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Linking regulatory focus and threat–challenge: transitions between and outcomes of four motivational states

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ABSTRACT

Self-regulation research has flourished for the last three decades. In social psychology and beyond, a number of motivational approaches have been developed and these have provided new insights about numerous phenomena. However, a theoretical integration of these approaches is lacking, as are empirical comparisons across theories. This article seeks to make a step towards closing this gap. We do so by suggesting a model that specifies the relation between threat and challenge – as defined by the Biopsychosocial Model of arousal regulation – on the one hand, and promotion and prevention focus – as defined by Regulatory Focus Theory – on the other hand. In addition, the literature on the relation between these four motivational states and their impact on (a) the processing of valenced information and (b) the preference for (social) contexts is reviewed. Finally, we identify avenues for further research.

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Over the last three decades, self-regulation research has flourished in both social psychology and motivation science. Self-regulation can be defined as “the volitional and cognitive processes that individuals apply to reach a (subjectively) positive state” (Sassenberg & Woltin, 2008, p. 127). In essence, self-regulation approaches are theories or models about the question of *how* people strive for goals, that is, theories about how means to attain a goal are selected. Addressing these questions constituted a major innovation, in that previous research had, for a long time, been concerned with the *what* of goal striving or the content of motivation (i.e., specific goal content, needs, or motives). Self-regulation approaches do not simply focus on the cognitive and behavioural strategies people choose when striving to reach a specific goal; these approaches also examine the *patterns* of means choice that people apply *across different* goals and contexts. These patterns are called self-

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regulation strategies. Due to this independence from goal content and contexts, self-regulation approaches opened a new window on motivated action and cognition. They provided a different set of insights about a very broad range of phenomena, many of them being social in nature.

Being just one of many self-regulation approaches, Regulatory Focus Theory alone has contributed to the understanding of numerous phenomena – from decision-making (Crowe & Higgins, 1997; Sassenberg, Landkammer, & Jacoby, 2014) and creativity (Baas, de Dreu, & Nijstad, 2008; Friedman & Förster, 2001) to emotions (Higgins, Shah, & Friedman, 1997; Idson, Liberman, & Higgins, 2000), social relations like close relationships (Righetti, Finkenauer, & Rusbult, 2011), leader–member relations (Sassenberg & Hamstra, 2017), and intergroup relations (Sassenberg & Woltin, 2008). In addition, Regulatory Focus Theory has assisted in understanding applied domains, such as organisational behaviour (Lanaj, Chang, & Johnson, 2012), consumer behaviour (Avnet & Higgins, 2006; Wang & Lee, 2006), and health communication (Keller & Lehmann, 2008).

In early research, *individual* differences in strategies of goal striving received the most attention (e.g., Elliot & McGregor, 2001; Higgins, Bond, Klein, & Strauman, 1986; Kuhl, 1985). The next generation of approaches then focused on *situational* fluctuations of self-regulation strategies; as in Regulatory Focus Theory (Higgins, 1997), Regulatory Mode Theory (Higgins, Kruglanski, & Pierro, 2003), and the Biopsychosocial Model of arousal regulation (Blascovich & Tomaka, 1996). Meanwhile, it seems justified to conclude that self-regulation strategies vary inter-individually and intra-individually (situationally). As a result, they have the potential to bridge personality-based approaches (e.g., personnel selection) and situational approaches (e.g., workplace design, see Sassenberg & Hamstra, 2017).

Though each self-regulation approach takes unique *types* of strategies into account, most approaches rely on one specific pair of concepts. Examples of such pairs are action/state orientation in Action Control Theory (Kuhl, 1985), promotion/prevention focus in Regulatory Focus Theory (Higgins, 1997), and threat/challenge in the Biopsychosocial Model (Blascovich & Tomaka, 1996). Over the years, an almost endless stream of studies has shown that these pairs of strategies help us to understand and predict behaviour. Nevertheless, almost all of this research (including a number of our own studies) has solely compared the effects of *one pair* of self-regulation strategies with one another, focusing on a single theoretical approach (or even on the effects of a single strategy within one approach). This work has yielded meaningful insights about the antecedents and consequences of a concept *within* each pair of strategies. However, we barely know anything about the relations between concepts that are *not* coupled within a pair (i.e., those beyond a single approach). In other words, how a pair of strategies in one theoretical approach relates to and differs from the pairs of strategies in

other theoretical approaches is unknown, because research integrating different theoretical accounts is lacking.

In this article, we seek to take the first steps towards addressing this gap. To do so, we summarise research from both our own and others' labs which is informative about the relation between two sets of strategies: namely, threat/challenge (Biopsychosocial Model; Blascovich & Tomaka, 1996) and promotion/prevention focus (Regulatory Focus Theory; Higgins, 1997). To be clear, this will not create a comprehensive picture of all possible connections between self-regulation approaches; nevertheless, it will partly integrate two prominent approaches for the first time. Each approach has been applied by many different research teams to a large variety of phenomena and paradigms, examining how people regulate their attention, behaviour and performance. The aim of the current article is to bring these separate bodies of research together, taking the following steps: First, we summarise the Biopsychosocial Model and the motivational states threat/challenge (Blascovich & Tomaka, 1996), and then Regulatory Focus Theory and the motivational states promotion/prevention focus (Higgins, 1997). Next, we highlight (a) *commonalities* and (b) *differences* between the two approaches, (c) the *relation* between the four concepts challenge, threat, promotion, and prevention, and (d) the *outcomes* of each of these four concepts. Then, we discuss *research* that is relevant to the relation between these four concepts. We go on to summarise research on how the four concepts impact (1) the processing of valenced stimuli and (2) the attraction of (social) contexts. In these latter two areas of research, both self-regulation approaches have mostly been applied separately, although a few studies compared the outcomes of the four states directly. Finally, we will discuss avenues for future research.

Two self-regulation approaches: threat/challenge and promotion/prevention

Threat/challenge in the Biopsychosocial Model of arousal regulation (Blascovich & Tomaka, 1996), and promotion/prevention focus in Regulatory Focus Theory (Higgins, 1997) are two fundamental, prominent pairings of concepts in theorizing about self-regulation. It could be argued that this alone justifies our effort to integrate them. However, as should become clear when we outline the two approaches below, these concept pairings also overlap substantially on a theoretical level, which is why we have chosen to relate these approaches to each other.

Threat/challenge: the biopsychosocial model of arousal regulation

The Biopsychosocial Model (Blascovich & Tomaka, 1996; Seery, 2013) is concerned with how people appraise and physiologically respond to

situational demands based on the assumption that appraisals precede physiological responses (for evidence see Tomaka, Blascovich, Kibler, & Ernst, 1997). The model applies to motivated performance situations “in which individuals must actively perform instrumental responses to reach a goal that is self-relevant or important in some way” (Seery, 2013, p. 638) – which could be taking a test, performing a difficult task, competing with others, or giving a speech. Such situations elicit active engagement and the more the goal to-be-achieved is self-relevant, the greater this engagement is. Being in a motivated performance situation and showing the resulting task engagement are prerequisites for experiencing threat/challenge.

If both preconditions are met, appraisals of situational demands (e.g., task difficulty) and personal resources (e.g., skills, abilities) determine whether people respond with a threat or challenge state. *Threat* is characterised by the perception that resources outweigh demands (endangering goal achievement). In contrast, *challenge* is given when people perceive that resources meet or exceed demands. These appraisal-based definitions of threat and challenge will be used throughout the current article. Because threat and challenge differ only in the configuration of these demands-to-resources appraisals, they constitute two poles of one dimension (rather than discrete states). Threat/challenge and their underlying appraisals occur continuously and automatically (Blascovich, 2008).

Beyond the psychological level of appraisal, the Biopsychosocial Model also makes assumptions about the resulting physiological responses, that is, changes in cardiovascular indicators (compared to a baseline in a relaxed state). During motivated performance, the heart starts pumping faster (HR = heart rate increases) and with more force (PEP = pre-ejection period, an index of left-ventricular contractile force, decreases), indicating task engagement. Challenge is reflected by increased activation of the sympathetic-adrenomedullary axis (SAM), which leads to vasodilatation, lowering systemic vascular resistance (TPR = total peripheral resistance, reflecting the constriction vs. dilation of the arterial system, decreases) and allowing blood to easily flow through the body (CO = cardiac output, reflecting the amount of blood pumped through the system, increases). In contrast, threat is characterised by activation of both the SAM axis and the hypothalamic pituitary adrenal (HPA) cortical axis, with the latter reducing vasodilatation or facilitating vasoconstriction (i.e., an increase in TPR), thereby leading to small or zero increases in CO (compared to baseline levels). As such, HR and PEP reflect motivated performance (i.e., task engagement) and the level of TPR and CO indicate physiological challenge vs. threat, with challenge being reflected in relatively lower TPR and higher CO than threat. TPR and CO are often integrated into a single physiological threat-challenge-index (standardizing each and then subtracting changes in CO from changes in TPR). Higher scores on this index indicate relatively more threat and less challenge.

The physiological responses resulting from threat/challenge prepare the body for demanding physical and cognitive activities. The physiological response associated with challenge fits well with enduring demanding activities that are usually performed when eagerly striving to reach a goal. Conversely, the physiological imprint of threat incorporates additional elements that fit high vigilance and activity inhibition; this combination of being ready to act, but also being ready to stop acting, fits the appraisal pattern of high demands and low resources under threat. This pattern requires putting effort into goal striving, but also stopping activity when resources turn out to be insufficient and further effort would be a waste of energy.

According to the Biopsychosocial Model, the physiological threat-challenge-index provides an indication of psychological correlates of threat and challenge during the motivated performance. The relations between physiological indicators and (a) threat/challenge states (i.e., appraisals of demands and resources; e.g., Tomaka, Blascovich, Kelsey, & Leitten, 1993; Tomaka et al., 1997) as well as (b) behavioural outcomes have been validated (Chalabaev, Major, Cury, & Sarrazin, 2009; Seery, Weisbuch, & Blascovich, 2009; but see Wright & Kirby, 2003; for recent meta-analyses, see Behnke & Kaczmarek, 2018; Hase, O'Brien, Moore, & Freeman, 2019). Physiological indicators do not capture the psychological state itself, but rather provide an indirect means of assessing it. The model has been successfully applied in numerous studies (see Blascovich, 2008; Seery, 2013).

Note that the work summarised below focuses on threat/challenge along the lines of this appraisal-based definition; the physiological correlates have only been assessed in a few studies reported here. For the present review, relying mainly on appraisals seems to be adequate because we specifically focus on comparing threat/challenge as motivational states with the two regulatory foci. Such a comparison should, in the first place, rely on threat/challenge as it is defined here based on appraisals, in line with the Biopsychosocial Model. For the purpose of this article, physiology constitutes (only) a correlate of threat/challenge – though one that is central to the Biopsychosocial Model.

