proactivity and stress literatures. The present thesis aims to address these calls for further research by exploring stress appraisal in relation to proactivity.

Summary

A review of the proactivity literature reveals a host of associated benefits at multiple levels of the organisation, providing an impetus for further research. The present thesis adopts a behavioural approach to proactivity, focusing on a single category of proactive behaviours (i.e., those targeted at the internal work environment). These behaviours share a common target of impact and so provide a useful basis for examining common underlying mechanisms, such as stress appraisal. The next chapter outlines the potential role of stress appraisal in shaping the effects of problem-solving demands on proactivity.

Chapter 3 – The Role of Stress Appraisal for Proactivity and Problem-Solving

Drawing upon the literature reviews on stress appraisal (Chapter 1) and proactivity (Chapter 2), this chapter develops a multi-level conceptualisation of stress appraisal in the context of proactivity and problem-solving. I predicted that stress appraisal could help to disentangle the potential positive and negative effects of problem-solving demands on proactivity. This chapter begins with a summary and justification for the overall thesis model, before explaining the specific research questions addressed in each empirical study. It is intended to be brief, recognising that components of the model are examined in greater detail in the empirical studies that comprise this thesis.

Proactive Behaviour in Response to Problem-Solving Demands: A Multi-Level Approach

The increasing complexity of the contemporary work environment means that knowledge-related stressors, such as problem-solving demands, are becoming more prevalent (Schmitt, Zacher, & Frese, 2012). Problem-solving demands involve the need to manage complex and novel issues (Moregeson & Humphrey, 2006). They are relevant to proactive behaviours because they signify that routine, conventional approaches may not be suitable (Zhou, Hirst, & Shipton, 2012), providing opportunities for employees to be proactive and find alternative ways of doing things.

Despite its potential relevance for proactivity, problem-solving demands have been shown to exert both positive and negative effects. Since they require the application of new ideas, positive consequences of problem-solving demands have included creativity and performance (Daniels, Wimalasiri, Beesley, & Cheyne, 2012; Moregeson & Humphrey, 2006; Von Hippel, 1994). However, other studies have shown the negative phenomena linked with problem-solving demands (and related stressors such as task complexity) which included psychological strain (Beehr, Glaser, Canali, & Wallwey, 2001), impaired

performance (Jacko & Ward, 1996), and activated negative affect (Madrid, Patterson, & Leiva, 2015). Given its ambivalent associations, problem-solving demands could be expected to have both positive and negative implications for proactivity.

A key theoretical issue is that little is known about why problem-solving demands may exert differing effects. To extend theoretical understanding of the pathways underlying the effects of problem-solving demands on proactivity, I proposed the overall thesis model shown in Figure 3.1. I postulated a mediated process whereby problem-solving demands influenced multiple proactive behaviours via stress appraisal pathways (i.e., challenge, threat, and/or hindrance appraisal). To understand the boundary conditions for these pathways, I drew on social theories and reinforcement sensitivity theory to identify potential moderators that exist at the person and team levels. This section aims to provide a concise step-by-step justification for the model.

A Model of Problem-Solving Demands, Stress Appraisal, and Proactivity

Problem-solving demands prompt challenge, threat, and hindrance appraisals.

According to transactional stress theory, an individual's interpretation of a stressor can take on various forms (Lazarus & Folkman, 1984). *Primary stress appraisal* describes an individual's interpretation with reference to its personal impact (for example, "How will this stressor affect my wellbeing?"). Primary stress appraisals can take the form of a *challenge appraisal*, if the stressor is thought to provide future opportunities for growth and mastery or a *threat appraisal*, if thought to cause personal harm/loss (Lazarus & Folkman, 1984). However, other researchers have since also identified *hindrance appraisal*, the perception that a stressor will obstruct future goal attainment. Consistent with transactional theory, Daniels et al. (2012, pp. 668) argue that appraisals of problem-solving demands are "likely to vary, as they might be experienced as challenging and motivating, but also as adverse and

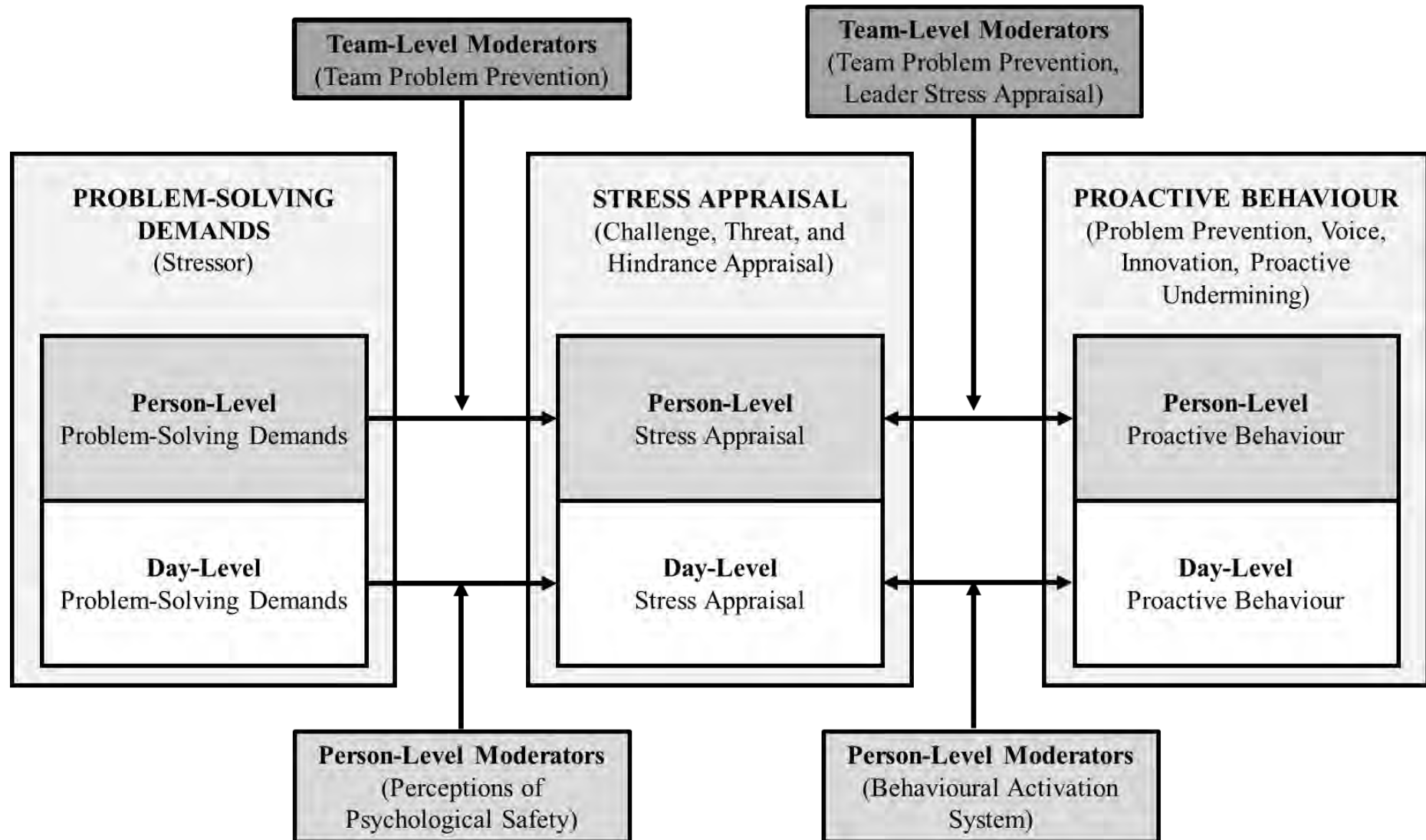


Figure 3.1. Proposed multi-level model of problem-solving demands, stress appraisal, and proactivity.

hindering”. Moreover, empirical evidence demonstrates that the same stressor can be interpreted in numerous ways, as a challenge, but also as a threat or hindrance (Searle & Auton, 2015; Webster, Beehr, & Love, 2011). Therefore, problem-solving demands may be expected to stimulate all three types of appraisal (challenge, hindrance, and threat).

Challenge, threat and hindrance appraisals as pathways to proactive behaviour.

Adopting a behavioural approach to the study of proactivity (the benefits of which are outlined in Chapter 2), I examined the implications of stress appraisal for multiple types of proactive behaviours. The proactive behaviours I investigated were individual innovation (the implementation of novel and useful ideas, Scott & Bruce, 1994), problem prevention (the anticipation and management of recurring issues, Frese & Fay, 2001), voice (speaking out about issues to bring about change, Van Dyne & LePine, 1998), and proactive undermining (sabotaging another colleague’s work, Searle, 2009). I selected these behaviours based on Parker and Collins’ (2010) framework for categorising proactive behaviours. Parker and Collins (2010) argue that proactive behaviours can be clustered in terms of their target of impact. In this case, all of the identified behaviours share the same target of impact, namely the internal working environment (categorised as *proactive work behaviours* using Parker and Collins’ framework). A common target of impact makes these behaviours more comparable.

Whereas proactive innovation, problem prevention, and voice are generally thought of as positive forms of proactivity (Parker and Collins, 2010), proactive undermining is regarded as a negative form of proactivity (Searle, 2009). These behaviours may be affected by problem-solving demands in different ways, via unique stress appraisal mechanisms.

Challenge appraisal is a psychological state characterised by positive affect (Folkman & Lazarus, 1985; Lazarus, 1991) and increased motivation to approach desired goals (Schneider, Rivers, & Lyons, 2009). As such, it has been linked with creativity and flexibility (Gutnick, Walter, Nijstad, & De Dreu, 2012). Similarly, it seems likely that challenge

appraisal prompts a positive psychological state that enhances the likelihood of people engaging in positive forms of proactivity such as innovation, problem prevention, and voice.

On the other hand, threat appraisal is a negative psychological state characterised by negative affect (Lazarus & Folkman, 1984) and reduced cognitive resources (Cadinu, Maass, Rosabianca, & Kiesner, 2005). As such, it is associated with reduced performance and adaptability (Drach-Zahavy & Erez, 2002, Staw, Sandelands, & Dutton, 1981). In this way, it may be expected to diminish positive forms of proactivity. However, perceptions of threat have also been shown to narrow and focus individuals' attention towards the source of the threat (Notebaert, Crombez, Van Damme, De Houwer, & Theeuwes, 2011). In this way, it could prompt negative forms of proactivity such as undermining which aims to alleviate feelings of threat by sabotaging colleagues to "even the score". Negative affect, a correlate of threat appraisal, has been consistently associated with undermining behaviour (Duffy et al., 2002). Therefore, threat appraisal could be expected to diminish positive proactive performance (in the form of innovation, problem prevention, and voice) while stimulating proactive undermining as a maladaptive way of coping when threatened.

Although the present thesis focuses predominantly on challenge and threat appraisals, given their centrality in transactional stress theory, hindrance appraisal is a recently identified type of appraisal which has shown some promise for predicting organisational behaviours (Searle & Auton, 2015). Hindrance appraisal is characterised by feelings of frustration. Since considerable effort is often necessary to remove obstructions to goal attainment, feeling hindered is also linked to feeling fatigued and depleted (Tuckey, Searle, Boyd, Winefield, & Winefield, 2015). Distinct from feeling threatened, feeling hindered and fatigued is likely to reduce all types of proactive behaviour, irrespective of whether they are positive or negative.

Reverse causal pathways. Although past research has consistently positioned appraisal as an antecedent of workplace behaviours, it could be that workplace behaviours

also have a reverse effect on how employees interpret the subsequent situations they encounter. Lazarus and Folkman (1984) argue that appraisal is a dynamic process, continually shifting as individuals reappraise their situations. Moreover, proactive behaviours are intended to influence future outcomes (Grant & Ashford, 2008). Appraisals are therefore likely to be influenced by an individual's previous behaviour. Study 4 explores this reverse pathway in detail.

Moderating factors of the relationships between problem-solving demands, stress appraisal, and proactivity. Problem-solving demands may affect proactivity in complex ways via stress appraisal. Beyond these pathways, a more comprehensive conceptualisation of the appraisal process requires an understanding of the moderating factors that strengthen or inhibit pathways. The review on stress appraisal research (Chapter 1) identified a need for further moderational analyses to understand the interplay between factors at multiple levels of the organisation. Drawing upon social theories and reinforcement sensitivity theory, I identified potential moderators across multiple levels with relevance to problem-solving demands.

For example, at the individual-level, perceptions of psychological safety, the extent to which people feel confident to speak up (Edmondson, 1999), may also influence stress appraisals of problem-solving demands. Social information processing theory suggests that people interpret their situation with reference to their social context (Salancik & Pfeffer, 1978). Employees in a psychologically safe environment are more likely to interpret risky problem-solving behaviours in light of the open, respectful relationships that comprise their social context. As such, they would be more likely to see the value of engaging in risky problem-solving behaviours. This is likely to amplify the beneficial effects of problem-solving demands on challenge appraisal, while protecting against elevated threat appraisal.

Personality factors could also play a key role. Behavioural activation is a personality characteristic that refers to a sensitivity toward the rewarding and frustrating aspects of situations (Gray & McNaughton, 2000). According to reinforcement sensitivity theory, behaviourally-activated individuals tend to approach situations with a potential for reward. Given that challenge appraisal is similarly linked to perceptions of reward and gain, behavioural activation could strengthen challenge appraisals of problem-solving demands.

At the team-level, team problem prevention may play a key role in amplifying or dampening relationships between problem-solving demands and stress appraisal. Team problem prevention is the extent to which teams anticipate and prepare for complex issues (Parker & Collins, 2010). Individuals in teams who prevent problems effectively are likely to feel more prepared to deal with the problem-solving demands they may encounter. This may amplify the beneficial effects of between problem-solving demands on challenge appraisal while alleviating the association between problem-solving demands and threat appraisal.

Leader stress appraisals could also act as a moderator to strengthen or inhibit the effects of their followers' appraisals on proactivity. Leaders who feel threatened by problem-solving demands may be more likely to focus on the risks associated with proactive behaviours (Edmondson, 1999), and so may penalise unsuccessful proactive endeavours. Consistent with social information processing theory (Salancik & Pfeffer, 1978), this is likely to elevate the perceived negative consequences associated with proactivity among team members. Within this context, individuals who feel threatened by problem-solving demands would be even less likely to engage in proactive behaviours.

We now acknowledge that while we have proposed several moderators in our model, there is a myriad of other moderators that could be considered in future research.

Summary

The proposed model helps to clarify the effects of problem-solving demands on appraisal via distinct stress appraisal pathways. Problem-solving demands may be expected to lead to positive forms of proactivity via challenge appraisal, and negative forms of proactivity via threat appraisal. Moreover, these associations may be moderated by a range of team and person-level factors relevant to problem-solving, such as team problem prevention, leader stress appraisals of problem-solving demands, psychological safety, and behavioural activation. This model provides the conceptual approach for the present thesis.

Research Aims and Design

This thesis aimed to address four research questions, each exploring different aspects of the proposed model, shown in Figure 3.2. These questions incrementally build upon each other, derived from the idea that stress appraisals can help clarify the implications of problem-solving demands for proactivity.

Research question 1: How do daily problem-solving demands impact stress appraisals, and in turn different types of proactive behaviours?

Empirical Study 1 (Chapter 4) entitled “Proactivity, Stress Appraisals, and Problem-Solving: A Cross-Level Moderated Mediation Model” aimed to answer research question 1. In that paper, I tested the proposed thesis model at both the day and person-level of analysis. Drawing upon transactional stress theory (Lazarus & Folkman, 1984), I explored the mediating role of stress appraisal (i.e., challenge and threat appraisal) for explaining the effects of problem-solving demands on both positive (i.e., proactive problem prevention, innovation, voice) and negative (i.e., proactive undermining) types of proactive behaviours. It is worth noting that this was the only paper to examine a negative form of proactive behaviour. We acknowledge that the investigation of negative proactivity was not a primary focus of our research. Moreover, there are practical challenges associated with exploring negative proactivity, such as the lack of established measures and difficulties asking people to

report on socially undesirable behaviours (Rosenfield, Giacalone, & Riordan, 1995). Finally, I aimed to test whether psychological safety perception (person-level) was a significant cross-level moderator of the daily effects of problem-solving demands on challenge and threat appraisal.

Research question 2: How do teams impact individual-level relationships between problem-solving demands and stress appraisals?

Study 2, “Peers, Proactivity, & Problem-Solving: A Multi-Level Study of Team Impacts on Stress Appraisals of Problem-Solving Demands” focused on answering

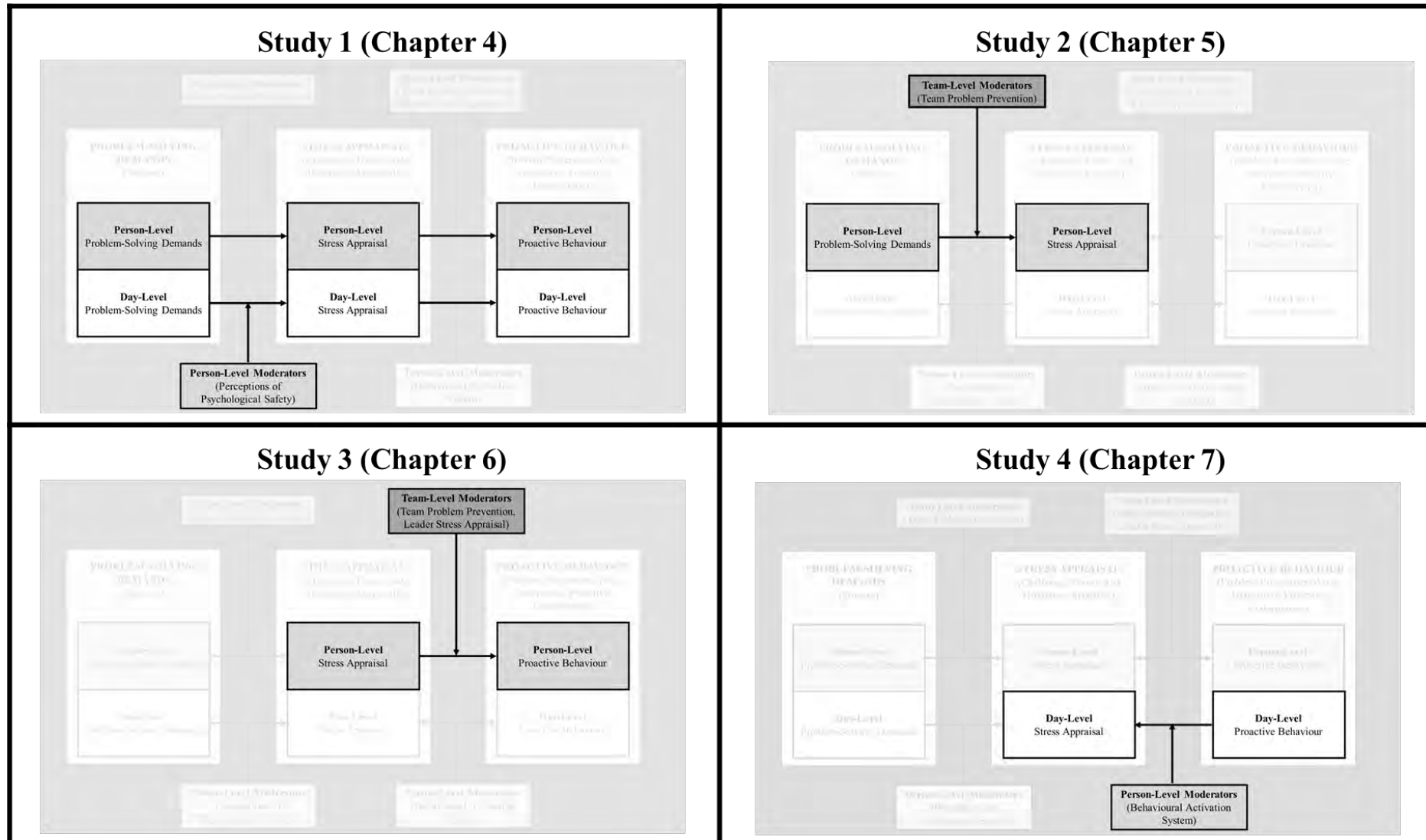


Figure 3.2. Components of the proposed multi-level thesis model tested in each study.

research question 2 by examining pathways depicted in the left side of the model – the relationship between problem-solving demands and stress appraisal. Informed by social information processing theory (Salancik & Pfeffer, 1978) and using a multi-level design, it progressed understanding by examining team-level impacts on individual stress appraisals of problem-solving demands, namely the effect of team problem prevention. The exploration of contextual factors is critical given the recognised role of teams for problem-solving and the increased interdependency of the contemporary workforce.

Research question 3: How do teams and leaders impact individual-level relationships between stress appraisals and proactive innovation?

Empirical Study 3 entitled “Stress Appraisal, Teams, and Innovation: A Multi-Level Study”, focused on the second half of the model – the relationship between stress appraisal and proactivity outcomes. This paper tested research question 3, exploring the individual-level relationship between stress appraisal and proactive innovation. Furthermore, grounded in social cognitive theory (Bandura, 1986), it examined team and leader factors, namely team problem prevention and leader stress appraisals, as potential moderators of the relationship between problem-solving demands and proactive innovation.

Research question 4: What is the effect of daily proactivity on stress appraisals of problem-solving demands, and does this vary depending on personality characteristics?

Empirical Study 4, “Daily Proactive Problem-Solving and Stress Appraisals: The Role of Behavioral Activation” presents the final study which aimed to test research question 4. Similar to previous research, Studies 1 and 3 positioned proactivity as an outcome of stress appraisal. However, Study 4 positioned proactivity as an antecedent, rather than an outcome, of stress appraisal. Using diary study methodology, this paper explored the effects of proactive problem prevention on next-day stress appraisals. Drawing upon reinforcement sensitivity theory, it tested whether these effects are moderated by an individual personality

characteristic relevant to the stress process, namely, behavioural activation system. In this paper, we also discuss the distinction between hindrance and threat appraisal. Some researchers theorise about the unique characteristics of hindrance versus threat appraisal (Searle & Auton, 2015; Tuckey et al., 2015; Espedido & Searle, 2018), yet it remains unclear the contexts in which differentiating between hindrance and threat may be sufficiently meaningful. For this reason, although the distinction between hindrance and threats was not a major focus of this thesis, we did want to explore it in a single study.

Data

The four studies draw upon two datasets collected from independent samples. The first sample was comprised of Australian employees across multiple industries who were instructed to complete multiple surveys over time (initial general survey, twice daily surveys for five consecutive days). This was critical to allow for the exploration of phenomena at the day and person-levels. The second sample was comprised of employees nested in project teams who worked closely together. Notably, this was a key strength of the present thesis to allow for an accurate examination of team phenomena emerging from the interdependence and interactions between team members.

Dataset 1. The first dataset was used for Studies 1 and 4. It consisted of individual-level data collected in an initial survey plus twice daily (morning and afternoon) diary surveys administered across a one-week period. Recruitment was conducted through a survey panel provider with inclusion criterion being full-time employment within Australia. In response to the study advertisement, 310 people registered to participate, of whom 248 (80%) completed the initial survey. From this pool, a further 949 morning surveys, and 955 afternoon surveys were completed (mean of 7.7 diary surveys per participant). Participants came from 21 different industry categories (O*Net, 2017), with the majority working in professional, scientific, and technical services (12%), educational services (11%), and

government roles (9%). Age groups ranged from 18-24 years (4%) to 65+ years (1%), with the median category being 35-44 years (32%). Participants were 56% (138) female, had spent a median number of 6-10 years (27%) within their current organisation, and 3-5 years in their current role (25%).

Dataset 2. The second dataset was used for Papers 2 and 3. An on-line survey was completed by 647 employees (36% response rate) from the Australian base of a global construction corporation. Teams were project-based working in construction, architectural, engineering, and administrative roles. The criteria for analyses in Papers 2 and 3 were that i) the participant belonged to a team in which at least three team members responded (364 people) and ii) the team leader provided ratings of their team's behaviour (43 teams). The final sample consisted of 192 participants comprising 43 teams with sizes ranging from 4 to 10 members ($M = 5.47$, $SD = 1.70$). Despite the dropout due to the inclusion criteria, the demographic profile of the final sample was reflective of the industry profile. In the final study sample, there were 144 males (75%) and 48 (25%) females. This is comparable to Australia's census data showing the male dominated nature of the construction industry (83% males, 17% females; Australian Bureau of Statistics, 2018). Age groups ranged from 18-24 years (6%) to 65+ years (2%), with the median category being 35-44 years (29%). The mean tenure within the organisation was 9.31 years ($SD = 8.41$). Participants had spent a mean of 4.77 years ($SD = 5.33$) in their current roles.

Conclusion

The present chapter provides a research agenda to advance understanding of the role of stress appraisal in the problem-solving demands—proactivity linkage. This model makes several contributions. The proposed model provides a possible explanation for the complex associations between problem-solving demands and a range of proactive behaviours. Furthermore, it specifies boundary conditions for these relationships. The present thesis aims

to test the model across a series of four empirical papers drawing from multi-level samples that enable the exploration of day, person, and team-level effects.

Chapter 4 – The Role of Stress Appraisal in Shaping the Effects of Problem-Solving

Demands on Proactive Behaviours

In my review of the stress appraisal literature (Chapter 1), I identified a need to integrate the stress appraisal construct into work stress theories, a paucity of multi-level research, and a need for further research on the implications for work behaviour outcomes. In Chapter 3, I aimed to address these areas by examining the implications of stress appraisal for proactive work behaviours, at multiple levels of the organisation. The present paper (Study 1) aimed to test the proposed thesis model (Figure 3.1) at the day and person levels. The rationale for exploring these levels is that day-level analyses can provide an indication of daily fluctuations that impact the appraisal process, whereas person-level analyses shed light on the individual differences that shape appraisals. The multi-level hypotheses for this study are summarised in Figure 4.1. Results showed that the effects of problem-solving demands on proactivity were mediated by stress appraisal (i.e., challenge and threat appraisal), and moderated by psychological safety climate. Validating the proposed mediational pathways was a critical first step to extend the understanding of multi-level processes in the context of problem-solving and proactivity. This paper lays the foundation for the subsequent papers (Studies 2-4) which turn to focus on specific sub-components of the proposed model. This paper is currently accepted for publication (pending minor revisions) with the journal of *Work & Stress*. To satisfy journal submission requirements, I have used British spelling convention.

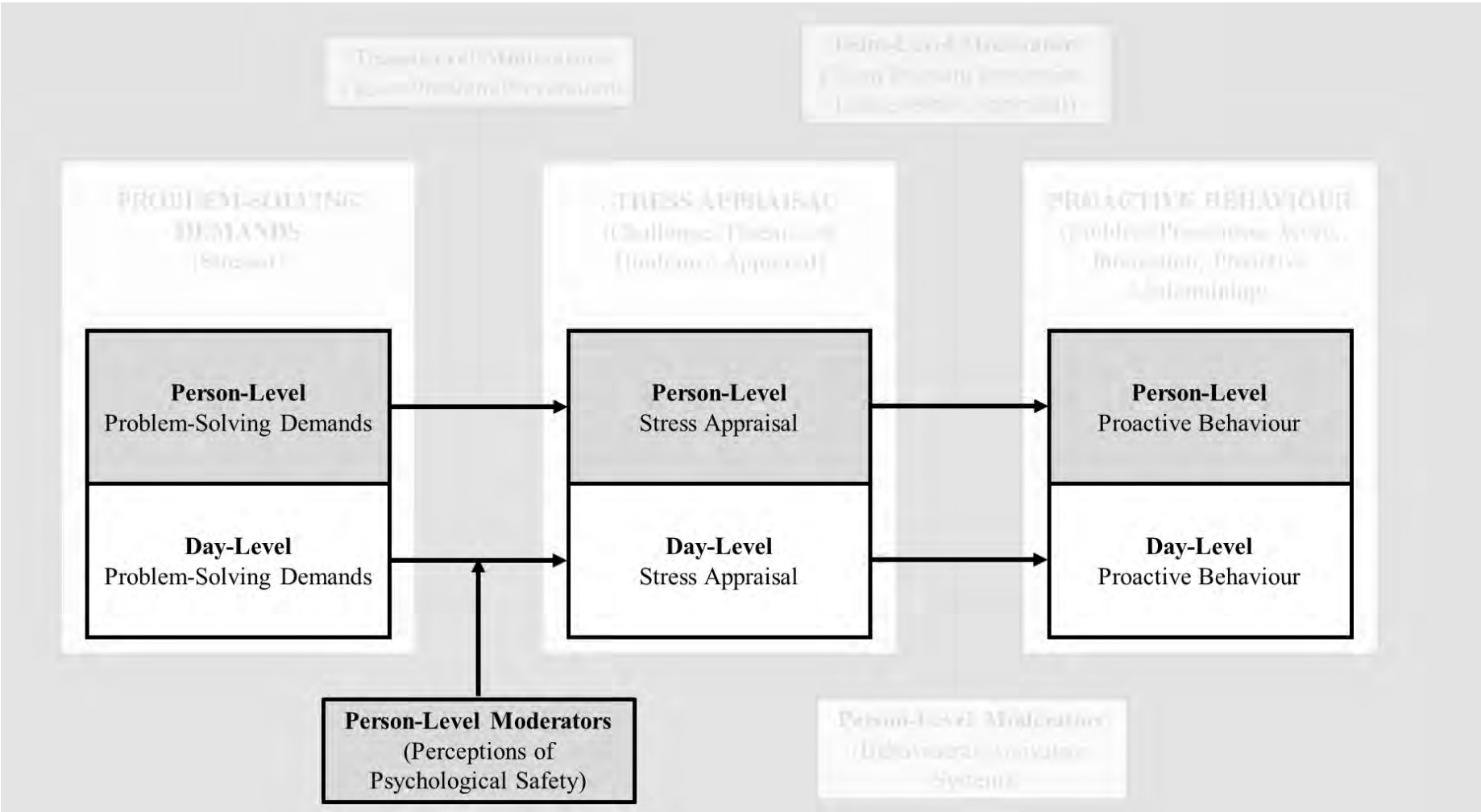


Figure 4.1. Multi-level hypotheses tested in Study 1.

