J Bus Psychol (2015) 30:583–604
DOI 10.1007/s10869-014-9383-4

ORIGINAL PAPER

Trait Resilience Fosters Adaptive Coping When Control Opportunities are High: Implications for the Motivating Potential of Active Work

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Published online: 11 October 2014

Abstract
Purpose We examine the interaction between trait resilience and control in predicting coping and performance. Drawing on a person–environment fit perspective, we hypothesized resilient individuals would cope and perform better in demanding work situations when control was high. In contrast, those low in resilience would cope and perform better when control was low. Recognizing the relationship between trait resilience and performance also could be indirect, adaptive coping was examined as a mediating mechanism through which high control enables resilient individuals to demonstrate better performance.
Methodology In Study 1 ($N = 78$) and Study 2 ($N = 94$), participants completed a demanding inbox task in which trait resilience was measured and high and low control was manipulated. Study 3 involved surveying 368 employees on their trait resilience, control, and demand at work (at Time 1), and coping and performance 1 month later at Time 2.
Findings For more resilient individuals, high control facilitated problem-focused coping (Study 1, 2, and 3), which was indirectly associated with higher subjective performance (Study 1), mastery (Study 2), adaptive, and proficient performance (Study 3). For more resilient individuals, high control also facilitated positive reappraisal (Study 2 and 3), which was indirectly associated with higher adaptive and proficient performance (Study 3).
Implications Individuals higher in resilience benefit from high control because it enables adaptive coping.
Originality/value This research makes two contributions: (1) an experimental investigation into the interaction of trait resilience and control, and (2) investigation of coping as the mechanism explaining better performance.

Keywords Trait resilience · Control · Coping strategies · Mastery · Performance

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Introduction

Resilience is broadly defined as the psychological capacity to adapt and cope with adversity. While conceptualizations of resilience have varied depending on the context of the research, current considerations of resilience are as an individual difference, both dispositional and trait-like, and also state-like and open to development (Fletcher and Sarkar 2013; Luthans et al. 2006). One's capacity for resilience can be influenced by external (environmental) and internal (psychological) characteristics and develops over time and in the context of person–environment interactions (Egeland et al. 1993; Luthans et al. 2006; Masten 2001). Researchers propose that individuals build resilience through gaining psychological resources when they experience a stressful event with minimal impact, and these psychological resources are then employed in future demanding situations to minimize the impact of the stressful event (Berinsky et al. 2012). Various conceptualizations of resilient individuals are that they achieve growth and strength through facing difficult challenges (Harland et al. 2005), proactively prepare for stressful

events (Shin et al. 2012), have the ability to capitalize on challenges and turn them into opportunities (Lengnick-Hall et al. 2011), and have a sense of confidence and mastery in their ability to cope (Fredrickson et al. 2003).

A number of empirical studies demonstrate resilient individuals utilize more adaptive coping strategies and attain better life and work outcomes across a variety of contexts. For example, individuals who are more resilient appraise stressful encounters as less threatening (Tugade and Fredrickson 2004), use effective emotion-management strategies such as positive re-appraisal (Pickering et al. 2010), utilize more assertive or active problem-solving strategies (Moorhouse and Caltabiano 2007), experience greater psychological well-being (Beasley et al. 2003) and life satisfaction (Liu et al. 2012), and perform better in academic settings (Sheard and Golby 2007). Specifically in the work context, researchers have found that resilience minimizes psychological distress (Klohnen et al. 1996; Utsey et al. 2008) and biopsychosocial strain (Ferris et al. 2005). Indeed, in the occupational stress literature, resilience is considered an important employee strength that should be identified, particularly for selection into roles where stressors are high in regularity and intensity (Ferris et al. 2005). Moreover, resilient employees have been found to score higher on performance appraisals (Luthans et al. 2007) and actual performance (Maddi et al. 2006), and perceive more satisfaction with their work, more competence, and report greater accomplishment (Glasberg et al. 2007; Ong et al. 2006; Youssef and Luthans, 2007). Given the considerable literature supporting direct effects of resilience to coping and performance outcomes, we proposed the following:

Hypothesis 1 Trait resilience will be positively associated with (a) adaptive coping strategies, and (b) performance outcomes.

Much of the research investigating resilience has focussed on the different outcomes experienced by those high and low in the trait. Consideration of how situational variables influence the experiences of those high and low in resilience remains limited. In considering resilience in the work context, it is not only necessary to examine its main effects but also how resilience interacts with key job characteristics, such as having control over work tasks and methods. More broadly, having control has been found to have a positive impact on both physiological and psychological well-being, emotional functioning, and task performance (Becker 1997; Patall et al. 2008; Spector 1987). Conversely, a lack of control has been found to increase the likelihood of anxious and depressive symptoms, and induce feelings of 'helplessness' (Burger and Arkin 1980; Seligman 1975). Organizational scholars have theorized that control is both directly motivating (Humphrey et al. 2007) and particularly useful as a buffer of stress in highly demanding circumstances (Karasek 1979; Karasek and Theorell 1990). Furthermore, when demands are high, control can even provide a positive challenge (i.e., a sense of active learning and mastery over the demanding situation).

Despite these findings and the general perception that control is positive, some researchers suggest that having discretion over decision-making has a negative impact on health and performance. Indeed, Burger (1989) argued that there are instances when control is not desirable, including (1) when the concern for self-presentation is high (2) when the perceived likelihood of obtaining desired outcomes is low, and (3) when the perceived predictability of outcomes is low. Shapiro et al. (1996) argued that increased control can induce cognitive fatigue due to the effortful use of mental resources required. Muraven and Baumeister's (2000) Self-Control Model also posits that any act of self-control drains executive resources because this is effortful self-regulation. Also, Jones (2010) argued that there are unintended consequences of "high scope" jobs (i.e., jobs with high autonomy), including emotional exhaustion, when there is too much discretion and no structure.

In light of person–environment fit theory (Kristof-Brown et al. 2005; Pervin 1992), many studies have aimed to determine which aspects of personality 'match with', or are adaptive for capitalizing on, the positive effects of control, and conversely, for which individuals increased control may have negative effects because of a 'mismatch' between the person and the environment (e.g., Meier et al. 2008; Parker and Sprigg 1999). Control is an important factor to consider in relation to trait resilience because while resilient individuals could see control as a challenge and use it as an opportunity to attain better work outcomes, in contrast, individuals with lower resilience could view control as a hindrance and additional burden to attaining better work outcomes.

As such, we have conducted a program of research in both the laboratory and field contexts to investigate the extent to which: (1) resilient individuals cope and perform better during demanding task situations when control is high compared to low, and in contrast, whether those low in resilience cope and perform better when control is low compared to high, and (2) recognizing that the relationship between resilience and performance outcomes also could be indirect, we explored whether adaptive coping strategies are a mediating mechanism through which high control enables highly resilient individuals to experience better performance outcomes (see Fig. 1). In the following sections, we outline our reasoning for these moderating and mediating relationships.

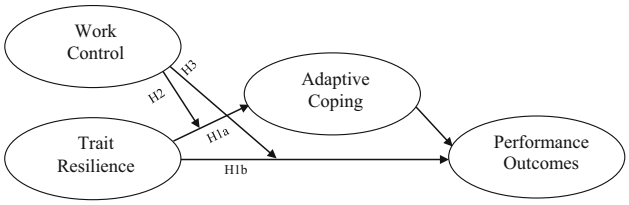

Fig. 1 Proposed conditional indirect effect of trait resilience on performance outcomes through adaptive coping

Interactive Effects of Trait Resilience and Control

There are a limited number of studies that have examined the relationship between trait resilience and opportunities for control. In the work context, a potential moderating relationship between trait resilience and control was first revealed, when Wanberg and Banas (2000) found an interaction between trait resilience and participation in change for a sample of 130 employees undergoing corporate re-structuring. Participation in the change process was determined by the extent to which employees felt they had influence over the change process, a form of control synonymous with participative decision-making (Evans and Fischer 1992). Results revealed that, for those high in trait resilience, having input into the decision-making process was associated with greater job satisfaction. Conversely, for those low in trait resilience, limited control over the change process was associated with higher job satisfaction, suggesting that low control was beneficial for less resilient employees.

Hystad et al. (2011) investigated the relationship between hardiness (which is an earlier conceptualization of trait resilience) and perceived control in the prediction of sickness-related absenteeism. In a study of 7,239 personnel from the Norwegian Defence Force, results revealed findings consistent with Wanberg and Banas (2000). For those high in hardiness, high control resulted in less sickness-related absenteeism compared to low control. Conversely, those low in hardiness had worse outcomes when control opportunities were high, such that they had higher rates of sickness-related absenteeism. The authors suggested that those low in hardiness prefer low control, and that ultimately they have better work outcomes in such conditions (in this case, lower absenteeism). This finding is consistent with Burger (1989) and Shapiro et al. (1996) who suggest some individuals anticipate the disadvantages of control because they lack belief in their ability to use this resource, and that high control can actually have a stress-enhancing effect.

These preliminary findings prompt the need for further examination of the interaction between trait resilience and control. As such, in three empirical studies, we investigate the interactive effect of trait resilience and control on adaptive coping strategies and performance-related outcomes. A limitation of these workplace studies is reliance on measures of self-reported control, which limits causal conclusions. Thus, in order to further explore the relationship between trait resilience and control, a controlled and objective manipulation of control is warranted. As such, the present research utilizes two experimental studies (Study 1 and Study 2) to investigate the interactive effect of trait resilience and control on adaptive coping and performance, when individuals are presented with high or low control during a work simulation. We then extend these findings to the field using a heterogeneous sample of employees with our predictors (i.e., trait resilience, control, and demand) measured at Time 1 and outcomes (i.e., adaptive coping and performance) measured at Time 2, 1 month later.