Threat and challenge may seem related to avoidance and approach, respectively. Blascovich (2008) argued that challenge is closely and exclusively related to approach (see also Seery et al., 2009), whereas threat combines elements of approach and avoidance. The approach-aspect results from the motivated performance situation that is by definition, a precondition of threat; the avoidance-aspect results from the aversive appraisal structure. Accordingly, challenge/threat do not map one-to-one on approach/avoidance (see also Jonas et al., 2014), which means that the two pairs of concepts need to be distinguished.

To sum up, two aspects are highly relevant for relating the Biopsychosocial Model to Regulatory Focus Theory. First, threat/challenge states occur in *motivated performance* situations, in which actors want to reach a *change* from the status quo (e.g., finish a test or complete a speech and then “be

done with it"). Closely related to this is the motivational state itself (which is constituted by appraisals of the status quo). Second, threat and its physiological correlates imply *vigilance* during goal striving, whereas challenge and its physiological correlates imply persistent, *eager* goal striving.

Regulatory focus theory

Regulatory Focus Theory (Higgins, 1997) distinguishes *two motivational systems*: promotion and prevention. In a promotion focus, people eagerly regulate their needs for accomplishment and achievement and follow their ideals. They seek to achieve hits and they construe events in terms of gains vs. non-gains. In cases of success or failure, the dominant emotional responses are cheerfulness or dejection, respectively. As an outcome of this motivational orientation, information is processed globally and flexibly, and there is a readiness to take risks and an openness for change. In contrast, in a prevention focus, people vigilantly regulate their needs for safety and security and follow their obligations. They seek to avoid false alarms and construe events in terms of non-losses vs. losses. In cases of success or failure, the dominant emotional responses are quiescence or agitation, respectively. Resulting from this orientation, prevention-focused people process information locally and analytically, follow rules, and try to avoid errors. Both motivational states vary chronically and situationally. Evidence for this theory has been found in a wide variety of contexts and phenomena, as summarised above.

Notably, regulatory focus shows some overlap with approach/avoidance (e.g., Shah, Brazy, & Higgins, 2004). However, even though there are links between promotion focus and approach, and between prevention focus and avoidance, there are theoretical and empirical differences. On the theoretical level, people in a promotion focus strive to approach gains and to avoid non-gains, whereas people in a prevention focus strive to approach non-losses (and rules) and to avoid losses (and errors). Accordingly, regulatory focus manipulations that frame events as gains/non-gains to induce promotion, or as losses/non-losses to induce prevention, should include both the approached positive (promotion: gain; prevention: non-loss) and the avoided negative outcome (promotion: non-gain; prevention: loss; see also Crowe & Higgins, 1997). Manipulations that compare a gain to a loss condition manipulate, if anything, approach/avoidance but not regulatory focus.

Empirically, the outcomes of promotion vs. prevention and approach vs. avoidance can sometimes even reverse. For instance, both people in a promotion focus (compared to a prevention focus) and people with avoidance goals and avoidance motor-schema activation (rather than those with approach goals and approach motor-schema activation) show better perspective-taking performance (Sassenrath, Sassenberg, Ray, Scheiter, & Jarodzka,

2014; Sassenrath, Sassenberg, & Scholl, 2014). Therefore, promotion needs to be distinguished from approach, and prevention from avoidance.

Importantly, in a promotion (vs. prevention) focus, the needs for accomplishment and achievement (vs. for safety and security) at a given moment are not necessarily *high*. In other words, the needs should not be equated with the foci. Rather, people in a promotion focus are *concerned* with accomplishment and achievement, whereas people in a prevention focus are concerned with safety and security – which can be to bolster, to restore, or simply to maintain these needs. When the respective needs are saturated, this will result in inaction; when the needs are undermined, this will result in action. As a main difference to threat/challenge, the regulatory foci are thus not associated with a motivational momentum as a result of striving to *change* the situation – and certainly not in a way that, ultimately, the regulatory focus itself will change. In contrast, people specifically value and choose the kind of behaviour that is *in line* with their regulatory focus, as well as objects associated with this behaviour (Camacho, Higgins, & Luger, 2003; Idson et al., 2000). This so-called regulatory fit effect (Higgins, 2000) even contributes to sustaining the regulatory focus in question.

Regulatory focus affects the direction of behaviour via the strategic inclination each focus implies. As described above, promotion vs. prevention elicits eager vs. vigilant strategies, which produces differences in the perception of events, the choice of means, and ultimately people's responses to situations. The application of an eager strategy in a promotion focus will, for instance, lead to the perception of goal progress as a gain and of setbacks as a non-gain. It will also lead to attempts to make use of as many opportunities for goal achievement as possible, including risky actions and trying out new things. In contrast, the application of a vigilant strategy in a prevention focus will lead to both the perception of progress as non-loss and of setbacks as loss, and to the avoidance of mistakes and, thus, the choice of well-known actions. Taken together, regulatory focus influences cognition and action based on *applying a strategy*, but not primarily a striving for change.

The integration

From these summaries, it is evident that the Biopsychosocial Model (Blascovich & Tomaka, 1996) and Regulatory Focus Theory (Higgins, 1997) partly overlap, despite being very different theories. The main *commonality* is that both make assumptions about the antecedents of vigilant versus eager goal striving – the latter being called persistent goal striving in the Biopsychosocial Model. The fact that both theoretical models include a similar pair of states in goal striving raises the question of how they relate to each other.

The most striking *difference* between the two approaches is that they differ in the type of motivation (or self-regulation) they target. The Biopsychosocial Model focuses on motivated performance situations in which people want to change something (e.g., the status quo). People here aim to turn the current status quo into a different desired end-state (reach a goal and resolve the threat/challenge) and thereby seek to overcome the necessity to apply vigilant/eager goal pursuit. When the goal is finished – because the demands have been met, the goal has been achieved, or one has given up – threat/challenge, as defined by the Biopsychosocial Model, are no longer experienced. In contrast, promotion and prevention focus influence goal striving based on the strategic inclinations that are inherent to them. Applying these strategies influences how events are perceived and which means are applied during goal pursuit, with no inherent inclination to end the application of these strategies (because these strategies “fit”). This means that the motivational quality of the two types of concepts differs. *Striving for change* is inherent to threat/challenge, whereas *applying a strategy* is essential to promotion/prevention focus. Taken together, these four concepts can be classified in terms of two dimensions (see Table 1). Importantly, these two dimensions should not be mistaken as defining features of the four motivational states. The dimensions enable us to compare the four motivational states based on their outcomes, but these dimensions do not represent the defining features of the motivational states (for definitions see the two preceding sections).

So far, we have described these two self-regulation approaches and related key concepts. This is the basis for two types of predictions that our Integrative Model of Eagerness and Vigilance regulation (IMEV) seeks to make: (1) Predictions about transitions between promotion/prevention and threat/challenge (i.e., how one pair can facilitate the other); and (2) predictions about the outcomes of the four states (i.e., when the two pairs result in the same or in different outcomes). In what follows, we outline these predictions.

It should be noted that IMEV was developed after most of the research reported below had been conducted. It relies largely on the reasoning and hypotheses formulated in the published articles reporting that research, but in other parts, it is inspired by the findings (i.e., post-hoc). We decided to present the model upfront as an organizing structure because we believe it

Table 1. Classification of promotion and prevention focus (as defined by Regulatory Focus Theory) as well as threat and challenge (as defined by the biopsychosocial model of arousal regulation) along key motivational dimensions.

		Motivational Quality	
		Striving for Change	Applying a Strategy
Goal Striving	Vigilant	Threat	Prevention
	Eager	Challenge	Promotion

will help readers to navigate the findings we report. At the same time, we neither want to raise the expectation that the reported studies are formal tests of the IMEV, nor claim that the reported studies fully cover IMEV; in particular, comparisons of all four motivational states in a single study are unfortunately still very scarce.

Transitions between motivational states

Given the classification shown in [Table 1](#), threat and prevention focus elicit vigilant goal striving, whereas challenge and promotion focus evoke eager goal striving. As a result, transitions between prevention and threat as well as between promotion and challenge seem intuitively likely – and there are more elaborate reasons for this. We now discuss the transitions from regulatory foci to threat/challenge, and then discuss the reverse direction.

From prevention to threat and from promotion to challenge

Threat and challenge differ with respect to the appraisal of resources available during the motivated performance. Threat results from the perception that resources do not suffice to cope with demands, whereas challenge results when resources do seem to suffice. Why would promotion/prevention focus result in threat/challenge when a motivated performance situation is encountered? The reason lies in the resource appraisal.

In a promotion focus, people strive to attain “hits”, which facilitates a search for multiple means to attain the goal at hand. Given that they do not want to miss any opportunity, people here consider all these means as providing the potential to achieve the goal. In contrast, in a prevention focus, people strive to make “correct rejections”, which undermines the detection of means to attain a goal; this strategy forces them to focus on “safe” and, thus, far fewer options (e.g., Crowe & Higgins, 1997; Liberman, Molden, Idson, & Higgins, 2001). As such, a promotion focus should promote the perception of means and resources, whereas a prevention focus is likely to undermine or limit the perception of resources during the motivated performance. This results in the following prediction (see also Keller & Bless, 2008; Sassenrath, Sassenberg, & Scheepers, 2016):

Hypothesis 1: People who enter a motivated performance situation in a prevention focus or who chronically hold a prevention focus are more likely to appraise this situation as a threat; people who enter such a situation in a promotion focus or who chronically hold a promotion focus are more likely to appraise the very same situation as a challenge.

From threat to prevention and from challenge to promotion

For the reverse sequence, the same pairs of concepts should go together, now based on a different argument. Threat elicits vigilant self-regulation to overcome the status quo (i.e., higher demands than resources) and achieve security. Given that vigilance and security needs are assumed to be part of the motivational system that is activated in a prevention focus (Higgins, 1997), an association between threat and prevention seems likely.

Furthermore, the challenge involves eager goal striving to overcome the demands at hand (i.e., goal achievement). Because eagerness and achievement are part of the motivational system underlying promotion focus (Higgins, 1997), an association between challenge and a promotion focus is likely. When people are not yet involved in a motivated performance situation, but only think about such a situation – for instance, because the situation will soon arise (e.g., when they are about to give a speech or enter a test situation) – we assume that appraising this upcoming situation as threatening can activate a prevention focus, whereas appraising this situation as challenging can activate a promotion focus:

Hypothesis 2: When people appraise a task (or an upcoming task) as threatening, this will facilitate a prevention focus; when people appraise a task (or an upcoming task) as challenging, this will facilitate a promotion focus.

On a cautionary note, Hypotheses 1 and 2 focus on instant transitions between motivational states directly after being confronted with new tasks or task-related information. They do not cover the potentially more dynamic processes that develop over time while a person continues working on a task. This needs to be addressed by an extension of the model and requires further research.

