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## CONCEPTUAL REVIEW

# A Self-determination Theory Approach to Understanding Stress Incursion and Responses

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### Abstract

Given the high costs of stress for both mental and physical health, understanding of how stress is incurred and how it is coped with has both theoretical and clinical significance. Self-determination theory (SDT), a broad framework for understanding motivation and personality, speaks to many issues concerning stress-related phenomena. Research based on SDT suggests that both less stress incursion and better coping with demanding events are associated with greater autonomous functioning, higher mindfulness, more interest-taking in internal events, and lifestyles focused on pursuing intrinsic over extrinsic goals, among other factors. These topics are discussed within the growing body of empirical research stemming from SDT and linkages are drawn with the larger literature on stress and coping. Copyright © 2011 John Wiley & Sons, Ltd.

### Keywords

stress; coping; health; well-being; self-determination theory; needs

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## Introduction

Life in most modern societies introduces ubiquitous potential stressors. Negotiating identities, careers, finances, relationships and the many other challenges of a complex world presents both transient and chronic stressors that can have negative implications for mental health (e.g. Melchior, Berkman, Niedhammer, Zins, & Goldberg, 2007; Taylor, Repetti, & Seeman, 1997) and physical health (e.g. Banyard, Edwards, & Kendall-Tackett, 2009; Seeman, 1989; Standage & Ryan, *in press*). At the same time, research has also demonstrated substantial variability in both perceptions of and responses to potentially stressful events (Weinstein, Brown, & Ryan, 2009). Identifying the various factors that predict reactions to stressors is thus important for understanding the processes and consequences of stress, as well as for developing interventions aimed at ameliorating stressor impact.

Interest in constructs such as resilience and coping (Kessler & McLeod, 1984; Rutter, 1979) reflects attempts to identify characteristics that predict more positive (or at least less negative) outcomes of stress. Literature on resilience focuses on identifying patterns of positive adaptation in the context of adversity. More resilient individuals may perceive challenging situations as less stressful or less overwhelming. Over time, reduced stress attributions lead to lower rates of physical illness and

psychological disorders (Dohrenwend & Dohrenwend, 1974; Elliott & Eisdorfer, 1982). Resilience also concerns the prevention of stress incursion—the likelihood of experiencing stress and negative physiological arousal—typically because of dispositional characteristics that help individuals to experience less stress over the lifespan. When people are resilient to stressors, they behave in ways that facilitate well-being across life domains, maintaining satisfying relationships with others (e.g. Anderson, 2006), behaving productively at work (e.g. Bacharach, Bamberger, & Conley, 1991; Scott, Hwang, & Rogers, 2006) and engaging in physically healthy behaviours (Ng & Jeffery, 2003).

Coping, on the other hand, refers to attempts to manage perceived stress and related negative emotions as these arise (e.g. Lazarus, 2000). A number of approaches have been proposed that examine specific coping styles or the particular strategies individuals use to regulate stress after its occurrence. One example is a literature that examines avoidance and approach coping strategies (S. Roth & Cohen, 1986). Studies emerging from this literature indicate that quality of coping can consistently predict short- and long-term outcomes of stressor exposure, and that certain personality and contextual predictors influence the quality of coping selected in a given stressful environment (Carver & Connor-Smith, 2010; Schwarzer & Knoll, 2007).

Both resilience and coping processes are thus a function of person and situation factors (Lazarus, 1999); i.e. individuals bring much to the table with respect to how they respond to present stressors, but contextual supports can also greatly facilitate adaptive stress responses. In this paper we examine both personal and contextual factors affecting stress through the lens of *self-determination theory* (SDT; Deci & Ryan, 1985a; Ryan & Deci, 2000), an increasingly employed framework for the study of motivation and well-being. Specifically, we explore individual differences (e.g. autonomous orientations, mindfulness) that support resilience and positive coping in response to stressors, and aspects of the environment (e.g. supports for psychological need satisfactions) that strengthen individuals and facilitate their capacity for positive responding. We also discuss the issue of adaptive energy available for coping, or subjective vitality (Ryan & Deci, 2008; Ryan & Frederick, 1997), as a resource that can either be facilitated or depleted within social contexts.