It is expected that, under high control, there will be a positive relationship between trait resilience and adaptive coping and performance outcomes. For individuals higher in trait resilience high control will present a 'match', as it will act as a resource providing the autonomy needed to master demanding work, which will result in more adaptive coping and performance. Conversely, for those with lower trait resilience, the opportunity for high control may present a 'mismatch,' as such opportunities will be associated with more responsibility and uncertainty.

It also is expected that, under low control, there will be a negative relationship between trait resilience and adaptive coping and performance outcomes. Low control will present a 'mismatch' for highly resilient individuals,' such that they will use less adaptive coping strategies and perform worse in these conditions of as low control will restrict their ability to adaptively master their work demands. Conversely, for those lower in trait resilience, it is predicted that the presence of low control will present a better 'match' between the person and the environment, through the provision of more task structure, and subsequently result in better responses to the task. Thus, the following is proposed:

Hypothesis 2 There will be a two-way interactive effect of trait resilience and control on adaptive coping strategies, such that: (a) under high control, trait resilience will be positively associated with adaptive coping strategies, and (b) under low control, trait resilience will be negatively associated with adaptive coping strategies.

Hypothesis 3 There will be a two-way interactive effect of trait resilience and control on performance outcomes, such that: (a) under high control, trait resilience will be positively associated with performance outcomes, and (b) under low control, trait resilience will be negatively associated with performance outcomes.

Mediating Role of Adaptive Coping Strategies

So far, we have argued for direct effects from trait resilience to both coping and performance (Hypothesis 1), as well as conditional direct effects (i.e., moderation by control; Hypotheses 2 and 3). In this respect, we have argued that, when control opportunities are available, only individuals with higher trait resilience will be equipped to take advantage of the benefits high control affords. This theorizing is because resilient individuals will see control as a positive challenge, or a useful tool for mastering demanding work, which will enable adaptive coping responses. It is plausible that this enhanced adaptive coping by more resilience individuals, in and of itself, will enable attainment of better performance outcomes. Indeed, adaptive coping is considered a proximal predictor of performance, a mechanism at the heart of the stress process.

Lazarus and Folkman's (1984) transactional stress and coping model considers stress to be a dynamic process during which the individual draws on internal and external resources to resolve the stressful encounter. According to the model, individual differences, such as trait resilience, are causal antecedents that substantially influence the coping process (e.g., influencing appraisal processes and adopted coping strategies based on suitability with the individuals' abilities and preferences; Folkman et al. 1986; Lazarus and Folkman 1984). As previously discussed, resilient individuals do two things in order to achieve better outcomes during stressful circumstances; they appraise events in positive and constructive ways and undertake planful or problem-focused coping. The transactional stress and coping model also emphasize that the context of the stressful encounter plays a critical role in determining outcomes; more specifically, that person and environment variables together shape coping efforts (Lazarus and Folkman 1984; Folkman et al. 1986). Indeed, Folkman (1984) subsequently proposed that an individual's reaction to the availability of control in their environment is a central predictor of adaptive appraisal, coping strategies, and ultimately the attainment of positive outcomes. In this way, we argue that, when control is high, the use of adaptive coping strategies puts highly resilient individuals in a better position to master their environment and attain positive outcomes like better performance.

As such, we posit that the relationship between trait resilience and performance outcomes can be both direct, conditionally direct, and conditionally indirect (see Edwards and Lambert 2007; Preacher et al. 2007), and to test these models, we included an examination of not only the control conditions under which trait resilience is most likely to be effective for performance (i.e., a conditional direct effects model; see Hypothesis 3a and b), but also the mediating mechanisms (i.e., through adaptive coping) by which trait resilience and control facilitate performance (see Fig. 1 and Hypothesis 4 below). This proposition implies a first stage moderation model or a conditional indirect effects model (see Preacher et al. 2007), where we tested both Type B and F models, according to Edwards and Lambert's (2007) taxonomy of models of moderated and mediated relationships.

An examination of the psychological mechanisms through which trait resilience and control facilitates performance outcomes is a novel contribution of the present research. In essence, it is theorized that high control will allow individuals with high resilience to mobilize personal resources and choose appropriate coping strategies, such as more positive reappraisal and problem-focused coping strategies which, in turn, will lead to higher levels of mastery and performance over work tasks. As such, it was predicted that

Hypothesis 4 Control will moderate the indirect effect of trait resilience on performance outcomes through use of adaptive coping strategies. In this respect, it is anticipated that, when control is high, a positive indirect effect of trait resilience through adaptive coping strategies on performance outcomes will be present. However, this pattern of effects is not expected at low control.

Study 1

Method

Participants

Participants were 78 first-year psychology students at an Australian university who participated in the experiment for course credit during 2011. Participation was voluntary and informed consent obtained. The sample comprised 59 (75.6 %) females and 19 (24.4 %) males (distributed evenly across conditions). Age ranged from 17 to 34 years ($M = 19.45$; $SD = 2.67$). All participants had prior or current work experience.

Research Design and Procedure

The experiment used a between-subjects design with control manipulated as low versus high levels and trait resilience treated as a measured variable. Participants completed an online questionnaire assessing trait resilience 1 week prior to attend the experimental session. Participants returned for the second session at which time they were randomly assigned to one of the two levels of control. Participants were directed to a computer where they received task instructions (i.e., including the control

manipulation), completed the experimental task, and then completed a post-task questionnaire (i.e., containing the manipulation check, problem-focused coping strategies, and subjective performance). Tests verified that participants in the high and low control conditions did not significantly differ in gender, $\chi^2(N = 78) = 0.03$, $p = .792$, *ns*; age, $t(76) = -0.30$, $p = .768$, *ns*; or trait resilience, $t(76) = 0.21$, $p = .831$, *ns*.

Experimental Task

The experimental task was an inbox task, a common work simulation used in prior experimental research that has manipulated control in the laboratory context (e.g., Jimmieson and Terry 1997, 1999; Parker et al. 2009, 2013). Participants were instructed to consider themselves as Kim Jones, a Human Resource Manager at a fictitious department store. Their task was to respond to emails (via an Outlook Express email account) from their employees that raised a variety of human resource issues (e.g., disputes about performance appraisal criteria, staff taking excessively long meal breaks, and scheduling of morale boosting activities). The task was designed to be demanding, requiring participants to respond to 14 emails in a 20-min period. Emails were designed to be similar in length and complexity, and relevant to a retail store context. To provide organizational context and a sense of realism, participants were provided with background information about the organization, an organizational chart, and performance appraisal criteria.

Control Manipulation

Control was manipulated via task instructions that aimed to heighten or reduce feelings of autonomy and discretion over the task. This control manipulation is based on previous studies using inbox activities to investigate the effects of control (Jimmieson and Terry 1997, 1999; Parker et al. 2009, 2013). Task instructions addressed three of the five aspects of behavioral control identified in the work control literature, including scheduling, method, and pacing control (Jackson et al. 1993). In the high control condition, participants were informed that they could address each email in the order they believed appropriate (high scheduling control), alter their method (high method control), and adjust the time spent on each email (high pacing control). In the low control condition, participants were instructed to reply to emails in the order presented (low scheduling control), reply to emails as they read them (low method control), and spend an equal amount of time on each email and to continue working the entire time (low pacing control). Participants received these instructions in both written and audio formats.

Measures

Manipulation Checks In order to determine the success of the control manipulation, participants responded to five items on a 9-point semantic differential scale designed to measure their perceived control over the work task (e.g., "*I had to reply to the emails in the order they arrived in my inbox*" through to "*I could reply to the emails in any order I saw fit?*"). Internal consistency for the measure was $\alpha = .93$. The manipulation was successful, $t(76) = -11.52$, $p < .001$, with those in the high control condition perceiving higher control ($M = 6.29$; $SD = 2.14$) than those in the low control condition ($M = 1.81$; $SD = 1.15$).

To ensure the level of demand was high and did not vary as a function of the control manipulation, participants also responded to two single-item measures of demand. Participants responded on a 7-point scale ranging from 1 (hardly any) to 7 (a great deal) to the items; "*the activity required me to work very hard*" ($M = 5.21$; $SD = 1.38$) and "*the activity required me to work very fast*" ($M = 6.05$; $SD = 0.95$). There was no systematic variation in the *working hard* item, $t(76) = 0.49$, $p = .626$, *ns*, or the *working fast* item, $t(76) = 1.19$, $p = .237$, *ns,* by the control manipulation.

Trait Resilience This construct was measured using the 25-item Resilience Scale (RS-25) developed by Wagnild and Young (1993). It is important to note that the concept of trait resilience is grounded in the early work of Kobasa (1979) who pioneered the development and measurement of hardiness. There are, however, several key limitations to Kobasa's measure of hardiness that justify using a measure of the broader construct of trait resilience, in order to reliably tap an individual's ability to respond effectively in the face of adversity (see Funk 1992, for a review). In a review of instruments measuring resilience, Ahern et al. (2006) determined the RS-25 to be the preferred measure due to its psychometric properties and applications in a variety of age groups and ethnicities. The RS-25 was developed through an exploratory study of elderly people and has been psychometrically validated through a number of studies across different age groups and ethnicities (Ahern et al. 2006; Lundman et al. 2007; Portzky et al. 2010). Items tap participants enduring sense of self-reliance, perseverance, equanimity, and self-acceptance. Responses were rated on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). An example item includes "*I usually manage one way or another*".