Outcomes of motivational states

According to the Biopsychosocial Model and Regulatory Focus Theory, the four motivational states affect a wide variety of cognitive and behavioural outcomes (as briefly reviewed above). Rather than considering all outcomes to which these two approaches have ever been applied, we have selected outcomes that we consider particularly likely to be dependent on the quality of motivation and the type of goal striving (vigilant vs. eager). Based on this criterion, the outcomes we have chosen are: (1) the processing of valenced (positive or negative) information, and (2) the preference for (social) contexts, roles, or groups. Exactly how motivational quality and type of goal

striving apply to each of these three outcomes will become clear when we discuss each outcome below.

Processing of valenced stimuli

The motivational quality inherent to threat/challenge vs. promotion/prevention focus has implications for the way people process valenced – that is, positive and negative – stimuli.¹ To reduce *threat*, people continuously search for positive information that signals opportunities to do so. A similar argument has been put forward by the counter-regulation hypothesis (Rothermund, Voss, & Wentura, 2008); this predicts that “negative” motivational states (like threat) lead to heightened attention to positive stimuli and preferential processing of positive information. Therefore, threat (compared to challenge) should lead to heightened attention to and preferred processing of *positive* information.

Similarly, to get beyond and master the *challenge*, people continuously try to reduce the distance between the current and the desired end state. Therefore, they need to monitor what the demands are and which barriers they still need to overcome. To do so, they pay attention to negative information, providing them with information about unfulfilled demands and signalling potential barriers to deal with along the way – the things they still need to fight to resolve the situation. Again, a similar argument has been made as part of the counter-regulation hypothesis (Rothermund et al., 2008), stating that “positive” motivational states (like challenge) lead to heightened attention to negative stimuli and preferential processing of negative information. In sum, challenge (compared to threat) should result in heightened attention to and preferred processing of *negative* information.²

How does this apply to regulatory focus? A prevention focus is, by definition, a state in which events are being perceived as non-losses vs. losses. The attentional process in a prevention focus should prefer *negative*

¹Valence of events and stimuli is, at least since Kurt Lewin's work (e.g., Lewin, Heider, & Heider, 1936), considered as a function of person and event, because valence appraisals depend on people's goals. The valence of chocolate is, for instance, generally considered as positive, whereas for people who aim to lose weight chocolate will (also) have negative valence (see also Brendl & Higgins, 1995). There are, however, good reasons to assume that people associate the same valence with many stimuli. These associations (being stored in memory) are not necessarily the same as the valence that a specific stimulus has in any given moment. However, as research on affective priming has repeatedly demonstrated, people associate positive or negative valence with many stimuli and this can be spontaneously activated (e.g., Hermans, de Houwer, & Eelen, 1994). Along these lines, chocolate might also spontaneously elicit positive associations among those dieting, which they then downregulate – more or less successfully depending on the strength of their dieting goal. This spontaneously activated valence is what we target here.

²It should be noted that Blascovich and Mendes (2000) discussed the relation between affective cues and threat/challenge. Their focus was, however, on the role of affective cues, mood, and emotions as *antecedents* of threat and challenge. In contrast, the focus here is on the *consequences* of threat and challenge on the processing of affective or valenced stimuli.

(rather than positive) information that relates to potential (non-) losses. Conversely, a *promotion* focus should facilitate attention to and preferred processing of *positive* cues – because this motivational state is characterised by perceiving events as gains vs. non-gains, which is, in essence, a focus on positive cues and information. This suggests that:

Hypothesis 3a: Threat and promotion focus lead to heightened attention to and preferred processing of *positive* information (compared to challenge and prevention).

Hypothesis 3b: Challenge and prevention focus lead to heightened attention to and preferred processing of *negative* information (compared to threat and promotion).

Preferences for contexts, roles and groups

The motivational quality of these four states also has implications for the contexts, roles, and groups people seek to be in. Recall that threat/challenge is associated with a striving for *changing* the situation in a way that removes the reasons for vigilant/eager goal striving, respectively. Accordingly, threat and challenge should lead to a *low* preference for contexts, roles, and groups that would require people to apply the types of goal striving associated with threat/challenge even more. For instance, under threat, people likely do not prefer a context that requires them to be even more (rather than less) vigilant. Instead, contexts requiring a different (i.e., changed) type of goal striving should be preferred. Thus, threat should lead to a preference for social and contextual conditions that *do not favour* vigilant goal striving, but that enable a change in the type of goal striving. Similarly, challenge should result in a preference for contexts that *do not* require eager goal striving (but again, contexts that allow for a change).

This is likely to be different for regulatory focus. A *prevention* focus should lead to a preference for contexts that allow people to maintain vigilant goal striving. Research on regulatory fit has repeatedly shown that people prefer behaviour and tasks requiring them to apply and act in line with their current self-regulation strategy (Higgins, 2005; Motyka et al., 2014). This preference generalises to objects and people associated with these tasks (e.g., Hamstra, Van Yperen, Wisse, & Sassenberg, 2013). Analogously, a *promotion* focus (also being associated with applying their strategy) will instigate a preference for contexts demanding or allowing for eager self-regulation. This results in our final set of predictions:

Table 2. Overview of predictions regarding outcomes of threat, challenge, prevention focus, and promotion focus.

	<i>Goal striving</i>		<i>Motivational quality</i>		<i>Attention to/processing of ...</i>		<i>Preference for contexts & roles ...</i>	
	Vigilant	Eager	Change	Apply	Positive info	Negative info	Requiring vigilance	Requiring eagerness
Threat	x		x		x			x
Challenge		x	x			x	x	
Prevention	x			x		x	x	
Promotion		x		x	x			x

Hypothesis 4a: Threat and a promotion focus elicit a stronger preference for contexts, roles, and groups that require eager goal striving (compared to challenge and prevention focus).

Hypothesis 4b: Challenge and a prevention focus elicit a stronger preference for contexts, roles, and groups that require vigilant goal striving (compared to threat and promotion focus).

Summary

The IMEV makes predictions about (a) transitions between threat and prevention focus, (b) transitions between challenge and promotion focus, as well as (c) the effects of threat, challenge, prevention and promotion on both the processing of valenced stimuli and preferences for certain contexts, roles, and groups. Given that threat and prevention rely on the same goal striving *needs*, as do challenge and promotion, it seems intuitively plausible that transitions within each pair are likely to occur (Hypotheses 1 & 2). In light of this prediction, it might seem surprising that these pairs should result in different outcomes (Hypotheses 3 & 4; see Table 2 for an overview of the predictions). These differences are due to the different motivational qualities involved in the Biopsychosocial Model and Regulatory Focus Theory – namely, *striving for change* under threat/challenge vs. *applying a strategy* under prevention/promotion.

Empirical evidence

We now review the evidence relevant to IMEV. First, we address research on the transitions between concepts (relevant to Hypotheses 1 & 2). Next, we report work on the outcomes of the four motivational states, starting with the processing of valenced stimuli, followed by the preference for contexts, roles, and groups (Hypotheses 3 & 4).

Evidence on transitions between motivational states

From regulatory focus to threat and challenge

According to IMEV, people entering a motivated performance situation in a (chronic or situationally determined) prevention focus are more likely to appraise this upcoming situation as a threat; in contrast, people entering the same situation in a promotion focus are more likely to appraise that situation as a challenge (Hypothesis 1). Sassenrath et al. (2016) tested this in two studies. Before people entered a motivated performance situation, the first study assessed chronic regulatory focus with the promotion and prevention focus scales developed by Sassenberg, Ellemers, and Scheepers (2012). These are revised versions of the scale by Lockwood, Jordan, and Kunda (2002) and, compared to the original, include more approach-related items in the prevention scales and avoidance-related items in the promotion scale (see Table 3 for sample items). Participants (undergraduate students, $N = 83$) learned that they would complete a demanding cognitive performance test and then read a sample item. Afterwards, their threat and challenge appraisals for this upcoming test were assessed using items adapted from the stress appraisal measure developed by Peacock and Wong (1990). In line with Hypothesis 1, the stronger participants' chronic promotion focus was, the more challenge they reported ($B = .45, SE = .17$), whereas the stronger their chronic prevention focus was, the more threat they perceived ($B = .57, SE = .20$). However, promotion did not predict threat ($B = -.13, SE = .21$), nor did prevention predict challenge ($B = .03, SE = .16$)³

The second study was an experiment ($N = 54$ undergraduate students), manipulating regulatory focus via the “mice in the maze” procedure

Table 3. Sample items from regulatory focus measures.

<i>Regulatory Focus Questionnaire</i> (Higgins et al., 2001)	
<i>Promotion:</i>	I feel like I have made progress toward being successful in my life. Do you often do well at different things that you try?
<i>Prevention:</i>	Not being careful enough has gotten me into trouble at times (reversed). Did you get on your parents' nerves often when you were growing up?
<i>General Regulatory Focus Measure</i> (Lockwood et al., 2002)	
<i>Promotion:</i>	I often think about how I will achieve academic success. I often imagine myself experiencing good things that I hope will happen to me.
<i>Prevention:</i>	In general, I am focused on preventing negative events in my life. I frequently think about how I can prevent failures in my life.
<i>Scale by Sassenberg et al. (2012)</i>	
<i>Promotion:</i>	My motto is “Nothing ventured, nothing gained”. The big picture is more important to me than the details.
<i>Prevention:</i>	Success sets me at ease. I am literally always following rules and regulations.

³Throughout this article, only significant effects are reported as “influences” or “predictions” unless clearly indicated otherwise (e.g., marginal relations are presented as “trends”).

(Friedman & Förster, 2001), which asks participants to navigate a mouse through a maze. To induce promotion focus, participants had to prevent the mouse from starving by guiding it towards cheese (i.e., fulfilling its eagerness needs, mentioning non-gains and gains, in line with the requirements for regulatory focus manipulations discussed above); to induce a prevention focus, they needed to prevent the mouse from falling prey to a raptor by navigating it towards a mouse hole (i.e., fulfilling safety and security needs, again mentioning losses and non-losses). The procedure then followed Study 1. Perceived resources for the upcoming test were assessed as a mediator with an item commonly used in research on the Biopsychosocial Model (e.g., Tomaka et al., 1997; “I believe that I can cope with the problems.”). Supporting Hypothesis 1, participants reported more threat in the prevention ($M = 4.02$, $SE = .24$) than in the promotion condition ($M = 3.27$, $SE = .24$), and more challenge in the promotion ($M = 4.95$, $SE = .23$) than in the prevention condition ($M = 4.23$, $SE = .23$). In line with our earlier reasoning, there was an indirect effect of regulatory focus via perceived resources on both threat and challenge appraisals (see Figure 1). People in the prevention condition perceived fewer resources than those in the promotion condition; in turn, perceived resources predicted more challenge and less threat.