Study 1 – Proactivity, Stress Appraisals, and Problem-Solving:**A Cross-Level Moderated Mediation Model**

A. Espedido & B. J. Searle

Problem-solving demands have been shown to exert both positive and negative effects on employees. We examined whether these inconsistencies could be explained by the way people appraise (interpret) their problem-solving demands, either as a challenge or a threat. We proposed a cross-level moderated mediation model whereby the effects of problem-solving demands on a range of proactive behaviours (i.e., proactive innovation, problem prevention, voice, and proactive undermining) would be mediated by stress appraisals and moderated by psychological safety climate. Two daily surveys were completed over five consecutive work days by 199 employees from a range of industries. Multi-level analyses showed that appraisals of challenge mediated the relationship between problem-solving demands and favourable forms of proactivity, whereas appraisals of threat mediated the relationship with unfavourable forms of proactivity. Depending on the type of proactive behaviour, these effects manifested at either the within- or between-person level. Finally, we observed a cross-level moderated mediation effect in which psychological safety climate strengthened the positive effects of within-person problem-solving demands on challenge appraisal, which in turn promoted proactive innovation. These results emphasise the explanatory power of stress appraisals and climate in shaping a range of proactive behaviours.

Keywords:

Stress appraisal; proactivity; problem-solving; multi-level; challenge-hindrance; psychological safety climate

In increasingly complex workplaces, employees are encouraged to be proactive: to anticipate what will need to be done, and to engage in self-initiated, future-focused behaviours directed towards change (Grant & Ashford, 2008). One set of antecedents that may provoke proactivity are problem-solving demands (Moregeson & Humphrey, 2006), involving work situations that require novel solutions. Problem-solving demands signal that passive, conventional approaches are unsuitable (Wu & Parker, 2011). To resolve this pressure for non-routine solutions (problem-solving demands), employees may benefit from anticipating needs, showing personal initiative, and striving for change (proactivity).

To understand *how* problem-solving demands may exert influence on proactivity, the concept of stress appraisal holds considerable promise (Ohly & Fritz, 2010). Transactional stress theory suggests that behavioural responses to stressors are explained by the way people appraise (interpret) them (Lazarus & Folkman, 1984). For example, a novel and unexpected problem could be interpreted as a chance to learn new skills (a challenge), or as a potential cause of failure (a threat) (Lazarus & Folkman, 1984). There is increasing evidence that employee wellbeing (Oliver & Brough, 2002), behaviour, and performance are influenced by the way people appraise their situations (e.g., Espedido & Searle, 2018). Extending this research, it seems plausible that the extent to which people interpret problem-solving demands as challenging or threatening may shape their tendency to engage in proactive behaviours.

The present study examines stress appraisal as a potential mechanism for explaining how problem-solving demands affect proactivity, thereby making several contributions to the literature. Firstly, it examines relationships at both the day and person levels. Whilst day-level analyses provide an indication of daily fluctuations that impact on the appraisal process, person-level analyses highlight differences between individuals that can shape appraisals. Secondly, it answers calls to investigate multiple types of proactive behaviours, in order to offer a more precise exploration of the specific processes influencing each one. Thirdly, it

captures both positive and negative forms of proactivity, contributing a more balanced perspective than in previous research which has predominantly focused on positive aspects of proactivity. Fourthly, it examines the effects of problem-solving demands, a pervasive yet relatively under-researched stressor (Espedido, Searle, & Griffin, in press). Fifthly, it examines potential moderators (i.e. psychological safety climate) that could clarify the nature of the relationship between problem-solving demands and appraisals. Sixthly, it examines antecedents that are relatively malleable (i.e., stress appraisals, psychological safety) and thus arguably more within the scope of control for managers and practitioners, lending practical value. Finally, it applies a diary study methodology to explore stronger causal conclusions (Ohly, Sonnentag, Niessen, & Zapf, 2010).

Theoretical Background: Proactive Behaviours

There has been growing recognition of the need for employees to proactively influence their environment (Parker, Bindl & Strauss, 2010). Examples of proactive behaviours include individual innovation: the implementation of novel and useful ideas, problem prevention: the anticipation and management of recurring issues (Frese & Fay, 2001), voice: speaking out about issues to affect change (Van Dyne & LePine, 1998), and job crafting: altering aspects of the job to better fit one's skills, abilities, and interests (Wrzesniewski & Dutton, 2001). Proactive behaviours have been linked to performance, job satisfaction, commitment (Thomas, Whitman, & Viswesvaran, 2010), leadership capability, charisma, and organisational citizenship behaviours (Crant & Bateman, 2000). The host of benefits associated with proactive behaviours make them a worthwhile subject of study. To capitalise on these benefits, organisations need to understand the antecedents of proactivity.

Proactivity research has often focused on a general proactivity construct or a single type of proactive behaviour, yet less research has examined different proactive behaviours within the same study (exceptions include Griffin, Neal, & Parker, 2007 and Parker & Collins, 2010). Exploring multiple proactive behaviours may progress theory and application

by providing a more precise, finer-grained understanding of the different mechanisms driving different types of behaviour, revealing key commonalities and points of difference (Bolino, Harvey, & Valcea, 2010; Parker & Collins, 2010). For example, transactional theory (Lazarus & Folkman, 1984) would suggest that challenge appraisals facilitate positive forms of proactivity, whereas threat appraisals facilitate negative forms of proactivity.

While few studies have examined multiple, specific types of proactivity concurrently (Parker & Collins, 2010), even fewer have investigated the more negative forms of proactivity (Belschak, Den Hartog, & Fay, 2010). Perhaps in part due to its overlap with positive psychology and research on thriving at work (c.f. Luthans, 2002), research on proactivity has traditionally shared the basic premise that proactivity is a desirable behaviour that can help employees cope with change effectively (for reviews see Grant & Ashford, 2008; Wu & Parker, 2011). One proactivity construct, personal initiative, is explicitly defined (more narrowly than other forms of proactivity) so as to exclude otherwise proactive behaviours that can harm the organisation (Frese & Fay, 2001).

Some researchers have challenged the notion that proactivity is uniformly positive (Belschak et al., 2010; Searle, 2009). It is possible that even though some types of proactive behaviour may have substantial benefits and very few drawbacks for all stakeholders, other types of proactive behaviour present significant costs to organisations (Bolino et al., 2010). Undermining is an example of one such overtly harmful proactive behaviour. Undermining refers to “behaviour intended to hinder, over time, the [target’s] ability to establish and maintain positive interpersonal relationships, work related success and favourable reputation” (Duffy et al., 2002, p. 332). As undermining involves a series of planned acts intended to achieve a long-term goal of change to the target’s reputation and/or relationships, it could be considered proactive behaviour (Searle, 2009). Investigating negative forms of proactivity, such as undermining, in conjunction with positive forms of proactivity, has the potential to yield a more complete perspective of the benefits and costs of supporting proactive

behaviours.

To extend previous research, this study measures different types of positive and negative proactive behaviours: individual innovation, problem prevention, voice, and proactive undermining. These behaviours were selected based on Parker and Collins' (2010) proactive behaviour framework. Parker and Collins argue that proactive behaviours can be organised under three higher-order categories describing their target of impact. The first category, *proactive work behaviour*, encompasses behaviours which focus on changing the internal organisation. The second category, *proactive strategic behaviour*, describes behaviours intended to change the organisation's fit to its external environment, whereas the third category, *proactive person-environment fit behaviour*, refers to behaviours intended to alter one's fit within the organisation. Parker and Collins (2010) argue that behaviours within the same category are united by their target of impact, making it easier to draw comparisons between them and providing a rationale to test them concurrently. Given our daily diary study design, the present study focuses on *proactive work behaviours* as there is more scope for performing these behaviours regularly and seeing their patterns of association with work demands and stress appraisals than would be the case with the other categories of behaviour.

Development of Hypotheses

Problem-solving demands and proactivity. Research has focused on the influence of “traditional” job demands on proactivity (e.g., time pressure, general job demands; Ohly & Fritz, 2010), but the impacts of knowledge-related demands, such as problem-solving, have yet to be established clearly. According to Parker et al.'s (2010) proactive motivation model, employees require a “reason to” engage in proactivity, given proactive behaviours are not typically the expected and necessary behaviours that are part of one's normal job role. Problem-solving demands provide a reason to engage in proactivity because they offer opportunities for individuals to take initiative (Schmitt, Zacher, & Frese, 2012), develop new skills and seek additional information (Zhou, Hirst, & Shipton, 2012).

Yet problem-solving demands could also present opportunities to be proactive in less desirable ways. Forms of proactivity, such as undermining or sabotaging, may serve as a maladaptive coping mechanism in response to work demands in that they increase feelings of control (Greenberger & Strasser, 1986) and are an outlet for feelings of frustration or anxiety (Fox & Spector, 2001). Therefore, although problem-solving demands are typically viewed as a favourable aspect of work design (Schmitt et al., 2012), they could also have hidden costs if they increase undesirable forms of proactivity.

Hypothesis 1: Problem-solving demands will be positively related to both positive (innovation, problem prevention, voice) and negative (proactive undermining) forms of proactive behaviour.

If problem-solving demands provide opportunities for both positive and negative proactive behaviours to manifest, mediating variables such as stress appraisal may play a critical role in disentangling the distinct effects. According to transactional stress theory (Lazarus & Folkman, 1984), the nature of people's response as positive and/or negative is often explained by the way people appraise (interpret) their situation. Stress appraisals take on the form of a challenge appraisal if a situation is perceived to promote goal achievement, or a threat appraisal if a situation is viewed as presenting potential harm or loss (Lazarus & Folkman, 1984). Whereas challenge appraisals typically link stressors to positive responses (e.g., problem-focused coping, Moos, Brennan, Fondacaro, & Moos, 1990; positive emotions, Searle & Auton, 2015; workplace creativity, Ohly & Fritz, 2010), threat appraisals generally link stressors with unfavourable outcomes (e.g., physiological stress, Harvey, Nathens, Bandiera, & LeBlanc, 2010; negative emotions, and avoidant coping strategies, Lengua & Long, 2002). Therefore, examining distinct challenge and threat appraisal mechanisms may reveal the ways in which problem-solving demands enhance positive and negative proactivity. We first discuss relations between problem-solving demands and stress appraisal, before turning to the distinct effects of challenge and threat appraisals on proactivity.

Problem-solving demands and stress appraisal. Conceptual and empirical research suggest that problem-solving demands may be appraised as both challenging and threatening (Lazarus & Folkman, 1984; Daniels, Wimalasiri, Beesley, & Cheyne, 2012). Appraisal may be particularly worthwhile to explore in relation to problem-solving demands because interpretations of problem-solving demands are “likely to vary, as they might be experienced as challenging and motivating, but also as adverse and hindering” (Daniels et al., 2012; pp. 668). In terms of stimulating challenge appraisals, Wall, Corbett, Clegg, Jackson, and Martin (1990) assert that problem-solving demands “challenge employees” (pp. 208) because they require people to stretch their knowledge and skill base to diagnose non-routine problems at work. Under the challenge-hindrance framework, problem-solving demands have also been categorised as a challenge stressor (Holman et al., 2012), which assumes that they are typically appraised as challenging. This may be in part because problem-solving demands involve elements of creativity (Morgeson & Humphrey, 2006) which have been empirically linked with feelings of challenge, interest, and stimulation (Amabile, 1997).

However, problem-solving demands could also be perceived as a threat. Any situation necessitating a deviation from the status quo carries an element of personal risk. For example, problem-solving demands present interpersonal risks because employees could face embarrassment, negative evaluation or rejection from colleagues if they do not problem solve effectively. Problem-solving demands also tax mental resources and have been shown to cause personal losses such as fatigue (Schmitt et al., 2012) and a decrease in available cognitive resources (Baumeister, Vohs, DeWall, & Zhang, 2007). Thus, under many circumstances, problem-solving demands have potential to activate threat appraisals as well as challenge appraisals.

Hypothesis 2a: Problem-solving demands will be positively related to challenge appraisals.

Hypothesis 2b: Problem-solving demands will be positively related to threat appraisals.

Stress appraisals and proactivity. Applying the proactive motivation model (Parker

et al., 2010), challenge appraisals may encourage positive proactive responses via the “reason to” pathway. The “reason to” pathway indicates that employees require a strong rationale for engaging in proactivity because proactive behaviour is often non-routine and outside of the scope of one’s prescribed job role. If behaviours are perceived as challenging and useful for future goals, this provides an impetus and “reason to” engage in that behaviour. Challenge appraisals assume that successfully addressing demands will likely lead to valued outcomes such as heightened feelings of self-worth, mastery and recognition from others (Lazarus, 1991; LePine, Podsakoff, & LePine, 2005). Therefore, the more challenging problem-solving demands seem, the more employees expect to gain, providing “reasons to” address these demands proactively.

Hypothesis 3a: Challenge appraisal will be positively related to positive forms of proactive behaviour (individual innovation, problem prevention, and voice).

Hypothesis 3b: Challenge appraisal will mediate the positive relationship between problem-solving demands and positive forms of proactive behaviour.

By contrast, threat appraisals may promote more undesirable proactive behaviours. High job demands have been seen to increase negative affect, which in turn increases counterproductive work behaviours (including blaming others for one’s own mistakes; Balducci, Schaufeli, & Fraccaroli, 2011). This can be explained with transactional theory, which predicts not only that threat appraisals are linked with negative affect, but also with maladaptive forms of coping (Lazarus & Folkman, 1984). Indeed, aggressive behaviour is a common consequence of perceived threats, particularly threats to esteem (Feshbach, 1964). If attempts to resolve work demands have the potential to cause negative evaluations from others, employees may strive to protect their own image by undermining colleagues.

Hypothesis 4a: Threat appraisal will be positively related to proactive undermining.

Hypothesis 4b: Threat appraisal will mediate the positive relationship between problem-solving demands and proactive undermining.

The moderating role of psychological safety climate. To understand the contextual factors that influence problem-solving, stress appraisals, and proactivity, we turn to the role of psychological safety climate. Psychological safety climate is the perception that a work environment supports interpersonal risk-taking (Baer & Frese, 2003; Edmondson, 1999). Climate theorists argue that for climate constructs to have practical usefulness and predictive validity, the constructs should focus on a specific aspect of the work environment (Ehrhart, Schneider, & Macey, 2014). We chose to examine psychological safety because of its focus on specific aspects of the work environment that have relevance to proactivity and problem-solving. Problem-solving and proactivity often require collaborative brainstorming and new ideas (Parker & Collins, 2010), which are likely to be facilitated by the open, respectful relationships that comprise a psychologically safe climate.

As shown in Figure 1, we propose a cross-level moderated mediation model. Psychological safety climate is positioned as a cross-level moderator of the within-person effects of problem-solving demands on proactivity via stress appraisal. Social information processing theory (Salancik & Pfeffer, 1978) provides a perspective for understanding the moderating role of climate, invoking group-level processes. Salancik and Pfeffer (1978) argue that people interpret their situation with reference to the social norms in their context. In a psychologically safe environment, employees are more likely to be acknowledged and rewarded for frequent risk-taking and the voicing of new ideas (Edmondson, 1999). Given these social norms, people in a psychologically safe climate may be more sensitive to the challenges and opportunities present.

In contrast, psychological safety climate may be likely to dampen the effects of problem-solving demands on threat appraisal, and in turn negative forms of proactivity. Psychological safety climate is likely to alleviate the detrimental effects of threat appraisals because it represents an environment where employees are free from interpersonal risks such as rejection, incivility, or negative consequences to their reputation (Baer & Frese, 2003).

Applying social information processing theory (Salancik & Pfeffer, 1978), in contexts with a high climate for psychological safety, employees are more likely to feel comfortable voicing solutions and novel ideas (Edmondson, 1999). Drawing upon these social cues, individuals may be less likely to feel threatened as problem-solving demands increase.

Hypothesis 5a: Psychological safety climate will moderate the within-person effects of problem-solving demands on positive proactive behaviours via challenge appraisal, such that the positive relationship between problem-solving demands and challenge appraisal will be stronger at higher levels of psychological safety climate.

Hypothesis 5b: Psychological safety climate will moderate the within-person effects of problem-solving demands on a negative proactive behaviour via threat appraisal, such that the positive relationship between problem-solving demands and threat appraisal will be weaker at higher levels of psychological safety climate.

[Insert Figure 1 about here]

Materials and Methods

Participants

All participants were full-time employees across Australia. Recruitment was conducted through a survey panel provider and 310 people registered to complete the initial survey. Of those who registered, 248 (80%) participated in the twice daily diary surveys. However, 49 participants were removed due to significant missing data (i.e., completed fewer than two out of five full days of surveys).

From the final 199 participants (64% response rate), a total of 1,976 surveys were completed: 199 general surveys, 886 morning surveys, and 891 afternoon surveys. This sample size was sufficient as an a priori power analysis indicated that we needed at least 145 participants to have 90% power to detect a small effect size when employing the traditional .05 criterion of statistical significance (Soper, 2019).

Age groups ranged from 18-24 years (4%) to 65+ years (1%), with the median

category being 35-44 years (34%), and 56% (111) were female. Participants came from 21 different industry categories (O*Net, 2017), with the majority working in educational services (11%), professional services (10%), and government roles (9%).

Measures

Following previous research, the stem for daily survey items was rephrased to reference day-level experiences (Schmitt et al., 2012). Scales ranged from 1 (Not at all / Strongly Disagree) to 5 (Very frequently / Strongly Agree).

Problem-solving demands. Problem-solving demands were measured using Wall, Jackson, Mullarkey, and Parker's (1996) five-item scale (e.g., "To what extent have you been required to solve problems which have no obvious correct answer?"). Participants rated the problems encountered in "their work day so far". As shown in Table 1, Cronbach's alpha was adequate at the within- ($\alpha_w = .84$) and between-person ($\alpha_b = .95$) levels.

Stress appraisal. Challenge appraisal of problem-solving demands was assessed using Searle and Auton's (2015) four-item scale (e.g., "They will help me to learn a lot", $\alpha_w = .87$, $\alpha_b = .98$). Threat appraisal was measured using Feldman, Cohen, Hamrick, and Lepore's (2004) three-item scale (e.g., "They are going to have a negative impact on me", $\alpha_w = .87$, $\alpha_b = .99$). Participants were instructed to "think about the same daily problems" rated in the previous measure.

Psychological safety climate. Psychological safety was measured using Baer and Frese's (2003) seven-item scale (e.g., "In our organisation one is free to take risks", $\alpha_b = .68$). Three items were reverse scored.

Proactive work behaviours. Participants rated the proactive behaviours they carried out during the entire work day. Three-item scales from Parker and Collins (2010) were used to measure *individual innovation* (e.g. "generate new ideas", $\alpha_w = .69$, $\alpha_b = .93$), *problem prevention* (e.g. "spend time planning how to prevent recurring problems", $\alpha_w = .77$, $\alpha_b = .97$), and *voice* (e.g. "speak up with new ideas or changes in procedures", $\alpha_w = .78$, $\alpha_b = .98$).

Proactive undermining was measured using Searle's (2009) four-item scale (e.g., "I sabotaged a project, plan, policy, or device at work", $\alpha_w = .83$, $\alpha_b = .99$).

Procedure

An initial online survey was administered to measure demographics and psychological safety climate. After two weeks, participants were given two daily online surveys over five consecutive days (Monday-Friday). A daily morning survey was administered to measure problem-solving demands and stress appraisals after a few hours at work. A daily evening survey was used to measure proactive behaviours throughout the working day. To ensure valid responses, morning surveys were only accessible between 10am-12pm, and evening surveys were accessible between 4pm-midnight. As recommended by Ohly et al. (2010), reminder text messages were sent at 10am and 4pm. To encourage responses, participants were awarded company points valued at AU\$10 for the initial survey and an additional AU\$10 for completing all five days.

[Insert Table 1 about here]

Analysis

As shown in Table 1, Cronbach's alphas were calculated for study variables at the between and within-person levels. Multi-level modelling techniques were used in MPlus (version 8) (Muthén & Muthén, 2012). All items were examined using multi-level confirmatory factor analysis (MCFA, using MPlus version 8) to test the proposed factor structures at both the within and between-person level and the divergence of latent constructs. Consistent with Browne and Cudeck (1992), fit was considered adequate where the confirmatory fit index (CFI) and Tucker-Lewis index (TLI) showed values above .90, and where the root-mean-square error of approximation (RMSEA) and standardized root-mean-square residual at the within- ($SRMR_w$) and between-person ($SRMR_b$) level were close to or below .08. The initial measurement model (Model 1) fit the data well ($\chi^2(508) = 1363.180$, $p < .001$; CFI = .929, TLI = .916, RMSEA = .042, $SRMR_w = .044$, $SRMR_b = .059$). However,

one challenge appraisal item and one voice item were indicated by negative residual variances, so we fixed these residuals to zero. The revised measurement model (Model 2) also fit the data well ($\chi^2(510) = 1359.059, p < .001$; CFI = .929, TLI = .917, RMSEA = .042, SRMR_w = .044, SRMR_b = .059). MCFA verified the proposed factor structure at both levels.

Hypothesis Testing

To test the direct and mediating effects (Hypotheses 1-4), a predictive structural equation model was used. Pathways were estimated from problem-solving demands to appraisal variables, and from problem-solving demands and appraisal variables to all the proactive behaviour variables (Model 1 fit: $\chi^2(466) = 1289.795, p < .001$; CFI = .927, TLI = .913, RMSEA = .043, SRMR_w = .048, SRMR_b = .077). To test the cross-level moderated mediation effects (Hypothesis 5) a random effects model was used with manifest variables calculated from scale means (Aguinis, Gottfredson, & Culpepper, 2013). Problem-solving demands, appraisal, and proactivity (Level 1) were centred to the group mean, while psychological safety (Level 2) was centred to the grand mean (Enders & Tofighi, 2007).

Results

A summary of the results at both the between- and within-person levels is provided in Figure 2.

[Insert Figure 2 about here]

Descriptives and Correlations

As shown in Table 1, there were differences in associations at the between- versus within-person levels. For example, at the between-person level problem-solving demands was moderately associated with challenge ($r = .39, p < .001$) and threat appraisal ($r = .43, p < .001$). However, at the day-level problem solving demands were moderately associated with challenge appraisal ($r = .40, p < .001$), but were not related to threat appraisal.

Direct Effects

Problem-solving demands and proactivity. Hypothesis 1 predicted positive

relationships between problem-solving demands and all proactive behaviours. As shown in Table 2, this was supported by strong associations at the between-person level (innovation: $\gamma = .80, p < .001$; problem prevention: $\gamma = .87, p < .001$; voice: $\gamma = .77, p < .001$; proactive undermining: $\gamma = .28, p = .019$). At the within-person level, problem-solving demands were only weakly related with innovation ($\gamma = .19, p < .004$) and moderately related with problem prevention ($\gamma = .29, p < .001$).

[Insert Table 2 about here]

Problem-solving demands and stress appraisal. Hypothesis 2a predicted a positive relationship between problem-solving demands and challenge appraisal, which was supported by moderate effects at both the between- ($\gamma = .37, p < .001$) and within-person levels ($\gamma = .46, p < .001$). Hypothesis 2b predicted a positive relationship between problem-solving demands and threat appraisal, which was supported by a moderate association at the between-person level only ($\gamma = .44, p = .001$).

Stress appraisals and proactive behaviour. Hypothesis 3a predicted positive relationships between challenge appraisal and positive forms of proactivity and was only partially supported. At the between-person level, challenge appraisal had a weak, positive association with voice ($\gamma = .18, p = .023$), and its positive relationship with problem prevention approached significance ($\gamma = .14, p = .053$). However, the relationship between challenge appraisal and individual innovation did not reach significance. At the within-person level, challenge appraisal had a weak, positive relationship with individual innovation ($\gamma = .15, p = .009$). Hypothesis 4a predicted a positive association between threat appraisal and proactive undermining. This was only supported at the between-person level with a moderate association ($\gamma = .59, p < .001$).

Mediated Effects

Problem-solving demands, stress appraisals, and proactivity. Hypothesis 3b predicted the mediational effects of problem-solving demands on positive proactivity via

challenge appraisal. At the between-person level, the mediating effects of problem-solving demands on voice ($\gamma = .07, p = .020$) and problem prevention ($\gamma = .05, p = .038$) via challenge appraisal were significant, with small effect sizes. At the within-person level, the mediating effect of problem-solving demands on individual innovation via challenge appraisal was significant with a small effect size ($\gamma = .07, p = .013$). Hypothesis 4b predicted the mediational effect of problem-solving demands on proactive undermining via threat appraisal. This was only supported at the between-person level with a moderate effect size ($\gamma = .26, p = .001$). No other hypothesised mediated effect reached significance.

Cross-Level Moderated Mediation Effects

Hypotheses 5a and 5b predicted that psychological safety climate would act as a cross-level moderator of the effects of problem-solving demands on proactivity via stress appraisals. The variance of the problem-solving demands—challenge appraisal slope was significant ($\tau_0 = .08, p = .046$), indicating that sufficient variance in this random slope could be accounted for by between-person predictors and it was appropriate to test cross-level moderation (Aguinis et al., 2013) for this slope. There was a significant moderated mediation effect in which psychological safety climate was a significant cross-level moderator of the within-person effects of problem-solving demands on individual innovation via challenge appraisal ($\gamma_{11} = .16, p = .024$). Figure 3 shows the relationship between problem-solving demands and challenge appraisal for two levels of psychological safety climate (mean ± 1 *SD*). The simple slopes test revealed a stronger positive relationship at high ($.52, p < .001$) compared to low ($.31, p < .001$) levels of psychological safety climate. No other hypothesized moderated mediation effect reached significance.

[Insert Figure 3 about here]

Discussion

To resolve inconsistent accounts of the effects of problem-solving demands, we conducted a diary study to see if their effects were explained by stress appraisal. Problem-

solving demands were found to increase both positive and negative forms of proactivity, each working via a distinct mechanism. Problem-solving demands, when they stimulated challenge appraisals, increased positive forms of proactivity such as individual innovation, problem prevention, and voice. However, when they stimulated threat appraisal they led to negative proactive behaviour. Moreover, psychological safety climate played a critical role in shaping these stress appraisal processes.

Problem-solving demands and proactivity. At the between-person level, problem-solving demands, on average, strongly increased both positive and negative forms of proactivity. Previous researchers have typically only focused on the positive effects of problem-solving demands, recommending that managers should increase problem-solving demands as a job design strategy (Schmitt et al., 2012). The results of the present study add a caveat to such recommendations indicating that simply increasing problem-solving demands may have unintended detrimental effects. Therefore, there is a need to consider other factors such as stress appraisal to understand the conditions in which detrimental effects may occur.

At the within-person level, the pattern of results differed. On days where employees experienced greater problem-solving demands, they showed higher levels of individual innovation and problem prevention, but no significant increases in voice or proactive undermining behaviours. It may be that employees are not able to enact voice and proactive undermining daily because these behaviours are inherently interdependent. For example, voice is about communicating views “to others in the workplace, even if others disagree” (sample item, Parker & Collins, 2010) and proactive undermining involves “undermining someone who causes problems” (sample item, Searle, 2009). Such behaviours can only be displayed in a group context, such as in meetings or social interactions. On the other hand, innovation and problem prevention can often be carried out independently, day-to-day. These behaviours are likely to be facilitated more regularly because they impact on employees’ immediate context and the management of daily tasks (Frese & Fay, 2001).

Problem-solving demands and stress appraisals. Consistent with transactional stress theory (Lazarus & Folkman, 1984), problem-solving demands were related to both higher challenge and threat appraisals at the between-person level. Daniels et al. (2012) argue that problem-solving demands could be interpreted in various ways. For instance, they often involve elements of creativity and novelty (Morgeson & Humphrey, 2006), which have been shown to stimulate a sense of challenge (Amabile, 1997). Yet problem-solving demands could also be viewed as threatening because novel solutions could be met with resistance or failure, which could harm one's reputation.

The pattern of results differed at the daily level, with problem-solving demands being positively related to challenge but not threat appraisal. We observed consistently low levels of threat appraisal during the week. This restriction of range may have obscured the ability to detect significant effects. It may be that problem-solving demands are more frequently appraised as challenging because they present the potential for daily benefits such as learning or a sense of achievement. In contrast, they are less frequently viewed as a threat. A single day of poor problem-solving is unlikely to damage one's self-image or cause personal harm (Daniels et al., 2012), rather it is when this occurs repeatedly over time that employees feel threatened. The one-week time frame used in the present study may be too short to measure such chronic, cumulative effects of problem-solving demands on threat appraisal. Future research applying longer time frames is warranted.

Stress appraisals and proactivity. Supporting transactional stress theory (Lazarus & Folkman, 1984), problem-solving demands enhanced positive forms of proactivity via challenge appraisal. Again, the type of proactive behaviour predicted by challenge appraisals differed depending on the level of analysis. At the between-person level, challenge appraisal was positively related to voice and its association with problem prevention approached significance. The mediating effects of problem-solving demands on voice and problem prevention via challenge appraisal were also significant. However, caution is warranted in

interpreting between-person mediation effects given that these results are cross-sectional and do not allow us to infer directionality. Nevertheless, theory affirms the proposed directionality of the mediating effects (Lazarus & Folkman, 1984). At the within-person level, individual innovation was predicted directly by challenge appraisal, and indirectly by problem-solving demands via challenge appraisal.

The observed pattern of results may be due in part to the specific nature of individual innovation. Its focus on creativity, novel ideas, and experimentation (Parker & Collins, 2010) may tie it more strongly to challenge appraisals at the daily within-person level compared to other types of proactive behaviours. According to Amabile's (1996) componential model of creativity, feelings of intrinsic motivation and challenge are critical for fostering creative, innovative ideas. These feelings have a relatively immediate mobilising effect on creativity (Amabile, 1996). On the other hand, voice and problem prevention behaviours often involve tasks that are less interesting and unusual. Challenge appraisal may be less likely to have an immediate effect on these types of proactive behaviours. The differing effects for different behaviours demonstrate the utility of measuring different forms of proactivity.

Problem-solving demands were also linked to proactive undermining, an effect that, consistent with transactional stress theory, was partially mediated via threat appraisal. At the between person-level, individuals who felt threatened by problem-solving demands were more likely to undermine others. However, these effects did not manifest at the within-person level. This could be because, as has been observed in previous research, proactive undermining behaviours are relatively infrequent (Searle, 2009) and so were less likely to vary day-to-day. Indeed, in the present study, the intra-class correlation for proactive undermining was .76, indicating relatively little daily variation.