Adaptive Coping Strategies Problem-focused coping was measured as one coping strategy considered to be adaptive for the current task context; more specifically, strategies aimed at strategizing and tackling problems head-on (see

Table 1 Study 1 descriptive data and correlations ($N = 78$)

Variables	*M*	*SD*	1	2	3	4	5	6	7	8
Gender	–	–	–							
Age	19.45	2.66	.12	–						
Trait resilience	5.32	0.58	.03	.19	(.86)					
Control manipulation	–	–	−.03	.03	−.03	–				
Problem-focused coping	3.83	0.76	.08	.15	.24*	−.16	(.77)			
Subjective performance	3.85	1.22	−.15	.07	.20	−.02	.43**	(.95)		
Quantitative performance	7.59	2.97	.17	.01	−.06	−.15	.18	.30**	–	
Qualitative performance	1.93	0.37	.23*	−.22	−.06	.14	.08	−.02	−.29*	–

Cronbach's (1951) alpha coefficients for the multi-item variables are in parentheses along the main diagonal; Gender coded as males = 1; females = 2; Control coded as low = 1; high = 2

* $p < .05$. ** $p < .001$

Skinner et al. 2003). This was measured with 4 items drawn from the problem-focused coping measure of Lazarus and Folkman's (1984) Ways of Coping Checklist (WOCC). An example was "*I came up with a strategy to best perform the task*". Responses ranged from 1 (not at all) to 5 (all the time).

Subjective Performance Based on a shortened version of the achievement goal scale (Elliot and McGregor 2001), three items assessed subjective performance (e.g., *I feel as if I did better than other participants in this study*), ranging from 1 (strongly disagree) to 7 (strongly agree).

Quantitative Performance Quantitative performance was operationalized as the number of emails completed.

Qualitative Performance Qualitative performance was assessed using a coding scheme in which responses were coded as 1 (poor), 2 (basic), and 3 (good). One trained rater coded all of the emails and in order to check inter-rater reliability, a second trained rater coded a random sample of 50 % of the emails. Kappa analysis revealed an inter-rater reliability of .78, $p < .001$, (Cohen 1960). To account for variance in the number of emails answered, participants' quality scores for each of their responses were summed and then divided by the number of emails they responded to.

Results

Descriptive statistics, correlations, and Cronbach (1951) alpha coefficients are presented in Table 1.

Moderated Hierarchical Regression Analysis

To test Hypotheses 1–3, hierarchical moderated regressions were conducted using trait resilience as a continuous variable and control as a dummy-coded dichotomous variable (1 = low control; 2 = high control) in the prediction of coping and performance (see Table 2). A multiplicative two-way interaction term between trait resilience and control was computed based on centered scores (Aiken and West 1991).

In line with Hypothesis 1a, trait resilience had a significant positive main effect on problem-focussed coping, $\beta = .24$, $t(1,76) = 2.17$, $p = .033$, $sr^2 = .06$. Contrary to Hypothesis 1b, trait resilience was unrelated to the three performance outcomes.

There was a significant interaction involving trait resilience and control on problem-focused coping, $\beta = .34$, $t(1, 75) = 3.28$, $p = .002$, $sr^2 = 12$ (see Fig. 2). Graphical representation of the significant interaction was derived using the unstandardized regression coefficients (*B* values) of the regression lines for participants high and low on the moderator variable of experimentally manipulated task control (Jaccard et al. 1990). In support of Hypothesis 2a, under high control, those with higher resilience engaged in significantly more problem-focused coping, $B = 0.79$, $t(74) = 3.98$, $p < .001$. Contrary to Hypothesis 2b, under low control, those with higher or lower levels of resilience reported no difference in problem-focused coping, $B = -.10$, $t(74) = -0.54$, $p = .593$, *ns*. Examination of Fig. 2 suggested this pattern of effect was being driven by differences between control conditions at the low end of trait resilience. Thus, we followed up with the other set of simple slopes, which revealed those low in trait resilience reported less problem-focused coping in high control as compared to low control conditions, $B = -0.75$, $t(74) = -3.39$, $p < .001$, but this was not the case at high trait resilience, $B = .28$, $t(74) = 1.28$, $p = .206$, *ns*. As can be seen in Table 2, no significant interactive results were revealed on the three performance outcomes, which is contrary to Hypothesis 3.

Table 2 Study 1 hierarchical regression analysis with control as moderator of trait resilience ($N = 78$)

	Problem-focussed coping β	Subjective performance β	Quantitative performance β	Qualitative performance β
Step 1				
Trait resilience	.24*	.20	−.06	−.06
Control manipulation	−.16	−.01	−.15	.14
$R^2ch.$	.08*	.04	.03	.02
Step 2				
Trait resilience × control manipulation	.34**	−.02	−.04	.07
$R^2ch.$	.12**	.00	.00	.01

Control coded as low = 1; high = 2

* $p < .05$. ** $p < .001$

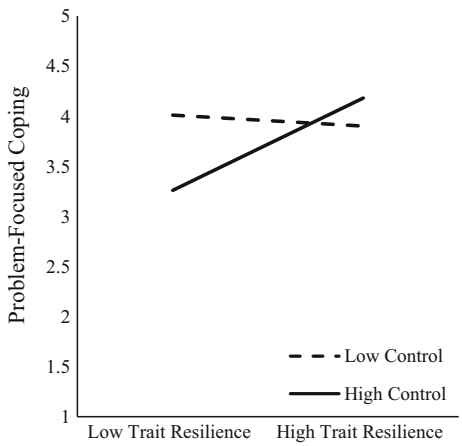

Fig. 2 Study 1 interaction of trait resilience and control on problem-focused coping

Conditional Indirect Effects

Hypothesis 4 posited that adaptive coping strategies would mediate the relationship between trait resilience and performance outcomes, but only at high levels of control. As displayed in Table 2, there were no significant effects of trait resilience or the interaction of trait resilience and control on performance outcomes. As such, we could not test our conditional indirect effects using the traditional "causal steps" method (see Baron and Kenny 1986). Drawing on more contemporary approaches to testing moderated mediation (see Edwards and Lambert 2007; MacKinnon et al. 2012), it is still possible to examine the conditional indirect effects on performance, despite the lack of support for Hypothesis 1b and 3, using the PROCESS macro and using bootstrapping analysis (Hayes 2013b). Specifically, Model 7 was used to examine the indirect effect between trait resilience and performance outcomes considering the mediator (i.e., problem-focused coping) and moderator (i.e., control) (Hayes 2013b).

Table 3 Study 1 conditional indirect effects of trait resilience on subjective performance through problem-focused coping

Moderator value	Conditional indirect effect			
	Boot indirect effect	Boot *SE*	L95	U95
High control	.52	.16	.25	.92
Low control	−.06	.13	−.34	.17

$n = 78$. Bootstrap $N = 10{,}000$. Unstandardized coefficients are shown. Bias corrected confidence intervals are reported. Moderator values were the dummy-coded levels of the control manipulation (i.e., 1 is low or 2 is high)

L95 95 % confidence interval lower limit, *U95* 95 % confidence interval upper limit

Bootstrapping is a statistical technique that resamples the data so that it is more representative of the population (Preacher and Hayes 2008) and allows the researcher to avoid power problems associated with asymmetric and other non-normal sampling distributions introduced by an indirect effect (MacKinnon et al. 2004).

The PROCESS analysis, using 10,000 bootstraps, revealed no support for conditional indirect effects on quantitative or qualitative performance. However, in support of Hypothesis 4, there was a conditional indirect effect on subjective performance. The conditional indirect effect of trait resilience on subjective performance, through problem-focused coping, was examined at high and low control. As shown in Table 3, bootstrap confidence intervals indicated that the indirect and positive effect of trait resilience on subjective performance was through problem-focused coping at high control but not low control.

Study 2

In Study 1, support for Hypothesis 2a was revealed, as there was a positive relationship between trait resilience and problem-focused coping, but only at high control. However, the pattern of this interactive effect suggested it

was driven by individuals lower in trait resilience using less problem-focused coping in the high control condition (i.e., the result of a person–environment mismatch and stress-enhancing effect). The conditional indirect effect (i.e., a Type B first stage moderation model; Edwards and Lambert 2007) on subjective performance suggested that the use of problem-focused coping under high control results in highly resilient individuals perceiving better performance on the task. However, there was no support revealed for Hypotheses 3 and no support revealed for Hypothesis 4 on the other performance outcomes.

There are a number of plausible reasons as to why there were no interactive effects of trait resilience and control on performance (and limited support for the conditional indirect effect on performance through adaptive coping). First, it is possible that the level of demand of the work simulation was too high (i.e., 14 emails to complete in 20 min) for control to be a useful resource in the attainment of better performance. Second, there might have been a lack of sensitivity in the self-rating of performance, which was a measure of the extent to which participants thought they did better than other participants on the task. As such, for Study 2, we (1) reduced the level of demand (i.e., from 14 to 10 emails to complete in 20 min) to allow scope for the interactive effects of trait resilience and control to emerge on our performance-related outcomes, and (2) replaced subjective performance perceptions for mastery perceptions, as this latter construct is expected to be a more sensitive indicator of participants' assessment of their subjective performance on the task, in particular their learning goal attainment (see Elliot and McGregor 2001). In addition, in Study 2, we included an additional adaptive coping response, that being positive reappraisal. Positive reappraisal is a cognitive coping strategy that involves altering the interpretation of the event or situation to view it as positive and possible (Lazarus and Folkman 1984). It is a powerful emotion regulation strategy that can improve physiological and affective responses to stress (Gross 1998, 2002), as well as task performance (Jamieson et al. 2010). Indeed, use of this strategy during stressful tasks is linked to less generation of negative emotions (Gross 1998, 2002).

Method

Participants, Design, and Procedure

Participants were 94 first-year psychology students at an Australian university who participated in the experiment for course credit during 2013. Again, participation was voluntary and informed consent was obtained. The sample consisted of 72 females (76.6 %) and 21 males (22.3 %), with one participant not reporting gender. Gender was distributed evenly across conditions. The mean age was 20.05 years (age ranged 17–53 years; $SD = 5.25$). Again, all participants reported having work experience.