Other research (Keller & Bless, 2008, Study, p. 3) showed that in the absence of any additional intervention, a higher promotion focus and a lower

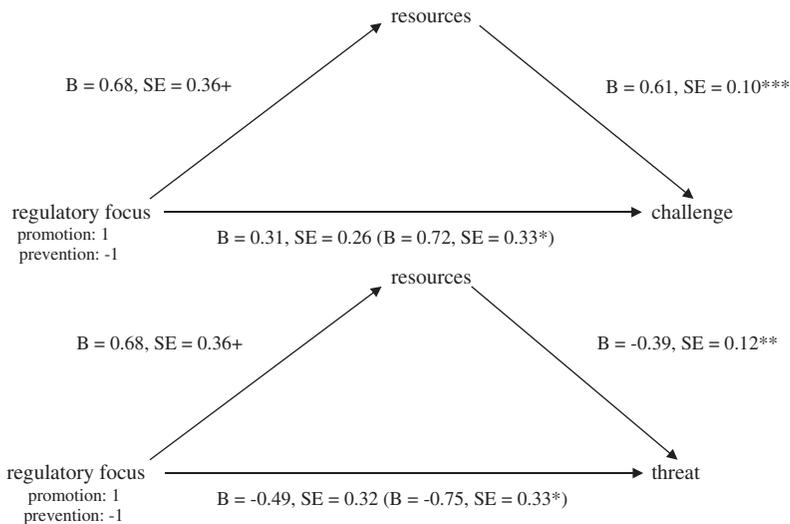


Figure 1. Regression weights for the impact of regulatory focus via perceived resources on challenge (a) and threat (b) while controlling for mood (+: $p = .064$; *: $p < .05$; **: $p < .01$; ***: $p < .001$).

***: $p \leq .001$, **: $p \leq .01$, *: $p \leq .05$, +: $p = .064$.

Reproduction of Figure 2 from Sassenrath et al. (2016) approved by Hogrefe AG, Switzerland.

prevention focus (here reported as a difference score from similar promotion and prevention scales as those used in the first study by Sassenrath et al., 2016) led to higher performance as predicted by the participants, which can be interpreted as a proxy for perceived resources. This study also showed how the effect of regulatory focus on threat/challenge can be overcome: when positive expectations about task performance were induced (i.e., perception of low resources was “compensated”), the effect of regulatory focus on participants’ own predicted performance disappeared.

From threat/challenge appraisals to regulatory focus

IMEV suggests that people appraising an upcoming task as a threat will adopt a prevention focus, whereas those appraising an upcoming task as a challenge will adopt a promotion focus (Hypothesis 2). Research testing this prediction directly is, to the best of our knowledge, lacking, but several studies provide indirect, converging evidence that is consistent with this hypothesis.

First, there is evidence from research on the potential threat in inter-racial interactions. European Americans often appraise such interactions as threatening, because they are afraid of appearing prejudiced (Trawalter & Richeson, 2006) – in the terminology of the Biopsychosocial Model, these people may perceive that they have insufficient resources to cope with the demanding task of “not appearing prejudiced” in inter-racial interaction. If threat facilitates a prevention focus, European Americans, after (thinking about) an inter-racial interaction, should behave in a way that is similar to those with an induced prevention focus. Trawalter and Richeson (2006) conducted an experiment on this issue by inducing promotion focus, prevention focus, or reminding participants of the interracial nature of an ostensibly upcoming interaction before they performed a Stroop task. As expected, participants who were *reminded* of the inter-racial nature of the interaction (i.e., in the potential “threat” condition) showed the same performance pattern as those in a *prevention* focus, and a different one compared to those in a promotion focus: the Stroop effect was stronger for those in a prevention focus and the interracial condition than for those in a promotion focus. This provides initial evidence that a potential threat may elicit a prevention focus.

Furthermore, there is evidence from research on stigmatised group membership. Members of minorities or stigmatised groups see their group membership as a threat, because it is typically associated with unfair treatment (i.e., fewer resources or higher demands than majority members in demanding situations). In line with our reasoning for Hypothesis 2, Oyserman, Uskul, Yoder, Nesse, and Williams (2007) hypothesised that the mere activation of a stigmatising group membership (in our conceptualisation a potential “threat”) would heighten people’s *prevention* focus. Two experiments supported this: merely reporting their stigmatised group

membership before completing a regulatory focus questionnaire (from Lockwood et al., 2002, see Table 3) led to a higher prevention focus, but did not affect promotion focus. Conversely, activating a *majority* group membership did not affect regulatory focus. Moreover, people reporting *frequent* experiences with unfair treatment (i.e., potentially frequent exposure to “threat”) reported higher prevention scores than those who had experienced less unfair treatment. This once again provides support for the prediction that threat may elicit a prevention focus.

Finally, evidence suggests that positive performance-related ingroup stereotypes lead to a *promotion* focus, whereas negative performance-related ingroup stereotypes (so-called stereotype threat) lead to a *prevention* focus. Positive stereotypes imply sufficient resources to cope with a task at hand and, thus, challenge appraisals; negative stereotypes imply insufficient resources and, thus, threat appraisals. Across five experiments, Seibt and Förster (2004) demonstrated that negative stereotypes (“threat”) led to better recall of avoidance-related words and better *analytic* performance; conversely, positive stereotypes (“challenge”) led to better recall of approach-related words and better *creative* performance. Moreover, positive expectations led to faster and less accurate verbal performance than negative expectations. All these differences in recall and performance resulting from negative and positive stereotypes – which likely imply *threat* and *challenge* appraisals – mirror outcomes that previous research had found for *prevention* and *promotion* focus, respectively.

Summary

Supporting Hypothesis 1, entering a motivated performance situation in a prevention focus indeed seems to render threat more likely. In contrast, approaching such a situation in a promotion focus renders challenge more likely. The negative impact of a prevention focus and the positive impact of a promotion focus on perceived resources seem to play a key role in the emergence of threat/challenge appraisals. However, these conclusions notably rest on the results of a small number of studies that are underpowered by current standards, and therefore in need of replication. Moreover, evidence with regard to the *physiological correlates* of threat and challenge is lacking, and the separate effects of prevention and promotion focus on resources appraisals have not been tested yet. Finally, none of the studies summarised above explicitly manipulated the presence vs. absence of motivated performance situations – another point that should be addressed in future research.

In line with Hypothesis 2, anticipating a *threatening* social interaction, or assuming that resources for an upcoming task might be low, leads to the kind of information processing that results from a prevention focus. In addition, the assumption that resources *suffice* elicits the type of information processing that is known to result from a promotion focus. Finally,

activating *threat*-related aspects of the self leads to a stronger prevention focus. This provides converging support for Hypothesis 2. However, there is no direct evidence yet for the impact of *challenge* on promotion focus (as opposed to the information processing style associated with the latter).

It should be noted that in all these studies, threat and challenge were implemented very subtly, for instance by reminding people of their stigmatised group membership or by announcing an upcoming inter-racial interaction. It might even be considered unlikely that this would be sufficient to create a motivated performance situation, and thereby to elicit threat or challenge as defined by the Biopsychosocial Model. Hypothesis 2 and these findings are rather more about the *anticipation* of motivated performance, which people then appraise as threat or challenge. Similarly, Hypothesis 1 does not state that prevention and promotion focus unconditionally result in threat and challenge; rather, these effects are just expected in motivated performance situations. As mentioned above, Hypotheses 1 and 2 are explicitly not about the temporal dynamics during goal-striving but about discrete points in time.

This is crucial with regard to the consistency of Hypotheses 1 and 2 with Hypotheses 3 and 4: Predicting *different* effects of threat/prevention and challenge/promotion on subsequent outcomes (as we do in Hypotheses 3 & 4), but at the same time predicting an immediate, unconditional transition within each pair, would be contradictory. This suggests that Hypothesis 2 is not (necessarily) applicable to situations in which people perceive *actual* threat and challenge – that is, when they are already engaged in motivated performance situations – but rather to situations in which an upcoming task is appraised as threatening or challenging at the *cognitive* level (which the hypothesis explicitly states exactly for this reason).

Evidence on the outcomes of motivational states

Evidence on the processing of valenced stimuli

According to IMEV, the four motivational states differentially or similarly affect the processing of valenced stimuli. Hypothesis 3 states that threat and a promotion focus lead to relatively heightened attention to and preferred processing of *positive* information, whereas challenge and a prevention focus lead to relatively heightened attention to and preferred processing of *negative* information. A substantial literature has shown this separately for threat vs. challenge and for prevention vs. promotion focus, which we will summarise first. Then, we will review the single study considering all four motivational states together.

Threat vs. challenge. The effects of threat vs. challenge on the processing of valenced stimuli were studied in research by Greving and Sassenberg (2015, 2018; Greving, Sassenberg, & Fetterman, 2015). They directly studied the

impact of threat (vs. challenge or a neutral control condition) on the processing of positive and negative information across a number of processing steps during an internet search. In most of these studies, threat versus challenge was induced along the lines of appraisals. Undergraduate participants recalled a situation in their current life that was demanding (e.g., an upcoming exam as a student) and for which they perceived themselves to have either sufficient or insufficient resources, the implication being that they were thinking about a challenge or threat. In other studies, the threat condition was compared to a neutral control condition in which participants were asked to think of a routine situation in their daily life. Afterwards, participants conducted internet searches or parts of an internet search process. Greving and Sassenberg (2015, Study, p. 1) manipulated threat versus neutral control in an experiment. Afterwards, undergraduates ($N = 51$) generated *search terms* for an unrelated internet search on a health topic (living organ donation). The search terms were rated for their valence (scale: 1 for negative to 9 for positive) by three independent raters ($r > .75$). Supporting Hypothesis 3, participants generated more positive search terms (e.g., “surgery success”; “life quality”) under threat ($M = 4.86$, $SD = 0.36$) than in the control condition ($M = 4.63$, $SD = 0.39$).

This focus on positive information under threat was also found when testing the impact of threat vs. challenge and control conditions on the *selection of links* from a search engine results list. Greving and Sassenberg (2018) manipulated threat, challenge and a neutral control condition as described above among 116 undergraduate students. Afterwards, participants were asked to inform themselves about living organ donation by selecting links from a list with four neutral (e.g., “organ donation committee”), six positive (e.g., “organ donation can save lives”) and six negative links (e.g., “possible side effects”). Then, they read the texts that the links led to. An index of positive valence of selected links was computed by subtracting the number of selected negative links from the number of selected positive links and dividing the result by the total number of selected links. In line with Hypothesis 3, the selected links were more positive in the threat condition ($M = .01$, $SD = 0.21$), than in both the neutral ($M = -.06$, $SD = 0.16$) and the challenge conditions ($M = -.11$, $SD = 0.22$). The latter two conditions showed the predicted pattern but did not differ significantly (for similar results see Greving, Sassenberg, & Fetterman, 2015, Study 2). For the time participants subsequently spent reading the texts which the positive, neutral and negative links led to, we found the same pattern of results (see Figure 2; this result was replicated for actual internet searches, Greving et al., 2015, Study 71).