The study findings have several theoretical implications. Firstly, they demonstrate the explanatory power of stress appraisal beyond wellbeing outcomes, onto performance outcomes such as proactivity. Secondly, the results identify that problem-solving demands

have the potential for both positive and negative outcomes, each working via distinct stress appraisal mechanisms. This highlights how stress appraisals can help us understand how to maximise workplace benefits while reducing costs. Thirdly, the findings demonstrate the value of differentiating between distinct types of proactivity. The differential effects of problem-solving demands and appraisals at the between versus within-person levels would have been obscured had a broad proactivity construct been used as in previous research. Finally, the present findings underscore the value of further multi-level research, showing that the same stressor can be appraised differently, and exert unique effects, at multiple levels.

Psychological safety climate as a cross-level moderator. As predicted, psychological safety climate strengthened the individual-level relationship between problem-solving demands and challenge appraisal, which in turn enhanced individual innovation. Guided by social information processing theory (Salancik & Pfeffer, 1978), contexts with high psychological safety climate are likely to encourage risk-taking behaviours (Edmondson, 1999). Based on these social cues, individuals in psychologically safe contexts may be able to more easily frame problem-solving demands as a positive challenge, interpreting them as an opportunity to explore new ideas and express creativity, rather than as a criterion for interpersonal criticism or rejection. This highlights the impact of contextual factors (climate) in shaping the stress appraisal process.

Practical Implications

The results indicate that proactive behaviours may be stimulated by an increase in the amount of problem-solving demands, even within the same day in the case of individual innovation proactivity. Problem-solving demands are useful because they are within the remit of organizations' control. Chen and Aryee (2007) assert that managers can design employees' jobs to involve more sophisticated problem-solving. For example, managers could allocate greater decision-making authority and nominate employees for "stretch" assignments. Such strategies not only increase the amount of novel problems encountered, they are also helpful

for reducing the load on managers thereby improving the efficiency of an organization – a key aim of the empowerment literature (Chen & Aryee, 2007).

However, given that problem-solving demands were also found to increase harmful types of proactivity such as proactive undermining, strategies to increase problem-solving demands should also be coupled with strategies to encourage employees to appraise demands as challenging and reduce apparent threat. Cognitive reappraisal training is a strategy based on transactional theory whereby employees are taught to understand the impact of their appraisals and re-frame the meaning of a situation as a challenge (Lazarus & Folkman, 1984). It has been shown to help regulate stress and emotion (Lazarus, 1991). Given that problem-solving demands were shown to increase both positive and negative forms of proactivity, cognitive reappraisal training can help to maximise the positive forms of proactivity while minimising negative forms.

The results also suggest that enhancing psychological safety is likely to encourage more positive appraisals of problem-solving demands. To cultivate a psychologically safe climate, researchers recommend emphasising shared rewards and collaborative goals (Chen & Tjosvold, 2012), displaying inclusive behaviours, and encouraging member contributions, as these can promote the open and cohesive relationships that comprise a psychologically safe climate (Edmondson, 1999).

Limitations and Future Research

All constructs were measured using self-report measures. Although common in many survey studies, this can introduce social desirability bias and common method bias. To address social desirability bias, we ensured that anonymity was guaranteed, and we minimised identifiable demographic questions. To address common method bias, we had a time lag between the measurement of independent and dependent variables, as recommended by Podsakoff et al. (2003). Furthermore, the use of multi-level analysis and person-centred scores minimised the potential influence of response tendencies from individual differences.

Nevertheless, future studies could use objective measures and ratings from different sources to measure problem-solving demands and proactive behaviours.

Our study was conducted over a period of one work week, which is a short extract of demands, behaviour, and appraisal. Future studies could increase the number of days to assess changes within persons over time more precisely. Data over longer time frames could also investigate long-term effects. For example, some studies have shown that fatigue increases rigidity in problem-solving and impedes creative thinking (van der Linden, Frese, & Sonnentag, 2003). It would be interesting to see if the results are consistent over the long-term when fatiguing effects are able to manifest.

Conclusion

This study demonstrates the role of stress appraisal for understanding how to maximise beneficial proactive outcomes in response to problem-solving demands, while minimising negative proactive outcomes. It further highlights the impact of climate in shaping these stress processes. Methodologically, the diary study design and advanced cross-level moderated mediation analyses provide a unique opportunity to synthesise both day and person-level perspectives. Practically, the findings outline developable factors such as employee perceptions (appraisals) and climates (related to psychological safety) which can be leveraged to enhance desirable forms of proactivity.

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Table 1*Descriptive Statistics, Zero-Order Correlations, and Internal Consistencies*

Variables	<i>M</i>	<i>SD_W</i>	ICC	1	2	3	4	5	6	7	8
<i>SD_B</i>				.66	.69	.66	.80	.82	.83	.64	.67
1. Problem-solving demands	2.17	.67	.47	(.95)	.39***	.43***	.75***	.87***	.77***	.43***	-.09
2. Challenge appraisal	3.38	.64	.54	.40***	(.98)	-.06	.41***	.44***	.48***	-.04	.01
3. Threat appraisal	2.12	.64	.52	.06	.15**	(.99)	.19*	.28**	.22*	.69***	-.32***
4. Individual innovation	2.31	.59	.64	.20***	.17***	-.01	(.93)	.90***	.91***	.30**	-.01
5. Problem prevention	2.24	.70	.60	.23***	.12**	.04	.53***	(.97)	.92***	.39***	.01
6. Voice	2.30	.68	.58	.12*	.13**	.07	.56***	.55***	(.98)	.36***	-.07
7. Proactive undermining	1.30	.36	.76	-.01	.02	-.01	.10**	.13**	.10*	(.99)	-.33***
8. Psychological safety climate	3.62	–	–	–	–	–	–	–	–	–	(.68)

Note. *B*: between-person statistics; *W*: within-person statistics. ICC: intra-class correlation.

Between-person statistics (*n* = 199) presented above the diagonal, individual-level statistics (*n* = 953) presented below the diagonal.

Values on the diagonal in parentheses are between-person Cronbach's alphas.

* *p* < .05, ** *p* < .01, *** *p* < .001.

Table 2*Standardised Direct and Mediated Effects from Structural Equation Model 1.*

Variable/effect	Challenge appraisal	Threat appraisal	Individual innovation	Problem prevention	Voice	Proactive undermining
<i>Within-person effects</i>						
Problem-solving demands – direct	.46***	.10	.19**	.29***	.11	-.03
Challenge appraisal (CA) – direct			.15**	-.01	.08	.02
Threat appraisal (TA) – direct			-.04	.01	.07	-.02
Problem solving demands – mediated, via CA			.07*	-.00	.04	.01
Problem-solving demands – mediated, via TA			-.00	.00	.01	-.00
Within-person R^2	.21***	.01	.09*	.09*	.03	.00
<i>Between-person effects</i>						
Problem-solving demands – direct	.37***	.44***	.80***	.87***	.77***	.28*
Challenge appraisal (CA) – direct			.12	.14	.18*	-.14*
Threat appraisal (TA) – direct			-.13	-.11	-.11	.59***
Problem solving demands – mediated, via CA			.05	.05*	.07*	-.05
Problem-solving demands – mediated, via TA			-.06	-.05	-.05	.26**
Between-person R^2	.14	.19	.64***	.79***	.66***	.53***

* $p < .05$, ** $p < .01$, *** $p < .001$.

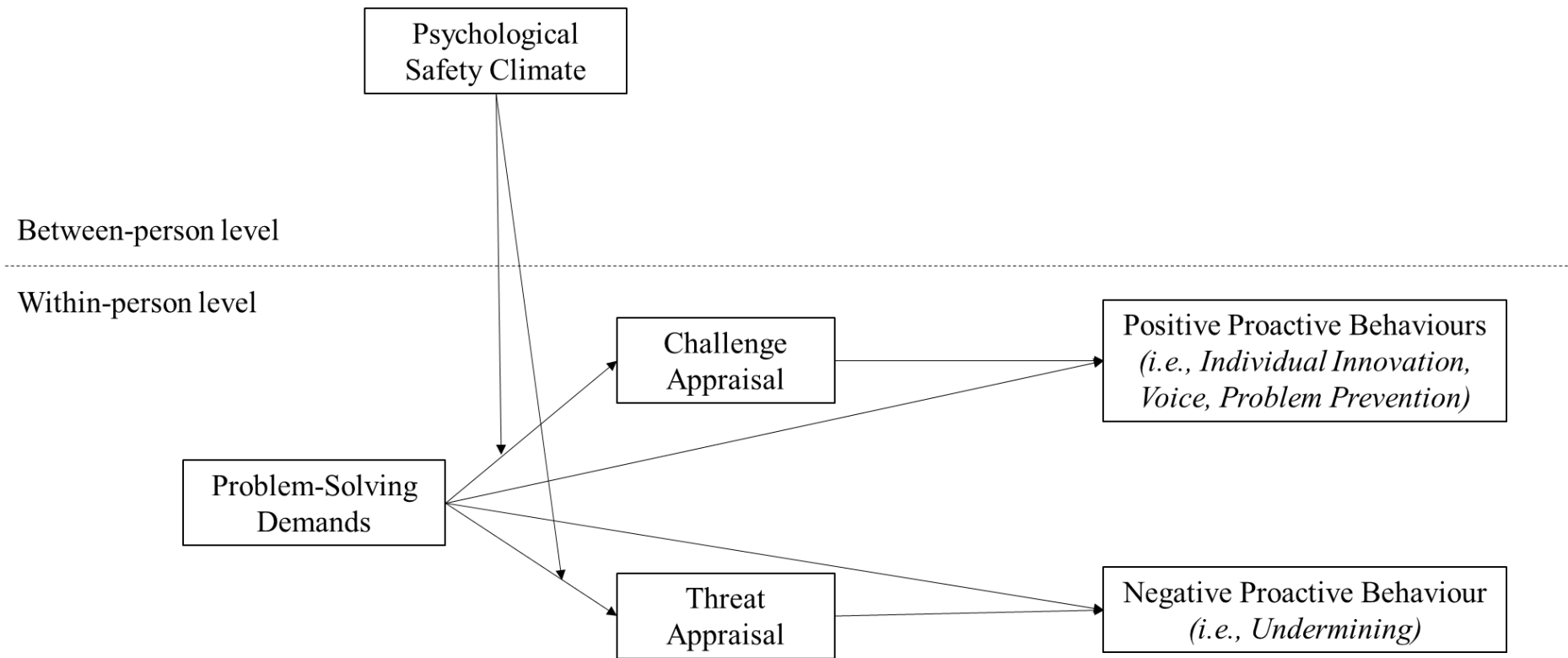


Figure 1. Cross-level moderated mediation model.

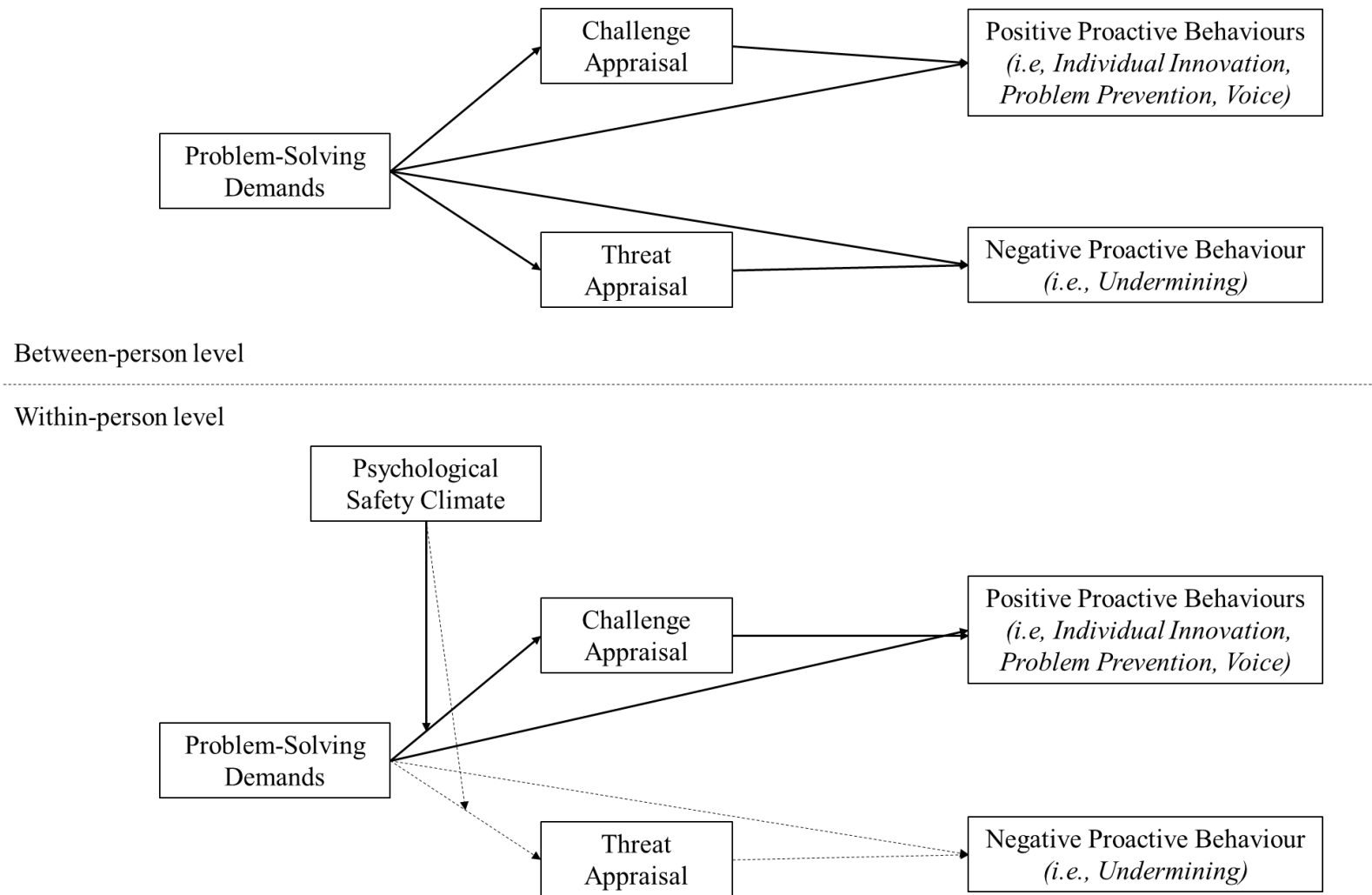


Figure 2. A simplified summary of study relationships.

Note: solid lines represent supported hypotheses and dotted lines denote unsupported hypotheses.

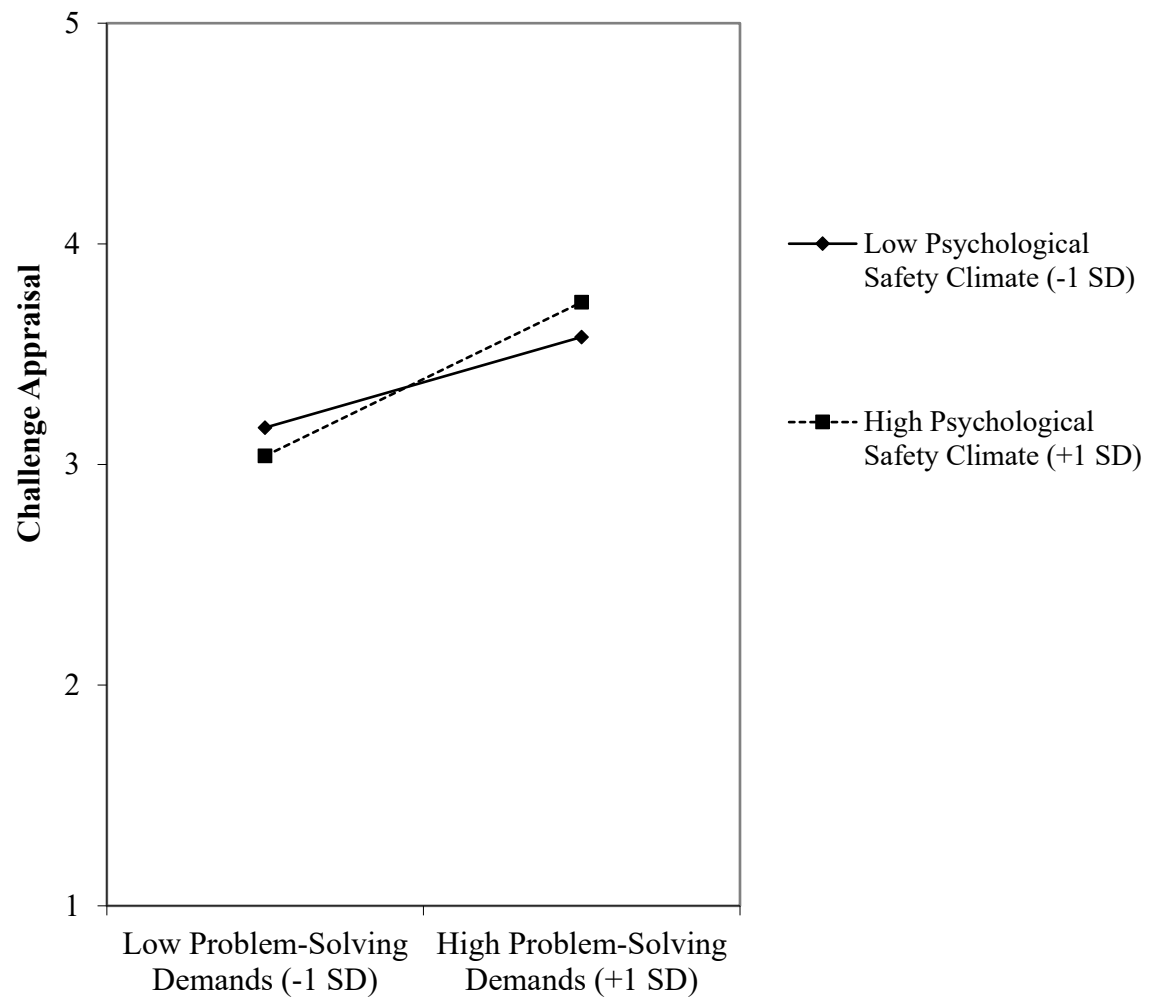


Figure 3. Psychological safety climate as a cross-level moderator of the mediation effect of problem-solving demands on individual innovation via challenge appraisal.

Chapter 5 – Team Impacts on the Individual-Level Relationship between Problem-Solving Demands and Stress Appraisal

In the previous paper (Study 1), I demonstrated that problem-solving demands are positively associated with both challenge and threat appraisal at the person-level. The present paper (Study 2) extends upon Study 1 by exploring these person-level associations in the context of teams. Building upon social theories (i.e., social information processing theory), this study investigates team problem prevention as a potential moderator of the person-level relationship between problem-solving demands and stress appraisal. The study hypotheses, which operate across the individual and team level, are presented in Figure 5.1. This is a key area for research given that teams play an increasingly important role in problem-solving (Janssen & Huang, 2008).

An earlier version of this paper entitled “Peers and problem-solving: A multi-level study of team impacts on stress appraisals” was accepted for presentation at the 33rd Annual Conference for the Society of Industrial and Organizational Psychology in Chicago, IL the United States of America. In its current form, the paper is “in press” with the journal of Work & Stress. I used British spelling convention to align with the journal submission requirements.

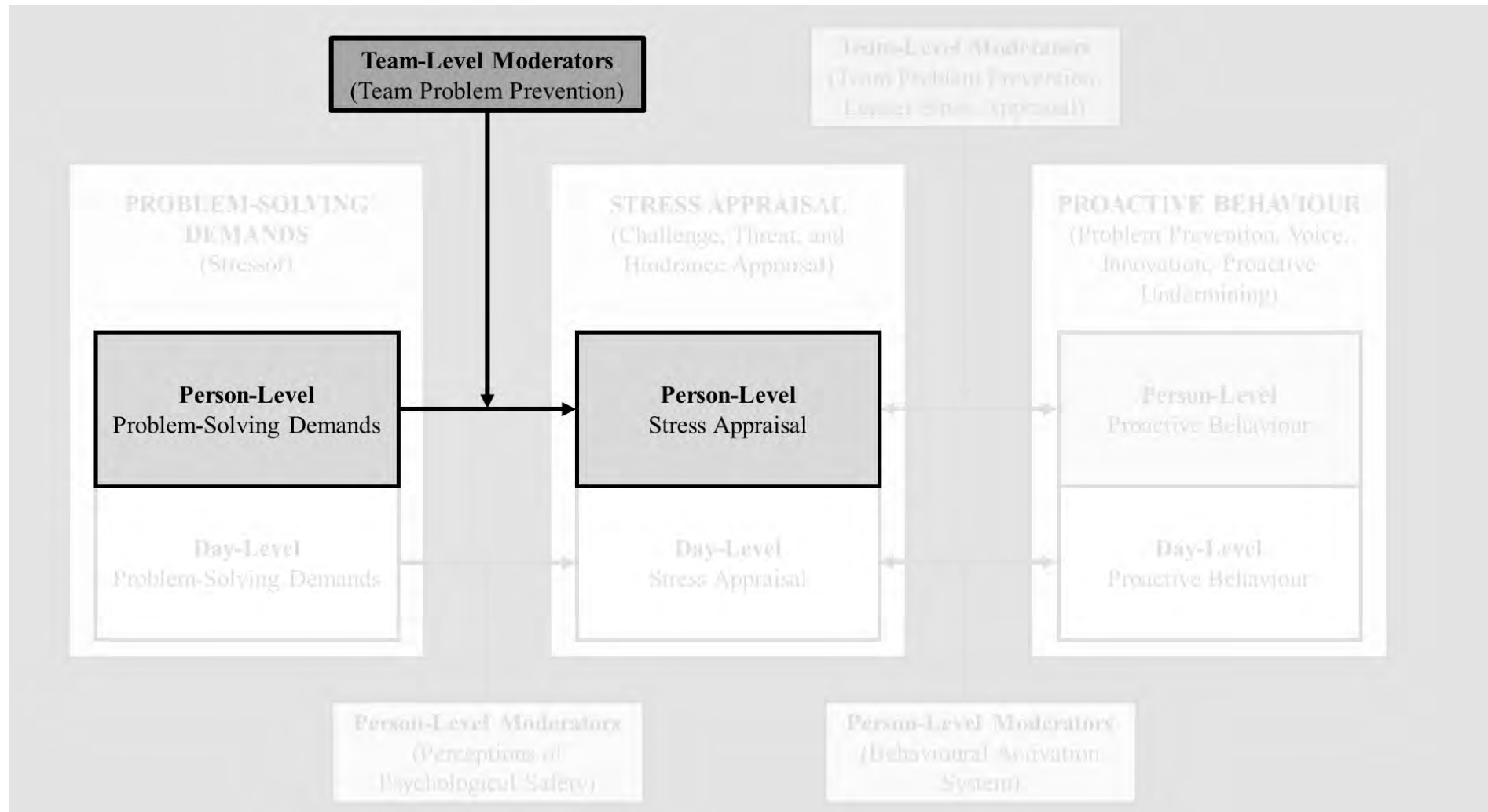


Figure 5.1. Multi-level hypotheses tested in Study 2.

Study 2 – Peers, Proactivity, & Problem-Solving: A Multi-Level Study of Team Impacts on Stress Appraisals of Problem-Solving Demands

A. Espedido, B. J. Searle, & B. Griffin

To date, there is a paucity of research on team-level impacts on the individual stress appraisal process despite the recognised role of teams for solving problems. Applying a multi-level approach, this study investigates the cross-level impact of team problem prevention behaviours on employee stress appraisals of problem-solving demands. It was hypothesised that team problem prevention would moderate the individual-level relationship between problem-solving demands and stress appraisals. Data were collected from 43 work teams comprised of 192 team members including all team leaders who also provided evaluations of their team's problem prevention behaviour. Results supported the hypothesised cross-level moderating effects on challenge appraisal, but not threat appraisal. As one of the first studies to demonstrate that stress appraisals are impacted by the group, not just by individual factors, the results support a multi-level conceptualisation of stress appraisals. The findings also highlight implications for practice, broadening the scope of possibilities for stress management interventions to utilise team-level strategies such as leadership development programmes and/or team building initiatives.

Keywords:

Work stress models; multi-level analysis; demands; teams; work organisation

Stressors refer to objective aspects of work that trigger stress (e.g., job demands, conflict; Spector & Jex, 1998) and result in employee strain. Consequently, a major focus for organisations is to help employees manage stressors effectively (Espedido & Searle, 2018). According to transactional stress theory (Lazarus & Folkman, 1984), a prominent framework for explaining the stress process, behavioural responses predominantly emanate from the subjective way an individual appraises (interprets) stressors. Stress appraisals have been linked to a host of beneficial behavioural and performance outcomes such as creativity and proactivity (Ohly & Fritz, 2010), task performance (Drach-Zahavy & Erez, 2002), wellbeing (Searle & Auton, 2015), organisational retention and loyalty (Boswell, Olson-Buchanan, & Pine, 2004). Given the range of favourable behavioural outcomes linked to stress appraisals, there is an impetus to understand the circumstances that shape appraisals within organisations.

Whereas the effects of stressors traditionally considered as sources of distress (e.g., time pressure, workload) on stress appraisals have been explored (Espedido & Searle, 2018; Ohly & Fritz, 2010; Webster, Beehr, & Love, 2011), appraisals of knowledge-related demands such as problem-solving demands are less understood (Schmitt, Zacher, & Frese, 2012). Yet research has linked problem-solving with organisational performance and innovation (Von Hippel, 1994), highlighting the importance of further research. There is also a paucity of research examining group-level impacts on the individual appraisal process. This is a serious deficiency due to the recognised role of contextual factors and team climates in shaping employee attitudes and perceptions (Kuenzi & Shminke, 2009), the increasing interdependency of the contemporary workforce (Tornau & Frese, 2013), and the potential for group resources to buffer stress reactions (Helgeson, 1993). Given the importance of leader and team factors in the problem-solving process (Hargadon & Bechky, 2006; Reiter-Palmon & Illies, 2004), it seems particularly important to consider team impacts in studies of

problem-solving demands. Specifically, we explore team problem prevention behaviours because they have direct relevance to the anticipation of problem-solving needs (Parker & Collins, 2010).

The present study extends past research in several ways. Firstly, it evaluates stress appraisals of a pervasive, yet relatively under-researched stressor, problem-solving demands. Secondly, it aims to advance the appraisal literature by exploring a team-level factor that may impact on appraisals of problem-solving demands, namely team problem prevention. The multi-level design whereby participants are nested within teams allows us to more accurately measure between-team differences that moderate the appraisal of problem-solving demands (Klein & Kozlowski, 2000). In addition, we combine individual employee responses with leader evaluations of team performance to assess perspectives at different levels and address common-method bias found in studies restricted to individual-level analysis.

Individual Problem-Solving Demands and Stress Appraisal

Theoretical accounts of the consequences of problem-solving demands on performance lack consensus, with researchers suggesting both positive and negative effects. A positive relationship between problem-solving demands and performance is supported by arousal-based theories (Spence & Spence, 1966), which suggest that external demands help to mobilise effort and direct attention. Related stressors, like task complexity, which similarly require the application of sophisticated skills and knowledge, have also been shown to enhance performance and productivity (Marshall & Byrd, 1998; Pepinsky, Pepinsky, & Pavlik, 1960). In contrast, cognitive resource theory predicts that problem-solving demands will reduce creative thinking owing to the finite nature of mental resources (Eysenck & Calvo, 1992; Vecchio, 1990). When demands are high, this can redirect cognitive resources towards monitoring and worry, leaving fewer resources available for task performance. For example, laboratory research shows that similar stressors, like task complexity, impair

performance and decision-making (Jacko & Ward, 1996; Topi, Valacich, & Hoffer, 2005). However, another explanation would fit these mixed findings. If, consistent with transactional stress theory (Lazarus & Folkman, 1984), the effects of stressors depend on the way they are appraised, individual differences in stress appraisals may clarify these inconsistent effects.

Transactional stress theory suggests that employees' behavioural and emotional responses to stressors are shaped by the way they perceive their situation. Challenge appraisals are the perception of stressors as providing an opportunity for mastery or goal achievement, whereas threat appraisals are the perception of stressors as potentially harmful (Lazarus & Folkman, 1984). These different forms of appraisal have distinct outcomes. Challenge appraisals are linked with a range of desirable performance outcomes such as workplace creativity (Ohly & Fritz, 2010) and positive emotions (Searle & Auton, 2015). Threat appraisals on the other hand, are generally linked with unfavourable outcomes such as physiological stress (Harvey, Nathens, Bandiera, & LeBlanc, 2010), avoidant coping strategies (Lengua & Long, 2002) and absenteeism (Fugate, Prussia, & Kinicki, 2012). Understanding differences in the way people appraise problem-solving demands may contribute to the literature by clarifying the mixed accounts of the problem-solving demands—performance relationship. Practically, our study may indicate the circumstances that facilitate challenge and threat appraisals, and therefore how organisations can promote beneficial challenge appraisals and minimise harmful threat appraisals.

Although the appraisal construct has been applied extensively in the broader psychology and health literature, less attention has been given to its direct application in the context of job stressors (Tuckey, Searle, Boyd, Winefield, & Winefield, 2015). Instead, the occupational stress literature more frequently draws upon the closely related challenge-hindrance framework (Cavanaugh, Boswell, Roehling, & Boudreau, 2000), perhaps due to its simplicity. Within this framework, stressors are categorised, *a priori*, as challenges, if they

are typically assumed to promote goal attainment (e.g., workload and responsibility), or hindrances if assumed to generally thwart goal attainment (e.g., role ambiguity, conflict, and job insecurity) (Cavanaugh et al., 2000). Under the challenge-hindrance framework, problem-solving demands have been categorised as a challenge (Holman et al., 2012), as have related stressors such as task complexity (LePine, Podsakoff, & LePine, 2005).