### SDT constructs in brief

Within the framework of SDT to develop and function optimally, individuals are presumed to universally require basic psychological nutrients that are conceptualized as *basic psychological needs* (Ryan, 1995). The three most basic needs are those for *competence*, or the perception that one is capable of influencing the environment in desirable ways; *relatedness*, or the feeling of closeness and connectedness with others; and *autonomy*, or the perception that one's behaviour is self-congruent and volitional. Satisfaction of these basic needs can be supported or thwarted within social environments. If their environments support their needs, individuals experience a sense of well-being and they move towards motivational states that are characterized as self-volitional or autonomous. Autonomous motivational states in turn encourage pursuit of interests and goals and experiences that further satisfy these basic needs. On the other hand, in environmental conditions that thwart basic needs, well-being is lowered and motivation is pressured or controlled. Controlled individuals often incur stress because they either fail to identify environments that provide basic psychological need satisfaction or actually select themselves into stress-producing situations, and as a result may be more prone to experience stress. There is a voluminous literature indicating that autonomy, relatedness and competence supports from the environment enhance wellness, whereas thwarting these needs leads to ill-being (Ryan & Deci, 2000).

Figure 1 depicts the model characterizing this literature. Individuals who receive satisfaction of the three basic psychological needs from the environment become increasingly autonomously motivated with respect to their behaviours, choices and cognitions. In turn, these individuals pursue increasingly need-

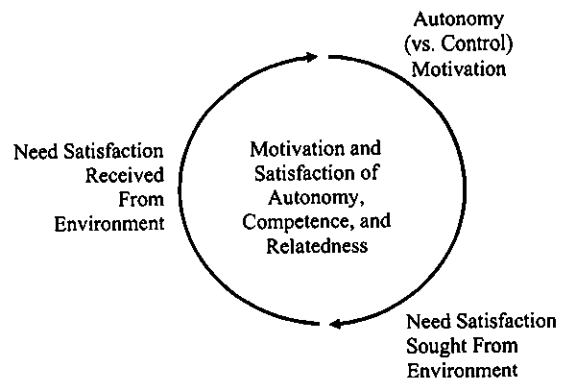


Figure 1 Relation of need satisfaction to autonomous motivation

satisfying environments that further support their autonomous motivation and well-being.

In addition to environment supports, certain attentional states, namely those characterized by awareness and *mindfulness*, encourage autonomous motivation and enhanced stress regulation (K. W. Brown & Ryan, 2003; K. W. Brown, Ryan, & Creswell, 2007). Mindfulness is characterized by an open, receptive and non-judgmental orientation to the present (Martin, 1997). Insofar as mindfulness fosters a fuller awareness of what is occurring, it is conducive to behaviours that are more congruent and autonomous on a daily basis (K. W. Brown & Ryan, 2003). We argue that both directly and indirectly, through its impact on autonomy motivation, mindful attention facilitates stress resilience and more positive coping.

Recent work in SDT has also gone beyond examining the reasons for goal-directed behaviours to also consider the content of people's life goals, or their *aspirations*, and their impact on need satisfaction and consequent well-being (Niemi, Ryan, & Deci, 2009). Two types of major life goals or aspirations can be distinguished. Intrinsic goals are those oriented towards behaviours that satisfy basic psychological needs and are thus inherently satisfying to pursue. These include goals for personal growth, health, intimate relationships and community. Conversely, extrinsic goals are focused on material or social rewards and are typically not directly related to, and can even thwart, basic need satisfactions. Such goals include those for wealth, popularity/fame and image (Kasser, 2002; Kasser & Ryan, 1996). When the latter goals are relatively strong, SDT predicts lower wellness stemming from both greater stress incursion and lower need satisfaction.

In part, autonomy motivation, mindful awareness and intrinsic aspirations act on stress regulation by their impact on *vitality*, or the perceived positive energy available to the self (Ryan & Deci, 2008). We later discuss the role of vitality in increasing capacity for positive stress responding.

## Part I: the resilient personality

### Autonomy orientations

One important predictor of how individuals incur and respond to stress is the motivational orientation under which they are functioning. SDT distinguishes autonomy and control orientations as two distinct ways of self-regulating behaviour (Deci & Ryan, 1985b, 2000). *Autonomy orientation* refers to the tendency to regulate behaviour on the basis of interests and one's integrated goals and values, and involves a sense of choice about and endorsement of one's own behaviour. This is to be distinguished from autonomy orientation as defined by the sociotropy/autonomy literature, in which it is described as an excessive concern about independent achievement or an exaggerated preoccupation with perfection and fear of personal failure, which is related to higher stress (Kwon & Whisman, 1998; Sato, Harman, Donohoe, Weaver, & Hall, 2010). In contrast, a *control orientation* refers to the tendency to self-regulate according to external contingencies and pressures and involves a sense of coercion and pressure (Ryan & Deci, 2000). People high in control orientations perceive social contingencies and rewards as salient and organize their behaviours accordingly.