This preferential processing and selection of positive information under threat (vs. challenge) also has implications for the information that people recall and the judgments they make afterwards. Evidence for this was provided in an experiment (Greving et al., 2015, Study 3) inducing threat and challenge

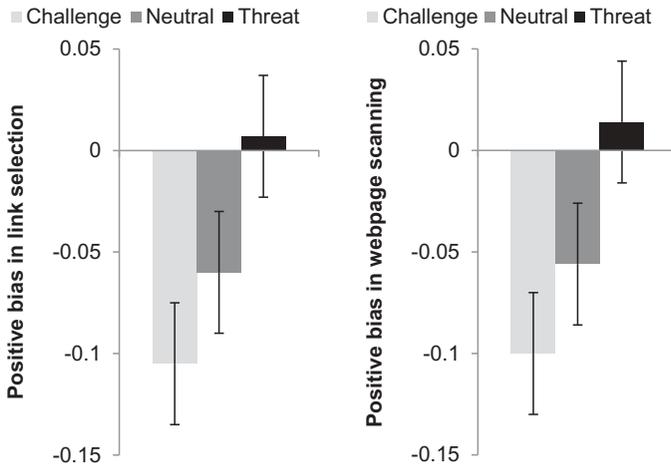


Figure 2. Means and standard errors for a positive bias in link selection and webpage scanning from Greving and Sassenberg (2018).

Note: Reproduction of Figure 1 from Greving and Sassenberg (2018) under Creative Commons licence CC BY-NC 3.0.

as described above, before undergraduate participants ($N = 41$) read 16 short texts (76–99 words) about living organ donation from different internet sources. Afterwards, participants judged the positive (e.g., beneficial) and negative aspects (e.g., risks) of living organ donation, completed a distractor task, and finally were given a surprise free recall. Under threat (vs. challenge), participants *recalled* more positive information and judged the search target (here a medical treatment for an illness) more positively. Interestingly, no difference occurred for the recall of negative information or negative judgment dimensions (see Table 4). Moreover, a parallel study (Greving & Sassenberg, 2015, Study 2) manipulating threat (vs. control) only after participants ($N = 39$) had already read information and before asking them to recall that information, led to parallel results: Participants in the threat condition recalled more positive ($M = 4.55, SD = 3.04$) and less negative ($M = 4.06, SD = 3.13$) information than participants in the control condition (positive: $M = 3.31, SD = 3.08$;

Table 4. Means (Standard deviations) for information recall of information and evaluation of information as a function of valence of information and motivational state (Greving et al., 2015, study 3).

	Recall of information		Evaluation of information	
	Positive	Negative	Positive	Negative
Threat	6.60 (4.33)	7.05 (2.66)	6.48 (2.40)	5.33 (1.93)
Challenge	5.10 (3.29)	7.50 (5.07)	4.45 (2.11)	6.10 (1.68)

negative: $M= 5.96$, $SD= 4.09$). Thus, threat biases not only the encoding of information but also its retrieval.

Taken together, a number of studies have demonstrated that *threat* (compared to challenge or a neutral control condition) leads to preferential processing of *positive* information at different stages: generation of search terms, selection of links, reading of pages, recall of information, and judgements of topics. It is also worth noting that in studies that included a *challenge* condition, this state tended to lead to preferential processing of *negative* information (although these effects were, across the board, weaker). Can these effects found in lab experiments also be generalised to real-life internet searches?

To address this question, we conducted a longitudinal study in the context of information about colonoscopy as a prevention measure against bowel cancer (Becker, Grapendorf, Greving, & Sassenberg, 2018). In line with Hypothesis 3, we predicted that the threat associated with a cancer diagnosis would predict a more positive attitude towards colonoscopy, the more participants search on the internet for health information. A two-wave longitudinal study with 150 participants aged between 45 and 55 years (the age at which the colonoscopy is recommended for bowel cancer prevention) with a time lag of 6 months was conducted. At both measurement points, all measures were taken. Threat of diagnosis was assessed with items adopted from Peacock and Wong (1990), internet search for health information was assessed with two self-generated items (e.g., “How often do you use the internet for health-related purposes?”), and attitude towards colonoscopy was assessed with two self-generated items (e.g., whether they would participate in colonoscopy if their doctor would advise them to do so). As predicted, the interaction of threat and internet use (T1) predicted the attitude towards colonoscopy (T2): among those using the internet frequently for health purposes (+1 SD), more threat was related to more positive attitudes towards colonoscopy ($B= .37$, $SE = .10$), but not among those using the internet rarely ($B= -.10$, $SE = .06$). In other words, those who felt threat and confronted themselves with information frequently ended up with the most positive attitudes, which is in line with Hypothesis 3 (for similar results see Sassenberg & Greving, 2016).

All in all, evidence from a broad range of paradigms – ranging from the generation of search terms via memory biases to judgements in longitudinal studies – indicates that *threat* leads to preferential processing of *positive* information, whereas *challenge* leads to preferential processing of *negative* information. Prior studies focused more on effects of threat than those of challenge, but they also yielded clear evidence for the effect of challenge (vs. a neutral condition), in particular with regard to attention. Nevertheless, a clear limitation is that, so far, evidence relies exclusively on manipulations and measures of appraisal. Physiological evidence on this is, to the best of our knowledge, completely lacking.

Regulatory focus. Direct evidence for the impact of regulatory focus on the processing of positive and negative information is generally lacking; nevertheless, there is a good deal of indirect evidence. Across different contexts such as health and marketing, people in a promotion focus are more convinced by messages stressing gains (e.g., improved health), whereas people in a prevention focus are more influenced by messages stressing losses and how they can be avoided (e.g., no illness; for meta-analyses of the marketing literature, see Motyka et al., 2014; for a systematic review of the health literature, see Ludolph & Schulz, 2015). Lee and Aaker (2004), who conducted the first research on this effect, also provide evidence with regard to processing preferences: People in a promotion focus find messages stressing gains (which one could consider “positive” information) easier to process, whereas people in a prevention focus find messages stressing losses (“negative” information) easier to process. This perception mediated the interaction of regulatory focus and gain/loss-framing on persuasion – that is, the easier the message was to process, the more it persuaded the receiver. In a second study, regulatory focus differentially affected word recognition of gain- and loss-related words. Participants were asked to identify words that were presented and masked for 50 ms. In a promotion focus, *gain*-related words were more likely to be correctly identified, whereas, in a prevention focus, *loss*-related words were more likely to be correctly identified.

In line with our hypothesis, additional studies demonstrate that this effect of regulatory focus is not limited to losses and gains, but also holds for *negative and positive stimuli* more generally. de Lange and van Knippenberg (2007) showed that in an inference task, participants in a prevention focus were faster at suppressing negative (than positive) word content, whereas those in a promotion focus were faster at suppressing positive (than negative) words which they were not supposed to respond to. The authors took this as evidence that a prevention focus leads people to process *negative* content faster, whereas a promotion focus leads people to process *positive* content faster.

Finally, many studies support the downstream effects of these preferences in information processing. For example, people in a prevention focus show stronger affective responses when a cost is presented as loss, whereas those in a promotion focus respond more strongly when a cost is presented as non-gain (Idson et al., 2000). Furthermore, those in a prevention focus learn payoff structures better when they consist of losses, whereas those in a promotion focus do so when the payoff structures consist of gains (Markman, Baldwin, & Maddox, 2005). It, therefore, seems justified to conclude that a prevention focus leads to preferential processing of *negative* cues, and that a promotion focus leads to preferential processing of *positive* cues, although direct evidence for this effect is lacking.

The impact of all four motivational states. There is also a direct test of Hypothesis 3 that considers the four motivational states together. Sassenberg, Sassenrath, and Fetterman (2015) tested the impact of threat/challenge and promotion/prevention on attention to negative stimuli among 88 undergraduate students in the lab. Threat and challenge were induced by recalling events (resembling the appraisal structure of threat/challenge as described above; Greving & Sassenberg, 2015). The manipulation of regulatory focus also relied on the recall of events (to render it as similar as possible to the induction of threat/challenge). Participants were asked to recall three events, two of which they had succeeded in and one in which they had failed to apply either vigilant, prevention-oriented or eager, promotion-oriented self-regulation. This manipulation was adopted from Higgins et al. (2001) and has been employed in many other studies (e.g., Hamstra, Sassenberg, Van Yperen, & Wisse, 2014). Afterwards, participants performed a dot-probe task. Here, they indicated as quickly as possible whether a dot appeared on the left or right side of a screen. Before the dot appeared, a noun was displayed on each side of the screen for 500 ms; in target trials, one of these nouns was neutral and the other was negative. Attention to negative words is indicated by faster responses on trials in which the dot appeared in the same location as the negative word than on trials in which the dot appeared in the same location as the neutral word. As expected, motivational state and word (neutral vs. negative) interacted: Correct responses to dots replacing a negative (compared to a neutral) word were faster (i.e., more attention to *negative* words) in the challenge condition and marginally in the prevention condition, but not in the two other conditions (see Table 5).

Taking all the evidence together, there is substantial support for Hypothesis 3. Yet, studies comparing all four motivational states within a single design are rare and more such studies need to be conducted in the future. Moreover, studies considering the impact of physiological correlates of threat/challenge as a more indirect, but objective indicator should be undertaken.

Table 5. Means (standard errors) of ln-transformed and raw response times in milliseconds to dots replacing negative and control words, broken down by motivational state (Sassenberg et al., 2015).

	Prevention	Promotion	Threat	Challenge
Negative words				
ln	5.890 (.028)	5.832 (.030)	5.913 (.027)	5.820 (.029)
ms	365.89	343.59	372.52	339.32
Control words				
ln	5.903 (.026)	5.830 (.028)	5.912 (.026)	5.840 (.028)
ms	370.41	342.79	372.04	345.70

Evidence for preferences for contexts, roles, and groups as an outcome

Hypothesis 4 predicts that threat and a promotion focus elicit a preference for contexts, roles, and groups requiring eager goal striving, whereas prevention and challenge elicit a preference for contexts, roles, and groups requiring vigilant goal striving. Relevant evidence comes from two lines of research, one on leadership and one on the attraction of social power.

Promotion and prevention focus in the context of leadership. Followers infer from leadership behaviour (i.e., how a leader acts and treats them) which type of behaviour the leader expects them to show. According to Sassenberg and Hamstra's (2017) self-regulation model of leadership behaviour, this includes whether followers feel encouraged to apply vigilance or eagerness strategies. *Transactional* leadership behaviour – focusing on requirements, rules, errors, and contingent rewards to subordinates – encourages followers to show a vigilant self-regulation style (focusing on rules and errors). In contrast, a *transformational* leadership style – communicating visions and high expectations, but also considering followers' needs and providing intellectual stimulation – encourage eagerness strategies (trying out new ways of doing things). Combining this with Hypothesis 4, threat and promotion should lead to a preference for a specific social context, namely, for transformational leadership (encouraging eager self-regulation) among their leaders, whereas challenge and prevention should lead to a preference for transactional leadership (encouraging vigilant self-regulation).