Study 2 used the same between-subjects experimental design including the manipulation of control, as well as similar procedures as Study 1. One difference was that trait resilience was measured in a final questionnaire also measuring demographic variables. Tests verified that participants in the high and low control conditions did not significantly differ in gender, χ^2 $(N = 94) = 0.73$, $p = .393$, *ns*; age, $t(92) = 0.85$, $p = .399$, *ns*, or trait resilience, $t(92) = 0.59$, $p = .555$, *ns*.

Study 2 used the same inbox activity that was used in Study 1. However, in Study 2, the task was designed to be less demanding, requiring participants to respond to 10 emails in a 20-minute period. The level of demand on participants (i.e., to complete 10 emails within 20 min) is still considered moderate to high, based on validations by previous research using this inbox task (Parker et al. 2013). As reported in the manipulation checks section below, follow-up tests on the items assessing demand perceptions supported this conclusion.

Measures

Trait Resilience This construct was measured using the same scale as Study 1.

Manipulation Checks The same control manipulation check used in Study 1 was utilized for Study 2. Internal consistency for the measure in Study 2 was $\alpha = .90$. Results supported the manipulation, $t(92) = -12.96$, $p < .001$, whereby participants in the high control condition reported experiencing significantly more control over the task ($M = 6.46$; $SD = 2.00$) than those in the low control condition ($M = 2.03$; $SD = 1.20$).

Once again, to ensure the level of demand was high and did not vary as a function of the control manipulation, participants responded to the same two single-item measures of demand. Scores on the items were once again above the mid-point of the scale for *working hard* ($M = 4.78$; $SD = 1.47$) and *working fast* ($M = 5.57$; $SD = 1.18$). There was no systematic variation in the *working hard* item, $t(92) = -.38$, $p = .704$, *ns*, or the *working fast* item, $t(91) = .31$, $p = .756$, *ns*, by the control manipulation.

We checked to see the level of perceived demand in Study 2 was in fact lower than the level of perceived demand in Study 1. As we expected, the group completing more emails within the same time period would perceive more task demands, we utilized a one-tailed test. The independent groups *t*-tests revealed that, for *working hard,* the difference between Study 1 and Study 2 was significant, $t(170) = 1.96$, $p = .026$, with demand lower in Study 2

Table 4 Study 2 descriptive data and correlations ($N = 94$)

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9
Gender	–	–	–								
Age	20.05	5.25	−.15	–							
Trait resilience	5.41	0.55	−.11	.07	(.86)						
Control manipulation	–	–	−.09	.10	−.05	–					
Positive reappraisal	2.60	0.99	.10	−.02	.33**	−.04	(.78)				
Problem-focused coping	2.78	0.97	.15	−.08	.30**	−.01	.38**	(.85)			
Mastery perceptions	5.03	1.15	−.05	.16	.41**	−.05	.42**	.26*	(.91)		
Quantitative performance	6.83	2.44	.14	−.16	.17	.12	−.07	−.07	.07	–	
Qualitative performance	2.07	0.38	−.16	.21*	.12	−.12	−.18	−.20	.00	−.16	–

Cronbach's (1951) alpha coefficients for the multi-item variables are in parentheses along the main diagonal; Gender coded as males = 1; females = 2; Control coded as low = 1; high = 2

* $p < .05$. ** $p < .001$

($M = 4.78$; $SD = 1.47$) than Study 1 ($M = 5.21$; $SD = 1.38$). Similarly, for *working fast,* this difference was significant, $t(169) = 2.89$, $p = .002$, with demand lower in Study 2 ($M = 5.57$; $SD = 1.18$) compared to Study 1 ($M = 6.05$; $SD = 0.95$).

Adaptive Coping Strategies In Study 2, two forms of adaptive coping were assessed, including strategies aimed at cognitively appraising the situation in a more positive light as well as problem-focused strategies aimed at task completion. Again, items were adapted from the WOCC (Lazarus and Folkman 1984), and participants responded on a 5-point scale from 1 (not at all) to 5 (yes, almost all the time). Positive reappraisal was measured using 4 items (e.g., "*I tried to see it in a different light, to make it seem more positive*"), and problem-focused coping also was measured using 4 items (e.g., "*I came up with a strategy to best perform the task*").

Mastery Perceptions A 5-item measure adapted from the achievement goal framework (Elliot and McGregor 2001) was used to assess mastery perceptions over the task. Items included, "*I mastered the difficulties of the situation*" and were assessed on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree).

Quantitative Performance As in Study 1, quantitative performance was operationalized as the number of emails completed.

Qualitative Performance As in Study 1, participants email responses were coded for quality of the response by two trained raters. This time, both raters coded all the emails, and an average quality score for each email was derived from the two raters scores. Kappa for inter-rater reliability was .78 (Cohen 1960). Again, to account for variance in the number of emails answered, participants' quality scores for each of their responses were summed and then divided by the number of emails they responded to.

Results

Descriptive statistics, correlations, and Cronbach (1951) alpha coefficients are presented in Table 4.

Moderated Hierarchical Regression Analysis

To test Hypotheses 1–3, moderated hierarchical regression analyses were conducted to examine the relationship between trait resilience, control, and their product, on each of the coping variables and performance outcomes. Like in Study 1, the main effects of trait resilience and the dummy-coded control variable were entered at Step 1. At Step 2, the two-way interaction of mean centered trait resilience and control was entered. Simple slopes analyses were conducted to follow up any significant interaction terms.

Adaptive Coping Strategies

Positive Reappraisal In support of Hypothesis 1a, a positive main effect of trait resilience on positive reappraisal was revealed, $\beta = .33$, $t(2, 91) = 3.38$, $p = .001$, $sr^2 = .11$ (see Table 5). A significant 2-way interaction of trait resilience and control on positive reappraisal also was revealed, $\beta = .24$, $t(3, 90) = 2.49$, $p = .015$ $sr^2 = .06$ (see Fig. 3). In support of Hypothesis 2a, simple slopes revealed that when control was high, trait resilience was positively related to positive reappraisal, $B = 1.05$, $t(85) = 4.36$, $p < .001$. Contrary to Hypothesis 2b, when control was

Table 5 Study 2 hierarchical moderated regressions with control as moderator of trait resilience ($N = 94$)

	Positive reappraisal β	Problem-focused coping β	Mastery perceptions β	Quantitative performance β	Qualitative performance β
Step 1					
Trait resilience	.33**	.31**	.41**	.19	.12
Control manipulation	−.03	.00	−.03	.12	.13
$R^2ch.$	.11**	.10*	.17**	.05	.03
Step 2					
Trait resilience × control manipulation	.24*	.20*	.21*	−.10	−.08
$R^2ch.$	.06*	.04*	.04*	.01	.01
Step 3					
Positive reappraisal			.09	–	–
Trait resilience × control manipulation			.18		
$R^2ch.$			.01		
Step 3					
Problem-focused coping			.30**	–	–
Trait resilience × control manipulation			.15		
$R^2ch.$			.08*		

Control coded as low = 1; high = 2. Mediators added at Step 3 in separate regression analyses

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

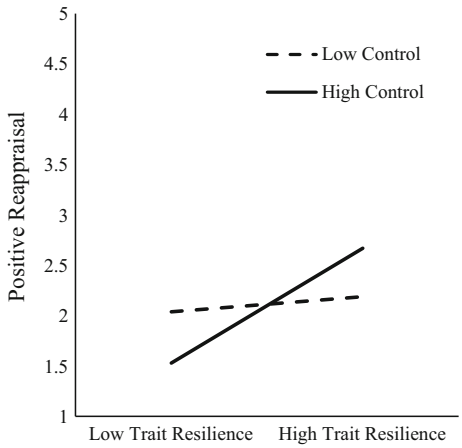

Fig. 3 Study 2 interaction of trait resilience and control on positive reappraisal

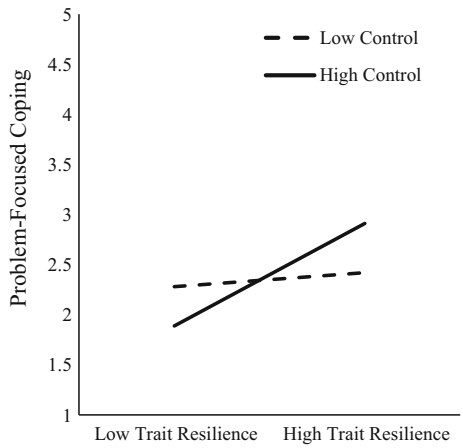

Fig. 4 Study 2 interaction of trait resilience and control on problem-focused coping

low, there was no relationship between trait resilience and positive reappraisal, $B = .14$, $t(85) = 0.49$, $p = .622$, *ns*.

Problem-Focused Coping In support of Hypothesis 1a, trait resilience had a positive main effect on participants' ratings of problem-focused coping, $\beta = .31$, $t(2, 91) = 3.08$, $p = .003$, $sr^2 = .10$ (see Table 5). A significant 2-way interaction involving trait resilience and control also was revealed, $\beta = .20$, $t(3, 90) = 1.98$, $p = .050$, $sr^2 = .04$ (see Fig. 4). In support of Hypothesis 2a, simple slopes revealed that, when control was high, trait resilience was positively related to problem-focused coping, $B = .93$, $t(86) = 3.92$, $p < .001$. Contrary to Hypothesis 2b, when control was low, there was no relationship between trait resilience and problem-focused coping, $B = .13$, $t(86) = 0.49$, $p = .622$, *ns*.