Early work on autonomy and control orientations suggested that being motivated by control rather than autonomy broadly relates to personality constructs that have maladaptive implications for stress, including type A personality patterns, a sense of public self-consciousness and a sense of pressure around achievement tasks (Deci & Ryan, 1985a). More recent research identifies behavioural outcomes of controlled versus autonomous motivation orientation. For example, Knee, Neighbors and Vietor (2001) showed that control-oriented participants were more likely to engage in behaviours indicative of road rage, such as angry driving, hostile gestures or others and experience anger while driving, all behaviours also indicative of poor regulation of stress.

However, researchers are only now beginning to identify relations of autonomous and controlled motivational orientations with stress impact (Weinstein & Hodgins, 2009). Though this research is still nascent, we propose four mechanisms by which motivational orientations impact on stress responses. Firstly, we believe that an autonomy motivational orientation facilitates fuller processing of emotions related to stressful events, which over time results in lower perceived stress and better physical and emotional health. Secondly, we review work suggesting that an autonomy orientation leads individuals to respond non-defensively to stressors, anticipating and interpreting stressors as challenges versus threats and engaging in less avoidant coping after a stressor, all mechanisms that lead to positive outcomes. Thirdly, we suggest that an autonomy orientation encourages *interest-taking* in one's own experiences in the face of stress or anxiety, which is a

helpful strategy for downregulating stress. Finally, we propose that autonomously oriented individuals are more likely to pursue life experiences, and set life goals, that induce less stress.

### Stress processing

When individuals are exposed to stressful situations, they are challenged with the task of processing the consequent emotions (anxiety, fears of failure, sadness, anger, etc.). Emotional processing refers to the cognitive (but not always conscious) task of understanding and organizing emotion-related information to make sense or meaning of a stressful event (Park & Folkman, 1997). Ultimately, doing so imposes a cognitive structure on painful experiences, which aids in making the information understandable, acceptable and palatable (Lepore, Ragan, & Jones, 2000; Pennebaker, 2002). One theory describing this process, multiple code theory (Bucci, 1995), proposes that as emotionally charged experiences are processed, one begins to identify and name such experiences and to establish referential links among cognitions. As individuals build multidimensional connections over time, they integrate emotional experience with their broader understandings. The type of language they use when describing their stressful experiences can identify where individuals are with respect to these processes. For example, fragmentary verbalization and concrete language words have been identified as two indicators that a stressful stimulus has not been fully or completely processed, such that the individual continues to attempt to organize unintegrated material (Bucci, 1995). Additional research shows that cognitive processing words related to cause-and-effect explanations (such as 'realize' and 'understand') are characteristic of well-developed emotional processing (Pennebaker, Mayne, & Francis, 1997). That is, when individuals have processed a stressful event well, their language involves more indicators that they have made some sense or meaning from the experience, and can speak about it in more tangible ways.

Tapping into these linguistic indicators, evidence suggests that autonomy motivation facilitates processing of emotionally challenging events. Weinstein and Hodgins (2009) demonstrated that autonomously functioning individuals, either as an individual difference or as a result of motivational priming that elicits autonomy versus control orientations in the moment, are capable of more effectively processing stressful events. In these studies, autonomously motivated individuals were more likely to demonstrate fuller processing of stressful material, as indicated by their language use. When writing about a distressing film they were asked to watch, autonomous individuals were more likely to use cognitive processing terms and less likely to use concrete word terms to describe their thoughts and feelings. Mediation analyses demonstrated that these indicators of processing were at least partially responsible for adapting to the emotionally challenging film after

repeated exposure, as was indicated by less anxiety and other physical and affective negative outcomes, as well as having more available energy after the film.

### Defence, threat and avoidance

A larger body of research has indicated that autonomous individuals tend to approach stressful events with more resilience and more adaptive coping styles. Specifically, studies identify two indicators of stress resilience that are characteristic of autonomous functioning. Firstly, consistent with the stress attribution literature, autonomous individuals are more likely to perceive events as challenging rather than as stressful. Secondly, autonomous individuals are more likely to reduce defensive responding and respond to stressors with active and adaptive coping styles rather than an avoidant method of coping.