A cross-sectional study among 104 psychology students holding a part-time or full-time job (Hamstra, Van Yperen, Wisse, & Sassenberg, 2011) assessed participants' regulatory focus, using the Regulatory Focus Questionnaire (RFQ; Higgins et al., 2001) which measures past success in eager and vigilant self-regulation as indicators of promotion and prevention focus, respectively (for sample items see Table 3). Participants then indicated their turnover intentions (i.e., a preference for leaving the context, here the organisation) on two items (e.g., "How likely is it that you will quit your job at this organization in the next six months?") as well as their perception of their direct supervisors' leadership style. With regard to the latter, transformational and transactional leadership were assessed with (a Dutch translation) of the standard instrument: the Multifactor Leadership Questionnaire (MLQ, Den Hartog, Van Muijen, & Koopman, 1997). As expected, we found that for participants with a strong *prevention* focus (+1 SD), *transactional* leadership predicted lower turnover intentions ($\beta = -.41$) and for participants with a strong *promotion* focus (+1 SD), *transformational* leadership predicted lower turnover intentions ($\beta = -.63$). Both relations were weaker and not significant for those with a weak promotion and prevention focus, respectively. In short, supporting Hypothesis 4, promotion-focused followers had lower intentions to quit (and thus

preferred) a context encouraging eager self-regulation (here, transformational leadership); prevention-focused followers had lower intentions to quit (and thus preferred) a context encouraging vigilant self-regulation (here, transactional leadership).

The same prediction using a different measure for the evaluation of the context was tested in a lab experiment (Hamstra, Sassenberg, et al., 2014). Undergraduate students ($N = 108$) were invited in groups of three. One person was allocated the role of a leader, the other two were followers. Only the leader knew the group task and had to inform the other group members, as well as assign rewards to them after the task was completed. Followers' regulatory focus was measured before the group task with the scale by Sassenberg et al. (2012). Transformational and transactional leadership style were rated, based on video recordings by two independent raters ($r > .9$). The stronger followers' prevention focus was, the more they felt valued when leaders showed a transactional leadership style ($b = 0.96$, $SE = 0.34$), but not when leaders did not do so ($b = -0.29$, $SE = 0.27$). Moreover, the stronger followers' promotion focus was, the more they felt valued when leaders showed a transformational leadership style ($b = 0.81$, $SE = 0.25$), but not when leaders did not do so ($b = 0.11$, $SE = 0.17$). Again, this demonstrates that regulatory focus predicts the social context people seem to prefer (here, one in which they feel valued).

Finally, Hamstra, Van Yperen, Wisse, and Sassenberg (2014) provided evidence that leadership styles (in interaction with followers' regulatory focus) impact perceived leader effectiveness via encouraged *strategies*. Study 1 tested the interaction between leadership style (MLQ) and follower regulatory focus (RFQ) on perceived leader effectiveness (e.g., "My supervisor carries out his/her role well") in a cross-sectional study among 92 employees. Higher scores on a promotion-prevention index interacted with transactional ($\beta = -.24$) and transformational leadership style ($\beta = .27$; see Figure 3). Again, in line with Hypothesis 4, the stronger the followers' prevention (rather than promotion) focus was, the more effective they perceived a leader with an increasing *transactional* leadership style to be. In contrast, the stronger the followers' promotion (rather than prevention) focus was, the more effective they perceived a leader showing an increasing *transformational* leadership style to be. In sum, followers' regulatory focus and leaders' styles (as a contextual feature) predicted how effective followers judged their leader to be – reflecting preferences for a specific social context.

Study 2 tested the key component of the *process* underlying this effect, namely, that followers perceive transactional leadership to encourage vigilance strategies, whereas they perceive transformational leadership to encourage eagerness strategies. Leadership styles (MLQ) and perceptions of encouraged strategies (e.g., vigilance: "comply with rules and regulations"; eagerness: "be ambitious") were assessed in a sample of 139

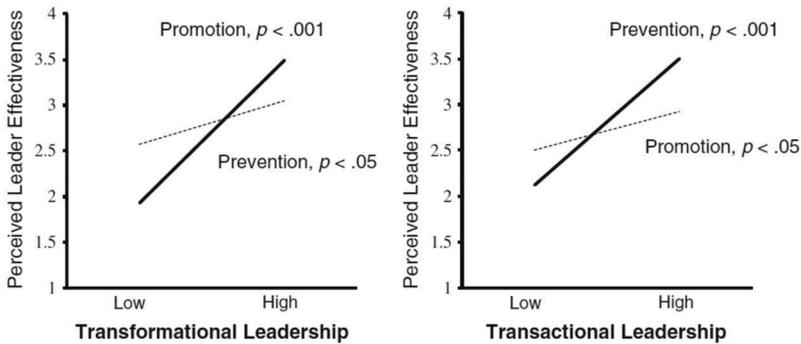


Figure 3. Followers' perceptions of their leader's effectiveness as a function of followers' regulatory focus and leaders' transformational and transactional leadership (Hamstra, Van Yperen, et al., 2014; study 1).

Note: Reproduction of Figure 2 c & d from Hamstra, Van Yperen, et al. (2014) based on John Wiley & Son license number 4605870148367.

employees in a cross-sectional design. As expected, transactional leadership predicted the perceived encouragement of vigilance ($\beta = .62$), but not eagerness strategies ($\beta = .05$). In contrast, transformational leadership predicted the perceived encouragement of eagerness ($\beta = .77$), but not vigilance strategies ($\beta = .02$). A follow-up study replicated this experimentally (Hamstra et al., 2014, Study 3).

In Studies 4 and 5, we tested the causal path from encouraged strategies to perceived leader effectiveness (Study 4, $N = 113$) and follower effort (Study 5, $N = 84$, in both studies adults were recruited online), which was again assumed to be moderated by followers' regulatory focus (RFQ; promotion-prevention index). In Study 4, encouraged strategies were manipulated using vignettes which requested participants to imagine that their leader had encouraged them to use eager or vigilant strategies, depending on experimental condition; afterwards, they rated the effectiveness of that leader (same scale as before). Study 5 used the same manipulation but replaced the leader effectiveness scale with the task of writing a text without using the letters *a* and *n*. Persistence on this task, measured in seconds, served as a dependent measure of follower effort. As predicted, predominantly prevention-focused followers perceived leaders who encouraged vigilant (rather than eager) strategies to be more effective; by contrast, predominantly promotion-focused followers perceived leaders who encouraged eagerness (rather than vigilant) strategies to be more effective. The same pattern was found for follower effort (see Figure 4; for similar findings see Stam, van Knippenberg, & Wisse, 2010a, 2010b). Taken together, this supports the idea that followers' regulatory focus predicts preferences for

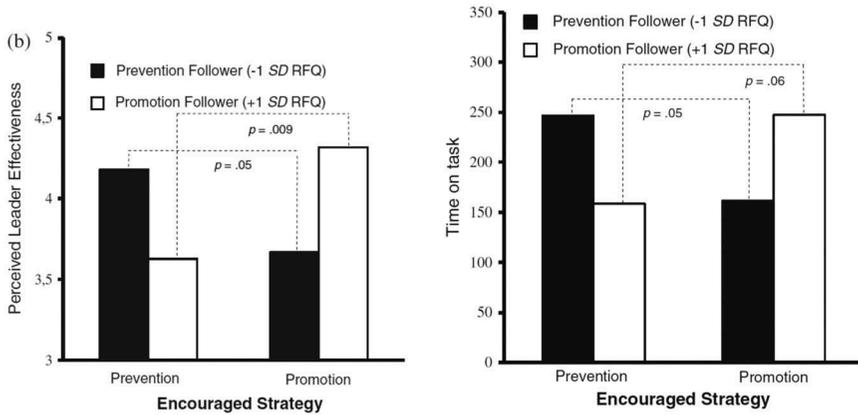


Figure 4. Perceived leader effectiveness as a function of encouraged strategy and follower regulatory focus (Hamstra, Van Yperen, et al., 2014; study 4 & 5).

Note: Reproduction of Figures 3b and 4 from Hamstra, Van Yperen, et al. (2014) based on John Wiley & Son license number 4,605870148367.

social context (leadership styles), because leadership styles suggest which strategies followers should employ.

In sum, across this series of studies, Hamstra and colleagues showed that prevention-focused people prefer contexts encouraging vigilant self-regulation, whereas promotion-focused people prefer contexts encouraging eager self-regulation. This effect occurred regardless of whether the encouragement resulted from leadership behaviour, or from directly communicated expectations. Similar effects occurred for organisational norms encouraging eager and vigilant self-regulation (Hamstra, Sassenberg, Van Yperen, Wisse, & Rietzschel, 2015). Evidence was collected using a wide variety of measures – turnover intentions, feeling valued, perceived leader effectiveness, and follower effort. All in all, this provides strong evidence that regulatory focus impacts preferences for contexts, roles, and groups encouraging vigilant or eager self-regulation.

Next, we summarise the (considerably smaller) literature addressing the impact of threat and challenge on preference for these contexts. Stam, van Knippenberg, Wisse, and Pieterse (2018) studied the impact of societal or organisational crises on the preference for leaders' encouragement of vigilant and eager self-regulation strategies. According to the authors, a crisis psychologically implies an "inadequacy of existing resources to counter a negative course of events", which produces intense feelings of negative affect. Based on this definition, crisis has an appraisal structure that is in line with the definition of threat in the Biopsychosocial Model: The resources are insufficient to address the current demands. Although Stam, van Knippenberg, Wisse, and Nederveen Pieterse (2018) did not explicitly label the resulting state as threat,

intense feelings of negative affect come very close to the experience of threat. A possible difference between threat and a crisis is that in the case of threat, the demands result from a motivated performance situation an individual is facing, whereas a crisis, such as a bad economic state of a company, the “negative course of events” is not necessarily perceived as demanding by all employees, but it should be by the people studied by Stam et al. (2018), namely managers. All in all, this comparison indicates that a crisis will lead to threat in leading (though not all) members of the affected group (e.g., company). Therefore, we consider the work by Stam et al. (2018) to be informative regarding the impact of threat. In line with IMEV, Stam et al. (2018) predicted that in a crisis (i.e., under *threat*), followers will endorse and be more motivated to follow a leader who encourages *eager* (rather than *vigilant*) self-regulation.

In an archival study, the relation between US presidents’ leadership style (i.e., encouragement for eagerness vs. vigilance), economic circumstances (i.e., threat vs. challenge), and endorsement of the presidents was examined. The authors predicted that the worse the economic situation was, the more eagerness- (rather than vigilance-) encouraging speeches should facilitate the endorsement of a president. The content of 35 inaugural speeches was analysed for the amount of eagerness- and vigilance-related language: inflation and economic growth were used as indicators of economic crisis; evaluations of political scientists, as well as reelection results, served as indicators of leader endorsement. Leader endorsement was, indeed, higher the more their inaugural speeches encouraged eagerness in times of crisis (i.e., under threat; high inflation and low economic growth), but this was not the case when the economic situation was good. Although this study had high external validity, it suffered from a small sample size and a correlation design. Therefore, the authors conducted two additional experiments.