Whilst a positive relationship between problem-solving demands and challenge appraisal has been assumed, it has not yet been investigated systematically. We examine whether problem-solving demands are actually appraised as challenging, and the extent to which this varies between individuals. Researchers have theorised that related stressors, such as task complexity, improve performance by challenging and motivating individuals (Hackman & Oldham, 1976). According to Wood (1986), task complexity refers to the number of task characteristics (components), how they relate to one another (coordination), and how they change over time (dynamic elements). By introducing opportunities to apply sophisticated skills and decision-making, job complexity enables an individual to feel challenged and stretched (Grant & Parker, 2009). Problem-solving demands are akin to task complexity, particularly the dynamic elements of task complexity, because they constantly require new information to be resolved. Whereas problem-solving demands may similarly prompt people to stretch their knowledge and skill base to diagnose problems (Wall, Jackson, Mullarkey, & Parker, 1996), they are conceptually distinct due to a strong focus on creative processing and the generation of unique and innovative solutions (Moregeson & Humphrey, 2006). This element of creativity may facilitate challenge appraisals because creativity has been empirically linked to heightened feelings of challenge, interest, and enjoyment (Amabile, 1996). We address calls from Zhou et al. (2012) to study problem-solving demands specifically because, unlike general task complexity, problem-solving demands offer a more precise aspect of job design with relevance to challenge. We also extend upon the research on

task complexity which has typically used laboratory designs by exploring relationships in a field setting, lending greater external validity to results.

Hypothesis 1a: Problem-solving demands will have a positive relationship with challenge appraisal.

Hypothesis 1b: Challenge appraisal will vary significantly between individuals.

However, transactional theory suggests that the same stressor can be interpreted both as challenging and threatening, to varying degrees, by different individuals (Lazarus & Folkman, 1984). Researchers theorise that variability in stress appraisals could emanate from a variety of personal and contextual factors such as differences in capacities, knowledge, skills and abilities, constraints, resources, and norms (Mechanic, 1978). This notion is supported by empirical evidence showing that the same stressor can be interpreted as an opportunity and challenge, as well as a threat (González-Morales & Neves, 2015; Webster et al., 2011). It remains unclear whether problem-solving demands are experienced universally as challenging, and if not, the degree to which this may differ between individuals. Indeed, research has shown that problem-solving demands and related stressors such as task complexity are linked with negative phenomena (e.g., psychological strain, Beehr, Glaser, Canali, & Wallwey, 2001; impaired performance, Jacko & Ward, 1996; activated negative affect, Madrid, Patterson, & Leiva, 2015). We examine problem-solving demands in part because “their interpretation is likely to vary, as they might be experienced as challenging and motivating, but also as adverse and hindering” (Daniels, Wimalasiri, Beesley, & Cheyne, 2012, pp. 668). Given that problem-solving demands may be perceived less uniformly than other stressors, it may be particularly appropriate to also measure appraisals of threat, rather than to rely on simple predetermined stressor categories.

Hypothesis 2a: Problem-solving demands will have a positive relationship with threat appraisal.

Hypothesis 2b: Threat appraisal will vary significantly between individuals.

The Moderating Role of Problem Prevention

To understand the circumstances that facilitate stress appraisals of problem-solving demands, there is a need to look at the appraisal process. According to transactional stress theory, stress appraisal consists of two main processes (Lazarus & Folkman, 1984). *Primary appraisals*, such as challenge and threat appraisals, involve the judgement of personal relevance and impact, whereas *secondary appraisals* involve judging options for coping. Lazarus and Folkman (1984) assert that secondary appraisals can influence primary appraisal. In our case, we examine coping strategies that are proactive rather than reactive. As such, proactive coping (in the form of problem prevention) is positioned as a potential antecedent of stress appraisals, as well as a moderator of the impact of problem-solving demands.

Whereas many researchers have examined coping as a reaction to current stressors, fewer have examined coping in relation to future stressors (Aspinwall & Taylor, 1997). Yet, there are merits to exploring proactive coping. Distinct from reactive coping, proactive coping involves thinking ahead to identify potential stressors, envisioning goals, planning actions, and acting in advance to achieve the best outcomes from stressors (Searle & Lee, 2015). Proactive coping has been shown to be effective for wellbeing (Greenglass & Fiksenbaum, 2009; Greenglass, Fiksenbaum, & Eaton, 2006), because it aims to prevent or modify stressful events before they are incurred. Problem prevention, which refers to anticipating and addressing future problems (Frese & Fay, 2001), is a type of proactive coping strategy, which out of all the proactive behaviours identified by Parker and Collins (2010), bears the most direct relevance for the management of problem-solving demands.

Consistent with transactional theory, it may be hypothesised that individuals who engage in higher levels of problem prevention are more likely to interpret that they have capacity to manage a given level of problem-solving demands. This may prompt stronger

perceptions of positive challenge and reduced perceptions of threat associated with problem-solving demands. Parker and Collins (2010) found that proactive problem prevention was related to constructs like challenge appraisal, such as learning goal orientation – a tendency to focus on opportunities for growth, mastery, and development. Although that study was conducted solely at the individual level, it shows the potential for problem prevention behaviours to correspond with perceptions of challenge, growth, and learning. Moreover, proactive coping strategies, akin to proactive problem prevention, have been shown to alleviate feelings of threat in the face of high demands (Aspinwall & Taylor, 1997) because they enable individuals to prepare for potentially stressful events (Lazarus & Folkman, 1984).

Hypothesis 3: Individual problem prevention will moderate the relationship between problem-solving demands and challenge appraisal, such that the relationship will be stronger when individuals have higher levels of problem prevention.

Hypothesis 4: Individual problem prevention will moderate the relationship between problem-solving demands and threat appraisal, such that the relationship will be weaker when individuals have higher levels of problem prevention.

To better understand the circumstances that affect appraisals of problem-solving demands, there is a need to also look at the group context. Klein and Kozlowski (2000) argue that it is important to examine phenomena, not just at the individual level, but also at the team level. Chan's (1998) typology suggests that phenomena can have the same focal content yet take on qualitatively different meaning when examined at the individual versus the team level. At the individual level, problem prevention refers to an employee's proactive coping behaviours to address his/her own problems at work (Parker & Collins, 2010). At the team-level, problem prevention relates to the collective norms and shared experiences within the group to cope with problems interdependently. Perceptions of individual problem prevention do not necessarily correspond with perceptions of team problem prevention (Chan, 1998). For

example, an individual team member may not personally feel that he or she prevented problems successfully, but the team as a collective unit may nevertheless be effective at preventing problems. This team experience is part of the work environment perceived by its members. Therefore, employees are affected not only by their own personal problem prevention behaviours, but also by the team behaviours to which they are exposed.

Previous studies on problem prevention have typically been limited to the individual level (Parker & Collins, 2010). This may stem from the theoretical focus of the appraisal construct on explaining individual variability in responses to the same situation (Lazarus & Folkman, 1984). It may also be due in part to the higher costs and number of participants, the complexity of analysis procedures, and the practical and ethical difficulties associated with multi-level research designs. However, Williams, Parker, and Turner (2010) showed that team-level proactivity explained variance in outcomes, over and above individual- or organisation- level proactivity. Baer and Frese (2003) also demonstrated the practical value of exploring group-level characteristics, finding that proactivity-related climates (i.e., organisational climate for initiative) could predict relevant organisational outcomes (i.e., innovation and performance). Examining team problem prevention enables us to measure emergent team-level properties, interdependencies and shared experiences in managing problems which individual problem prevention does not capture.

Appraisals of a situation are experienced individually, but they are likely to be influenced by employees' broader work and social contexts. Few studies have examined team-level impacts on the appraisal process. Yet transactional theory suggests that appraisals are a product of the interplay between the individual and their environment, indicating that appraisals emerge from the interaction between individual and social processes (Lazarus & Folkman, 1984). Therefore, we examine team problem prevention as a potential moderator of the problem-solving demands—stress appraisal relationship, addressing calls from Wu and

Parker (2011) to link the proactivity and stress literatures. Social information processing theory (Salancik & Pfeffer, 1978) invokes group-level processes and provides a framework for predicting how problem prevention, at the team level, may moderate challenge appraisals. According to social information processing theory, individuals interpret their situations with reference to their social group. Teams with high levels of problem prevention likely have social norms of coping well with problems (Druskat & Kayes, 2000). Individuals may draw upon these social cues and similarly appraise their situation as a positive challenge, because their team is equipped with stronger coping strategies.

Hypothesis 5: Team problem prevention will moderate the positive relationship between problem-solving demands and challenge appraisal, such that the relationship will be stronger in teams with high levels of problem prevention.

Team problem prevention may also moderate the relationship between problem-solving demands and threat appraisal, but in the opposite direction. Applying social information processing theory (Salancik & Pfeffer, 1978), teams with low levels of problem prevention are less likely to be effective in addressing problem-solving demands. Based on these social norms, individuals may be less likely to view opportunities and benefits when encountering problem-solving demands, and more likely to perceive negative consequences or potential risks.

Hypothesis 6: Team problem prevention will moderate the relationship between problem-solving demands and threat appraisal, such that the relationship will be weaker in teams with high levels of problem prevention.

Method

Participants

The on-line survey was completed by 647 employees (36% response rate) from a large engineering and construction company operating across Australia. To encourage

participation, respondents went into a prize draw to win company points. To maintain confidentiality, the researchers were responsible for randomly selecting five participants to receive an incentive, each to value of AU\$1,500. Company points equivalent to the Australian dollar are used to access shopping with selected suppliers (e.g., homewares, travel, clothing and technology suppliers). Survey responses were grouped by team and were only included in the final sample where i) the team had at least three members who participated and ii) the team leader provided ratings of their team's behaviour. This left 192 participants nested in 43 teams whose sizes ranged from 4 to 10 members ($M = 5.47$, $SD = 1.70$). Teams were administrative (including responsibilities such as project management, team resourcing, and financial planning) and construction-based (involving tasks such as manual labour and safety compliance).

The final sample predominantly male comprise of 144 males (75%) and 48 (25%) females. This reflects the company's profile and is comparable to Australia's census data showing the male-dominated nature of the construction industry (83% males, 17% females, Australian Bureau of Statistics, 2018). Age groups ranged from 18-24 years (6%) to 65+ years (2%), with the median category being 35-44 years (29%). The mean tenure within the organisation was 9.31 years ($SD = 8.41$). Participants had spent a mean of 4.77 years ($SD = 5.33$) in their current roles.

Measures

Problem-solving demands. Problem-solving demands were measured using the five-item scale from Wall et al. (1996). An example item was "How often are you required to solve problems which have no obvious correct answer?" Participants rated how often they had to address different kinds of problems on a scale from 1 (not at all) to 5 (a great deal). They were asked to respond with reference to "the past month". A relatively short time span was specified to minimise memory biases and provide a specific period from which

participants could recall concrete examples of their demands. Cronbach's alpha (α) was .88.

Stress appraisal. Challenge appraisal of problem-solving demands was assessed using Searle and Auton's (2015) 4-item scale (e.g., "They will help me to learn a lot", $\alpha = .86$). Threat appraisal was measured using Feldman, Cohen, Hamrick, and Lepore's (2004) 3-item scale (e.g., "They are going to have a negative impact on me", $\alpha = .91$). Participants were instructed to answer in relation to the past month, with reference to the same problem-solving demands they thought of when completing the previous measure using a response scale from 1 (strongly disagree) to 5 (strongly agree).

Proactive problem prevention. Parker and Collins' (2010) three-item problem prevention scale was used to measure individual-level initiative directed at anticipating and solving problems ($\alpha = .83$). Individuals rated how frequently they carried out prevention behaviours in the past month on a scale from 1 (not at all) to 5 (very frequently). A sample item was "How frequently do you spend time planning how to prevent recurring problems?".

The same scale was used to measure team proactive problem prevention ($\alpha = .75$). However, leaders rated the problem prevention behaviours of their teams. We chose to use leader ratings to independently capture shared, collective properties. According to Chen, Bliese, and Matheiu's (2003) referent composition model, simply aggregating individuals' personal problem prevention behaviours may miss aspects of the emergent higher-level construct, and in some cases measure a different construct entirely. Instead, the reference of the measure needs to be "shifted" from the individual to the team-level. As we wanted to capture global emergent properties of the team, rather than individual perceptions, we utilised leader ratings that referred to the team as a whole, rather than individual experiences. Proactivity and innovation research has often relied heavily on self-reports (e.g., Ancona & Caldwell, 1992; Edmondson, 1999; Schippers, West, & Dawson, 2015), which are more likely to be inflated than leader ratings (Harris & Schaubroeck, 1988). Meta-analytic

evidence suggests that leader ratings have greater inter-rater and intra-rater reliability than self or peer ratings of performance and other socially desirable behaviours (Conway & Huffcut, 1997). Leader ratings also have greater validity than individual ratings being more strongly correlated to performance measured by external ratings (Atkins & Wood, 2002). This may be because leaders are typically required to have greater visibility over their entire team, whereas individuals may have limited insight beyond their own experiences. As team proactivity behaviours, like problem prevention, are observable and socially desirable, Tornau and Frese (2013) suggest that they are best measured by the leader. Finally, including ratings from an independent party (the leader) reduces common method bias.

Procedure

The procedures used in this study were approved by the researchers' institutional review board. Surveys were administered online. An initial pilot study with a convenience sample of 13 participants from the Australian working population confirmed the comprehensibility of survey questions and adequate interface design. Consistent with recommendations from Rogelberg and Stanton (2007), potential participants were pre-notified of the survey a week in advance via an email from a key leader in the organisation. The survey was open for two weeks. Reminder emails were sent after the first week, and on the last day of the survey, as is suggested for this methodology (Rogelberg & Stanton, 2007). To minimise social desirability, respondents were repeatedly reassured throughout the survey that their responses were confidential and voluntary and were instructed to "please answer honestly" (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Analysis

As the data were structured hierarchically, with participants nested within teams, multi-level modelling techniques were used (Hofmann, 1997). Hypotheses were tested using the *MPlus* programme (Muthén & Muthén, 2012). A random effects model was used so that

cross-level moderations could be tested (Aguinis, Gottfredson, & Culpepper, 2013). Manifest variables calculated from scale means were used. Two-level models were tested with individuals at Level 1 ($N = 192$) and teams at Level 2 ($N = 43$). The problem-solving demands and individual problem prevention variables (Level 1) were centred to the group mean to estimate between-subject effects accurately without possible confounding between-team effects. For testing the moderating effect of individual problem prevention on the relationship between problem-solving demands and stress appraisal, we calculated the product of the group mean centred variables. Team problem prevention (Level 2) was centred to the grand mean to reduce multicollinearity and enhance interpretability (Enders & Tofighi, 2007). For the moderation hypotheses, simple slope significance tests were calculated (Preacher, Rucker, & Hayes, 2007).

Results

Descriptives and Correlations

As shown in Table 1, there was no significant relationship between problem-solving demands and challenge appraisal, and problem-solving demands and threat appraisal, at the within-person level.

Stress Appraisal of Problem-Solving Demands

Individual-level direct relationships between problem-solving demands and appraisal. Multi-level parameter estimates shown in Table 2 indicated that the mean value of the random slope for the relationship between problem-solving demands and challenge appraisal was not significant ($\gamma_{10} = .12, p = .092$). The mean value of the random slope for the relationship between problem-solving demands and threat appraisal was not significant ($\gamma_{10} = .05, p = .625$). Hypotheses 1a and 2a predicting positive relationships between problem-solving demands and stress appraisals were not supported.

Individual-level variation in appraisal. For each appraisal dependent variable, an

intercept-only model was estimated. Consistent with Hypothesis 1b and 2b, results showed significant individual-level variation in challenge ($\sigma^2_{\text{within}} = 0.35$, $p < .001$) and threat appraisal ($\sigma^2_{\text{within}} = 0.55$, $p < .001$). This indicates that appraisals varied considerably between individuals.

[Insert Table 1 about here]

[Insert Table 2 about here]

The Role of Problem Prevention

The ICC(1) value for challenge appraisal was .004, below Harlow's (2014) suggested .05 criteria, indicating that the team grouping structure did not explain a substantial proportion of variance in challenge appraisal (Hox, 2002). This may be due to the high levels of individual-level variation described above. The ICC(1) value for threat appraisal was .058, above Harlow's criteria. However, in a cross-level moderation design, Level 2 variables are used to explain variance in the slope of the independent variable on the dependent variable, rather than variance in the dependent variable itself (Aguinis, Goffredson, & Culpepper, 2013). Therefore, in determining whether it is appropriate to test cross-level moderation, it is more important to test whether the random slope of the independent on the dependent variable has significant variance at the between-team level, rather than examine the ICC(1) value (Mathieu, Aguinis, Culpepper, & Chen, 2012). The variance of the random slope for the relationship between problem-solving demands and challenge appraisal was significant ($\tau_0 = .06$, $p = .048$), indicating that sufficient variance in this random slope could be further accounted for by between-group predictors. This demonstrated that it was appropriate to test the cross-level moderation hypotheses. However, the variance of the random slope for the relationship between problem-solving demands and threat appraisal was not significant ($\tau_0 = .02$, $p = .829$). Team problem prevention was not included as a cross-level moderator of the relationship between problem-solving demands and threat appraisal.

Effects of individual level problem prevention. As shown in Table 3, the direct effects of individual problem prevention on challenge appraisal ($\gamma_{01} = .05$, $p = .444$) and threat appraisal ($\gamma_{01} = .01$, $p = .960$) were not significant. Inconsistent with Hypotheses 3 and 4, there was also no indication that individual problem prevention moderated the relationship between problem-solving demands and challenge appraisal ($\gamma_{11} = .09$, $p = .214$), or the relationship between problem-solving demands and threat appraisal ($\gamma_{11} = -.05$, $p = .639$).

Team problem prevention as a cross-level moderator. The interaction between team problem prevention behaviours and individual problem-solving demands was significantly related to individual challenge appraisal ($\gamma_{12} = .26$, $p < .001$), shown in Table 3. Figure 1 shows the expected relationship between problem-solving demands and challenge appraisal for two levels of team problem prevention (mean \pm 1 SD). At low levels of problem prevention (-1 SD), the simple slope was not significantly different from zero ($-.09$, $p = .163$). However, at high levels of problem prevention (+1 SD), the simple slope was significantly positive ($.31$, $p < .001$). This indicates that the relationship between problem-solving demands and challenge appraisal is only positive in teams with above average levels of problem prevention behaviours. This result supports Hypothesis 5 predicting that team problem prevention will moderate the relationship between problem-solving demands and challenge appraisal.

[Insert Table 3 about here]

[Insert Figure 1 about here]

Discussion

The results from this study indicate that team-level factors may impact on individual-level stress appraisals. To measure team phenomena accurately, we utilised a multi-level survey design with ratings sourced from both team members and their leaders. Results indicated that team problem prevention behaviour moderated the individual-level relationship

between problem-solving demands and challenge appraisal.

Individual Problem-Solving Demands and Stress Appraisals

The within-team association between problem-solving demands and challenge appraisal only approached significance, reinforcing that categorising problem-solving demands as a challenge may be simplistic. The within-team association between problem-solving demands and threat appraisal was non-significant. The lack of significant associations may be explained by substantial individual variability in appraisal. Aligned with expectations, there was substantial individual-level variation in both challenge and threat appraisals of problem-solving demands. This supports central tenets of transactional stress theory showing that the same stressor can be interpreted as challenging and as threatening, to varying degrees, by different individuals (Lazarus & Folkman, 1984). This may be because problem-solving demands typically have both positive and negative aspects which could elicit different types of appraisal. Examples of problem-solving demands include the need to design new technologies in an engineering context (Dumas, Schmidt, & Alexander, 2016), develop marketing campaigns in a sales context (Van Aken & Berends, 2018), or create a medical treatment plan in a health context (Estrada, Isen, & Young, 1994). For each of these examples, problem-solving demands may present benefits (e.g., potential recognition, remuneration, and job satisfaction when managed effectively) as well as threats (e.g., risk of reputational damage, failure or harm). The observed individual variability in challenge appraisals underscores the utility of examining moderators of appraisal processes to identify boundary conditions for when stressors may show differential relationships for different individuals. We now direct our attention to team-level moderators of the individual appraisal process.

The Moderating Role of Problem Prevention

Contrary to expectation, individual problem prevention did not moderate the

individual-level relationship between problem-solving demands and challenge appraisal. However, team problem prevention was a significant moderator, with the relationship stronger for those who worked in teams with high levels of problem prevention behaviours. This suggests that when it comes to appraisal of problem-solving demands, team norms and shared experiences have a stronger effect than individual problem prevention behaviours. Teams who exhibit problem prevention behaviours are more likely to anticipate and address problem-solving needs (Parker & Collins, 2010). This highlights the value of examining phenomena, not just at the individual level, but also at the team level.

The observed findings are consistent with social information processing theory (Salancik & Pfeffer, 1978) which suggests that people adjust their thoughts and actions based on the normative behaviours within their group. Given that problem prevention behaviours are linked with a tendency to focus on opportunities for growth and development (i.e., learning goal orientation, Parker & Collins, 2010), it is likely the case that team norms around perceiving opportunities and challenges exist. Therefore, drawing on these social cues, individuals working in teams with high levels of problem prevention may similarly interpret their situation with a greater sensitivity to the challenges and opportunities present. Also, consistent with social cognitive theory (Bandura, 1986), team problem prevention norms presumably emerge after individual team members display problem prevention behaviours to their group. Klein and Kozlowski (2000) argue that team phenomena have their foundation in individual behaviours which, through social interaction, have emergent properties that manifest at higher levels. In other words, teams with high problem prevention norms are likely to be comprised of individuals with strong proactive coping strategies that enable them to address problem-solving demands effectively, resulting in a stronger positive association between problem-solving demands and challenge appraisal. Although this need not preclude individual-level interactions, the observation of this interaction at the team level rather than

the individual level suggests that it is the team environment rather than the individual behaviour which influences appraisal of problem-solving demands. This may in part be due to the need, in many work environments, to seek assistance from other team members when problems arise (Parker et al., 2010).

Even though an important characteristic of stress appraisals is the way they differ between individuals, focusing on the influence of team norms and behaviours offers alternative points of intervention, beyond the individual, that are arguably more within the sphere of managers' influence (Ehrhart, Schneider, & Macey, 2014). Considering the team context is likely to equip managers to target strategies with greater precision and control, allowing efforts to be prioritised towards teams with less favourable characteristics. The present study findings lay groundwork for future research going forward to investigate how group-level norms might also affect workers' subjective appraisals of their objective situations.

Contrary to expectations, neither individual nor team problem prevention moderated the individual-level relationship between problem-solving demands and threat appraisal. It may be that problem prevention is more strongly linked to challenge appraisals, rather than threat appraisals. It is possible that other stressors, such as team job security, role conflict, and task ambiguity, may be more closely tied to threat experiences (Greenhalgh & Rosenblatt, 1984) given greater risks for harm or loss. Therefore, such stressors could be expected to moderate the relationship between problem-solving demands and threat appraisals. Future research could replicate the study with other team-level moderators to test how challenge and threat appraisals may be differentially impacted by group factors.

Practical Implications

The principal findings emphasise that individuals and teams have a shared responsibility to manage stress in the workplace. A criticism levelled at transactional theory

is that it places the onus on the individual by emphasising that stress responses emanate from individuals and their own appraisals (Israelashvili & Romanov, 2017). Such a focus directs attention away from unhelpful team practices and policies. The present study contributes to the appraisal perspective by identifying the role of team coping in shaping individual appraisals. This implies that long-term stress management programmes are likely to be more useful if they cultivate a team environment that supports effective coping.

Specifically, the results suggest that when employees face high levels of problem-solving demands, they are more likely to view such demands as challenging in a context with high team problem prevention. Social learning theory (Bandura, 1986) suggests that people observe and imitate the behaviours exhibited in their social group, particularly those modelled by people with status. Given that managers occupy positions of authority, social learning theory indicates that they have a key role to play in the development of group behavioural norms. Therefore, leadership development programmes may be a useful initiative, and can focus on training leaders to proactively anticipate and prevent problems. Indeed, research has shown that proactive skills are amenable to development through training (Searle, 2008; Strauss & Parker, 2015). Such training may help leaders to become the catalyst for establishing problem prevention norms within their teams.

Limitations and Future Directions

The survey had an adequate response rate, perhaps aided by the distribution of multiple incentives and study reminders. However, due to the inclusion criteria for this study, only a relatively small proportion of the organisation was included in the final analyses. This may have introduced response bias. Nevertheless, the criteria whereby teams were only included where at least three of their members responded was necessary to conduct multi-level analyses. Moreover, the requirement whereby team leaders also needed to respond enabled us to combine both team member and leader perspectives, mitigating common

method and social desirability biases present in exclusively self-report data.

The present study relies on a cross-sectional design which limits conclusions about the direction of causality. However, theory and previous longitudinal research affirm the proposed direction of the effects in which team factors influence lower order relationships (Chan, 1998), and in which demands precede their appraisal (Tuckey et al., 2015).

Nevertheless, further longitudinal research would be valuable for replicating and extending our findings.

A further limitation is that the sample came from a single engineering and construction company which could impinge upon the generalisability of results. The engineering industry has distinctive characteristics such as a heavy reliance on team units which may more readily precipitate team behaviours, and a high degree of novel and complex problems (García-Chas, Edelmira, Varela-Neira, 2015). This potentially elevates team problem prevention norms and problem-solving demands. Therefore, these factors impact appraisals in ways that may not be representative of the general workforce. However, sampling from one organisation means that a wide range of factors (e.g., organisational values, climate, training opportunities etc.) are more consistent across all participants, allowing greater control over extraneous variables.

Conclusion

This study extends understanding of individual appraisals of work demands by examining the impact of team behaviours (i.e., team problem prevention behaviours). It supports a shift to a multi-level model of stress appraisal by demonstrating the role of group, not just individual factors. Methodologically, the multi-level design of the study and combination of team and leader ratings extends previous research by rendering a more accurate examination of team-level phenomena. Practically, the finding that group factors may impact on people's stress appraisals of a situation, and by extension their capacity to

cope, broadens the scope of possibilities for intervention and practice to include team-level initiatives such as leadership development programmes and managerial practices.

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Table 1*Descriptive Statistics, Internal Consistencies, and Correlations*

Variables	<i>M</i>	<i>SD_W</i>	1	2	3	4	5
<i>SD_B</i>			.08	.19	.20	.11	.76
1. Challenge appraisal	3.95	0.59	(.86)	-.71	-.09	0.51	-.18
2. Threat appraisal	2.23	0.74	-.14	(.91)	-.23	-.75	-.20
3. Problem-solving demands	3.40	0.82	.20	.07	(.88)	.10	.41
4. Individual problem prevention	3.50	0.75	.17	.02	.36***	(.83)	.50
5. Team problem prevention	3.43	-	-	-	-	-	-

Note. Individual-level statistics ($n = 192$) presented below the diagonal, team-level statistics ($n = 43$) presented above the diagonal. Team problem prevention statistics exist at the team-level only. Values on the diagonal in parentheses are individual-level Cronbach's alphas. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2*Individual-Level Main Effects Models Examining the Relationship between Problem-Solving Demands and Stress Appraisals*

Model	Challenge appraisal			Threat appraisal		
	Est.	SE	95% CI	Est.	SE	95% CI
Random intercept (β_0)						
Mean (γ_{00})	3.51**	0.28	[2.96, 4.05]	2.17**	0.50	[1.20, 3.15]
Residual variance (σ^2_{e0})	0.01	0.62	[-0.02, 0.03]	0.05	0.07	[-0.09, 0.18]
Random slope (β_1)						
Mean (γ_{10})	0.12	0.07	[-0.02, 0.27]	0.05	0.09	[-0.13, 0.22]
Variance (τ_0)	0.06*	0.03	[0.00, 0.12]	0.02	0.10	[-0.17, 0.21]

Note: $N = 192$. CI = confidence interval. Level 1 equation: challenge appraisal (threat appraisal) = $\beta_0 + \beta_1$ (problem-solving demands) + e . Level 2 equations: $\beta_0 = \gamma_{00} + \mu_0$; and $\beta_1 = \gamma_{10} + \mu_1$. * $p < .05$, ** $p < .01$.

Table 3*Multi-Level Analysis Examining the Effects of Individual and Team Problem Prevention*

Model	Challenge appraisal			Threat appraisal		
	Coefficients	SE	95% CI	Coefficients	SE	95% CI
Random intercept (β_0)						
Intercept (γ_{00})	3.94**	0.04	[3.85, 4.02]	2.24***	.07	[2.11, 2.37]
Individual problem prevention (γ_{01})	0.05	0.06	[-0.07, 0.16]	.01	.10	[-0.19, 0.20]
Team problem prevention (γ_{02})	-0.03	0.04	[-0.11, 0.05]	-.02	.09	[-0.19, 0.16]
Residual variance (σ^2_{e1})	0.01	0.02	[-0.02, 0.04]	.52***	.09	[0.35, 0.70]
Random slope (β_1)						
Intercept (γ_{10})	0.11*	0.05	[0.01, 0.20]	.04	.11	[-0.16, 0.25]
Individual problem prevention (γ_{11})	0.09	0.07	[-0.05, 0.23]	-.05	.11	[-0.27, 0.17]
Team problem prevention – cross-level moderation effect (γ_{12})	0.26**	0.06	[0.15, 0.37]	-	-	-
Residual variance (σ^2_{e2})	0.01	0.02	[-0.03, 0.05]	.02	.12	[-0.22, 0.26]

Note: $N = 192$. CI = confidence interval. Level 1 equation: challenge appraisal (threat appraisal) = $\beta_0 + \beta_1$ (problem-solving demands) + e . Level 2 equations: $\beta_0 = \gamma_{00} + \gamma_{01}$ (individual problem prevention) + γ_{02} (team problem prevention) + μ_0 ; and $\beta_1 = \gamma_{10} + \gamma_{11}$ (individual problem prevention) + γ_{12} (team problem prevention) + μ_1 . * $p < .05$, ** $p < .01$, *** $p < .001$.