According to appraisal theories (Folkman & Lazarus, 1985; Kobasa, 1982; Tomaka, Blascovich, Kelsey, & Leitten, 1993), when individuals appraise an event as threatening, they perceive that the danger exceeds their personal resources, and as a result they fear potential loss over expecting potential gain. On the other hand, when individuals make challenge appraisals, they perceive adequate resources for dealing with a given situation, and therefore consider the possibility of gain from a stressor. The functional outcomes are perceptions of stress, anxiety and helplessness versus perceptions of challenge, energy and readiness to perform (Tomaka et al., 1993). Studies on motivation in the workplace show that when individuals are autonomous with respect to their work—enjoying and valuing the work rather than working to earn external rewards—they experience more sense of challenge with respect to work-related stressors and less pressure. In turn, they are more productive and effective at work (Amabile, Hill, Hennessey, & Tighe, 1994). Studies comparing autonomous to controlled motivational styles showed that those who are controlled are less persistent and perform more poorly when receiving negative feedback. On the other hand, autonomous individuals showed resilience persistence and performance after failure (Koestner & Zuckerman, 1994). Manipulation of success and failure led to similar results in a study of a children's activity when children were encouraged to orient to the activity autonomously or with control (Boggiano & Barrett, 1985). These studies demonstrate that more autonomy-oriented individuals are less sensitive to threatening and potentially stressful situations, choosing instead to view them as challenges to be met.

One reason that controlled (as compared to autonomously) functioning individuals are more likely to perceive stressors as threats rather than as challenges might be their higher level of defence. Defensive responses are similar processes to threat versus challenge reactions, in that both constructs are reflective of desires to avoid, minimize harm and 'cut losses' rather than to approach a stressful event head-on (e.g. S. Roth & Cohen, 1986).

Defence responses may occur in part because control-motivated individuals have more to lose when encountering stressful situations. One potential loss is the control-motivated individuals' self-esteem. Those who are autonomously motivated have a buffer in terms of a stable sense of self-esteem, which is not contingent on behaviours and outcomes being 'just so', whereas self-esteem in control-motivated individuals is vulnerable to their achieving certain ends, based on internalized or external societal expectations (Hodgins, 2008; Kernis, Paradise, Whitaker, Wheatman, & Goldman, 2000; Ryan, 1991). Thus, when encountering a stressful event, autonomy-oriented individuals perceive fewer potential losses to worldviews and negative self-perceptions (Cohen & Ashby Wills, 1985), and make fewer negative attributions about potential losses, and as a result they have less to defend against.

The link between autonomy and control motivation and defence has been demonstrated in several studies. For example, an autonomy orientation predicts likelihood of apologizing rather than defending or deceiving after wrongdoing (Hodgins, Liebeskind, & Schwartz, 1996). In addition, romantic partners in conflict are more likely to exhibit behaviours indicative of interpersonal openness rather than defence if they are autonomy oriented (Knee, Lonsbary, Canevello, & Patrick, 2005). As well, when participants are asked to think back to shameful past experiences, control-oriented individuals disown their memories, whereas those who are autonomous accept and integrate their negative experiences (Weinstein, Deci, & Ryan, in press).

These indicators of defence have been shown specifically within the context of stress regulation. For example, Weinstein and Hodgins (2009) found that individuals either high in individual-level autonomy or primed with autonomy tended to use more self-referencing pronouns (*I, my*, rather than *you, it*, etc.), indicative of more self-honesty about their experiences (Campbell & Pennebaker, 2003) and an absence of dissociation or defence (Dulaney, 1982; Newman, Pennebaker, Berry, & Richards, 2003). The absence of these defensive processes was at least partly responsible for the positive effects of autonomy motivation on negative emotions such as anxiety and lower energy after an unpleasant stimulus. In addition, Hodgins et al. (2010) showed that after a stress-inducing personal interview, participants who were primed with autonomy showed less physiological cardiovascular arousal indicative of threat versus challenge reactions, and showed lower defence as indicated by verbal responding (e.g. increased latency before responding, decreased response length and higher pitched voice tones). These indicators suggested that autonomy-primed (as compared to control-primed) individuals were less threatened and defensive when exposed to the same environmental stressor (the interview). As a result of non-defence, these individuals were able to perform more highly at a subsequent performance speech task.

Defensive responding also manifests as a preference for coping with negative emotions or stressful events by using avoidance rather than approach. While avoidant coping can reduce distress in the short term, it is ultimately ineffective in supporting well-being (Davies & Clark, 1998). In contrast, approach coping involves a cognitive, emotional or behavioural 'turning towards' stressful situations. Over longer time periods, avoidance coping styles are associated with poorer health (Compas, Malcarne, & Fondacaro, 1988; Holahan & Moos, 1990). Preliminary research supports the role of motivation in predicting approach rather than avoidance coping styles. Specifically, Knee and Zuckerman (1998) showed that individuals higher in dispositional autonomy were less likely to use defensive coping styles, denial, behavioural disengagement and mental disengagement (common indicators of avoidance coping styles; Stowell, Kiecolt-Glaser, & Glaser, 2001).