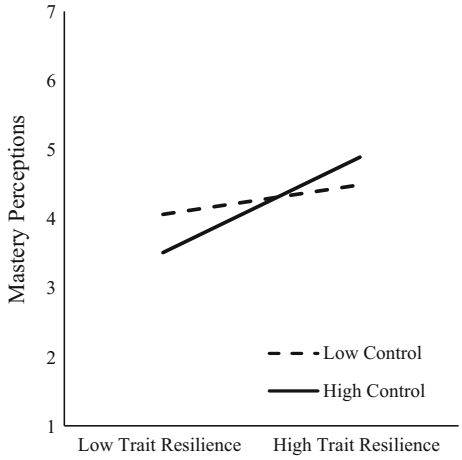

Fig. 5 Study 2 interaction of trait resilience and control on mastery perceptions

Performance Outcomes

Mastery Perceptions In support of Hypothesis 1b, trait resilience had a positive main effect on mastery perceptions, $\beta = .41$, $t(2, 91) = 4.31$, $p < .001$, $sr^2 = .17$ (see Table 5). A 2-way interaction of trait resilience and control on mastery perceptions also was revealed, $\beta = .21$, $t(3, 90) = 2.19$, $p = .031$, $sr^2 = .04$ (see Fig. 5). In support of Hypothesis 3a, when control was high, trait resilience was positively related to mastery perceptions, $B = 1.25$, $t(87) = 4.66$, $p < .001$. Contrary to Hypothesis 3b, when control was low, there was no relationship between trait resilience and mastery perceptions, $B = .39$, $t(87) = 1.31$, $p = .194$, *ns*.

Quantitative and Qualitative Performance There were no main effects or interactive effects of resilience and control on these task performance indicators (see Table 5).

Conditional Indirect Effects

To test Hypothesis 4, we entered positive reappraisal and problem-focused coping into the moderated hierarchical regression analyses at Step 3 to determine if there was mediation of the moderated relationship between trait resilience and each of the performance outcomes (as per Baron and Kenny 1986; Hayes 2013a; see Table 5). This test of Hypothesis 4 could be considered mediated moderation, as the strategy in this research was to first examine control as a moderator of the relationship between trait resilience and task outcomes and then test the mediating role of adaptive coping. However, both mediated moderation and moderated mediation use the same analytic models, and the distinction between the two is more of a theoretical preference (Hayes 2013a; Muller et al. 2005).

Table 6 Study 2 conditional indirect effects of trait resilience on mastery perceptions through problem-focused coping

Moderator value	Conditional indirect effect			
	Boot indirect effect	Boot *SE*	L95	U95
High control	.33	.14	.10	.68
Low control	.06	.11	−.14	.30

$n = 94$. Bootstrap $N = 10{,}000$. Unstandardized coefficients are shown. Bias corrected confidence intervals are reported. Moderator values were the dummy-coded levels of the control manipulation (i.e., 1 is low and 2 is high)

L95 95 % confidence interval lower limit, *U95* 95 % confidence interval upper limit

Given the outcomes of the moderation (as shown above, that the effect of trait resilience differs at different levels of control), the most appropriate strategy was to examine the mediating effect at different levels of control, which is moderated mediation or analysis of conditional indirect effects (Hayes 2013a; Preacher et al. 2007). Like in Study 1, we examined the indirect effect using bootstrapping analysis ($N = 10{,}000$) in the PROCESS macro (Hayes 2013b). Using Models 7 and 8, we examined the indirect effect between trait resilience and performance outcomes considering the mediators (i.e., positive reappraisal or problem-focused coping) and moderator (i.e., control) (Hayes 2013b).

As displayed in Table 5, the interaction between trait resilience and control is significantly associated with the mediator of problem-focused coping, $\beta = .20$, $t(3, 90) = 1.98$, $p = .05$, $sr^2 = .40$. Also shown in Table 5, at Step 3, the problem-focused coping was positively associated with mastery perceptions, $\beta = .30$, $t(4, 89) = 3.09$, $p = .003$, $sr^2 = .08$, when controlling for trait resilience, control, and their interaction. Finally, the interaction between trait resilience and control was no longer related to mastery perceptions, when problem-focused coping was included in the regression model. These results are supportive of a moderated mediation process outlined in Hypothesis 4. Bootstrapping results were examined to further explore these results. Using Model 8, the conditional indirect effect of trait resilience on mastery perceptions through problem-focused coping was examined at high and low control. As shown in Table 6, bootstrap confidence intervals indicated the indirect and positive effect of trait resilience on mastery perceptions through problem-focused coping was at high levels of control but not at low levels of control.

As shown in Table 5, the interaction between trait resilience and control is significantly associated with the mediator positive reappraisal, $\beta = .24$, $t(3, 90) = 2.49$, $p = .015$, $sr^2 = .06$. However, positive reappraisal was not

significantly associated with mastery perceptions when controlling for trait resilience and control, $\beta = .09$, $t(4, 89) = 0.85$, $p = .396$, *ns*. More contemporary approaches to testing conditional indirect effects argue we do not need support for the causal steps approach (see Baron and Kenny 1986; Hayes 2013b), nor Hypothesis 1b and 3, to be able to test for the conditional indirect effects on performance (see Mackinnon et al. 2012). As such, we still explored the conditional indirect effects using PROCESS analysis. Using Model 8, these tests revealed no support for conditional indirect effects involving positive reappraisal on mastery perceptions. Using Model 7, we also found no support for conditional indirect effects of either coping strategy on the other performance outcomes.

Study 3

In Study 2, which had lower demand than Study 1, it was revealed that, under high control, there was a positive relationship between trait resilience and both types of adaptive coping strategies (i.e., positive reappraisal and problem-focused coping; Hypothesis 2a). In addition, under high control, there was a positive relationship between trait resilience and mastery perceptions (Hypothesis 3a). Moreover, we found support for our moderated mediation model; more specifically, it was revealed that, for highly resilient individuals, high control is the key for facilitating the use of problem-focused coping, which increased resilient individuals' mastery perceptions (Hypothesis 4; a Type F direct effect and first stage moderation model according to Edwards and Lambert 2007).

Although there are advantages to experimental research with student samples, such as reducing 'noise' associated with conducting research in organizations (Highhouse and Gillespie 2009), students may not have felt that they would gain anything from their performance, leading to a lack of support for Hypothesis 1b and 3 for the objective task performance outcomes. As such, Study 3 aimed to replicate and extend the findings of Study 1 and Study 2 using a survey design and heterogeneous sample of employees. Much of the resilience research has focussed on employees working in jobs that are typically categorized as stressful, such as nurses, social workers, and military personnel. In Study 3, we used a diverse sample of employees from different professions and industries. Because the level of job demand in our employee sample would naturally vary, we extended our analysis to include demand as a factor. In this way, we could test our hypotheses related to the interactive effects of trait resilience and control (Hypotheses 2–3) at high and low levels of perceived demand, as well as testing the conditional indirect effects of coping on performance at high and low levels of control and high and low levels of demand (Hypothesis 4).

Indeed, high control should only provide opportunities for positive challenge and learning, when demands also are high (Karasek and Theorell 1990). According to the literature, the interaction of demand and control creates four broad types of jobs; a passive job has low control and low demand; a high strain job has low control and high demand; a low strain job has high control and low demand; and an active job has high control and high demand (Karasek 1979; Karasek and Theorell 1990). Active jobs are considered to be energizing, prompting active learning, and mastery over the work environment. It is possible that Hypothesis 3 will only hold at high and not low levels of demands (i.e., in active jobs, but not low strain jobs). Moreover, the conditional indirect effects proposed in Hypothesis 4 might only hold, when demand also is high (i.e., in active jobs, but not low strain jobs).

In Study 3, we measured two types of self-rated task performance using the Model of Positive Work Role Behaviors (Griffin et al. 2007). We measured (1) *task proficiency*, which reflects the completion of core tasks properly and as prescribed by the requirements of the job, and (2) *task adaptability*, which reflects adjusting to new technologies, processes, or procedures in core tasks prescribed by the requirements of the job. We chose to measure these two types of self-rated performance as these tap two distinct forms of performance on the job that are both likely to be influenced by a compatibility of the individual and their environment.

Method

Research Design and Procedure

We surveyed Amazon Mechanical Turk (MTurk) workers from diverse professions, organizations, and industries. MTurk is crowd-sourcing website that connects researchers with participants, and has been found to produce reasonably high quality and low cost data (Berinsky et al. 2012; Buhrmester et al. 2011; Mason and Suri 2012). At Time 1, $N = 681$ MTurk workers completed the survey and were reimbursed \$1 for their time. Of these, $N = 501$ were invited back to complete Time 2 one month later. A subsample of Time 1 respondents was not invited to complete Time 2 because they were either: (1) under 18-years old, (2) currently employed less than 10 h per week, (3) not actually in paid employment (e.g., volunteer, student, homemaker, full-time MTurker), and/or (4) failed the quality control questions included in the survey (see Meade and Craig 2012). Of those invited to complete Time 2, 368 employees completed the survey for \$2 compensation. Thus, the Time 2 response rate was 73.45 %.

Participants

At Time 2, employees were $N = 368$. Participants were aged 18–69 years ($M = 33.04$; $SD = 10.37$), with 3 participants not reporting their age. Fifty one percent of the sample was female. Sixty eight percent of the sample was permanent full-time employed, and 59 % had completed a university degree or higher qualification. On average, employees had been in their current position for approximately 4.27 years ($SD = 4.81$).

Measures

Trait Resilience Trait resilience was measured at Time 1 using the same scale as Study 1 and Study 2.

Control Control was measured at Time 1 using a 3-item scale with items adapted from Cousins et al. (2004). An example is "*I have a choice in deciding what I do at work?*" Items were measured on a 7-point scale, ranging from 1 (never) to 7 (always).

Demand Job demand was measured at Time 1 using the Cousins et al. (2004) 4-item measure. An example item is "*I have unachievable deadlines*". Items were measured on a 7-point scale, ranging from 1 (never) to 7 (always).