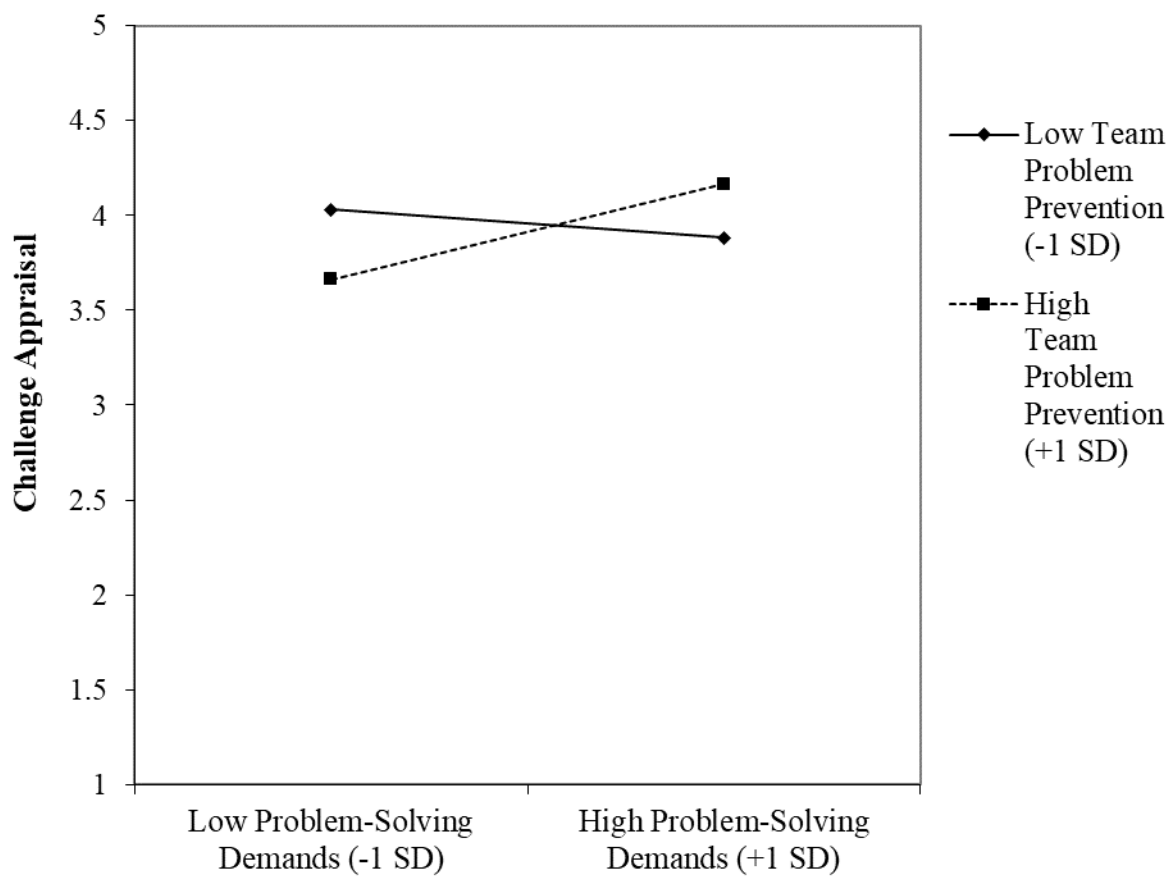


Figure 1. Team problem prevention as a moderator of the relationship between problem-solving demands and challenge appraisal.

Chapter 6 – Team Impacts on the Individual-Level Relationship Between Stress

Appraisal and Proactive Innovation

The previous paper focused on the individual-level relationship between problem-solving demands and stress appraisal, while this paper (Study 3) focused on the relationship between stress appraisal and proactivity. Drawing upon social information processing theory, I identified potential team (i.e., team problem prevention) and leader (i.e., leader stress appraisals of problem-solving demands) moderators of this relationship. The hypotheses of this study, operating at the individual and team levels, are illustrated in Figure 6.1. Given the role of teams for proactive endeavours, exploration of contextual factors above the individual level is critical for designing team-based innovation-boosting interventions. An understanding of the role of team and leader factors for either amplifying or dampening the effects of stress appraisals will better position practitioners to deliver effective interventions.

It is worth noting that the dataset used in the present paper (Study 3) is the same one used in the previous paper (Study 2). However, the relationship between problem-solving demands and proactivity via appraisals can be broken into two main components. The first is the effects of problem-solving demands on appraisals, the second is the effects of appraisals on proactivity. Moreover, each component may be moderated by team-level factors. As it is fairly complex to explore all of these effects in the one study, we have endeavoured to split it across two papers to enable deeper, in-depth exploration of each component

An earlier version of this paper entitled “Proactivity in response to problem-solving demands” was presented at the 12th Industrial and Organisational Psychology Conference in Sydney, Australia. It was awarded the Australian Psychological Society’s 2017 Best Paper Prize (symposium category). The paper is undergoing review following a “revise and resubmit” submission to the *Journal of Managerial Psychology*. To satisfy the journal submission requirements, I have adopted US spelling and Harvard referencing style.

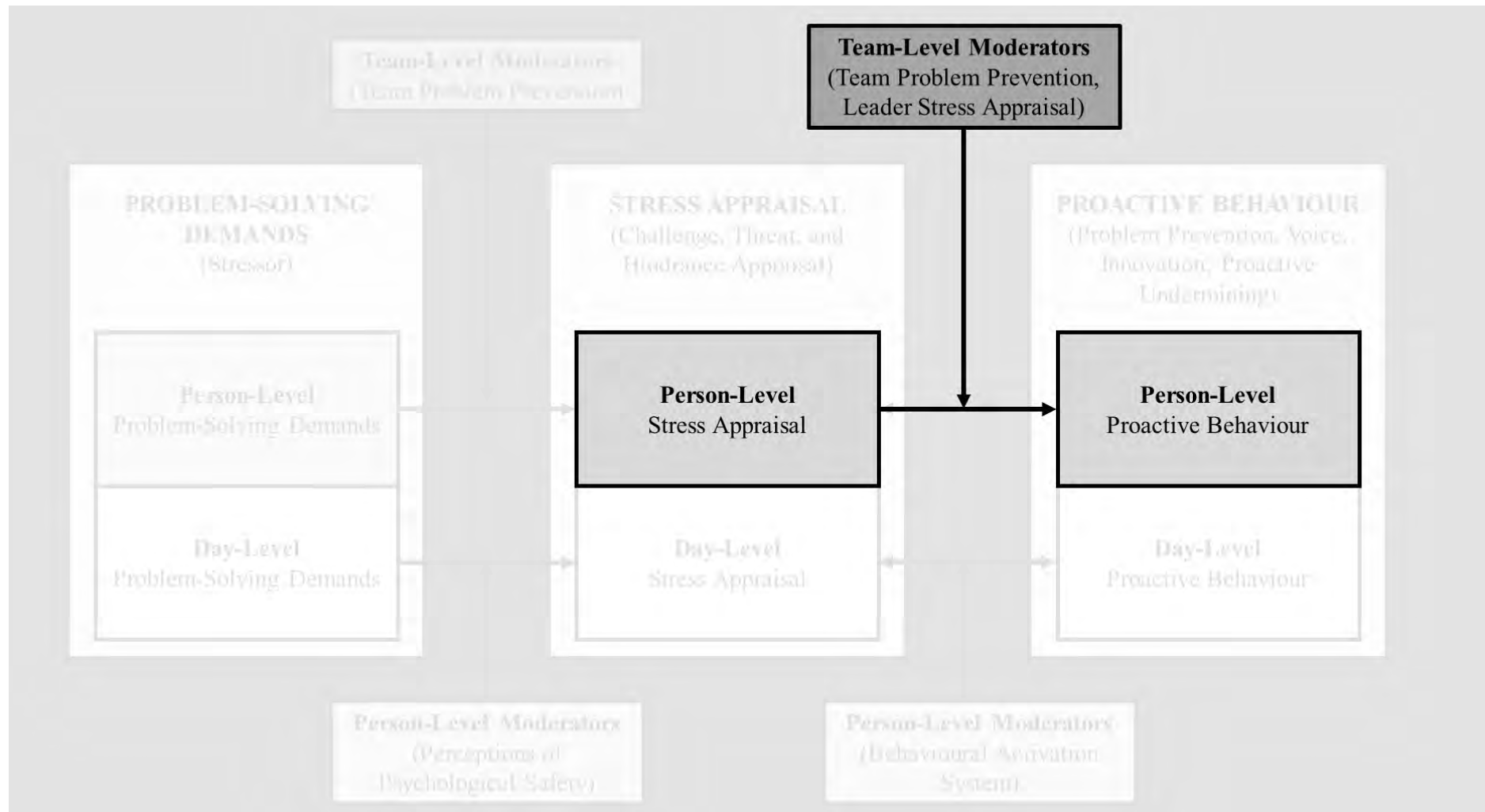


Figure 6.1. Multi-level hypotheses tested in Study 3.

Study 3 – Stress Appraisal, Teams and Innovation: A Multi-Level Study

A. Espedido & B. J. Searle

Purpose: Team factors have been shown to affect psychological phenomena and wellbeing, yet scarce research has examined team-level impacts on the stress appraisal process.

Framed by a strong theoretical foundation (i.e., transactional theory), this paper investigates team-level impacts (i.e., leader threat appraisal, leader challenge appraisal and team problem prevention) on the association between individual stress appraisals (i.e., threat and challenge appraisals) and proactive innovation.

Methodology: Data were collected from 192 individuals nested within 43 teams. Team leaders provided ratings of team-level variables (i.e., leader stress appraisals and team problem prevention behavior). All participants were from a global construction company.

Findings: Multi-level analyses revealed cross-level moderations of team factors on the effects of individual threat appraisal, but not challenge appraisal. Specifically, threat appraisal diminished innovation to a greater extent in teams with higher levels of leader threat appraisal or team problem prevention.

Practical implications: Managers and executives may consider broadening the scope of innovation-boosting interventions to include leadership development and team-based strategies.

Originality/Value: This study is first to demonstrate that the effects of individual threat appraisal can vary depending on factors at the team level. The study also makes notable contributions through the application of multi-level methodology and multi-source ratings. Overall, it provides support for an extension of transactional stress theory to incorporate team and leader factors.

Workplaces are increasingly complex and dynamic, increasing problem-solving demands and the need to innovate (Anderson *et al.*, 2014). Proactive innovation involves the generation and implementation of new ideas to solve problems (Von Hippel, 1994), for example, the development of new methods, techniques or products (Parker & Collins, 2010). Innovative behaviors are linked with a host of beneficial outcomes for individuals – such as job satisfaction and effectiveness (Janssen, 2000; Janssen & Huang, 2008), and for organizations – such as productivity and performance (Woodman *et al.*, 1993). To capitalize upon these benefits, organizations need to understand antecedents of proactive innovation at multiple levels of the organization.

Although the need for problem-solving is recognized as a potential trigger for innovative endeavors (Von Hippel, 1994), the way that problem-solving demands are interpreted (or appraised) could be a key antecedent of proactive innovation. According to transactional theory (Lazarus & Folkman, 1984), the way that people subjectively appraise stressful aspects of their situation plays a critical role in their stress response. In other words, the extent to which work demands are seen as either a threat or a challenge can influence employee behavior. For example, people who view their situation as threatening tend to respond with harm-minimizing behaviors (e.g., avoidant coping, Lengua & Long, 2002), which could diminish proactive innovation. Conversely, people who feel challenged tend to display more versatile, productive behaviors (e.g., workplace creativity, Ohly & Fritz, 2010; problem-focused coping, Searle & Auton, 2015), which could enhance proactive innovation.

Innovation is theorized to be a product of the interplay between an individual and his/her experiences at various levels of the organization (e.g., interactionist theory, Woodman *et al.*, 1993). Therefore, it may be important to explore how team factors interact with individual members' stress appraisals of problem-solving demands, especially given the recognized role of team factors in shaping employee perceptions (Kuenzi & Schminke, 2009), the importance of leader and team factors for innovation, and the growing interdependency in

workplaces (Hargadon & Bechky, 2006). The present study examines the effect of two team-level responses to problems, leader stress appraisals of problem-solving demands and team problem prevention. Leader stress appraisals refer to the team supervisor's interpretations of problem-solving demands (as either beneficial challenges or harmful threats). Team problem prevention involves the team's collective tendency to anticipate and mitigate potential risks and issues (Parker & Collins, 2010).

Our research aims to expand knowledge of the antecedents of proactive innovation in two key ways. Firstly, it looks at stress appraisals of problem-solving demands and their influence on employee innovation. Understanding the effects of stress appraisal has practical value because appraisal is malleable and amenable to development through training and management initiatives (e.g., Beehr *et al.*, 2001). Secondly, it extends the appraisal literature by examining how team factors influence the way that individual stress appraisals affect innovation. This study applies multi-level analyses to more accurately measure the between-team differences that impact the effects of appraisal on individual innovation (Klein & Kozlowski, 2000).

Theoretical Background

Stress appraisals of problem-solving demands. Stressors are work characteristics that have a high likelihood of triggering stress (Wall *et al.*, 1996). Problem-solving demands are a type of stressor in which employees must apply their skills and knowledge to identify and address problems at work (Zhou *et al.*, 2012). These problems are novel, unexpected and require cognitively sophisticated solutions (Wall *et al.*, 1995). For example, Moregeson and Humphrey (2006, pp. 1338) characterize problem-solving demands as “dealing with problems not encountered before” or problems that “have no obvious correct answer”, requiring employees to “be creative” and apply “unique ideas or solutions”. They are relevant to innovation and creativity because they provide opportunities for employees to acquire new skills and demonstrate non-routine methods (Zhou *et al.*, 2012). However, problem-solving

demands have been shown to exert mixed effects. While some researchers have observed positive effects of problem-solving demands and related stressors (e.g., task complexity) in terms of job satisfaction and creativity (Zhou *et al.*, 2012), others reported negative consequences such as negative affect, impaired performance and decision-making (Jacko & Ward, 1996; Madrid *et al.*, 2015). Given their ambivalent effects, it may be worthwhile examining how problem-solving demands are appraised to understand how they might affect innovation.

Stress appraisals refer to the interpretation of stressors with respect to their personal impact (Lazarus & Folkman, 1984). According to transactional theory, stress appraisals determine the effects of stressors on individuals' responses. *Threat appraisals* occur when the stressor is expected to cause future harm or loss. In contrast, *challenge appraisals* refer to the expectation that stressors will lead to gains, growth or mastery (Lazarus & Folkman, 1984). Researchers have speculated that problem-solving demands are likely to be appraised in qualitatively different ways by different individuals (Daniels *et al.*, 2011). An example of a problem-solving demand is a client requesting that a software program incorporate a new function (Dumas *et al.*, 2016). For some individuals, this could seem threatening, signifying external evaluation and potential damage to one's self-image if unsuccessful (Daniels *et al.*, 2011), and so would reduce the likelihood that they will innovate. However, for others the need to develop new software could be viewed as a challenge because it presents a means of gaining skills, recognition and rewards, and so could be expected to stimulate innovative behaviors.

A recent meta-analytic study (Mazzola *et al.*, 2018) showed that threat and challenge appraisals of work stressors explained significant variance in outcomes (i.e., performance, organizational citizenship behaviors, job satisfaction and psychological strain) beyond the direct effects of stressors themselves. The few studies to examine stress appraisals in occupational settings have demonstrated that appraisals can predict relevant work behaviors

(e.g., proactivity, Ohly & Fritz, 2010). Furthermore, understanding stress appraisals has important implications for managers because appraisals are developable and arguably easier to control than the objective stressors themselves (Beehr *et al.*, 2001). Therefore, the present study examines the impact of stress appraisals of problem-solving demands on proactive innovation, over and above the direct effects of stressors themselves. Stress appraisals of problem-solving demands remain relatively unexplored (Espedido *et al.*, in press), particularly in relation to innovation.

Individual-level relationships between stress appraisals and proactive innovation.

Appraisals of problem-solving demands have the potential to influence problem-related work behavior such as proactive innovation. Proactivity refers to self-starting, future focused behaviors, directed toward change (Williams *et al.*, 2006). Proactive innovation is a type of proactive behavior that involves initiating new techniques, technologies, products or ideas to improve the internal working environment (Parker & Collins, 2010). As described by Parker and Collins (2010), proactive innovation is closely related to creativity, as it involves the generation of new ideas. As such, it focuses on the early stages of the innovation process.

When people appraise problem-solving demands as threatening, this could have a detrimental effect on proactive innovation. Problem-solving demands could be perceived as threatening because when new ideas are unsuccessful it often results in negative evaluations (Yuan & Woodman, 2017) and may come at a significant cost to the organization (Ford & Gioia, 1995). West and Altink (1996) propose that individuals who feel threatened when they make mistakes are more likely to avoid taking risks and experimenting when solving problems. Researchers have also found that when faced with a threat, people often attempt to alleviate the threat as quickly as possible, narrowing their scope of attention (Gutnick *et al.*, 2012). Indeed, laboratory research shows that inducing a sense of threat narrows participants' focus (Carr & Steele, 2009), which is likely to undermine their capacity to generate and implement new ideas. Conversely, when individuals are free from threats in an environment

where people feel psychologically safe to speak up, proactive innovation is enhanced (West & Altink, 1996).

In contrast, challenge appraisals of problem-solving demands could be expected to enhance proactive innovation. Challenge appraisals have been linked to positive affect (Searle & Auton, 2015), which has in turn been found to enhance creative idea generation in a laboratory task (De Dreu *et al.*, 2008). Ohly and Fritz (2010) used a diary study to show that challenge appraisals of time pressure and job control were linked with increased proactivity. The present study extends Ohly and Fritz's work by examining appraisals of problem-solving demands, rather than time pressure or job control. It also measures threat appraisals in addition to challenge appraisals for a full test of the transactional model.

Hypothesis 1a: There will be a negative individual-level relationship between threat appraisal of problem-solving demands and proactive innovation.

Hypothesis 1b: There will be a positive individual-level relationship between challenge appraisal of problem-solving demands and proactive innovation.

The Role of Team Factors

The aforementioned studies linking stress appraisal and innovation were all conducted at the person-level. This may stem from the focus of the appraisal construct on explaining individual-level variation in stress responses (Lazarus & Folkman, 1984). Given the demonstrated role of contextual factors in shaping employee perceptions (Kuenzi & Schminke, 2009), there is a need to explore the impact of team factors on the stress appraisal process. Although limited to the individual-level of analysis, some research has shown that individuals scan their social context (e.g., supervisor or peer supports) when making appraisals of the situation (Folkman & Lazarus, 1985; Helgeson, 1993). Examining interactions between team factors and individual appraisal processes is likely to have significant practical value by clarifying the boundary conditions in which stress appraisal is most likely to facilitate proactive innovation. This paper progresses transactional theory by

examining contextual influences on the appraisal process, including leader stress appraisals of problem-solving demands (Lazarus & Folkman, 1984) and team problem prevention which requires the anticipation and management of potential issues (Parker & Collins, 2010).

Leader Stress Appraisals

Leaders play a key role in shaping group norms that impact how people assess their own experience and respond to it (George & Brief, 1992). This may be because individuals interpret the environment not only in terms of their own experiences, but also through the norms and behaviors reinforced and confirmed by their supervisor. According to the social contagion effect, team members tend to synchronize their feelings and perceptions with those of their leader (Brett & Stroh, 2003). As leaders occupy positions of authority, they are a salient part of the group and their social influence is particularly strong (LePine *et al.*, 2016). To the best of the authors' knowledge, the present study is the first to examine the impact of leader stress appraisals.

Leader threat appraisals. It may be that leaders who feel threatened by a particular stressor amplify the detrimental effects of individual threat appraisals of that stressor. Leaders who feel threatened by problem-solving demands are likely to think, feel and act differently from other leaders. For example, leaders who feel threatened by problems may be more likely to focus on the risks associated with innovative solutions (Edmondson, 1999). There is a chance that such leaders will be more punitive and less supportive if problems are resolved unsuccessfully (George & Brief, 1992). If leaders penalize unsuccessful problem-solving, this is likely to elevate the potential negative impacts associated with proactive innovation, further undermining confidence and motivation to engage in high-risk innovative endeavors among individuals who already feel threatened by problem-solving demands.

However, the hypothesized positive individual-level relationship between challenge appraisal and proactive innovation may be weaker in teams where leader threat appraisal is high. If individuals belong to a team that is likely to be penalized for unsuccessful problem-

solving, this diminishes the value of initiating innovation (Edmondson, 1999). In such teams, individuals would be less likely to innovate even if they personally see the problem as presenting opportunities for gain.

Hypothesis 2a: The negative individual-level relationship between threat appraisal and proactive innovation will be stronger for those in teams whose leader has high levels of threat appraisal.

Hypothesis 2b: The positive individual-level relationship between challenge appraisal and proactive innovation will be weaker for those in teams whose leader has high levels of threat appraisal.

Leader challenge appraisals. Leader challenge appraisal may also moderate the effects of individual stress appraisals on proactive innovation. Leaders who see the opportunities for gain in the face of problem-solving would be less likely to affirm the downsides of innovative problem-solving demands among those who feel threatened by problem-solving demands. Leaders who feel challenged would also be more likely to reinforce the benefits of innovative problem-solving among those who likewise view problem-solving demands as a challenge. Although this speculation has yet to be tested, related phenomena such as leaders' positive affect has been linked to positive affect among their team members, which in turn fosters flexible thinking and creativity (Avey *et al.*, 2012). Given that challenge appraisals are associated with positive affect (Maier *et al.*, 2003; Searle & Auton, 2015), it follows that they may similarly amplify positive emotions and flexible thinking amongst team members. Therefore, if a leader feels highly challenged, this may dampen the negative effects of individual followers' threat appraisal on proactive innovation, while enhancing the positive effects of individual followers' challenge appraisal.

Hypothesis 3a: The negative individual-level relationship between threat appraisal and proactive innovation will be weaker for those in teams whose leader has high levels of challenge appraisal.

Hypothesis 3b: The positive individual-level relationship between challenge appraisal and proactive innovation will be stronger for those in teams whose leader has high levels of challenge appraisal.

Team Problem Prevention

Problem prevention is a specific type of proactive behavior focused on understanding future issues and planning how to manage these (Parker & Collins, 2010). Of all the different types of proactive behaviors that Parker and Collins (2010) outline in their paper, problem prevention behaviors appear to have the most relevance to stress appraisals of problem-solving demands because of their common focus on approaching problems. Team problem prevention refers to team members' shared perceptions about their collective ability to anticipate problems and address future issues (Espedido *et al.*, in press).

Past research has typically only examined individual problem prevention, despite earlier researchers emphasizing a need to study proactive behaviors at the group level (Kirkman & Rosen, 1999). Multi-level researchers assert that phenomena can have the same content but be qualitatively distinct at different levels (Klein & Kozlowski, 2000). For example, team-level proactivity has been shown to predict variance in outcomes over and above individual-level proactivity (Williams *et al.*, 2010). This highlights the benefit of extending past research by examining team, rather than individual, problem prevention.

The present study positions team problem prevention as a moderator of the relationship between individual stress appraisals of problem-solving demands and proactive innovation. Social information processing theory (Salancik & Pfeffer, 1978) suggests that individuals adjust their perceptions and behaviors based on the expectations and norms of their group. This theory provides a framework for understanding how team problem prevention could dampen a negative relationship between individual-level threat appraisal and proactive innovation. Teams with high levels of problem prevention are likely to be effective at addressing problems (Parker & Collins, 2010). Employees within these teams may feel

more equipped to deal with problems since their team has strong problem-solving strategies. Based on these social norms, individuals may draw upon these social cues and perceive fewer negative consequences or potential risks in innovative endeavors.

Hypothesis 4a: The negative individual-level relationship between threat appraisal and proactive innovation will be weaker for those in teams with high levels of problem prevention.

In contrast, team problem prevention could amplify a positive relationship between individual challenge appraisal and proactive innovation. Teams with high levels of problem prevention are likely to manage problems effectively and expect creative ideas from team members (Parker & Collins, 2010). Consistent with social information processing theory, individuals who themselves feel personally challenged by problem-solving would be even more likely to see the value of initiating innovation if those around them also tend to approach problems (Salancik & Pfeffer, 1978). Conversely, teams characterized by low levels of problem prevention would be less effective at solving problems and have fewer expectations for creative idea generation. Such team conditions may be expected to dampen engagement in proactive innovation, even among those who feel personally challenged by problem-solving demands.

Hypothesis 4b: The positive individual-level relationship between challenge appraisal and proactive innovation will be stronger for those in teams with high levels of problem prevention.

Method

Participants

An online survey was completed by 647 employees (36% response rate) from the Australian base of a global construction corporation. Teams were project-based working in construction, engineering and administrative roles. To enhance participation, five incentives (company points) were given in a chance draw, each to the value of AU\$1,500. The prize draw was conducted by the researchers, not by any member of the company, to maintain

participant confidentiality. Participants were grouped by teams. The criteria for inclusion in the present study was that i) the participant belonged to a team in which at least three team members responded (364 people) and ii) the team leader provided ratings of their team's behavior (43 teams). The final sample consisted of 192 participants comprising 43 teams with sizes ranging from 4 to 10 members ($M = 5.47$, $SD = 1.70$).

In the final study sample was predominantly male comprised of 144 males (75%) and 48 (25%) females. This is comparable to Australia's census data showing the male dominated nature of the construction industry (83% males, 17% females; Australian Bureau of Statistics, 2018). Age categories ranged from 18-24 years (6%) to 65+ years (2%), with the median category being 35-44 years (29%). The mean tenure within the organization was 9.31 years ($SD = 8.41$). Participants had spent a mean of 4.77 years ($SD = 5.33$) in their current roles.

Measures

Individual and leader stress appraisals of problem-solving demands. Individual ($\alpha_{\text{within}} = .91$) and leader ($\alpha_{\text{between}} = .91$) threat appraisal were measured using Feldman *et al.*'s (2004) scale (three items, e.g., "They are going to have a negative impact on me"). Individual ($\alpha_{\text{within}} = .86$) and leader ($\alpha_{\text{between}} = .90$) challenge appraisal were measured using Searle and Auton's (2015) scale (four items, e.g., "They will help me to learn a lot"). All participants, leaders and non-leaders, responded on a scale from 1 (strongly disagree) to 5 (strongly agree). Participants were instructed to respond in reference to the problem-solving demands they encountered individually over the past month. This was a relatively short time span designed to minimize memory biases and provide a specific period from which participants could recall concrete examples of demands.

Team proactive problem prevention. Parker and Collins' (2010) problem prevention scale was administered to leaders to measure their team's initiative in anticipating and solving problems (three items, e.g., "How frequently does your team spend time planning how to prevent recurring problems?"; $\alpha_{\text{between}} = .76$). Leaders rated how frequently their team carried

out these behaviors in the past month on a scale from 1 (very infrequently) to 5 (very frequently). Leaders are arguably in a better position to rate team behavior given they have visibility over the entire team. Utilizing Chan's (1998) referent-shift consensus model, the scale referent was adapted from the individual "you" to the collective "your team" to better capture emergent group properties, whilst retaining the underlying meaning of the constructs.

Proactive innovation. Proactive innovation was measured using Parker and Collins' (2010) scale (three items, e.g., "How often do you promote and champion ideas to others?", $\alpha_{\text{within}} = .84$). Participants rated how frequently they carried out each behavior over the past month on a scale from 1 (very infrequently) to 5 (very frequently).

Control variables. Problem-solving demands were measured using the scale by Wall *et al.* (1996) (five items, e.g., "How often are you required to solve problems which have no obvious correct answer?", $\alpha_{\text{within}} = .88$) on a scale from 1 (not at all) to 5 (a great deal). Time pressure was measured using Sonnentag and Bayer's (2005) measure (three items, e.g., "I was required to work fast", $\alpha_{\text{within}} = .87$) on a scale from 1 (strongly disagree) to 5 (strongly agree). When answering the problem-solving demands and time pressure measures, participants were asked to respond with reference to "the past month".

Procedure

A pilot study conducted with a convenience sample of 13 participants confirmed survey comprehensibility and adequate interface design (Rogelberg & Stanton, 2007). The survey was launched in the participating organization and was open for two weeks. Reminder emails were sent from senior leaders in the first week (as recommended by Rogelberg & Stanton, 2007).

Analysis

It is worth noting that the dataset used in this manuscript is also the basis of another paper by Espedido *et al.* (in press). However, while the other paper focuses on the relationship between stressor (problem-solving demands) and appraisals, this paper focuses on the

relationship between appraisals and business outcomes (proactivity).

As the data were structured hierarchically, with employees nested within teams, multi-level modelling techniques (using MPlus Version 8) were employed. A random effects model was used to test moderation effects. Two-level models were tested with individuals at Level 1 ($N = 192$) and teams at Level 2 ($N = 43$). Manifest variables were calculated from scale means. The individual threat appraisal, challenge appraisal, problem-solving demands and time pressure variables (Level 1) were centered to the group mean to estimate between-subject effects accurately without possible confounding between-team effects. Leader threat appraisal, leader challenge appraisal and team problem prevention (Level 2) were centered to the grand mean to enhance interpretability and reduce multi-collinearity (Enders & Tofighi, 2007). Interaction plots and simple slope significance tests were obtained for the moderation hypotheses using tools by Dawson (2013).

In order to understand the role of stress appraisals of problem-solving demands, over and above the effects of the problem-solving demands themselves, analyses controlled for the effects of problem-solving demands on proactive innovation. Time pressure was also included as a control variable, given findings suggesting that stress appraisals and proactive behaviors vary systematically as a result of time pressure (Espedido & Searle, 2018; Ohly & Fritz, 2010) and the observed correlations between time pressure and individual threat appraisal ($r = .19, p = .016$) and time pressure and problem-solving demands ($r = .39, p < .001$), as shown in Table 1.

Results

Descriptives and Correlations

Individual challenge appraisal had the highest mean and smallest variance among the individual-level variables ($M = 3.95, SD = 0.11$), while leader challenge appraisal had the highest mean and smallest variance among the team-level variables ($M = 3.79, SD = 0.65$).

The individual-level associations between threat appraisal and proactive innovation, and challenge appraisal and proactive innovation, were not significant.

Individual-Level Relationships Between Stress Appraisals and Proactive Innovation

Multi-level parameter estimates shown in Table 2 indicated that the mean value of the random slopes for the relationship between threat appraisal and proactive innovation ($\gamma_{10} = -0.16, p = .130$) and challenge appraisal and proactive innovation ($\gamma_{20} = 0.05, p = .677$) were not significant. Hypotheses 1a and 1b were therefore not supported.

The fixed slope for the control variable problem-solving demands on proactive innovation ($\beta_3 = 0.26, p = .010$) was significant, with each unit increase in problem-solving demands corresponding to a 30% increase in proactive innovation ($e^{0.26} = 1.30$). The fixed slope for time pressure on proactive innovation was not significant ($\beta_4 = 0.07, p = .463$).