The first experiment either informed students that the current economic situation would render their situation on the job market difficult (crisis or threat) or did not provide this information (control). Then, participants read a speech from a professor that either endorsed eagerness- or vigilance-oriented self-regulation and instructed them to do a task. The performance was lowest when the professor endorsed vigilance in the threat condition, compared to all other conditions – which is in line with our argument for Hypothesis 4 that threat leads to the avoidance of contexts that require vigilant self-regulation. The second experiment used a business case and replicated these findings.

Taken together, this work on leadership supports the idea that threat and promotion lead to a preference for contexts encouraging *eager* self-regulation, whereas prevention leads to a preference for contexts encouraging *vigilant* self-regulation. The available evidence for the effects of regulatory focus is more substantial than that for threat appraisals. Interestingly, the impact of *challenge* appraisals has so far not been studied in the domain of leadership. Comparisons across all four motivational states and research

using cardiovascular indicators of threat and challenge are also lacking at this point. Here, additional research is clearly needed.

Preferences for roles and groups related to social power. Research on the attraction of social power is also relevant to Hypothesis 4. Being in a powerful position or group allows for eager self-regulation, given that people high in power are in control of their own and others' situation. In contrast, being in low-power roles or groups necessitates vigilant self-regulation because others control one's own situation and outcomes (Keltner, Gruenfeld, & Anderson, 2003). Combined with Hypothesis 4, this suggests that threat and a promotion focus should lead to a positive evaluation of high-power roles and groups, whereas challenge and a prevention focus should lead to a (relatively more) positive evaluation of low-power roles and groups. Evidence for these predictions comes from a multitude of studies.

The impact of regulatory focus on the attraction of power was tested by Sassenberg, Jonas, Shah, and Brazy (2007). In the first study, 38 undergraduates rated the adequacy of eager vs. vigilant self-regulation strategies on five 9-point bipolar scales (e.g., try out something new vs. follow rules) for members of groups that were high or low in status or power. To manipulate group power, participants were asked to think about a group with a lot (vs. average) influence; to manipulate status, they thought of a group high (vs. average) in reputation. Participants then rated the adequacy of eager vs. vigilant strategies for members of each of the four groups. In line with the above reasoning, eagerness (vs. vigilance) strategies were perceived to be more adequate for members of high-power ($M = 5.74$, $SE = 0.25$) than low-power groups ($M = 3.40$, $SE = 0.27$); no difference was found for high-status ($M = 4.61$, $SE = 0.23$) or low-status groups ($M = 4.83$, $SE = 0.33$). Thus, high-power groups should be more attractive for those in a promotion focus, given that they prefer eager self-regulation, whereas low-power groups should be more attractive for those in a prevention focus who prefer vigilant self-regulation.

Study 2 manipulated regulatory focus using the mouse in the maze task (Friedman & Förster, 2001) and assessed the perceived power of and attraction to 16 social roles (e.g., manager, politician, member of a student union). The higher people in a promotion focus (versus prevention focus) perceived the power of a social role to be, the more they should be attracted to this role. Overall, the more participants ($N = 82$ undergraduates) were attracted to a social role, the stronger they perceived its power to be. This main effect was qualified by the predicted power \times regulatory focus interaction. Social power predicted the attraction of a social role to a stronger extent for those in a promotion focus ($B = 0.33$, $SE = 0.046$; $\eta^2_{\text{part.}} = .084$) than for those in a prevention focus ($B = 0.19$, $SE = 0.047$; $\eta^2_{\text{part.}} = .026$). In short, the power

of a social role contributes more to its attraction for those in a promotion focus than those in a prevention focus.

Study 3 focused on the attraction of social groups, rather than social roles, and manipulated social power, rather than assessing people's perception of power. One-hundred and thirty-five undergraduate students were asked to think about a high vs. low-power group and indicate its attraction after their regulatory focus had been manipulated (using the mice in the maze task). Replicating Study 2, high-power groups were more attractive than low-power groups, but this was again qualified by their regulatory focus (see Figure 5). People in a promotion focus showed a stronger preference for high-power groups ($M = 5.48$, $SE = 0.21$) than people in a prevention focus ($M = 4.85$, $SE = 0.21$), whereas this pattern reversed for low-power groups (promotion: $M = 3.65$, $SE = 0.19$; prevention: $M = 4.21$, $SE = 0.19$).

Given the strong main effect of power when explicitly assessing group attraction, Studies 4 and 5 used *implicit* measures in the form of a lexical decision task with sequential priming. The primes were city names and the targets were positive words, negative words, and non-words. For the East German participants in this study (72 undergraduates born and studying in the Eastern part of Germany), a pretest indicated that West Germany constitutes a high-power outgroup, whereas Poland constitutes a low-power outgroup. Accordingly, in the high-power condition, East German and Polish city names served as primes; in the low-power condition, East and West German city names served as primes. Participants were asked to judge as quickly as possible whether a target string was a word or a non-word. Faster responses to positive words and slower responses to negative

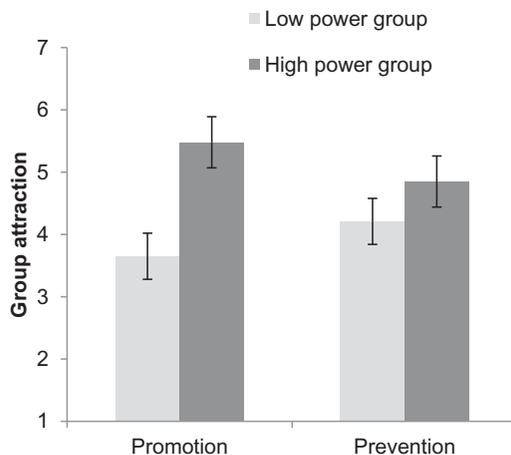


Figure 5. Mean group attraction by regulatory focus and group power and 95% CI error bars (Sassenberg, Jonas, et al., 2007, study 3).

words following ingroup primes, as well as slower responses to positive words and faster responses to negative words following outgroup primes, were combined into an index of *preference for the ingroup over the outgroup* (adopted from Sassenberg & Wieber, 2005). In Study 4, regulatory focus was assessed using the RFQ; in Study 5, it was manipulated via the framing procedure introduced by Crowe and Higgins (1997).

In Study 4, a marginal main effect of power was qualified by the predicted power \times promotion focus and power \times prevention focus interactions. In the higher ingroup power condition (i.e., East Germany vs. Poland), neither promotion focus ($\beta = -.08$) nor prevention focus ($\beta = -.23$) significantly predicted ingroup bias. However, in the lower ingroup power condition (i.e., East-Germans vs. West-Germans), a stronger promotion focus predicted less ingroup bias ($\beta = -.50$) and a stronger prevention focus predicted more ingroup bias ($\beta = .51$). This pattern of results was replicated experimentally in Study 5. In sum, regulatory focus predicted preferences for social power (in terms of roles and groups) in line with Hypothesis 4.

Sassenberg, Brazy, Jonas, and Shah (2013) replicated these findings with gender groups. Relying on the fact that women are still generally seen as holding less social power than men, it was predicted that women in a prevention focus and men in a promotion focus would show greater ingroup bias. Study 1 ($N = 61$ undergraduates) assessed regulatory focus using the Selves Questionnaire (Higgins, 1989). In this questionnaire, participants rate how much their current actual self fits their ideal and their ought self, based on four ideals and four statements about their ought self (which they generate themselves). Actual-ideal discrepancies serve as an indicator for promotion focus, actual-ought discrepancies serve as an indicator of a prevention focus (Higgins et al., 1997; Pham & Avnet, 2004). Afterwards, participants' gender intergroup bias was assessed using the same implicit measure as above, using "female" and "male" instead of city names as primes. A promotion dominance score was computed by subtracting the prevention (ought) score from the promotion (ideal) score. Conceptually replicating the findings by Sassenberg, Jonas, et al. (2007), there was a gender main effect that was qualified by the predicted promotion dominance \times gender interaction. Females showed a stronger preference for their gender ingroup (over the outgroup), the less their promotion focus dominated over their prevention focus ($\beta = -.33$). For males, the pattern descriptively reversed ($\beta = .28$). Study 2 replicated these effects, manipulating regulatory focus via framing (Crowe & Higgins, 1997). Finally, in Study 3, undergraduate students filled in the RFQ and rated both genders regarding non-stereotypic positive and negative adjectives (e.g., honest, healthy, bad, intolerant). A promotion dominance \times gender interaction again predicted ingroup bias. For women, there was a trend towards stronger

ingroup bias when their promotion focus was less dominant over their prevention focus ($\beta = -.30$), whereas the opposite trend was found for men.

Sassenberg, Ellemers, and Scheepers (2012, Study 2b, $N = 40$ undergraduates) found further evidence for the validity of the idea that individuals with a (strong) promotion focus prefer high-power groups because these groups allow for eager self-regulation. They manipulated the construal of power as opportunity vs. responsibility, asking participants to put themselves into the role of the organiser of a sports event and to rate whether certain measures would contribute to the success of the event (stressing the *opportunities* that their power would provide) or whether measures would constitute ethically responsible action (stressing the *responsibility* that their power would bring). Afterwards, the valence associated with social groups and roles that are high vs. low in power was assessed using the same implicit measure as before (here using names of high- and low-power groups and roles as primes). Power construed as opportunity allows for an eager pursuit of one's own goals, whereas power construed as responsibility requires the careful consideration of multiple goals (e.g., outcomes of actions for others). Accordingly, the authors predicted that a chronic promotion focus would predict a preference for high- over low-power groups when construing power as opportunity (i.e., when power allows for eagerness), but not when construing power as responsibility. Indeed, there was a significant interaction between promotion focus and construal of power on the implicitly assessed preference for high- over low-power groups. The stronger participants' promotion focus was, the more they preferred high- over low-power groups when construing power as opportunity ($\beta = .69$), but not when construing power as responsibility ($\beta = -.10$).

Sassenberg and Scholl (2013) tested whether this effect generalises to job characteristics and job offers in three studies. Do employees high in promotion focus value power at work more and do employees high in prevention focus value security more? In Study 1, we tested the relation between regulatory focus and valuing power and security at work, using a cross-sectional design among 111 business students shortly before they went on the job market. Study 2 used a two-wave longitudinal design among 168 young employees (job experience $M = 1.83$ years) with measurements taken 2 months apart. Cross-lagged panel analysis was conducted using the same measures as Study 1. In the final study, we assessed regulatory focus among 115 undergraduate students and asked them to rate the attraction of job advertisements focusing on power ("We offer training in order to develop leadership skills, the responsibility for a project team, and participating in organizational decisions") or security ("We offer well-practiced working processes in a good team atmosphere, planned establishment as a permanent official . . ."). In all studies, regulatory focus was assessed using the scale by Sassenberg et al. (2012) and in Studies 1 and 2, valuing power and autonomy in the job was assessed using items from a job value questionnaire (Cable & Edwards, 2004; e.g., "to have a certain amount of

power and authority”). Across studies, a stronger promotion focus predicted valuing power more (Study 1: $\beta_{\text{promotion}} = .41$; Study 2: $\beta_{\text{promotion}} = .23$) and being more interested in the job that provided power (Study 3: $\beta_{\text{promotion}} = .22$); conversely, a stronger prevention focus predicted valuing security more (Study 1: $\beta_{\text{prevention}} = .25$; Study 2: $\beta_{\text{prevention}} = .12$) and being more interested in the security-oriented job (Study 3: $\beta_{\text{prevention}} = .24$).