Adaptive Coping Strategies Two forms of adaptive coping strategies relevant to the work context were adapted from the WOCC (Lazarus and Folkman 1984) and measured at Time 2. Participants were asked to report on how often they used each coping strategy to deal with stressors they had experienced at work over the past month. Employees responded on a 7-point scale from 1 (never) to 7 (yes, almost all the time). Four items measured positive reappraisal (e.g., "*I tried to see things in a different light, to make them seem more positive*") and three items measured problem-focused coping (e.g., "*I took additional action to solve the problem*").

Task Performance Self-rated task performance was measured at Time 2 with two sub-facets of the Griffin et al. (2007) individual-level work role performance measure. All items were measured on a 7-point scale ranging from 1 (never) to 7 (always). Employees were asked to rate how often they had carried out a range of behaviors over the past month. Proficient task performance was measured with three items (e.g., "*carried out the main parts of my job well*"), and adaptive task performance was measured with three items (e.g., "*learned new skills to help you adapt to changes in your main tasks*").

Results

Descriptive statistics, correlations, and Cronbach (1951) alpha coefficients are presented in Table 7.

Moderated Hierarchical Regression Analysis

To test Hypotheses 1–3, moderated hierarchical regression analyses were conducted, which examined the relationships of trait resilience, control, and demand, and their products, on the adaptive coping variables (i.e., problem-focused coping and positive reappraisal) and performance variables (i.e., proficient and adaptive task performance indicators). Studies have found that resilience is positively correlated with age (Lundman et al. 2007; Portzky et al. 2010) and that gender differences in resilience may exist (Boardman et al. 2008). As such, control variables were entered at Step 1 (i.e., gender, age, and tenure in work role). The main effects of trait resilience, control, and demand were entered at Step 2. At Step 3, the multiplicative two-way interactions involving mean-centered trait resilience, control, and demand were entered. At Step 4, the three-way interaction of trait resilience, control, and demand was entered. Simple slopes analyses were utilized to follow up any significant interaction terms. Graphical representation of the significant interactions was derived using the unstandardized regression coefficients (B values) of the regression lines for participants high (+1 SD) and low (−1 SD) on the two moderator variables of demand and control (Jaccard et al. 1990).

Adaptive Coping Strategies

Positive Reappraisal In support of Hypothesis 1a, a positive main effect of trait resilience on positive reappraisal was revealed, $\beta = .47$, $t(3, 353) = 9.81$, $p < .001$, $sr^2 = .21$. A significant 3-way interaction of trait resilience, control, and demand on positive reappraisal also was revealed, $\beta = .11$, $t(1, 348) = 1.97$, $p = .050$, $sr^2 = .01$ (see Fig. 6). In partial support of Hypothesis 2a, simple slopes revealed that, at high control and high demand (i.e., an active job), the relationship of trait resilience to positive reappraisal was at its strongest, $B = 1.14$, $t(352) = 6.32$, $p < .001$. The positive relationship between trait resilience and positive reappraisal also was evident, when control was high yet demand was low, $B = .47$, $t(352) = 2.65$, $p = .008$, albeit weaker. Contrary to Hypothesis 2b, when control was low, a positive relationship between trait resilience and positive reappraisal also was evident, regardless of whether demand was high, $B = .76$, $t(352) = 6.69$, $p < .001$, or low, $B = .69$, $t(352) = 4.39$, $p < .001$.

Table 7 Study 3 descriptive data and correlations ($N = 368$)

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
Gender	–	–	–									
Age	33.04	10.37	.02	–								
Tenure	4.27	4.81	−.04	.44**	–							
Trait resilience	5.49	0.74	.04	.09	.02	(.93)						
Control	4.41	1.40	−.07	.11*	.12*	.22**	(.86)					
Demand	3.23	1.31	.01	.00	−.05	−.11*	−.18**	(.81)				
Positive reappraisal	4.83	1.18	.05	−.05	.06	.45**	.11*	.02	(.92)			
Problem-focused coping	5.18	1.11	.07	.06	.08	.40**	.13*	.05	.66**	(.88)		
Proficient task performance	5.94	0.96	.16*	.10*	.10*	.35**	.14*	−.09	.29**	.40**	(.93)	
Adaptive task performance	5.52	1.07	.15*	.07	.03	.33**	.15*	−.09	.35**	.39**	.63**	(.84)

Cronbach's (1951) alpha coefficients for the multi-item variables are in parentheses along the main diagonal

* $p < .05$. ** $p < .001$

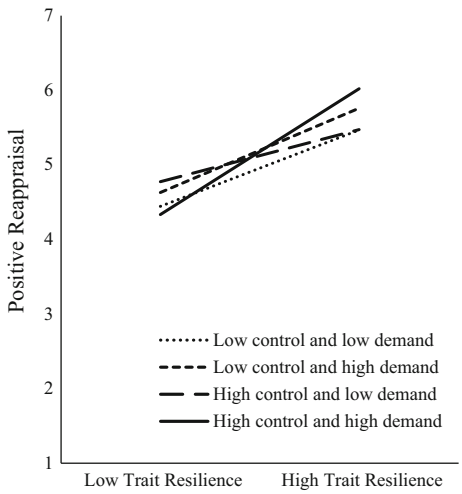

Fig. 6 Study 3 interaction of trait resilience, control, and demand on positive reappraisal

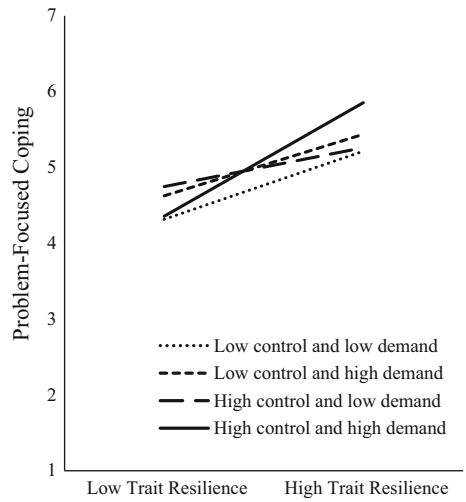

Fig. 7 Study 3 interaction of trait resilience, control, and demand on problem-focused coping

Problem-Focused Coping In support of Hypothesis 1a, trait resilience had a positive main effect on participants' ratings of problem-focused coping, $\beta = .39$, $t(3, 353) = 7.92$, $p < .001$, $sr^2 = .15$. A significant 3-way interaction involving trait resilience, control, and demand also was revealed, $\beta = .14$, $t(1, 349) = 2.44$, $p = .015$, $sr^2 = .01$ (see Fig. 7). In partial support of Hypothesis 2a, simple slopes revealed that, at high control and high demand (i.e., an active job), the relationship of trait resilience to problem-focused coping was at its strongest, $B = 1.01$, $t(352) = 5.64$, $p < .001$. The positive relationship between trait resilience and problem-focused coping was also evident when control was high yet demand was low, $B = .34$, $t(352) = 1.96$, $p = .050$, albeit weaker. Contrary to Hypothesis 2b, when control was low, the positive relationship between trait resilience and problem-focused coping also was evident, regardless of whether demand was high, $B = .54$, $t(352) = 4.72$, $p < .001$, or low, $B = .60$, $t(352) = 3.86$, $p < .001$.

Self-Rated Task Performance

Proficient Task Performance In support of Hypothesis 1b, trait resilience had a positive main effect on employees' ratings of proficient task performance, $\beta = .32$, $t(3, 353) = 6.44$, $p < .001$, $sr^2 = .10$. A significant 2-way interaction involving trait resilience and control also was revealed for proficient task performance, $\beta = .13$, $t(3, 350) = 2.63$, $p = .009$, $sr^2 = .02$ (see Fig. 8). In support of Hypothesis 2a, simple slopes revealed that, at high control, the positive relationship between trait resilience and proficient task performance was significant, $B = .63$, $t(353) = 5.91$, $p < .001$. Contrary to Hypothesis 2b, at low control, there was a positive relationship between trait

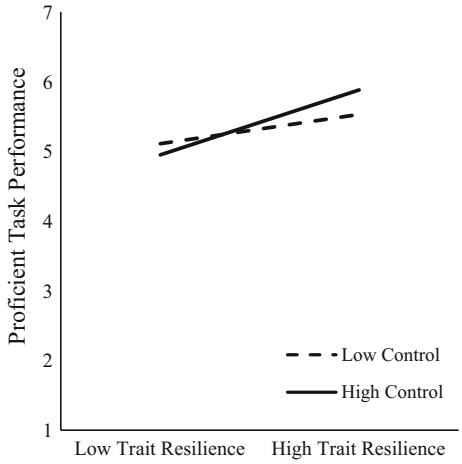

Fig. 8 Study 3 interaction of trait resilience and control on proficient task performance

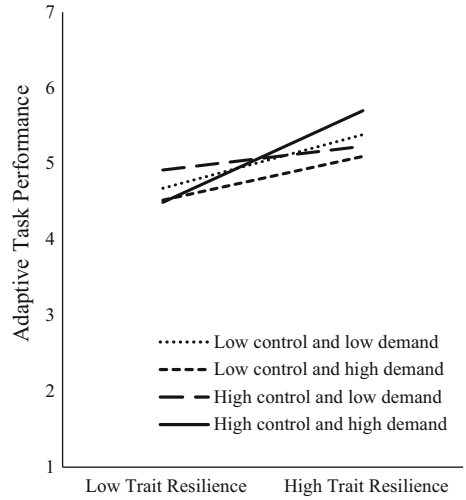

Fig. 9 Study 3 interaction of trait resilience, control, and demand on adaptive task performance

resilience and proficient task performance, $B = .28$, $t(353) = 3.03$, $p = .003$, although this effect was not as strong as at high control.