[Insert Tables 1 & 2 about here]

Team Impacts on the Stress Appraisal—Proactive Innovation Relationship

The ICC(1) value for proactive innovation was .04, lower than Harlow's (2014) recommended .05 criteria. This indicates that the variance in proactive innovation is not substantially attributed to between-team differences (Hox, 2002). Nevertheless, in a cross-level moderation design, Level 2 variables are used to explain variance in the slope of the independent variable on the dependent variable, not the dependent variable itself (Mathieu *et al.*, 2012). Thus, it is more important to test whether the random slope of the independent variable on the dependent variable has significant variance at the between-team level, rather than the ICC(1) value, to ascertain whether it is appropriate to test cross-level moderation (Aguinis *et al.*, 2013).

The variance of the random slope for the individual-level relationship between threat appraisal and proactive innovation was significant ($\tau_0 = .13, p = .046$), indicating that differences between groups in this random slope could be accounted for by between-group predictors. This demonstrated that it was appropriate to test cross-level moderation. However,

the variance of the random slope for the individual-level relationship between challenge appraisal and proactive innovation was not significant ($\tau_0 = .13, p = .554$). Therefore cross-level moderators of the relationship between challenge appraisal and proactive innovation were not tested in further analyses, so Hypotheses 2b, 3b, and 4b were not tested.

[Insert Table 3 about here]

The cross-level interaction between leader threat appraisal and individual threat appraisal significantly predicted proactive innovation ($\gamma_{11} = -.40, p = .009$), shown in Table 3. Following Cohen *et al.* (2003), the interaction was plotted at two levels of leader threat appraisal (mean ± 1 SD), as shown in Figure 1. At low levels of leader threat appraisal (-1 SD), the simple slope showed a non-significant positive trend ($.19, p = .357$). At high levels of leader threat appraisal ($+1$ SD), the simple slope had a non-significant trend in the opposite direction ($-.39, p = .124$). This moderation effect partially supports Hypothesis 2a. Although there was a significant moderation effect, there was no significant negative individual-level relationship between threat appraisal and proactive innovation.

[Insert Figures 1 and 2 about here]

The cross-level interaction between team problem prevention and individual threat appraisal significantly predicted proactive innovation ($\gamma_{13} = -.30, p = .006$). As shown in Figure 2, at low levels of team problem prevention (-1 SD) the simple slope was a non-significant positive trend ($.13, p = .541$). However, at high levels of problem prevention ($+1$ SD), the slope showed a non-significant negative trend ($-.33, p = .134$). Although significant, this result was in a different direction than Hypothesis 4a.

Discussion

Although past research has identified the potential for social factors to shape the outcomes of stress appraisals (Helgeson, 1993), such research has been limited to the individual level of analysis. The present study focused on team-level psychological constructs with direct relevance for problem-solving, namely leader stress appraisals of problem-solving

demands and team problem prevention. Applying a multi-level approach, it was hypothesized that these team-level phenomena would moderate the impact of individual stress appraisals on proactive innovation. Results indicate that the negative effects of threat appraisal on proactive innovation only exist under certain leader and team factors. In contrast, associations between challenge appraisals and proactive innovation did not appear to be influenced by team-level factors.

Theoretical Implications

Individual-level relationships between stress appraisals and proactive innovation.

To understand the role of stress appraisals of problem-solving demands, over and above the effects of the problem-solving demands themselves, analyses controlled for the effects of problem-solving demands on proactive innovation. Despite past findings linking problem-solving demands to creativity and innovation, the present study found stress appraisals of problem-solving demands were unrelated to proactive innovation, after controlling for problem-solving demands. In this study, the lack of direct effects was explained by the variability in responses to threat appraisal dependent on the team in which people worked. For example, whilst high individual threat appraisals diminished proactive innovation in some contexts, in others it seemed to have the opposite effect, prompting people to invest resources in innovation, perhaps as a strategy for alleviating the threat. This highlights the utility of examining team-level moderators to understand the boundary conditions for when individual stress appraisals facilitate or undermine proactive innovation.

Team-level moderators of the individual appraisal of problem-solving demands.

As predicted, leader threat appraisals moderated the relationship between individual threat appraisal and proactive innovation. In teams where the leader saw problem-solving demands as non-threatening, there was a positive trend between individuals' own threat appraisals of these problem-solving demands and their level of proactive innovation. However, in teams

where the leader felt threatened by problem-solving demands, there was a negative trend whereby people who felt threatened by the problems they encountered at work reacted by engaging in less proactive innovation.

Our finding is consistent with one of the only studies to examine the interaction between individual threat appraisals and leader factors, which found that negative leader characteristics amplify the detrimental effects of team members' negative appraisals on job outcomes (LePine *et al.*, 2016). Moreover, our study helps explain that finding, by suggesting that behaviors of leader negativity can discourage risky but potentially adaptive work among employees who already see the situation negatively, consistent with the social contagion effect (Brett & Stroh, 2003). Leaders who feel threatened by problem-solving demands may affect their team in different ways. For example, leaders who feel threatened may be more sensitive to risk and less likely to instill confidence in the team to implement new ideas. Therefore, the more detrimental context for proactive innovation is a combination of high levels of threat appraisals for individuals as well as their leaders.

Team problem prevention behaviors also moderated the relationship between threat appraisal and proactive innovation, although the direction of this effect was contrary to expectation. We found that the relationship between individual threat appraisal and proactive innovation showed a negative trend for those who worked in teams with high levels of problem prevention, and a positive trend for those in teams with low levels of problem prevention. While problem prevention has direct benefits (Parker & Collins, 2010), researchers have also argued that generally adaptive group phenomena can have unprecedented negative consequences when combined with negative individual-level phenomena (Bolino *et al.*, 2010; Harvey *et al.*, 2006). Teams with high levels of problem prevention can have high expectations for resolving problems effectively (Parker & Collins, 2010). Baugher and Roberts (2004) assert that problem-focused coping strategies "presuppose that workers understand the risks in their workplaces, what they can do to minimize

exposures, and what they should do when confronted with an exposure”. When teams expect effective problem prevention from one another, this may increase the pressure to perform and cause frictions between those who manage problems effectively versus those who feel threatened by problems (Bolino *et al.*, 2010). Although initially counterintuitive, individuals who are threatened by problems may feel especially unable to meet expectations if they belong to a team characterized by high levels of problem prevention, thereby discouraging them from innovating.

Inconsistent with hypotheses, leader challenge appraisals did not interact with threat appraisal to predict proactive innovation. A plausible explanation for this is that it appears problem-solving demands were appraised consistently as highly challenging, by both leaders and non-leaders. The restriction of range in leader and individual challenge appraisals may have weakened observed effects. This issue warrants further exploration.

Practical Implications

As one of the first studies to demonstrate group-level impacts on appraisal processes, and the first to show the effects of leader appraisals, this study offers alternative points of intervention for adjusting threat appraisals directed at leader appraisals and team behaviors, which are arguably more within the sphere of managerial control (Ehrhart *et al.*, 2014). Specifically, the finding that the negative effects of individuals’ threat appraisals were exacerbated when their leaders also had high threat appraisals highlights the potential for prioritizing efforts towards leaders. For example, leadership development programs may incorporate cognitive reappraisal strategies and stress management training (Beehr *et al.*, 2001). If leaders can reframe their appraisals positively, this is likely to alleviate the negative effects of their team member’s threat appraisals. This protective factor may be even more important in teams with high levels of problem prevention behaviors wherein individuals’ threat appraisals have a particularly detrimental effect on proactive innovation.

Our results also highlight that team phenomena, such as problem prevention, can have

unintended negative consequences when individuals appraise a situation as highly threatening. Previous research has traditionally viewed these phenomena as exclusively positive for organizations. Yet promoting problem prevention climate within teams whilst neglecting individual threat appraisals could be detrimental to innovative endeavors. Practitioners could measure individual threat appraisals to identify those team members with high levels of threat who may need additional resources and support.

It is also worth noting the importance of considering working conditions, particularly among those who feel threatened by problem-solving demands. It may be necessary for managers to monitor and alleviate the amount of problem-solving demands for those who feel threatened, so as to reduce the potential negative implications for proactive innovation.

Limitations and Future Directions

The survey had an adequate response rate, perhaps encouraged through incentives and study reminders. However, only a relatively small proportion of the organization was included in the final analysis due to the inclusion criteria. This could have contributed to response bias. Nevertheless, the inclusion criteria were necessary to conduct multi-level analysis. Furthermore, the criteria of collecting both leader and follower data from each team enabled us to combine perspectives, thereby mitigating biases inherent in exclusively self-report data.

The study design, although multi-level, was only cross-sectional. Although previous longitudinal research and theory affirm the direction of effects whereby appraisal precedes behavioral outcomes (Lazarus & Folkman, 1984; Ohly & Fritz, 2010), it is possible that perceptions of personal innovative behavior precede threat appraisals, or the relationship may be a reciprocal spiral. Causal conclusions may be strengthened through further longitudinal research.

Finally, the sample came from a single construction organization which may hamper the generalizability of results. Distinct from other industries, the construction industry is often characterized by complex problems and a heavy reliance on team units (García-Chas *et al.*,

2015). These factors could impact stress appraisals of problem-solving demands and team problem prevention behaviors in a way that is not representative of other industries. Future research could benefit from replicating the study across multiple industries, especially due to the novelty of the findings.

Conclusion

This paper makes several key contributions to managerial psychology by examining the effects of team and leader factors in the stress appraisal—innovation relationship.

Theoretically, this paper extends the transactional model by arguing that stress appraisals, although typically examined at the person-level, could be influenced by group-based factors.

Methodologically, team phenomena were more accurately assessed through a multi-level design and leader ratings. Practically, the exploration of malleable work factors highlights ways to manage innovation, beyond the individual employee, encompassing leadership development and team-based initiatives.

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Table 1*Descriptive Statistics, Zero-Order Correlations, and Internal Consistencies*

Variables	<i>M</i>	<i>SD_B</i>	1	2	3	4	5	6	7	8
<i>SD_W</i>			0.74	0.58	0.78	0.82	0.72	-	-	-
ICC			0.05	0.03	0.04	0.06	0.09	-	-	-
1. Individual threat appraisal	2.23	0.18	(.91)	-.15	-.14	.07	.19*	-	-	-
2. Individual challenge appraisal	3.95	0.11	-.37	(.86)	.19	.20	.06	-	-	-
3. Proactive innovation	3.27	0.17	-.09	.06	(.84)	.33**	.13	-	-	-
4. Problem-solving demands	3.41	0.22	-.25	-.03	-.23	(.88)	.39***	-	-	-
5. Time pressure	3.84	0.23	.21	-.13	-.25	.50	(.87)	-	-	-
6. Leader threat appraisal	2.16	0.72	.23	-.37	-.02	-.55	-.29	(.91)	-	-
7. Leader challenge appraisal	3.79	0.65	-.10	.57	-.55	.14	.23	-.52***	(.90)	-
8. Team problem prevention	3.43	0.76	-.20	-.19	-.04	.09	-.39	-.38**	.19	(0.76)

Note. Team-level statistics ($n = 43$) presented below the diagonal, individual-level statistics ($n = 192$) presented above the diagonal. Leader threat appraisal, leader challenge appraisal, and team problem prevention exist at the team-level only. Values on the diagonal in parentheses are Cronbach's alphas. ICC = intra-class correlation, SD_W = within-team standard deviation, SD_B = between-team standard deviation. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2

Individual-Level Models of the Main Effect of Challenge and Threat Appraisal on Proactive Innovation

Model	Proactive innovation		
	<i>Estimate</i>	<i>SE</i>	<i>95% CI</i>
Random intercept (β_0)			
Mean (γ_{00})	2.02	1.35	[-0.63, 4.66]
Variance (τ_0)	0.05	0.03	[-0.01, 0.12]
Random slope for threat appraisal (β_1)			
Mean (γ_{10})	-0.16	0.11	[-0.37, 0.05]
Variance (τ_1)	0.13*	0.06	[0.00, 0.25]
Random slope for challenge appraisal (β_2)			
Mean (γ_{20})	0.05	0.13	[-0.9, 0.30]
Variance (τ_2)	0.13	0.21	[-0.29, 0.54]
Fixed slope for problem-solving demands (β_3)	0.26*	0.10	[0.06, 0.46]
Fixed slope for time pressure (β_4)	0.07	0.09	[-0.11, 0.24]

Note: $N = 192$. *SE* = standard error, *CI* = confidence interval. * $p < .05$, ** $p < .01$.

Table 3*Cross-Level Moderation Model*

Model	Proactive innovation		
	<i>Estimate</i>	<i>SE</i>	<i>95% CI</i>
Random intercept (β_0)			
Intercept (γ_{00})	1.00	2.11	[-3.14, 5.14]
Residual variance (σ^2_{e1})	0.06	0.06	[-0.06, 0.17]
Random slope for threat appraisal (β_1)			
Individual threat appraisal (γ_{10})	-0.10	0.20	[-0.49, 0.29]
Leader threat appraisal x individual threat appraisal (γ_{11})	-0.40**	0.15	[-0.71, -0.10]
Leader challenge appraisal x individual threat appraisal (γ_{12})	-0.07	0.09	[-0.11, 0.25]
Team problem prevention x individual threat appraisal (γ_{13})	-0.30**	0.11	[-0.52, -0.09]
Residual variance (σ^2_{e2})	0.08	0.34	[-0.59, 0.75]
Random slope for challenge appraisal (β_2)			
Individual challenge appraisal (γ_{20})	0.10	0.12	[-0.13, 0.33]
Residual variance (σ^2_{e3})	0.04	0.09	[-0.13, 0.21]
Fixed slope for problem-solving demands (β_3)	0.22*	0.10	[0.02, 0.41]
Fixed slope for time pressure (β_4)	0.06	0.09	[-0.12, 0.23]

Note: $N = 192$. SE = standard error, CI = confidence interval. * $p < .05$, ** $p < .01$.

Figure 1. Leader threat appraisal as a moderator of the individual-level relationship between threat appraisal and innovation.

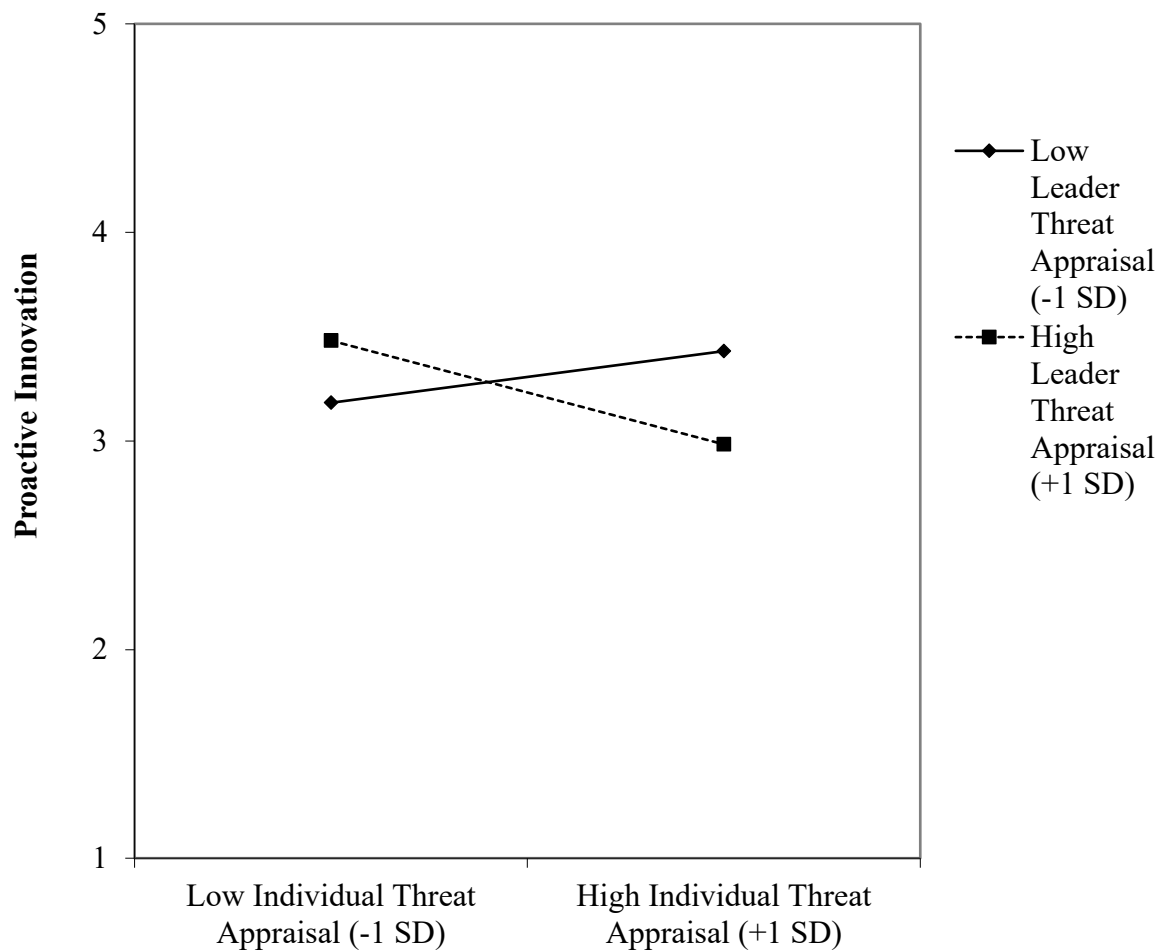
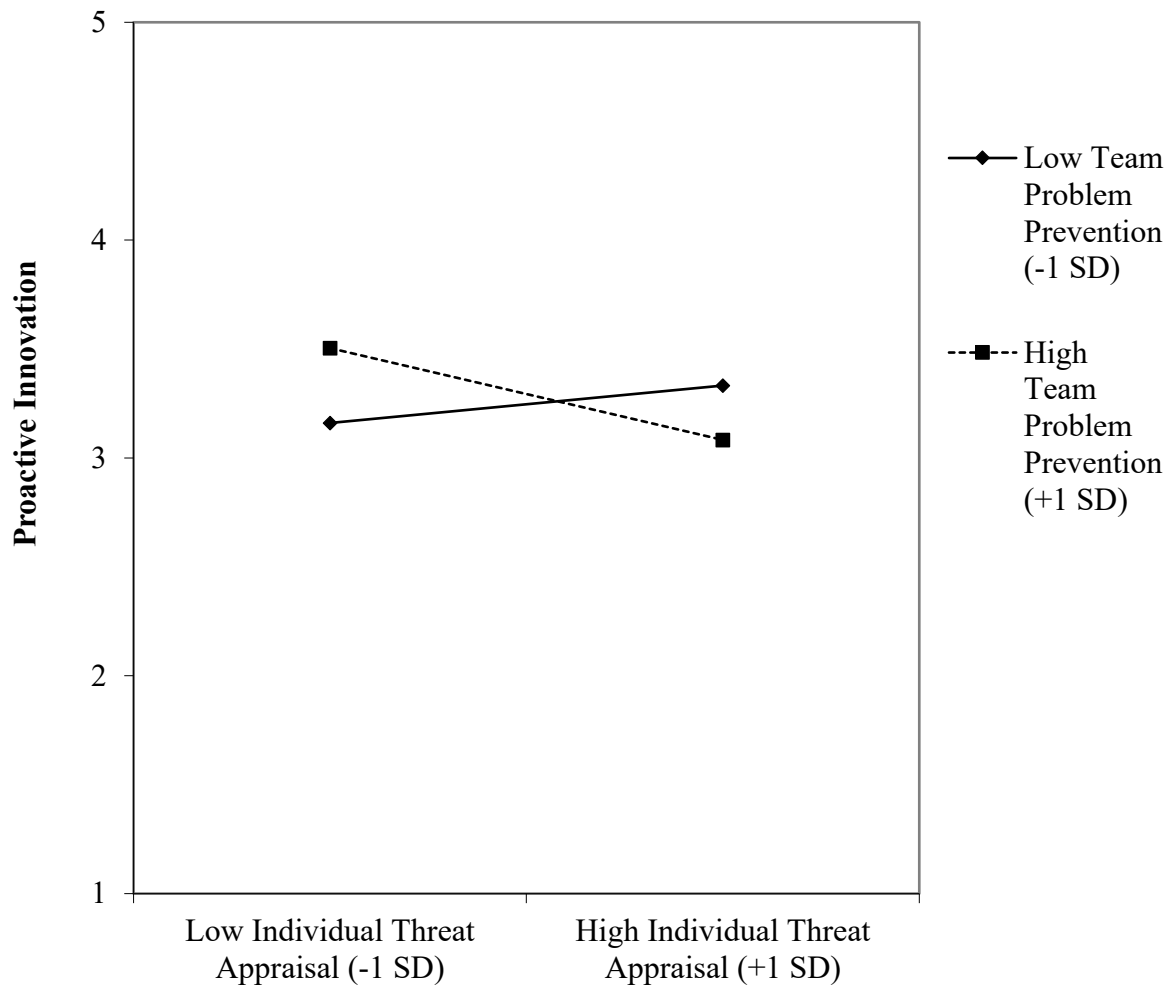


Figure 2. Team problem prevention as a moderator of the individual-level relationship between threat appraisal and innovation.



Chapter 7 – The Role of Behavioural Activation in the Day-Level Relationship Between Proactive Problem Prevention and Stress Appraisal

In common with previous research, Studies 1 and 3 positioned stress appraisal as an antecedent of proactivity. In contrast, this study (Study 4) positioned proactivity as an antecedent of stress appraisal, examining the reverse causal pathway. Transactional stress theory suggests that while an individual's stress appraisal influences his/her behaviour, his/her behaviour can also have a recursive effect in shaping the way individuals appraise subsequent events (Lazarus & Folkman, 1984). It was hypothesised that daily proactive problem prevention would shape stress appraisals of problem-solving demands on the subsequent day, by helping individuals feel more prepared to deal with problems. While the previous three studies examined the role of challenge and threat appraisal, this paper instead focuses on challenge and hindrance appraisal. Given that challenge and hindrance appraisal focus on aspects of goal pursuit, we drew upon reinforcement sensitivity theory to identify potential moderators. Behavioural activation is a sensitivity to reward and frustration. Given that challenge appraisal often involves the perception of reward, whereas hindrance appraisal is closely linked to frustration, we hypothesised that behavioural activation system would affect the way people appraised their situation in terms of its upsides and downsides. Moreover, behavioural activation would interact with proactive problem prevention to influence next-day stress appraisal. Multi-level hypotheses operating at the person and day-level are summarised in Figure 7.1. The rationale for exploring these levels was that person-level analyses provide an indication of the individual differences that impact the stress appraisal process, whereas day-level factors provide an indication of the daily fluctuations that can impact upon stress appraisal. The paper is currently undergoing revision following an invitation to "revise and resubmit" with *Anxiety, Stress, and Coping*.

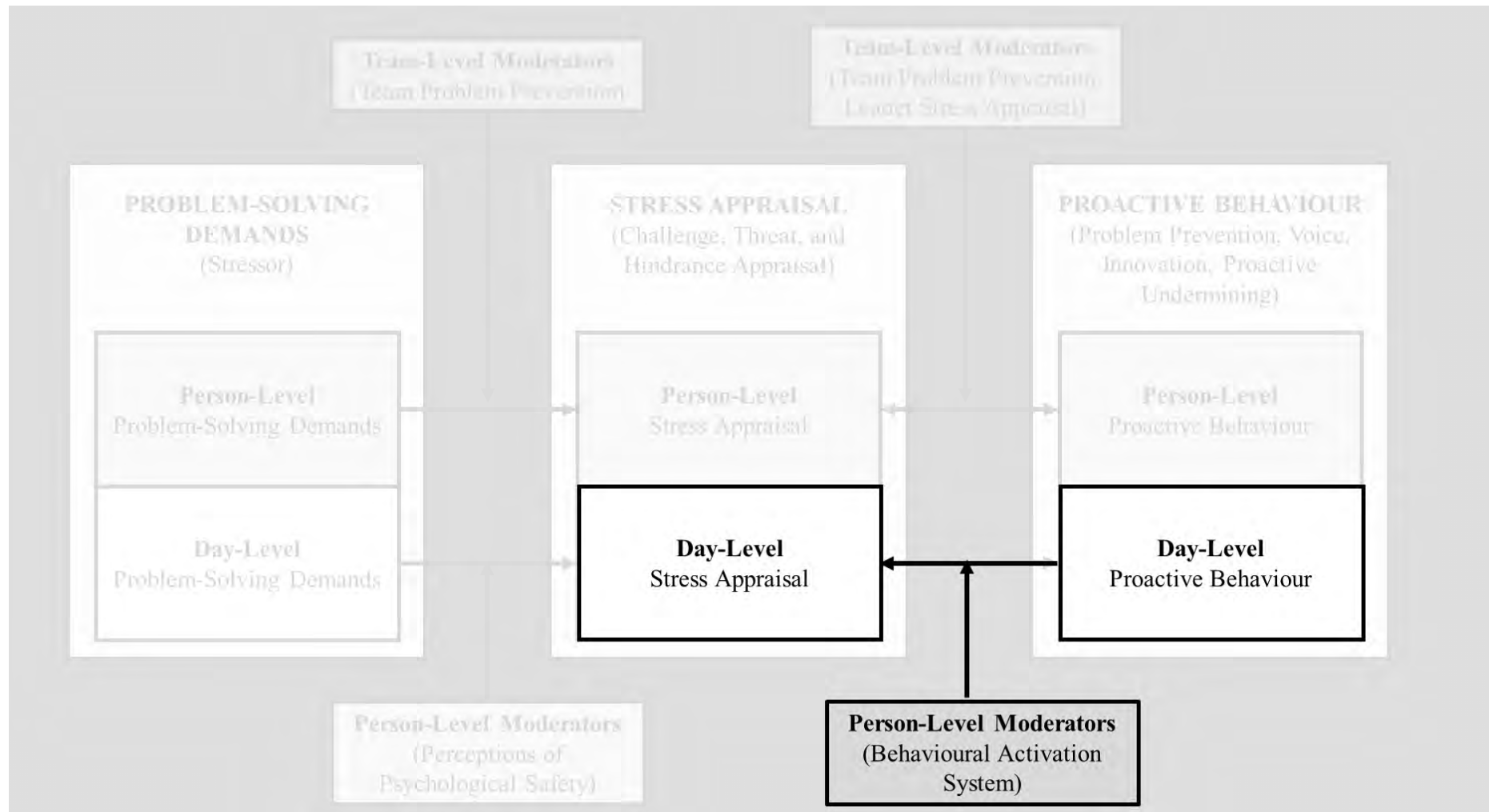


Figure 7.1. Multi-level hypotheses tested in Study 4.

Study 4 – Daily Proactive Problem-Solving and Stress Appraisals:**The Role of Behavioral Activation**

A. Espedido & B. J. Searle

Background and objectives: Drawing upon transactional theory, this study examines the interactive effects of daily problem-prevention behaviors and an aspect of personality relevant to stress responses (i.e., behavioral activation) on next-day stress appraisals of problem-solving demands.

Design and methods: Data was collected from 188 employees across a range of industries using an initial survey to collect information on personality, followed by twice-daily surveys over five consecutive work days to measure problem-prevention, stress appraisals and problem-solving demands.

Results: Multi-level analyses revealed that behavioral activation system (BAS) affected stress appraisals in unique ways. As hypothesized, BAS had a positive direct effect on challenge appraisal. It also moderated the effects of problem-prevention on next-day hindrance appraisals, such that the relationship was more strongly positive for individuals with low levels of BAS.

Conclusions: The results demonstrate the BAS has implications not just for promoting positive appraisals, but also for alleviating detrimental effects on stress appraisal. Overall, the findings emphasize the value of exploring the interactive effects of day- and person-level factors on stress appraisals, thereby offering a platform for future research.

Keywords:

Stress appraisal; proactivity; problem-solving; multi-level; challenge-hindrance; behavioral activation

Stressors refer to events and situations (including work characteristics) that typically elicit a stress response (Schaubroeck, Cotton, & Jennings, 1989). Stress appraisals, however, refer to the ways in which people interpret stressors (Lazarus & Folkman, 1984). Theory and evidence indicate that the subjective way individuals appraise stressors is a key driver of stress responses, rather than simply the objective qualities of the stressors themselves (Lazarus & Folkman, 1984; Ohly & Fritz, 2010). For example, negative forms of stress appraisal have been linked to such undesirable outcomes as negative moods (e.g. Tuckey, Searle, Boyd, Winefield, & Winefield, 2015), avoidance coping (Lengua & Long, 2002), aggression and venting (Searle & Auton, 2015). However, positive stress appraisal has been linked to such desirable outcomes as task performance (Drach-Zahavy & Erez, 2002), creativity (Espedido & Searle, 2018), wellbeing (Searle & Auton, 2015), organizational retention, and loyalty (Boswell, Olson-Buchanan, & Pine, 2004). Given the potential costs and benefits arising from stress appraisals, it may be worthwhile to be able to predict which conditions will stimulate which stress appraisals, for which individuals.

Although appraisals of “routine” stressors such as time pressure and workload have often been explored (e.g., Ohly & Fritz, 2010; Webster, Beehr, & Love, 2011), appraisals of non-routine demands such as problem-solving have received less attention (Schmitt, Zacher, & Frese, 2012). Some researchers have assumed that problem-solving demands will only be appraised positively, as a challenge (e.g., Daniels, Wimalasiri, Beesley, & Cheyne, 2011; Schmitt et al., 2012), but emerging research shows that they can also be appraised negatively (Espedido, Searle, & Griffin, in press). As workplaces become more complex and dynamic, it will be increasingly critical for all employees to be able to resolve novel problems effectively (Zhou, Hirst, & Shipton, 2012), requiring an understanding of how to facilitate positive appraisals of such problems.