Overall, there is ample evidence that a promotion focus elicits a preference for high power, providing the opportunity for eager self-regulation, whereas a prevention focus facilitates a preference for low power, requiring vigilant self-regulation. In what follows, there is evidence that threat results in a preference for contexts *not* requiring vigilant self-regulation, and there is even a study testing the effects of threat, challenge, promotion, and prevention focus on the attraction of high and low social power. These studies will now be summarised.

Stollberg, Fritsche, and Bäcker (2015) tested the hypothesis that a threat to people's need for control will increase identification with *agentic* groups, but not with non-agentic groups. A control need threat likely leads to threat appraisals, as defined by the Biopsychosocial Model. The authors asked participants to think back to a situation in which they had no control over what was going on – in other words, a situation in which demands exceeded their resources. The idea is that agentic groups provide members with control over their situation, which comes very close to having social power and allows for more eager and/or less vigilant self-regulation. These studies are, therefore, very relevant for understanding the impact of threat on avoidance of (or low preference for) contexts requiring vigilance.

In their Study 1, Stollberg et al. (2015) threatened or affirmed the need for control by asking participants to recall a situation when they either did or did not have control over what was happening. They then assessed participants' identification with an agentic group (a task group) and each of three control groups (e.g., a loose association of people such as a spontaneous gathering). As predicted, control need threat (vs. control need affirmation) led to higher identification with the *agentic* group, but not with the three control groups. In Studies 2 and 3, the authors tested the attraction of groups that are high or low in agency in a less confounded way, manipulating agency by asking participants to recall a situation in which they did or did not feel influential or powerful. Afterwards, all participants rated the same groups. Together, these three studies demonstrate that threat leads to a preference for groups that require less vigilant self-regulation or allow for more eager self-regulation.

Scholl, Sassenrath, and Sassenberg (2015) conducted an integrated test of Hypothesis 4, including all four motivational states in two experiments that only differed with regard to the manipulation: In the first experiment they manipulated regulatory focus and in the second experiment they manipulated

threat vs. challenge. Experiment 1a was a replication of Experiment 3 from Sassenberg, Jonas, et al. (2007). To manipulate regulatory focus, 60 undergraduate students were asked to work through the mice in the maze task. Then, they were asked to think of a high- and a low-power group of their choice and to indicate their attraction to each. As predicted, and replicating Sassenberg, Jonas, et al. (2007), participants in a promotion focus were more attracted to high-power groups ($M = 5.58$, $SE = 0.33$) than were participants in a prevention focus ($M = 4.58$, $SE = 0.33$), whereas participants in a prevention focus were more attracted to low-power groups ($M = 3.82$, $SE = 0.28$) than were participants in a promotion focus ($M = 2.95$, $SE = 0.28$).

In Experiment 1b, we manipulated challenge/threat by asking 80 undergraduates to complete an open-ended questionnaire about exam preparation. They imagined that they either used the opportunity to retake an exam they had passed in order to improve their grade, or had the final chance to resit an exam which they had failed. In the former case, resources outweighed demands, which should induce challenge; in the latter case, demands outweighed resources, which should induce threat. As expected, high-power groups were more attractive in the threat ($M = 5.61$, $SE = 0.29$) than challenge condition ($M = 4.95$, $SE = 0.29$), and low-power groups were more attractive in the challenge ($M = 3.90$, $SE = 0.19$) than threat condition ($M = 3.30$, $SE = 0.19$). These two studies provide evidence for fully testing and supporting Hypothesis 4.

Despite the fact that evidence on the effects of threat and (in particular) challenge appraisals is still rare, the literature on leadership and the attraction of social power summarised in this section clearly supports IMEV: Threat and a promotion focus lead to greater attraction to contexts, roles, and groups allowing for eager self-regulation, whereas challenge and a prevention focus lead to greater attraction to contexts, roles, and groups allowing for vigilant self-regulation. There is, nevertheless, a clear need for further research on the impact of threat and challenge appraisals on these variables, given that this has rarely been studied.

Summary and outlook

The current paper aimed to integrate threat and challenge as conceptualised by the Biopsychosocial Model (Blascovich & Tomaka, 1996) with promotion and prevention focus as introduced by Regulatory Focus Theory (Higgins, 1997). To this end, we introduced IMEV as a model highlighting the similarities and differences between the four motivational states of threat/challenge and promotion/prevention focus, and deriving predictions from them. The Biopsychosocial Model and Regulatory Focus Theory both compare vigilant and eager self-regulation, but focus on different motivations underlying these

types of self-regulation. *Striving for change* is inherent to threat/challenge, whereas *applying a strategy* is inherent to prevention/promotion focus.

Given that the same needs underlie threat and prevention and that the same needs underlie challenge and promotion, we predicted that transitions within these pairs of concepts are particularly likely (Hypotheses 1 & 2). Moreover, due to their different motivational qualities, states sharing the same underlying need should result in opposing outcomes. Specifically, both threat and promotion should facilitate the processing of positive stimuli and lead to a preference for (social) contexts requiring eager, rather than vigilant, goal striving. In parallel, both challenge and prevention should facilitate the processing of negative stimuli and lead to a preference for (social) contexts requiring vigilant rather than eager self-regulation (Hypotheses 3 & 4).

As noted earlier, the research discussed above was not conducted to test IMEV, but rather stems from diverse literatures. As a result, the measures and manipulations used are somewhat heterogeneous and allow for alternative explanations. However, across the board, the findings appear to provide consistent support for our hypotheses. This support would be strengthened if three major shortcomings were addressed in the future: First, studies assessing *cardiovascular* indicators of threat/challenge are scarce (which is not surprising, given the resource-demanding nature of these studies). Second, studies comparing the outcomes of *all four* motivational states are rare; indeed, one of the motivations for writing the current article was to inspire more research of this type. In particular, the consistent use of measures and manipulations of the four motivational states across hypotheses within IMEV would allow for clearer support for the model. Third and finally, many of the studies were conducted before current norms for *statistical power* were implemented (in our own as well as in other labs). Thus, it is not surprising that some sample sizes are small by current standards. In these cases, the need for appropriately powered replications is clearly indicated. In addition, a number of specific shortcomings were acknowledged in the summary sections above. In sum, there is a clear need for more research integrating the Biopsychosocial Model and Regulatory Focus Theory.

The main argument in favour of research of this type is that in the past, threat and prevention (and partly also challenge and promotion) have often been considered to be similar, closely related, or even alike (e.g., Oyserman et al., 2007; Seibt & Förster, 2004). We have (hopefully convincingly) shown that there are good reasons for this – namely, that transferring from threat to prevention and from challenge to promotion is highly likely. However, the fact that threat vs. prevention, as well as challenge vs. promotion, can lead to opposing outcomes (processing of valenced stimuli; preferences for social contexts) suggests that states sharing the same underlying need also need to be *distinguished*, despite being related in other ways. This

combination of relatedness and differences in outcomes highlights the value of integration efforts and of research including more than a single pair of concepts, as is traditional in self-regulation research.

Future research should not only seek to test the model and hypotheses presented here more thoroughly, but also extend it to other outcomes. One such outcome is *cognitive performance*. One could hypothesise that threat (vs. challenge) undermines cognitive performance because it implies continuous monitoring for potential escape, such as stop signals (i.e., positive cues); this impairs processing capacity and performance (e.g., Blascovich, Mendes, Hunter, & Salomon, 1999). However, much depended on the nature of the task. The vigilant vs. eager goal striving in a prevention vs. promotion focus, respectively, implies that there would be a performance advantage on tasks requiring the application of these strategies. Analytic tasks require vigilant, rule-based goal striving; accordingly, a prevention focus leads to better performance on such tasks. In contrast, creativity requires eager, flexible goal striving, which is why a promotion focus leads to better performance on such tasks (cf. Crowe & Higgins, 1997; Friedman & Förster, 2005).

There is ample evidence in line with these predictions within research on the Biopsychosocial Model and Regulatory Focus Theory. For example, Chalabaev et al. (2009) found that less threat-related (as opposed to challenge-related) cardiovascular activity predicted higher GRE (Graduate Record Examination) performance. Similarly, Scholl, Möeller, Scheepers, Nüerk, and Sassenberg (2017) showed that the higher the cardiovascular indicators of threat (as opposed to challenge) were and the lower resource appraisals were, the worse numerical cognition was. With regard to regulatory focus, Friedman and Förster (2001, 2005; see also Crowe & Higgins, 1997) have demonstrated that a promotion focus leads to higher creative performance, whereas a prevention focus leads to higher analytic performance. What is lacking is an empirical integration of and comparisons between the effects of all four motivational concepts on cognitive performance. This represents an avenue for further research.

Another aspect that deserves attention is the dynamics of *changes* between the four motivational states during goal striving. As mentioned above, Hypotheses 1 and 2 only capture transitions between threat/challenge and promotion/prevention at a given point in time. However, when taking action and making (or not making) progress, this might also result in transitions between concepts. For instance, certain events during goal-striving might lead to regulatory fit, which is an energizing experience; such experienced fit might lead to the appraisal of stronger resources and render challenge more likely, independent of whether fit results from a promotion or a prevention focus. This is just one of the many ways in which the model could be extended.

Future research should also strive to integrate *other* self-regulation approaches, beyond the two examined here. For example, a self-regulation duality that could be integrated into the current model is the distinction between approach and avoidance. As discussed above, the four concepts discussed here are closely related due to their joint focus on outcomes of the same valence. However, research and theorizing that would enable the integration of approach/avoidance, threat/challenge, and regulatory focus is currently lacking.

Conclusion

Across a heterogeneous set of effects (processing of valenced stimuli and attraction of contexts, roles, and groups), both prevention and challenge and promotion and threat result in similar *outcomes*. In other words, concepts with different underlying needs seem to have the same effects, even though the transition between promotion and challenge and prevention and threat (i.e., concepts with the same underlying needs) has been demonstrated to occur. The different outcomes are due to the difference in *motivational quality* between threat/challenge and promotion/prevention. Although the current theorizing and summary offers a coherent picture, there is much scope for further research, ranging from tests of the current model to extensions in order to integrate other self-regulation approaches. We argue that the *integration of different approaches* to self-regulation is what is needed in order to synthesise the many local patterns observed so far into a more global understanding of human self-regulation.

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