Adaptive Task Performance In support of Hypothesis 1b, trait resilience had a positive main effect on employees' ratings of adaptive task performance, $\beta = .30$, $t(3, 353) = 5.94$, $p < .001$, $sr^2 = .09$. There also was a significant 3-way interaction involving trait resilience, control, and demand, $\beta = .14$, $t(1, 349) = 2.36$, $p = .019$, $sr^2 = .01$ (see Fig. 9). In support of Hypothesis 3a, simple slopes revealed that at high control and high demand (i.e., an active job), the relationship of trait resilience to adaptive task performance was at its strongest, $B = .82$, $t(352) = 4.56$, $p < .001$. In addition, the positive relationship between trait resilience and adaptive task performance was not evident when control was high yet demand was low, $B = .21$, $t(352) = 1.20$, $p = .231$, *ns*. It is possible that high control is a particularly useful resource for highly resilient employees, when the stakes are high (i.e., under high levels of demand). Contrary to Hypothesis 3b, when control was low, there was still a positive relationship between trait resilience and adaptive task performance, whether demand was high, $B = .39$, $t(352) = 3.31$, $p < .001$, or low, $B = .48$, $t(352) = 3.02$, $p < .003$, although this effect was not as strong as at high control and high demand.

Conditional Indirect Effects

In Study 3, we measured demands, as we could not hold this constant and at a high level like in Studies 1 and 2. A conditional indirect effect (or moderated mediation model) was examined for trait resilience and task performance through adaptive coping strategies at the different combinations of the levels of control (i.e., low vs high) and levels of demand (i.e., low vs high). To test this 3-way moderated mediation (i.e., to test Hypothesis 4), the coping variables were separately entered into the regression analysis at Step 5 to determine whether there was mediation of the interactive effects on task performance. Following the same procedures as in Studies 1 and 2, to examine the conditional indirect effect, a bootstrapping analysis ($N = 10{,}000$) was conducted using the PROCESS macro (Hayes 2013b). Specifically, Models 11 and 12 were used to examine the indirect effect between trait resilience and task performance considering the mediators (i.e., positive reappraisal and problem-focused coping) and moderators (i.e., control and demand; Hayes 2013b). The moderated hierarchical regression analyses are displayed in Table 8, and the conditional indirect effects are displayed in Tables 9, 10, 11, and 12.

As shown in Table 8, the 3-way interaction between trait resilience, control, and demand is significantly associated with the mediator positive reappraisal, $\beta = .11$, $t(1, 349) = 1.97$, $p = .050$, $sr^2 = .01$. Also shown in Table 8, at Step 5 of the regression, positive reappraisal was significantly positively associated with adaptive task performance when controlling for trait resilience, control, demand, and their interactions, $\beta = .26$, $t(1, 348) = 4.78$, $p < .001$, $sr^2 = .05$. Finally, the 3-way interaction term at Step 5 was no longer significant, $\beta = .11$, $t(1, 348) = 1.92$, $p = .055$, $sr^2 = .01$, *ns*. These results are supportive of a moderated mediation process. The conditional indirect effect of trait resilience on adaptive task performance through positive reappraisal was examined at the different levels of high and low control and high and low demand. As shown in Table 9, using Model 12, bootstrap confidence intervals indicated that the indirect and positive effect of trait resilience on adaptive task performance through

Table 8 Study 3 hierarchical moderated regressions with control and demand as moderators of trait resilience ($N = 368$)

	Positive reappraisal β	Problem-focused coping β	Proficient task performance β	Adaptive task performance β
Step 1				
Gender	.06	.07	.15	.15*
Age	−.09	.03	.06	.06
Tenure	.10	.07	.08	.01
$R^2ch.$	.01	.01	.04**	.03*
Step 2				
Trait resilience	.47**	.39**	.32**	.30**
Control	.03	.06	.06	.08
Demand	.09	.11*	−.05	−.04
$R^2ch.$	.22**	.17**	.12**	.11**
Step 3				
Trait resilience × control	.04	.06	.13**	.05
Trait resilience × demand	.07	.05	.00	.05
Control × demand	−.03	−.03	.05	.07
$R^2ch.$	.00	.00	.02*	.00
Step 4				
Trait resilience × control × demand	.11*	.14*	.11	.13*
$R^2ch.$	.01*	.01*	.00	.01*
Step 5				
Positive reappraisal			.17**	.25**
Trait resilience × control			.11*	–
Trait resilience × control × demand			–	.10
$R^2ch.$			.02*	.05**
Step 5				
Problem-focused coping			.29**	.30**
Trait resilience × control			.11*	–
Trait resilience × control × demand			–	.09
$R^2ch.$			.07**	.07**

Mediators added in Step 5 in separate regression analyses

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

positive reappraisal is strongest at high levels of control and high levels of demand, which constitutes an active job (see Karasek and Theorell 1990).

As displayed in Table 8, the 3-way interaction between trait resilience, control, and demand is significantly associated with the mediator problem-focused coping, $\beta = .14$, $t(1, 349) = 2.44$, $p = .015$, $sr^2 = .01$. Also shown in Table 8, at Step 5, problem-focused coping was positively associated with adaptive task performance, $\beta = .30$, $t(1, 348) = 5.66$, $p < .001$, $sr^2 = .07$, when controlling for trait resilience, control, demand, and their interactions. Moreover, the 3-way interaction between trait resilience, control, and demand was no longer related to adaptive task performance, when problem-focused coping was included in the regression model, $\beta = .07$, $t(1, 348) = 1.24$, $p = .217$, $sr^2 < .00$, *ns*. Again, these results are supportive of a moderated mediation process. As shown in Table 10, using Model 12, bootstrap confidence intervals indicated that the indirect and positive effect of trait resilience on adaptive task performance through problem-focused coping is strongest at high levels of control and high levels of demand, which constitutes an active job.

We also explored the conditional indirect effects through coping onto the proficient task performance variable using PROCESS analysis and Model 11. As displayed in Table 11, bootstrap confidence intervals indicated that the indirect and positive effect of trait resilience on proficient task performance through positive reappraisal is strongest at high levels of control and high levels of demand, which constitutes an active job. Moreover, a similar pattern of effects was revealed for problem-focused coping, as displayed in Table 12. Overall, these effects

Table 9 Study 3 conditional indirect effects of trait resilience on adaptive task performance through positive reappraisal

Moderators values	Conditional indirect effect			
	Boot indirect effect	Boot *SE*	L95	U95
Low control and low demand	.16	.06	.06	.27
Low control and high demand	.18	.05	.10	.29
High control and low demand	.15	.06	.06	.29
High control and high demand	.26	.07	.14	.43

$n = 360$. Bootstrap $N = 10{,}000$. Unstandardized coefficients are shown. Bias corrected confidence intervals are reported. Moderator values were control SD = ±1.42 and demand SD = ±1.31

L95 95 % confidence interval lower limit, *U95* 95 % confidence interval upper limit

Table 10 Study 3 conditional indirect effects of trait resilience on adaptive task performance through problem-focused coping

Moderators values	Conditional indirect effect			
	Boot indirect effect	Boot *SE*	L95	U95
Low control and low demand	.17	.05	.08	.29
Low control and high demand	.15	.05	.08	.26
High control and low demand	.10	.05	.01	.22
High control and high demand	.29	.07	.17	.47

$n = 360$. Bootstrap $N = 10{,}000$. Unstandardized coefficients are shown. Bias corrected confidence intervals are reported. Control SD = ±1.41; Demand SD = ±1.30

L95 95 % confidence interval lower limit, *U95* 95 % confidence interval upper limit

Table 11 Study 3 conditional indirect effects of trait resilience on proficient task performance through positive reappraisal

Moderators values	Conditional indirect effect			
	Boot indirect effect	Boot *SE*	L95	U95
Low control and low demand	.09	.03	.03	.19
Low control and high demand	.11	.04	.04	.20
High control and low demand	.11	.04	.04	.20
High control and high demand	.16	.06	.06	.29

$n = 360$. Bootstrap $N = 10{,}000$. Unstandardized coefficients are shown. Bias corrected confidence intervals are reported. Control SD = ±1.42; Demand SD = ±1.31

L95 95 % confidence interval lower limit, *U95* 95 % confidence interval upper limit

Table 12 Study 3 conditional indirect effects of trait resilience on proficient task performance through problem-focused coping

Moderators values	Conditional indirect effect			
	Boot indirect effect	Boot *SE*	L95	U95
Low control and low demand	.14	.05	.05	.25
Low control and high demand	.12	.05	.05	.23
High control and low demand	.12	.06	.03	.26
High control and high demand	.20	.07	.08	.37

$n = 360$. Bootstrap $N = 10{,}000$. Unstandardized coefficients are shown. Bias corrected confidence intervals are reported. Control SD = ±1.41; Demand SD = ±1.30

L95 95 % confidence interval lower limit, *U95* 95 % confidence interval upper limit

support Hypothesis 4; however, it is important to note that the conditional indirect effects are all in the same positive direction, and that these are at their strongest when job demands are also high (i.e., in active jobs).

Discussion

It was predicted that, overall, those high in trait resilience would cope (Hypothesis 1a) and perform (Hypothesis 1b) better during demanding work, and these hypotheses were partially supported. In Study 1, those with higher levels of trait resilience reported engaging in more problem-focussed coping. In Study 2, those with higher trait resilience reported more positive reappraisal and problem-focused coping, as well as reporting greater mastery over the task. In Study 3, the field study, those higher in trait resilience engaged in more positive reappraisal and problem-focused coping, as well as reporting more proficient and adaptive task performance. These results support previous research demonstrating that resilient people are more likely to engage in adaptive coping behaviors (Moorhouse and Caltabiano 2007), report higher competence and accomplishment (Glasberg et al. 2007), and feel more positive about their abilities after a stressful situation (Ong et al. 2006).