The present study extends previous research in key ways. Firstly, it further explores

stress appraisals of problem-solving demands – a relevant, widespread, yet relatively under-researched stressor (Schmitt et al., 2012). Secondly, to predict how people may appraise a stressor on a given day, it synthesizes both between-person and within-person antecedents. A between-person factor that may be important for appraisals is behavioral activation system (BAS). BAS refers to a sensitivity to rewards and gains, and “frustration” due to non-rewards (Corr, 2009; Gray & McNaughton, 2000). This makes them highly relevant for challenge and hindrance appraisals which similarly focus on rewards and frustration respectively. Less research has examined within-person factors, which can provide additional insight into how the daily fluctuations of an individual’s behavior can influence the way they appraise stressors. Problem-prevention is a type of proactive coping behavior that fluctuates daily. It involves the anticipation and amelioration of future problems (Parker & Collins, 2010). Individuals who engage in problem-prevention will likely have a better capacity to manage problems, thereby helping them to appraise problem-solving demands in a positive way. The present study investigates antecedents of stress appraisals in the workplace, since these could inform the development of interventions that promote positive appraisals and thus increase the likelihood of enhanced wellbeing and performance (Searle & Auton, 2015).

Theoretical Background

Challenge and hindrance appraisals. Traditional stressor-strain models typically assume that all stressors have negative outcomes (e.g., Schaubroeck et al., 1989). This notion is challenged by the challenge-hindrance framework, wherein outcomes depend upon the nature of the stressor (Cavanaugh, Boswell, Roehling, & Boudreau, 2000). *Challenges* refer to stressors with the potential to support an employee’s goals or achievement, for example, time pressure (Cavanaugh et al., 2000), workload (LePine, Podsakoff, & LePine, 2005), and responsibility (Boswell et al., 2004). By contrast, *hindrances* have the potential to restrict goals and achievements, for example, role ambiguity, role conflict, and hassles (Pearsall,

Ellis, & Stein, 2009). The central prediction within this framework is that challenges typically lead to positive work outcomes, whereas hindrances typically lead to negative outcomes. Consistent with predictions, meta-analytic data show challenges to be positively associated, and hindrances negatively associated, with motivation (LePine et al., 2005), satisfaction, and organizational commitment (Podsakoff, LePine, & LePine, 2007).

The challenge-hindrance framework has parallels with Lazarus and Folkman's transactional theory (1984), which says a person interprets situations with reference to the potential for gain or loss. Stress appraisals can take on the form of a *challenge appraisal* if thought to promote goal achievement, growth or mastery (Lazarus & Folkman, 1984). Researchers have also since identified *hindrance appraisal*, the perception that a situation is thought to obstruct goal achievement (Webster et al., 2011). The concept of hindrance appraisals is closely aligned to Lazarus' (1991) early proposition that frustration is a type of appraisal, since frustration has often been linked to feeling hindered from goal pursuit (e.g., Dollard, Doob, Miller, Mowrer, & Sears, 1939). Whereas challenge appraisals are consistently linked with positive outcomes (e.g., adaptive coping and positive emotions, Searle & Auton, 2015), hindrance appraisals are often linked with negative outcomes (e.g., exhaustion and negative emotions, Paškvan, Kubicek, Prem, & Korunka, 2015; Searle & Auton, 2015). Since appraisals have the potential to consistently influence critical outcomes, it would be practically useful to directly measure appraisal and its antecedents. Exploring the antecedents of stress appraisals may help us to understand how to facilitate beneficial challenge appraisals and mitigate negative hindrance appraisals.

Although transactional theory is closely related to the challenge—hindrance framework, there are some key differences that warrant further attention. Transactional theory emphasizes that the same stressor can be interpreted in different ways by different people (Lazarus & Folkman, 1984). For example, problem-solving demands may seem

challenging to some (because resolving novel problems presents opportunities for growth and mastery) but may seem hindering to others (because they involve non-routine issues which can disrupt people from their prescribed job roles). However, under the challenge-hindrance framework, stressors are categorized *a priori* as challenges or hindrances (Podsakoff et al., 2007; LePine et al., 2005). This assumes that stressors are appraised uniformly as either challenging or hindering. This is contrary to empirical evidence. Stressors that have been labelled as a “challenge” (e.g., time pressure, workload) have been shown to be appraised as both challenging and hindering (Searle & Auton, 2015; Webster et al., 2011). This demonstrates the value of measuring appraisal directly, rather than relying on pre-determined stressor categories.

Challenge and hindrance appraisals of problem-solving demands. Problem-solving demands refer to the need to apply advanced knowledge and skills to address complex issues at work (Zhou et al., 2012). Moregeson and Humphrey (2006, pp. 1338) describe problem-solving demands as issues “not encountered before” or problems that necessitate “unique ideas or solutions”. Examples of problem-solving demands include medical diagnoses that involve the integration of complex information (such as a patient’s presenting symptoms, complaints, and assessment results; Estrada, Isen, & Young, 1994), the development of service proposals that need to address multiple stakeholders, and the demand for new products to cater to emerging markets (Dumas, Schmidt, & Alexander, 2016). In an increasingly dynamic and complex work environment, job roles are often less prescribed (Grant & Ashford, 2008), so employees are now required to work flexibly and solve problems independently (Espedido et al., in press). This presents a need for research that sheds light on how stress appraisals of problem-solving demands can be managed.

There are specific reasons why it may be worthwhile to measure appraisals of problem-solving demands directly, rather than to infer appraisals *a priori*. Although problem-

solving demands have been classified as a positive challenge (Holman et al., 2012) and have been linked to favorable outcomes (e.g., creativity, Zhou et al., 2012), they are also linked to a range of negative phenomena (e.g., psychological strain, Beehr, Glaser, Canali, & Wallwey, 2001; activated negative affect, Madrid, Patterson, & Leiva, 2015). Daniels et al. (2012, pp. 668) assert that the interpretation of problem-solving demands “is likely to vary, as they might be experienced as challenging and motivating, but also as adverse and hindering”.

Development of Hypotheses

Proactive problem-prevention and next-day stress appraisals of problem-solving demands. Appraisal is often treated as an antecedent of coping outcomes (e.g., Searle & Auton, 2015), yet Lazarus and Folkman (1984) suggest that coping behaviors in response to a prior stressor have the potential to influence primary appraisals of a subsequent stressor. Proactive coping involves anticipating, envisioning, setting goals, and acting in advance to prevent anticipated stressful situations (Searle & Lee, 2015). Previous research on coping has largely been either focused on longer-term within-person effects (e.g., Fay, Bagotyrute, Urbach, West, & Dawson, 2019) or is correlational at the between-person level (e.g., Hewett, Liefoghe, Visockaite, & Roongrerngsuke, 2018). Yet the short-term effects across a working week have rarely been explored. Building on observations that daily experiences and events influence the stress process (Stawski, Sliwinski, Almeida, & Smyth, 2008), we propose that proactive coping can also exert effects on stress appraisals into the subsequent working day.

In the present study we focus on problem-prevention, the anticipation and management of future problems, because out of the proactive behaviors identified by Searle and Lee (2015) and Parker and Collins (2010), problem-prevention is the most explicitly connected to problem-solving demands because of its focus on anticipating and preparing for complex problems. Parker and Collins (2010) found that problem-prevention enhanced

constructs that have similarities to challenge appraisal, such as learning goal orientation which refers to a sensitivity to opportunities for growth, development and mastery (Vandewalle, 1997). Proactive coping has also been linked to less negative appraisals in demanding situations (Aspinwall & Taylor, 1997). Similarly, Searle and Lee (2015) found that proactive coping was associated with engagement, particularly among those encountering high challenge demands. Although these studies were conducted at the between-person level, it seems plausible that similar processes would operate at the day-level. Therefore, proactive problem-prevention may be expected to increase challenge appraisals, while mitigating hindrance appraisals.

Proactive problem-prevention may have lasting effects onto the subsequent work day by helping individuals to anticipate and feel ready for the new demands that will be introduced the next day. Short-term effects on appraisal beyond a single work day have rarely been investigated despite research demonstrating that work experiences continue to affect the individual after they leave work (Sonnentag & Bayer, 2005). If proactive problem-prevention has lasting effects that spill over into the next-day, efforts to promote the behavior in the short-term will benefit organizations by helping their employees to view their situation positively. Such positive appraisals have been shown to lead to enhanced wellbeing and performance outcomes (Drach-Zahavy & Erez, 2002; Searle & Auton, 2015). Understanding the link between problem-prevention and next-day stress appraisals therefore has practical as well as theoretical value.

Hypothesis 1: Proactive problem-prevention will be positively related to next-day challenge appraisal.

Hypothesis 2: Proactive problem-prevention will be negatively related to next-day hindrance appraisal.

The role of behavioral activation for stress appraisals of problem-solving demands. BAS refers to a sensitivity to the rewarding and non-punishing aspects of situations (Jackson, 2009). Although emerging from the neuropsychology discipline, it has since been applied to work contexts to predict several occupational outcomes such as entrepreneurial intent (Lerner, Hatak, & Rauch, 2018), performance (Koy & Yeo, 2008), turnover (Renn, Steinbauer, & Fenner, 2014) organizational deviance (Diefendorff & Mehta, 2007), and health (van der Linden, Taris, Beckers, & Kindt, 2007). It therefore holds promise for impacting other workplace outcomes such as stress appraisals.

We explore BAS because of its relevance to stress appraisals. Emerging from reinforcement sensitivity theory (Gray & McNaughton, 2000), BAS is theorized to influence the stress response (Mischel, Shoda, & Ayduk, 2008). As a result of its underlying sensitivity to either the rewarding or non-punishing aspects of situations (Gray & McNaughton, 2000), BAS is likely to influence the extent to which people appraise a situation in terms of its potential upsides and downsides. Furthermore, BAS may be particularly relevant to the stressor of interest, problem-solving demands. Individuals high in BAS are particularly responsive to novelty and uncertainty in the environment (Lerner et al., 2018). BAS could therefore be expected to influence the way people appraise their problem-solving demands, which by definition involve addressing novel problems and issues (Moregeson & Humphrey, 2006). Finally, BAS relates to impulsive behaviours (Lerner et al., 2018) and the pursuit of immediate opportunities (Mischel et al., 2008). These may be particularly relevant to the exploration of short-term, daily stress appraisals. We therefore investigate the effects of BAS on stress appraisals of problem-solving demands.

Behavioral activation and challenge appraisal. Behaviorally-activated individuals are more reactive to and motivated by signals of reward (Smillie, 2008). In the workplace, individuals with high levels of BAS pursue situations which have the potential to bring

personal benefits such as recognition, pay, or achievement (Jackson, 2009; Stewart, 1996).

Challenge appraisals similarly refer to an interpretation of a situation as having the potential for personal reward, growth or mastery (Lazarus & Folkman, 1984). Given that behaviorally-activated individuals are more sensitive to the rewarding aspects of situations, it seems plausible that people high in BAS will tend to appraise situations as more challenging.

Furthermore, it may be expected that BAS will moderate the hypothesized positive relationship between daily problem-prevention and next-day challenge appraisal. According to transactional stress theory, stress appraisals emanate from both between- and within-person processes (Lazarus & Folkman, 1984). At the between-person level, different people may respond uniquely to the same stressor due to personal characteristics (such as behavioural activation). At the within-person level, the same person may appraise the same stressor differently on different occasions due to other day-level variations (e.g. in problem prevention behaviour or coping). It is also likely to be the case that some within-person effects are seen only among a subset of individuals, as in cross-level interaction. We propose that behaviorally-activated individuals tend to approach novel problems because they present opportunities for rewards (Lerner et al., 2018). BAS could therefore be expected to amplify the positive effects of problem-prevention on challenge appraisals on the subsequent day.

Hypothesis 3a: BAS will be positively related to challenge appraisal.

Hypothesis 3b: BAS will moderate the relationship between problem-prevention and next-day challenge appraisal, such that the relationship will be more strongly positive for those high in BAS.

Behavioral activation and hindrance appraisal. BAS may be expected to affect hindrance appraisal in the opposite direction. Given the focus on rewards and positive stimuli (Gray & McNaughton, 2000), behaviorally-activated individuals would be less likely to perceive the hindering or obstructive aspects of situations. Indeed, mastery orientation, which

is similar to BAS because it is characterized by the tendency to approach situations with the potential for growth, has been shown to promote persistence in classroom tasks even in the face of difficulty (Harackiewicz, Barron, & Elliot, 1998). This is because it enables students to focus on the interesting and challenging aspects of tasks.

BAS may also moderate the relationship between problem-prevention and next-day hindrance appraisal. Behaviorally-activated individuals approach situations that offer the potential for problem-solving (Jackson, 2009). As such, individuals who engage in problem-prevention are likely to be motivated to anticipate problems, helping them to be prepared for the problem-solving demands encountered the next-day, and ultimately alleviating feelings of hindrance the next-day.

Hypothesis 4a: BAS will have a negative effect on hindrance appraisal.

Hypothesis 4b: BAS will moderate the relationship between problem-prevention and next-day hindrance appraisal, such that the relationship will be more strongly positive for those low in BAS.

Method

Sample

Participants were Australian employees, recruited through a survey panel provider. To encourage motivation, participants were awarded company points to the value of AU\$10 for the initial survey and an additional AU\$10 for completing all five days. To enable sampling across consecutive working days, participants were only eligible to participate if they worked regular hours in full-time positions. In response to the study advertisement, 310 people registered to participate, of whom 248 (80%) completed the survey measures. Guided by Ohly, Sonnentag, Niessen, and Zapf (2010), 60 participants were removed from the sample due to significant missing data (i.e. had fewer than two days of problem prevention data with corresponding next-day stress appraisal data). From the final 188 participants (61% response

rate), a total of 1,901 surveys were completed: 188 initial surveys, 853 morning surveys, and 860 afternoon surveys. Participants came from 21 different industry categories (O*Net, 2017), with the majority working in professional services (12%), education (11%), and government roles (9%). Age groups ranged from 18-24 years (4%) to 65+ years (1%), with the median category being 35-44 years (32%). Of the participants, 56% (138) were female and had spent a median number of 6-10 years (27%) within their current organization.

Measures

Following Ohly & Fritz (2010), the item stems for the repeated measures were rephrased to reference day-level experiences.

Problem-prevention. Problem-prevention was measured using Parker and Collins (1996) three-item scale (e.g., “How frequently do you spend time planning how to prevent recurring problems?”; $\alpha_w = .78$, $\alpha_b = .97$). The scale ranged from 1 (not at all) to 5 (a great deal/very frequently).

Problem-solving demands. Problem-solving demands were measured using Wall, Jackson, Mullarkey, and Parker’s (1996) five-item scale (e.g., “To what extent have you been required to solve problems which have no obvious correct answer?”; $\alpha_w = .85$, $\alpha_b = .95$). Participants rated the problems encountered in “their work day so far” on a scale from 1 (not at all) to 5 (a great deal).

Stress appraisals. Searle and Auton’s (2015) scales were used to measure challenge appraisal (three items, e.g., “They will help me to learn a lot”; $\alpha_w = .86$, $\alpha_b = .99$) and hindrance appraisal (three items, e.g. “They will limit how well I can do”; $\alpha_w = .84$, $\alpha_b = .98$). Participants were asked to think about the same problems and issues as in the above problem-solving demands measure. The scale ranged from 1 (strongly disagree) to 5 (strongly agree). Since appraisals have been described as momentary judgements of a given situation, researchers recommend studying appraisals over short time periods such as the day-level

(Searle & Auton, 2015).

BAS. Jackson's (2009) scale was used to measure BAS (six items, e.g., "I actively look for new experiences"; $\alpha_b = .83$). The scale ranged from 1 (completely disagree) to 5 (completely agree).

Procedure

An initial general survey measured BAS. Participants were then administered two surveys daily over five consecutive working days to measure the other study variables. A daily evening survey measured problem-prevention behaviors during the entire working day. A daily morning survey measured problem-solving demands and appraisals of problem-solving demands after a few hours at work. All surveys were completed online to control time of completion. To ensure valid responses, evening surveys were only open between 4pm-midnight and morning surveys were only open between 10am-12pm. As is recommended for this methodology, reminder text messages and emails were sent at 10am and 4pm to prompt completion at the specified times (Ohly, Sonnentag, Niessen, & Zapf, 2010). To encourage honest responding, participants were repeatedly reassured of confidentiality.

Analysis

Analyses were conducted in MPlus using multi-level modelling techniques. All items were examined using multi-level confirmatory factor analysis (MCFA, using MPlus version 8) to test the proposed factor structures at both the within and between-person level and the divergence of latent constructs. The initial measurement model (Model 1) fit the data well ($\chi^2(154) = 346.458, p < .001$; CFI = .958, TLI = .948, RMSEA = .037, SRMR_w = .033, SRMR_b = .083). However, one problem-prevention and one hindrance appraisal item were indicated by negative residual variances, so we fixed these residuals to zero. The revised measurement model (Model 2) also fit the data well ($\chi^2(156) = 348.893, p < .001$; CFI = .958, TLI = .949, RMSEA = .037, SRMR_w = .033, SRMR_b = .082).

Intercept-only models were estimated to assess if there was meaningful within- and between-person variation in stress appraisal. The intra-class correlations (ICC) of 0.60 for challenge appraisal and 0.56 for hindrance appraisal were acceptable, indicating that it was appropriate to test multi-level models (Harlow, 2014). We matched daily problem-prevention data with participants' ratings of stress appraisals and problem-solving demands on the subsequent day. This enabled us to characterize the stress appraisal and problem-solving demands variables as "next-day".

Hypothesis Testing

A random effects model was used so that cross-level moderations could be tested (Aguinis, Gottfredson, & Culpepper, 2013). Next-day problem-solving demands were included as a control variable to reduce potential confounding with next-day appraisals of problem-solving demands (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Manifest variables calculated from scale means were used. Day-level measures were centered relative to each individual's mean scores (Enders & Tofighi, 2007). For the moderation hypotheses, simple slope significance tests were calculated.

Results

Descriptives and Correlations

As shown in Table 1, problem-prevention had moderate, positive associations with challenge ($r = .46, p < .001$) and hindrance appraisal ($r = .34, p < .001$) at the between-person level (calculated based on person means). However, problem-prevention was not significantly related to next-day challenge or hindrance appraisal at the within-person level. There was also a strong between-person correlation between problem prevention and problem-solving demands ($r = .92, p < .001$).

Effects of Daily Problem-Prevention on Next-Day Stress Appraisal

The random effects models, shown in Table 2, confirmed the lack of significant within-person associations between problem-prevention and challenge/hindrance appraisal, after controlling for next-day problem-solving demands. Hypotheses 1 and 2 were not supported.

[Insert Table 1 about here]

[Insert Table 2 about here]

The fixed slope for the control variable, next-day problem-solving demands, on next-day challenge appraisal ($\beta_2 = .38, p < .001$) was significant, as shown in Table 2. Each unit increase in problem-solving demands corresponded to a 46% increase in challenge appraisal the next-day ($e^{0.38} = 1.46$). The fixed slope for next-day problem-solving demands on hindrance appraisal was not significant.

Cross-Level Effects of BAS

Table 3 presents the cross-level models. After controlling for next-day problem-solving demands, BAS had a significant positive direct effect on challenge appraisal ($\gamma_{01} = .25, p = .008$), supporting hypothesis 3a. However, there was no significant direct effect of BAS on hindrance appraisal, contrary to hypothesis 4a.

[Insert Table 3 about here]

To ensure it was appropriate to test cross-level moderation, the variances of the random slopes between problem-solving demands and next-day appraisal were examined. The variance of the random slope for the relationship between problem-prevention and next-day challenge appraisal was not significant, indicating that variance in this random slope would not be further accounted for by between-subject predictors. Thus, we did not test any cross-level moderations for this random slope in the following analyses. In contrast, the variance of the random slope for the relationship between problem-prevention and next-day

hindrance appraisal was significant ($\tau_0 = .15, p = .008$), indicating that it was appropriate to test cross-level moderations.

The cross-level interaction between daily problem-prevention and BAS was significantly related to hindrance appraisal on the next-day ($\gamma_{11} = -.24, p = .026$), consistent with hypothesis 4b. Following Cohen, Cohen, West, and Aiken (2003), the interaction was plotted at conditional values of BAS (1 *SD* above and below the mean), as shown in Figure 1. At low levels of BAS (-1 *SD*), the simple slope was significantly positive (.16, $p = .045$). At high levels of BAS, the simple slope was not significantly different from zero (-0.13, $p = .125$). As predicted, for individuals low in BAS the relationship between problem-prevention and hindrance appraisal was more strongly positive.

[Insert Figure 1 about here]

Discussion

Stress appraisals are linked to key organizational outcomes such as job performance, wellbeing and commitment (Boswell et al., 2004; Drach-Zahavy, & Erez, 2002). To understand how to facilitate these organizational outcomes, the present study explored the interactive effects of within-person problem-prevention and between-person BAS on stress appraisals. Diary study results indicated that BAS had both a direct positive effect on challenge appraisal as well as a moderating effect on the relationship between problem-prevention and next-day hindrance appraisal.

Daily Problem-Prevention and Next-Day Stress Appraisals

To understand the role of problem prevention, over and above the effects of the problem-solving demands themselves, analyses controlled for the effects of problem-solving demands on appraisal. It was observed that problem-prevention had no significant effects on challenge or hindrance appraisals of problem-solving demands on the next-day, after controlling for problem-solving demands. Although this was contrary to expectation, such

predictions have not been tested previously at the day-level. Problem-prevention is theorized to be beneficial as it alleviates the stressful aspects of problem-solving demands before they are incurred (Aspinwall & Taylor, 1997). However, in the short-term it could be that the impact of problem-prevention behavior on appraisals depends upon the effectiveness of the behavior. Future research could examine whether the effectiveness of problem-prevention behaviors is a critical moderator of the short-term effects of problem-prevention on stress appraisals, rather than simply the execution of these behaviors.

The Role of Behavioral Activation in the Effects of Daily Problem-Prevention on Stress Appraisals

BAS exerted unique effects on challenge and hindrance appraisal. With regards to challenge appraisal, BAS had a direct positive association. This supports reinforcement sensitivity theory (Smillie, 2008) in that behaviorally-activated individuals are sensitive to reward (Jackson, 2009), and therefore would be more likely to interpret their situation as challenging with opportunities for growth and mastery. In relation to hindrance appraisal, BAS had a moderating role on the effects of daily problem-prevention on next-day hindrance appraisal. For behaviorally-activated individuals, the relationship between problem-prevention and next-day hindrance appraisal showed a negative trend. For individuals with low levels of behavioral activation, the detrimental effects of problem prevention in terms of increased hindrance appraisals were significant, lasting until the next day. Reinforcement sensitivity theory suggests that behaviorally-activated individuals are stimulated by novelty and the potential rewards presented by problem-solving demands (Smillie, 2008). As a result, they may be more adept at problem-prevention, alleviating the detrimental effects of problem-prevention in terms of increased hindrance appraisal. Collectively, these findings extend theory by demonstrating the critical role of BAS for both enhancing positive appraisals, while alleviating negative effects.

We also expected higher levels of BAS to be negatively related to hindrance appraisal. Although in the expected direction, this effect did not reach significance. Previous research linking similar constructs (i.e., extraversion, goal approach motivation) to hindrance/threat appraisals has typically been cross-sectional, a method that is susceptible to inflation and contamination with other state-like factors such as mood. In our study, we alleviated contaminating effects with time-separated measurements (Podsakoff et al., 2003). It could be that BAS alone is insufficient to impact hindrance appraisals, at least in terms of problem-solving demands.

Practical Implications

The present research highlights a need to account for the interaction between momentary and stable characteristics when designing stress management interventions. A “one-size fits all” approach to stress management may not be appropriate given the substantial variation we observed in stress appraisal, personality, and problem-prevention. Cognitive reappraisal training is a useful stress management strategy in that it accounts for individual differences in how people behave day-to-day, respond to their demands, and interpret their situation. Guided by transactional stress theory, employees are trained to regularly understand the impact of their appraisals, reframe daily situations, and discover coping strategies (Lazarus & Folkman, 1984). Based on the findings that daily problem-prevention and personality can interact to influence stress appraisals, cognitive reappraisal training may benefit from taking personality characteristics and problem-prevention behaviors into account. Given that for some individuals, these effects occur in the short-term (i.e., problem prevention affecting the subsequent day’s hindrance appraisals), this reinforces the need to manage stress regularly to prevent the accumulation of negative effects (Beehr et al., 2001). Organizations may also wish to invest in facilitating working conditions such as enhanced job autonomy and supervisor support (Wang & Cheng, 2010) which have been

shown to help enhance the effectiveness of problem-solving behaviors, and likely enhance challenge appraisals.

Limitations and Future Directions

Although many key study variables draw upon individual experiences, this study is limited by its exclusive reliance on self-report data which could introduce common method bias (Podsakoff et al., 2003). However, repeated measurements of study variables and the time lag between the measurement of the independent and dependent variables helps address this issue (Podsakoff et al., 2003). Further, the use of person-centered scores minimizes the influence of response tendencies due to individual differences (Enders & Tofghi, 2007). The presence of significant interactive effects and multi-level confirmatory factor analysis also suggested that common method bias was not a major issue in the present study.

Self-report data could also introduce social desirability biases as participants respond in ways that would attract positive impressions from others. In the context of the present study, for example, people may overrate desirable proactive behaviors and challenge appraisals, while underrating negative hindrance appraisals. To counteract this, participants were repeatedly reassured of confidentiality and within-person analysis reduces the impact of social desirability (Podsakoff et al., 2003). Nevertheless, future research could advance the field by using objective measures of behavior or multiple sources of data.

Conclusion

By adopting a day-level perspective, this study incorporated a novel time frame to examine how daily proactive coping behaviors and stable personality characteristics interact to influence stress appraisals. In so doing, we address calls to link the proactivity and stress literatures and explore proactivity as an antecedent, rather than a consequence. The results demonstrate that behavioral activation has implications not just for promoting positive appraisals but also alleviating negative appraisals in response to stressors. Practically, this

research provides insight into how daily behaviors (proactive coping behaviors) and stable employee characteristics (BAS) may be managed to facilitate beneficial challenge appraisals and mitigate less adaptive hindrance appraisals.

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Table 1*Descriptive Statistics, Internal Consistencies, and Correlations*

Variables	<i>M</i>	<i>SD_W</i>	<i>ICC</i>	1	2	3	4	5
<i>SD_B</i>				0.80	0.75	0.68	0.64	0.62
1. Problem-prevention	2.21	0.69	.57	(.97)	.46***	.34***	.92***	.25**
2. Challenge appraisal	3.33	0.62	.60	-.01	(.99)	-.04	.37***	.27**
3. Hindrance appraisal	2.18	0.61	.56	.02	.16*	(.98)	.44***	-.03
4. Problem-solving demands	2.09	0.67	.48	-.02	.42***	-.06	(.95)	.19*
5. Behavioral activation system	3.78	-	-	-	-	-	-	(.83)

Note. *W* = within-person. *B* = between-person. *ICC* = intraclass correlation. Within-person statistics ($n = 916$) presented below the diagonal, between-person statistics ($n = 188$) presented above the diagonal. Behavioral activation system was measured in the pre-survey and hence exists at the between-person level only, all other between-person correlations were calculated based on between-person means. Values on the diagonal in parentheses are between-person Cronbach's alphas. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2*Main Effects Models*

Model	Challenge appraisal			Hindrance appraisal		
	Est.	SE	95% CI	Est.	SE	95% CI
Random intercept (β_0)						
Mean (γ_{00})	2.38***	.21	[1.97, 2.80]	1.32***	.21	[0.91, 1.73]
Residual variance (σ^2_{e0})	0.45***	.06	[0.33, 0.58]	0.39***	.05	[0.29, 0.50]
Random slope for problem-prevention (β_1)						
Mean (γ_{10})	0.02	.04	[-0.06, 0.10]	-0.01	.05	[-0.12, 0.09]
Variance (τ_0)	0.01	.02	[-0.04, 0.05]	0.13*	.05	[0.03, 0.23]
Fixed slope for problem-solving demands (β_2)	0.38***	0.04	[0.30, 0.47]	-0.06	.05	[-0.15, 0.04]

Note: $N = 188$. CI = confidence interval. Level 1 equation: challenge appraisal (hindrance appraisal) = $\beta_0 + \beta_1$ (problem-solving demands) + e .

Level 2 equations: $\beta_0 = \gamma_{00} + \mu_0$; and $\beta_1 = \gamma_{10} + \mu_1$. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3*Cross-Level Models*

Model	Challenge appraisal			Hindrance appraisal		
	Coefficients	SE	95% CI	Coefficients	SE	95% CI
Random intercept (β_0)						
Intercept (γ_{00})	2.47***	.22	[2.05, 2.89]	1.29***	.21	[0.88, 1.69]
Behavioral activation system (γ_{01})	0.25**	.10	[0.06, 0.44]	-0.10	.08	[-0.26, 0.06]
Residual variance (σ^2_{e1})	0.43***	.06	[0.31, 0.56]	0.39***	.05	[0.29, 0.50]
Random slope for problem-prevention (β_1)						
Intercept (γ_{10})	0.02	.04	[-0.06, 0.09]	0.02	.05	[-0.08, 0.11]
Behavioral activation system – cross level moderation effect (γ_{11})	-	-	-	-0.24*	.10	[-0.45, -0.03]
Residual variance (σ^2_{e2})	0.01	.02	[-0.04, 0.05]	0.12**	.05	[0.03, 0.21]
Fixed slope for problem-solving demands (β_2)	0.38***	.04	[0.30, 0.47]	-0.05	.05	[-0.17, 0.04]

Note: $N = 188$. CI = confidence interval. Level 1 equation: challenge appraisal (hindrance appraisal) = $\beta_0 + \beta_1$ (problem-solving demands) + e .