Across the three studies, there was incomplete support for Hypotheses 2 and 3. Although there was support for the

role of high control in facilitating adaptive coping for those higher in trait resilience (Hypothesis 2a) and partial support for high control facilitating performance for those higher in trait resilience (Hypothesis 3a), under conditions of low control, there was no negative relationship between trait resilience and adaptive coping strategies (Hypothesis 2b) or trait resilience and the performance outcomes (Hypothesis 3b). Thus, it appears that those with higher trait resilience managed the adversity of the 'mismatched' situation of low control, moreover, that those with lower trait resilience do not necessarily benefit from the 'matched' situation of low control. This finding is in contrast with prior research, for example, Hystad et al. (2011) and Wanberg and Banas (2000) who reported low control conditions benefited individuals with lower resilience; as such, it is possible that either (1) resilient individuals can indeed cope with low control in the shorter-term, or (2) that there might be other specific contextual factors at play for the specific samples used in prior research (i.e., nurses and defence employees; such as, the stressful nature of the job demands faced by this sample being so acute that low control is a useful resource).

In Study 1, in support of Hypotheses 2a and 4, tests for conditional indirect effects to performance revealed that high control enabled individuals with more trait resilience to experience greater subjective performance through use of more problem-focused coping. However, it is important to note that the pattern of the interactive effect revealed that individuals with lower levels of trait resilience reported using less problem-focussed coping strategies in the high control condition. The detrimental effects of high control on this form of adaptive coping, even after only a short adverse encounter, suggest that high control may not be a useful resource for individuals low in trait resilience; indeed, it might create some frustrations that inhibit an adaptive coping response. This finding is in line with person–environment fit theorizing, Burger (1989), and others who suggest that the opportunity for high control can be stressful for those who do not prefer such conditions. The results also complement findings observed in organizational settings reported by Wanberg and Banas (2000), and more recently Hystad et al. (2011), whereby employees low in resilience had more negative outcomes when control perceptions were high. Those low in trait resilience may anticipate the negative effects of having control, particularly as past research has found this group is more likely to negatively appraise aversive situations (Tugade and Fredrickson 2004), which is likely to have a negative impact on their choice of coping strategy. However, it is possible that this effect might only be observed in contexts where the level of demand is very high, because in Study 2 and Study 3, this effect was not as marked at the low end of trait resilience.

In Study 2, at a lower level of demand, it was revealed that under high control, there was a positive relationship between trait resilience and both types of adaptive coping strategies (i.e., positive reappraisal and problem-focused coping; Hypothesis 2a), as well as a positive relationship between trait resilience and mastery perceptions (Hypothesis 3a). For highly resilient individuals, high control is key for facilitating problem-focused coping, which increased resilient individuals' mastery perceptions (Hypothesis 4). It is important to note that although the level of demand in Study 2 was lower than in Study 1, this was still a moderately demanding task, as reported by the participants. However, contrary to hypotheses, there were no conditional indirect effects of positive reappraisal for any of the performance outcomes. It is likely that the reason we did not find support for the mediational role of positive reappraisal is because our student sample did not have much invested in the inbox activity. Moreover, the process of positively reappraising a demanding work situation might require more time than was allocated during the 20-min work simulation. Positive reappraisal, as a mechanism, might require more motivation from participants, and/or a longer time period to be able to explain performance on, and performance perceptions of, the inbox activity.

In Study 3, the three 3-way interactions of trait resilience by control by demand, and the conditional indirect effects, demonstrated that active jobs (i.e., jobs with high control and high demand) strengthen the positive effect of trait resilience on adaptive coping strategies (i.e., positive reappraisal and problem-focused coping) as well as on adaptive task performance (supporting a direct and first stage moderation Type F model, according to Edwards and Lambert 2007). Moreover, there also was support for conditional indirect effects of these adaptive coping strategies for proficient task performance, especially when employees perceived their jobs to be active (supporting a first stage only moderation Type B model, according to Edwards and Lambert 2007). This support for positive reappraisal as an important mechanism in Study 3 could be due to utilising a sample of employees, who were motivated to positively reappraise the stress they faced at work because of the real world consequences at stake for them. More generally, it seems that highly resilient individuals really benefit from active jobs, perhaps because this is interpreted as a positive challenge (see Pickering et al. 2010). It is interesting that the 3-way interaction of trait resilience, control, and demand was not supported for proficient task performance. It is likely that a certain level of demand or challenge is required for control to be a useful resource for adaptive task performance (i.e., overcoming changes to technologies, processes, or procedures), whereas this is not necessary for proficient task performance (i.e., completion of core tasks required of the job).

When demands are high, other contextual factors in the work environment might be more relevant for proficient task performance (e.g., feedback or supervisor support). However, it is important to note that there was still a 2-way interaction of trait resilience and control, as well as conditional indirect effects through coping, on proficient task performance in support of the hypotheses.

In our laboratory studies, we did not find conditional direct effects on the quantitative (i.e., number of emails completed) and qualitative (i.e., quality of responses provided) performance variables (Hypothesis 3), nor support for conditional indirect effects through adaptive coping strategies on these variables (Hypothesis 4). These task performance variables could arguably be considered aspects of proficient task performance on the inbox task, rather than task adaptation, which was potentially captured better by the mastery perceptions measure in Study 2. It is likely that highly resilient participants in the experimental studies might have not had enough practice or exposure to the task to become proficient at it, even though they were implementing adaptive coping strategies under high control. In contrast, in Study 3, which involved employees and a time period of 1 month, we found support for Hypothesis 4 for the proficient task performance indicator, albeit self-reported. To further delineate the different processes at play for proficient versus adaptive task performance variables, future field research would benefit from obtaining more objective ratings of employee performance (e.g., supervisor ratings or performance appraisal scores).

Overall, the moderated mediation analyses demonstrated that the effect of trait resilience on performance is more or less easily expressed depending on the environment (i.e., high control). More specifically, in a moderately demanding work simulation (Study 1 and 2) and in the field when job demands were perceived as high (Study 3), when control opportunities were high, individuals with higher trait resilience were enabled to adopt and utilize more problem-focused coping strategies, which indirectly enabled better subjective performance (Study 1), mastery perceptions (Study 2), and adaptive and proficient task performance (Study 3). In the field study, positive reappraisal also was identified as a useful coping response for increasing both the proficient and adaptive task performance of employees working in active jobs (i.e., jobs with high control and high demand). Future research could investigate whether the effects presented here hold over the longer-term in both laboratory and field contexts; for example, in a work simulation by including more trials or in the field by collecting measures over time periods greater than 1 month.

Prior research indicates that successful adaptation and mastery over stressful situations is important to the process of building resilience (Harland et al. 2005; Fredrickson et al. 2003, Lengnick-Hall et al. 2011). Moreover, recent meta-analytic research demonstrates that individuals who are better adjusted (i.e., emotional stable) have greater adaptive task performance at work (Huang et al. 2014). In the current research, we demonstrate that when engaged in demanding work, those higher in trait resilience will need access to high control to be able to achieve this sense of mastery and adaptive performance on work tasks, through the use of more adaptive coping strategies. Prior research asserts that one's capacity for resilience can be influenced by environmental and psychological characteristics and develops over time and in the context of person–environment interactions (Egeland et al. 1993; Luthans et al. 2006; Masten 2001). It is possible that this is an iterative process and that successful mastery over demanding work further builds resilience. This is in line with conservation of resources theory, which posits that those who have resources accumulate more resources over time (Hobfoll 2001). More importantly, our results support the motivating potential of active jobs (Karasek 1979; Karasek and Theorell 1990), in particular for individuals higher in trait resilience through the use of more adaptive coping. The role of work design in the development of individuals' identities has been identified as a key challenge for the work design literature in future (Parker 2014). Our findings indicate that active work is central for the development of resilient individuals' capability to adapt and master demanding work. Future research could potentially explore the reciprocal effects of active work and resilience over time (i.e., the process of resilience building). Such research would certainly have implications for organizational development and work design in practice.

Conclusions

Our research demonstrates that high control environments will only be useful to those who are equipped to take full advantage of the benefits that high control can afford. This research demonstrates that individuals who are higher in trait resilience may be more suited to active work, where there is a certain degree of demand and access to high levels of control. In contrast, those lower in resilience did not benefit from high control. Although there was a lack of support for many of our predictions related to performance in Studies 1 and 2 (i.e., Hypothesis 1b and 3a and b), it is important to note that there was support garnered for the overall model, in particular Hypothesis 4, across the complete set of studies. For the performance outcomes, our results provided more support for a conditional indirect effects model (i.e., through adaptive coping), rather than a conditional direct effects model (i.e., interaction of trait resilience and control on performance). These findings

suggest that redesigning work to provide high control environments for highly resilient individuals might not be enough, that this needs to prompt adaptive coping efforts for performance improvements to be realized. Results also suggest that it is beneficial to provide less resilient employees with coaching and/or training on (1) using adaptive coping strategies, and (2) recognizing the benefits of high control rather than anticipating its disadvantages. Such training also may benefit those high in trait resilience, such that, when provided with opportunities for high control, they are able to fully utilize this resource. However, future research into the role of work design in the development of resilience is needed to better inform work redesign efforts.

Overall, our findings are in line with Lazarus and Folkman's (1984) transactional stress and coping model, which asserts adaptive coping is a response to an individual appraising their situation as providing the resources they need to cope with the aversive event. We also extend on existing investigations into the interactive relationship between trait resilience and control, and appear to be the first to manipulate control and examine its interaction with trait resilience in an experimental setting. Our findings highlight the importance of considering personality characteristics in work design, and highlight the importance of developing resilience in employees. The combination of high trait resilience and high work control is an important precursor to the adoption of more adaptive coping strategies (i.e., positive reappraisal and problem-focused coping), which then enables greater mastery and adaptive task performance when employees are engaged in demanding work.

Acknowledgments The authors thank Emma Howarth, Emma Lowery, Ilana Nathan, Michelle Nguyen, and Pirathat Techakesari for their assistance with data collection.

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