Level 2 equations: $\beta_0 = \gamma_{00} + \gamma_{01}$ (behavioral activation system) + μ_0 ; and $\beta_1 = \gamma_{10} + \gamma_{11}$ (behavioral activation system) + μ_1 . * $p < .05$, ** $p < .01$,

*** $p < .001$.

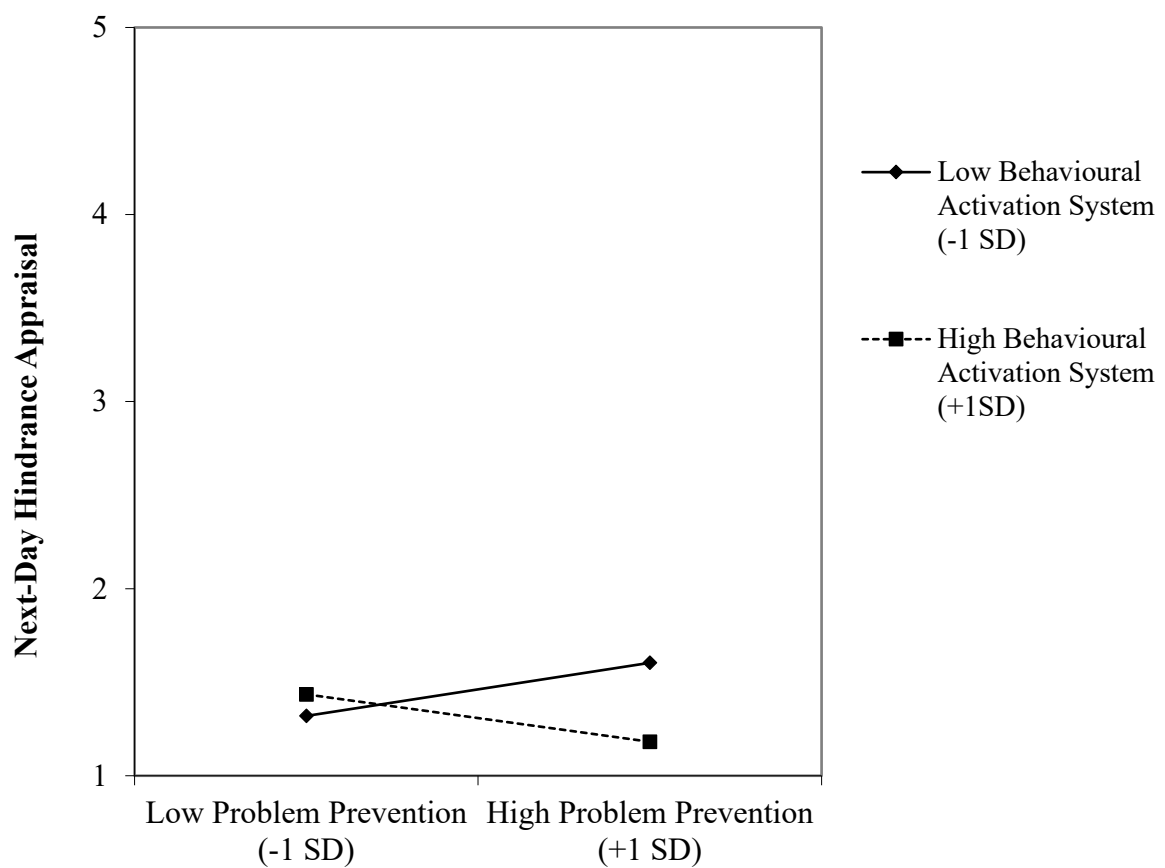


Figure 1. BAS as a moderator of the relationship between problem-prevention and next-day hindrance appraisal.

Chapter 8 – General Discussion

Adopting a multi-level perspective, this thesis investigated the potential antecedents of stress appraisals and their implications for workplace proactivity. Collectively, four empirical studies were presented to provide a synthesised understanding of the antecedents and impacts of stress appraisals that occur day-to-day, between employees, and across teams. This concluding chapter integrates key findings from each of the papers, alongside contributions to theory and implications for practice. The overall limitations of this thesis are also discussed, providing a platform for future research.

Research Outcomes

The four papers incrementally developed a case for a multi-level conceptualisation of the stress appraisal process. The research questions, aligned to key findings from relevant papers, are outlined below.

Research question 1: How do daily problem-solving demands impact stress appraisals, and in turn different types of proactive behaviours?

Drawing upon transactional theory (Lazarus & Folkman, 1984), this thesis was based around the speculation that stress appraisals act as a mechanism through which problem-solving demands influence discretionary work behaviours, such as proactivity. To validate this central proposition, Study 1 (Chapter 4) examined the effects of problem-solving demands on stress appraisals, and in turn multiple proactive behaviours. A daily diary study methodology was employed to compare day- and person-level effects. Multi-level analyses revealed that challenge appraisals mediated the relationship between problem-solving demands and desirable forms of proactivity, whereas threat appraisals mediated the relationship with undesirable forms of proactivity.

Critically, the effects of problem-solving demands and stress appraisals on proactivity manifested at either the day- or person-level, depending on the type of proactive behaviour.

For example, at the day-level, individuals who encountered more problem-solving demands in the morning felt more challenged, which prompted them to engage in more proactive innovation throughout the day. Moreover, this day-level appraisal response was amplified in psychologically safe climates, leading to even higher levels of proactive innovation. In contrast, at the person-level, we observed that individuals who felt consistently challenged by problem-solving demands tended to engage in more proactive voice behaviours and those who consistently felt threatened tended to engage in more counterproductive proactive behaviours. It may be that these behaviours did not manifest at the day-level because they are rarer and/or require interpersonal contexts to be enacted. Study 1 demonstrated that stress appraisal processes occurring at the day-level do not necessarily correspond with processes at the person-level, where the majority of previous research has been conducted (e.g., Gardner & Fletcher, 2009; Gerich, 2017; Malik, 2015; Rodney, 2008). This highlights the value of a multilevel conceptualisation of stress appraisal.

Overall, Study 1 demonstrated the explanatory power of stress appraisal for understanding how problem-solving demands relate to employee proactive behaviours. This was a key first step to validate the central thesis proposition, whereby problem-solving demands relate to stress appraisal, which in turn impacts proactivity. Having garnered support for these effects, research questions 2 and 3 then aimed to explore the role of teams. Research question 2 focused on the first part of the thesis proposition, the relationships between problem-solving demands and stress appraisal (antecedents of appraisal). Research question 3 focused on the second part of the thesis proposition, the relationships between stress appraisal and proactivity (outcomes of appraisal).

Research question 2: How do teams impact individual-level relationships between problem-solving demands and stress appraisals?

Extending upon the first paper, Study 2 (Chapter 5) explored the moderating role of team problem prevention on the individual-level relationships between problem-solving demands and stress appraisals. Despite the recognised role of teams in shaping employee wellbeing and behaviour (e.g., wellbeing, Bakker & Demerouti, 2018; burnout, Bakker, van Emmerick, & Euwema, 2006; learning, performance, Van der Vegt & Bunderson, 2005), scarce research has examined team impacts on the stress appraisal process. Study 2 utilised a multi-level design and multi-source ratings to render a more accurate examination of team-level phenomena. Team problem prevention was a significant moderator of the relationship between problem-solving demands and challenge appraisal, with the relationship having a stronger positive effect in teams with high levels of problem prevention. These results may be interpreted through social information processing theory (Salancik & Pfeffer, 1978), which suggests that employees interpret their own situations with reference to the behaviours within their groups. Problem prevention has been empirically linked with a tendency to focus on opportunities for growth (i.e., learning goal orientation, Parker & Collins, 2010). Teams with high levels of problem prevention, therefore, are likely to encourage perceptions of the beneficial aspects of situations. Based upon these cues, individuals in teams with high levels of problem prevention appear to similarly interpret their situations with a greater sensitivity to the opportunities and challenges present.

Research question 3: How do teams and leaders impact individual-level relationships between stress appraisals and proactive innovation?

The focus of Study 3 (Chapter 6) was on the individual-level relationship between stress appraisal and proactive innovation. According to Parker, Bindl, and Strauss' (2010) proactive motivational model, contextual factors such as leadership (e.g., vision, support) and social processes (e.g., co-worker support) influence employees to engage in proactivity. Drawing upon this, we explored the moderating role of leader (i.e., leader threat appraisal,

leader challenge appraisal) and team (i.e., team problem prevention) factors. Leader threat appraisals moderated the relationship between individual threat appraisal and proactive innovation, whereby leader threat appraisals exacerbated the detrimental effect of individual threat appraisal on proactive innovation. This is aligned with the social contagion effect (Brett & Stroh, 2003) whereby negative leader behaviours and reactions can amplify negative reactions amongst followers. Team problem prevention behaviours also moderated the relationship between individual threat appraisal and proactive innovation, with a stronger detrimental effect observed for those who worked in teams with high levels of problem prevention. Although counterintuitive, this finding supports social information processing theory (Salancik & Pfeffer, 1978) which suggests that people modify their own perceptions based on the behaviours of their group. Teams that regularly engage in problem prevention are likely to have expectations for managing problems effectively. This can create additional pressure (Bolino, Valcea, & Harvey, 2010), pressure that may be counterproductive for the individuals who view problem-solving demands as a threat. Individuals who feel threatened by problem-solving demand may be even more vulnerable to the personal costs associated with innovation in a high problem prevention team because they feel it is difficult to meet the expectations of their group. Overall, Studies 2 and 3 provide further support to shift to a multi-level model of stress appraisal by demonstrating the role of group, not just individual factors.

Research question 4: What is the recursive effect of daily proactivity on stress appraisals of problem-solving demands, and does this vary depending on personality characteristics?

Study 4 (Chapter 7) moved to investigate whether proactive behaviours have a recursive effect on stress appraisals. Previous research, including my research in Studies 1 and 3, has positioned proactivity (Ohly & Fritz, 2010), and related behaviours such as proactive coping (Searle & Auton, 2015) and creativity (Espedido & Searle, 2018), as

outcomes of appraisal. However, Lazarus and Folkman (1984) assert that the effect can also happen in reverse, with individuals constantly reappraising their situation based on previous outcomes. Furthermore, the notion of proactivity presupposes that actions taken to achieve proactive goals should have consequences in the future. It follows then that proactive behaviours have the potential to influence subsequent stress appraisals. We positioned daily proactive problem prevention as an antecedent of next-day stress appraisals. In addition, we also explored the impact of a personality characteristic which may be particularly important for appraisals, namely, behavioural activation system (BAS). According to reinforcement sensitivity theory, BAS refers to sensitivity towards the rewarding and frustrating aspects of situations, which is likely to influence the way people appraise situations in terms of potential benefits and drawbacks. As anticipated, BAS had a direct positive association with challenge appraisal. BAS also moderated the relationship between daily problem-prevention and next-day appraisals of hindrance. For individuals high in BAS, the association between problem prevention and next-day hindrance appraisal had a positive trend. For individuals low in BAS, the association between problem prevention and next-day hindrance appraisal had a negative trend. These findings reveal how individual actions (i.e., proactive problem prevention) interact with individual characteristics (BAS) to influence next-day stress appraisals. This further reinforces support for a multi-level conceptualisation of stress appraisal.

Theoretical Contributions

The research presented was framed around Lazarus and Folkman's (1984) seminal transactional model. Although not measuring Lazarus and Folkman's (1984) model in its entirety, we focused on three critical components:

- 1) Stressor: The event, situation, cue, or condition that has the potential to evoke stress;

- 2) Primary stress appraisal: The individual's interpretation of how likely it is that the stressor will affect him/her in terms of personally relevant goals, and if so, whether that effect is likely to be goal-supportive, goal-obstructive, or personally harmful;
- 3) Response/outcome: The individual's wellbeing or behaviour, that can be influenced by his/her experience of the stressor and/or his/her appraisal of the stressor.

The above components of the transactional model are carried forward and extended upon throughout this body of work. As illustrated in Figure 8.1, this research provides support for key extensions to the model:

- (a) This thesis extends the explanatory power of stress appraisal for understanding how problem-solving demands relate to a range of proactive behaviours (Study 1);
- (b) This work incorporates a day-level perspective to the antecedents and outcomes of stress appraisal (Studies 1 and 4), reinforcing the value of continued research that investigates short-term processes;
- (c) This thesis presents one of the few empirical studies to demonstrate the impact of team factors in shaping stress appraisals (Study 2);
- (d) This work substantiates the critical role of leaders and teams in moderating the effects of stress appraisal on proactivity (Study 3).

As discussed in Chapter 1, existing stress appraisal research has typically been conducted at the between-person level of analysis. Although valuable, this approach does not allow for an accurate understanding of the role of contextual factors, such as team and leader factors, and also how stress appraisal may fluctuate day-to-day. Using a combination of multi-level methodologies and multi-source data across several organisations and industries, this research provides robust support for key extensions to the transactional to incorporate team, leader, person, and daily characteristics.

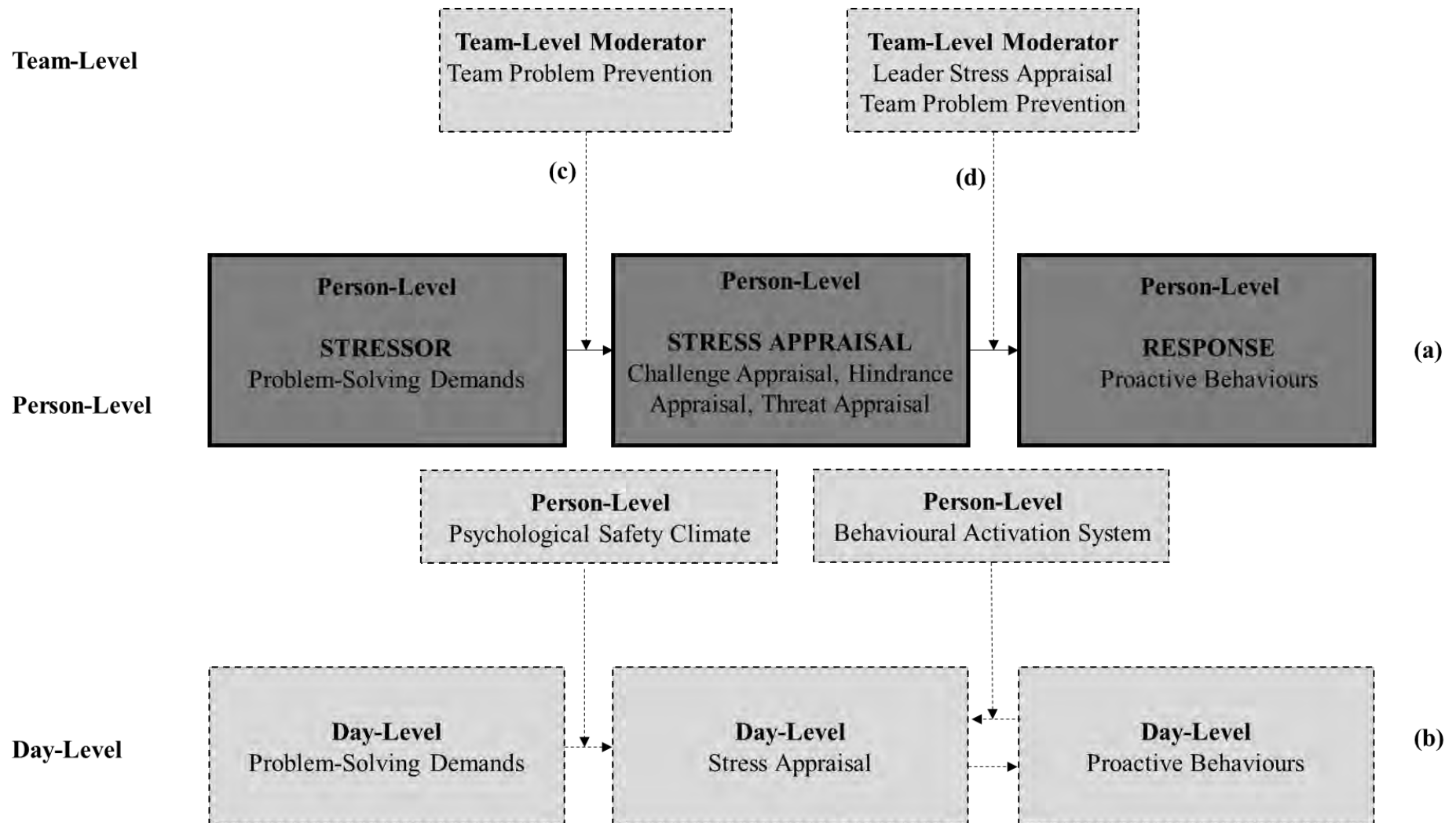


Figure 8.1. Extended transactional model, with solid lines representing components in the original model, and dashed lines representing extensions to the model.

Contribution (a). This thesis extends the explanatory power of stress appraisal for understanding how problem-solving demands relate to a range of proactive behaviours. As outlined in Chapter 1, the majority of stress appraisal research has explored wellbeing, rather than performance outcomes. Study 1 extended upon existing stress appraisal literature by looking at its implications for proactive performance, thereby expanding the explanatory power of stress appraisal to incorporate a wider range of workplace outcomes. We observed that stress appraisals helped to clarify the mixed effects of problem-solving demands on a range of positive and negative proactive behaviours, at the day and person level. Positive and negative forms of proactivity were predicted by distinct mechanisms, namely challenge and threat appraisals respectively. This highlights how an understanding of stress appraisal can help organisations maximise desirable forms of proactivity, while minimising undesirable forms. Apart from extending the transactional model to look at proactivity outcomes, it also contributes to the literature on proactivity by highlighting the value of differentiating between distinct forms of proactivity. Problem-solving demands and stress appraisals exerted unique effects on different forms of proactivity, and also at different levels of measurement. These effects would have been obscured had a single, broad proactivity construct been used rather than multiple measures of proactive behaviours.

Contribution (b). This work incorporates a unique day-level perspective to the antecedents and outcomes of stress appraisal (Studies 1 and 4), reinforcing the value of continued research that investigates short-term processes. The week-long diary study design in Studies 1 and 4 enabled the assessment of short-term processes and everyday experiences (Ohly, Sonnentag, Niessen, & Zapf, 2010). Stress appraisals are theorised to be momentary judgements of a given situation and state-like (rather than trait-like) in nature, varying on a day-to-day basis (Luthans & Youssef, 2007). For a closer approximation of the within-subject predictions made by transactional theory, we operationalised stress appraisals

as transitory variables, at the day-level, as recommended by Searle and Auton (2015). The day-level effects also provide greater confidence that this process is not a function of common method bias because longitudinal analysis procedurally controls for individual characteristics that impact upon self-report data (Podsakoff, MacKenzie, & Podsakoff, 2012).

In Study 1, we observed that daily problem-solving demands tended to increase appraisals of challenge, which increased individual innovation on that same day. This indicates that employees do not respond to problem-solving demands in a totally consistent way and the effects on challenge appraisal on individual innovation fluctuate on a short-term daily basis. This thesis was also built on the premise that appraisals emerge from transactions between a person (e.g., personality) and his / her environment (e.g., climate, job demands). In recognition of this, we tested cross-level interactions between day factors and climate (Study 1), as well as day factors and personality (Study 4). The observation that psychological safety climate moderated day-level effects of problem-solving demands on challenge appraisals and proactive innovation (Study 1) highlights the critical role of the organisational context in shaping the way people interpret daily situations. In Study 4, the finding that problem-prevention interacted with behavioural activation system to influence next-day hindrance appraisals reaffirms the theoretical value of research examining interactions between day- and person-level characteristics. Overall, this provides a more precise understanding of the conditions under which different types of stress appraisals emerge.

Contribution (c). This thesis presents one of the few empirical studies to demonstrate that team factors play an important role in shaping stress appraisals. Guided by team (Klein & Kozlowski, 2000) and multi-level theory (Chen, Mathieu, & Bliese, 2005), Study 2 extends understanding of the critical role of team-level processes in shaping stress appraisals. Stress appraisals are routinely conceptualised at the level of the individual. Previous research had suggested that individuals scan their social environment (for resources

such as peer or supervisor support) when making appraisals (Helgeson, 1993; Folkman & Lazarus, 1985; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986), but such studies had hitherto been carried out exclusively at the individual level of analysis. To the best of the author's knowledge, no published multi-level studies had previously looked at the impact of the group on stressor—appraisal relationships. The observed benefits of team problem prevention for strengthening the positive relationship between problem-solving demands and challenge appraisal suggests that teams can enhance individuals' responses to stressful demands. This supports the notion that the utility of team-level effects may be underestimated, indicating the value of further research in this area.

Contribution (d). This work substantiates the critical role of leaders and teams in moderating the effects of stress appraisal on proactivity. Social theories, such as social cognitive theory (Bandura, 1986), suggest that the impact of individuals' perceptions on their behaviour is shaped by those in their social group (including leaders and team members). The findings in Study 3 support this assertion. Leaders who felt threatened by problem-solving demands exacerbated the negative effects of their followers' threat appraisals on proactive innovation. This adds to the expanding body of leadership research, highlighting the active role of leaders in shaping the effects of their followers' appraisals.

However, more complex relationships were observed between teams and individuals, whereby problem prevention amplified the detrimental effects of threat appraisal on proactive innovation. Although counterintuitive, individuals who feel threatened by problems may feel less confident to meet expectations if they are in a team with high levels of high problem prevention, discouraging them from proactive innovation. These complex findings expand both the literature on stress appraisal and problem-solving demands, going beyond the straightforward main effects of stress appraisal that currently predominate the literature. It suggests that individual and team factors may impact proactivity in more complex ways than

scholars originally envisioned and reveals insights into how this occurs. Overall, the findings suggest the need for a more complex and interactive view of individual stress appraisals, team phenomena, and employee behaviours. Such research is particularly relevant given the increasing interdependency of the contemporary workforce (Tornau & Frese, 2013).

Practical Applications

Through multiple methods and cross-level analyses across a range of contexts, this thesis identified several possible points of intervention at multiple levels of the organisation.

Application 1: Ignoring stress appraisals is likely to have opportunity costs. The findings demonstrate that stress appraisals have impacts on employee proactivity, over and above the direct effects of the objective stressors themselves. This emphasises that the personal, organisational, and financial impacts of stress appraisals may be greater than anticipated. As discussed in Chapter 1, the majority of occupational stress research does not examine stress appraisals directly. Even when job demands are seen as having potential for positive effects, it is a more common approach to examine them using challenge-hindrance stressor categorisations (Tuckey, Searle, Boyd, Winefield, & Winefield, 2015). Therefore, the practical value of stress appraisals is often obscured. In the context of problem-solving demands specifically, ignoring appraisal is likely to have hidden costs. Previous research has neglected the role of appraisal, identifying problem-solving demand as a challenge stressor and advocating for increasing problem-solving demand in the organisation (Schmitt, Zacher, & Frese, 2011). For example, Zhou, Hirst and Shipton (2012) argue for interventions to boost problem-solving demand given its positive association with creativity. However, our research shows that problem-solving demand can also exert negative effects if appraised as a threat, in terms of stimulating undesirable proactive behaviours. Given that the present thesis demonstrated the independent role of stress appraisals in determining key performance

outcomes, scholars and practitioners should consider incorporating stress appraisal in the design of interventions and future research studies.

Application 2: Individual stress appraisals provide a point of intervention for facilitating desirable types of proactivity. Study 1 demonstrated that challenge appraisals mediated the effects of demands on desirable forms of proactivity (i.e., voice, individual innovation, problem prevention), whereas threat appraisals mediated the effects on undesirable forms of proactivity. Cognitive reappraisal training draws upon transactional stress theory to teach individuals to understand the impact of their appraisals (Lazarus & Folkman, 1984), helping them to re-frame the meaning of a situation as a challenge, rather than as a threat (Lazarus & Folkman, 1984). Proactivity-boosting interventions may therefore incorporate cognitive reappraisal strategies and stress management training. Furthermore, the finding that some of the effects of stress appraisals manifest in the short-term (e.g., the effects of challenge appraisal on proactive innovation) reinforces the need for individuals (and potentially managers) to address stress appraisals regularly as they occur, to prevent detrimental effects from accumulating. However, as Dewe (1992) highlights, reappraisal strategies are an alternative, but not a substitute for adequate work design.

Application 3: Proactivity and stress appraisal interventions can be prioritised towards leaders. We observed that leader threat appraisals play a key role in moderating the effects of their team members' threat appraisals on proactive innovation. Therefore, leaders can be targeted directly to help alleviate the effects of negative employee perceptions (Salancik & Pfeffer, 1978). Leader training, professional development activities, and coaching could focus on modelling positive reappraisals. Reappraisal training could involve enhancing leaders' awareness of the impact of their appraisals on others and teaching them to reframe situations in a positive way (Lazarus, 1993; Lazarus & Folkman, 1984). The ambiguity inherent within problem-solving demands (Moregeson & Humphrey, 2006) makes

them relatively difficult for organisations to control, and so leader reappraisal, communication, and support strategies are likely to be critical to help employees cope with the problem-solving demands they will face.

Application 4: Organisations should consider a multifaceted approach to intervention, addressing day, person, and team level factors. Multiple cross-level interactions were observed throughout this thesis, reinforcing the need to concurrently address stress appraisal phenomena at multiple levels. For example, we observed that daily proactive problem prevention behaviours interacted with personality characteristics (i.e., behavioural activation) to shape negative hindrance appraisals (Study 4). This suggests that a “one size fits all” stress management approach may not be appropriate. For example, identifying individuals low in behavioural activation system may be a helpful way of targeting remedial efforts, given these individuals are more likely to feel hindered when they engage in problem prevention behaviours. Another key finding in the present thesis was that seemingly desirable team phenomena, such as problem prevention (Study 3), can have unintended negative consequences for proactive innovation when combined with negative individual threat appraisals. Thus, efforts to not only develop problem prevention capacity in teams, but to “talk up” a team’s capability on problem prevention, while neglecting those individuals who feel threatened by problem-solving, could be detrimental to innovation. Practitioners could consider assessing threat appraisals in order to deliver differentiated interventions by identifying individuals who require additional resources or support. Finally, the results also suggest that psychological safety climate helps to accentuate the positive effects of problem-solving demands on challenge appraisals (Study 1). Therefore, stress appraisal interventions could also consider enhancing factors like psychological safety through leadership development programmes focused on promoting inclusive behaviours, the development of shared goals, and encouraging member contributions (Liu, Laio, & Wei,

2015). Overall, the findings underscore the importance of a multipronged approach to enhance proactive work behaviour, through job design, stress management, and team and leader-based initiatives.

Research Limitations and Future Directions

The overarching limitations associated with this thesis present avenues for future research. Limitations specific to each paper are included in their corresponding chapter, and so are not restated here.

Limitation 1: Use of predominately cross-sectional analyses. Although Studies 1 and 4 used non-cross sectional diary study designs, the between-person analyses in Studies 1 and 4 and all the results from Studies 2 and 3 are limited by their cross-sectional nature. Although cross-sectional analyses are frequently used in the occupational stress literature (LePine, Zhang, Crawford, & Rich, 2018; Nicholls, Levy, Jones, Meir, Radcliffe, & Perry, 2016; Spector & Pindek, 2015), they only enable associative conclusions to be drawn. For example, Studies 2 and 3 identified the role of team (i.e., team problem prevention) and leader (i.e., leader threat appraisal) factors in the stress appraisal process, yet further longitudinal or experimental research is needed to confirm the directionality of effects. Further longitudinal research could also consider expanding to include antecedents that could help explain how team and leader factors exert their effects. For example, perceived leader support may be a potential mediating factor explaining how team and leader factors influence stress appraisals. It would be particularly important to understand how various team and leader factors exert their influence, given the increasing reliance on team units in contemporary work environments (Shuffler, Burke, Kramer, & Salas, 2013). This is an important goal for future research since the findings can inform the development of leadership training and team building strategies.

Limitation 2: Reliance on self-report. Although common in organisational research, the present thesis predominantly relies on self-report measures. However, self-report does have value for measuring stress appraisals since they involve personal perceptions that others may not have insight into (Lazarus, 1991). Nevertheless, self-report measures are susceptible to social desirability bias, whereby people alter their responses to facilitate a good impression from others (Rosenfield, Giacalone, & Riordan, 1995). This may occur particularly because our focal constructs include proactivity and problem-solving which are highly important behaviours. This is also problematic because it has the potential to inflate or deflate relationships due to common method bias (Podsakoff, Podsakoff, & LePine, 2003). For example, the same characteristics which could lead someone to appraise their situation as threatening could also lead them to perceive greater levels of problem-solving demands. We also aimed to mitigate the effects of common source bias by combining self-report with leader ratings in Studies 2 and 3. Future studies could use objective measures and ratings from multiple sources (Ilies, Dimotakis, & De Pater, 2010).

Limitation 3: Short time frame. The present research used data from a single time-point (Studies 2 and 3) and data sampled across a single working week (Studies 1 and 4), which represent relatively short time frames. This was done to capture the malleable nature of appraisal given research demonstrating that it is a phenomena that varies considerably over short periods (Prem, Ohly, Kubicek, & Korunka, 2017). Presumably, the effects of stress appraisals are likely to manifest differently across different time periods (e.g., days, weeks, months, years). Our research provided partial support for this speculation, noting that some effects that were significant at the day-level, were not significant at the between-person level which averaged effects across the entire week. Further research using longer time periods (weeks, months, years) is necessary to ascertain the longer-term impacts of stress appraisals,

and whether stress appraisal is the mechanism through which problem-solving demands affect proactivity in the long term.

Limitation 4: Homogenous samples. The samples used in this research were comprised exclusively of Australian employees, hampering the generalisability of results. Research has shown that culture can have direct and moderating effects on how people manage their job demands (Liu, Chi, Friedman, & Tsai, 2009). Furthermore, team behaviours also vary across cultures, which in turn is likely to influence employee attitudes and behaviours in unique ways (Ehrhart, Schneider, & Macey, 2014). Future research across different cultures could be conducted to establish the generalisability of findings. This may be particularly important due to the increasing diversity within teams and the globalisation of contemporary workforces.

Conclusion

Grounded in transactional theory, the present thesis aimed to explore the antecedents and proactivity outcomes of stress appraisals. A strength of this body of work was its multi-level perspective, encompassing day, person, team and leader factors. Since organisations are interdependent and dynamic systems, this perspective provides a thorough assessment of interrelationships between study phenomena. We proposed several extensions to the transactional model by integrating multi-level concepts, social theories, and day-level research. The findings support a shift to a multi-level model of stress appraisal. They underscore the explanatory power of stress appraisal in shaping workplace phenomena, such as proactive behaviours. We identified specific day (i.e., daily problem prevention), person (i.e., BAS, perceptions of psychological safety), team (team problem prevention), and leader (leader threat appraisals) factors that play a critical role in either dampening or accentuating the effects on, and resulting from, stress appraisals. This broadens the possibilities for interventions, identifying a diverse range of factors that can be leveraged by organisations

including the role of teams and leaders in establishing effective group behaviours for employees to appraise stressors in a positive way. In conclusion, this thesis provides a platform for scholars and practitioners by highlighting the need to incorporate multiple levels in future research and interventions.

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Appendix 1 of this thesis has been removed as it may contain sensitive/confidential content