### Interest-taking

SDT posits that one characteristic of autonomous responding that has only recently received attention is *interest-taking* (Ryan & Deci, 2008), or the desire for new knowledge and experience (e.g. Litman, 2005). Turned outward towards aspects of the environment, interest-taking encourages exploration, growth and openness, thereby continually building both knowledge and skills (Deci & Ryan, 1985a; Silvia, 2006), providing a foundation for intellectual development and growth (Berlyne, 1966). William James (1890) was one of the first to propose that curiosity is an instinct, and to state its importance in facilitating problem solving and flexible, adaptive reactions to new situations. Empirical evidence has supported this claim. Interest relates to exploration, intrinsic motivation and information seeking (Deci & Ryan, 1985a; Fredrickson, 1998; Izard & Ackerman, 2000; Sansone & Smith, 2000; Silvia, 2005; Tomkins, 1962), all of which reflect a tendency towards expanding oneself and responding flexibly to new situations. Spielberger and Starr (1994) similarly described curiosity as a positive and important sign that one is flexibly adapting to the environment.

Turned inward towards one's own emotional experiences, interest-taking can act as a stress-regulatory mechanism. Specifically, although many of the studies conducted on interest focus on its relation to external stimuli, interest is not limited to orienting one's attention to external experiences. It may also be aroused in response to internal phenomena, such as thoughts and feelings, either those already present or in reaction to external events (Kashdan, 2004; Kashdan & Roberts, 2004). As is the case for external stimuli, certain internal stimuli may elicit a stronger interest response than others, primarily when novel and ambiguous, complex or contradictory (Silvia, 2005). When individuals take an interest in their own internal experiences, they may be more likely to effectively regulate negative internal emotions in response to challenging life events. Some

initial evidence supports the relation of curiosity and effectively experiencing emotions. Specifically, preliminary studies testing the relation of trait curiosity to emotional intelligence found that having a sense of curiosity towards exploring new stimuli was related to higher levels of attention to emotions, absorption (concentration on internal stimuli) and clarity of emotion (Leonard & Harvey, 2007).

According to SDT, interest-taking leads to optimally effective emotion regulation by facilitating the assimilation and integration of emotions with other previously held experiences, emotions and beliefs. When individuals take an open interest in their experiences, they are more likely to fully acknowledge and assimilate both acceptable and unacceptable aspects of the emotional experience, make sense of those experiences in a personal way and select those aspects of experience with which they most identify (Ryan, 1993). When fully aware of emotional states, experiences may then be utilized to accurately inform volitional action. Thus, individuals may select behavioural responses congruent with their values and with presently occurring aspects of the external world (Koestner, Bernieri, & Zuckerman, 1992; Ryan, Deci, Grolnick, & La Guardia, 2006). Conversely, when affectively laden experiences are characterized by pressure and control as opposed to interested awareness, they are felt as more threatening and are therefore more likely to elicit ineffective avoidant regulatory strategies aimed at suppressing or avoiding them (Ryan et al., 2006).

Those who are more curious have been shown to have not only a higher positive affect, but also a sense of energy and activation paired with less anxiety (Kashdan, 2004). In addition, recent research by Assor and colleagues supports the expectation that interest-taking—in this case formulated as *integrative regulation*—is an adaptive regulatory style. For example, Assor and Roth (2007) found that participants' degree of satisfaction with their success in coping with fear and sadness correlated positively with their integrative regulation of these emotions (see also Assor, Roth, & Deci, 2004). Integrative regulation may be particularly adaptive in the area of intimate relationships, which are a frequent source of stress-related supports. Roth, Assor, and Eliot (2004) found that integrative regulation was positively associated with appropriate disclosure of personal difficulties in close relations, empathic listening and support of one's intimate partner; controlling regulation demonstrated a particularly strong negative association with disclosure of personal difficulties and providing support for a partner expressing emotional difficulty.

In addition, as a result of processing them effectively, emotions could be utilized to provide needed information, but can also be downregulated when no longer useful. Weinstein (2009) examined these processes within an experimental study of interest-taking as a strategy for coping with rejection and ameliorating

potentially harmful carryover effects. To this end, participants in a laboratory study were first led to believe that a peer had rejected them. They were then asked to write for 7 min. The content of the writing depended on assignment to one of three conditions. In a *suppression* condition, they were asked to suppress their feelings and instead focus their attention to neutral events that had occurred earlier in the day. In an *expression* condition, participants were asked to express thoughts and feelings using procedures drawn from Pennebaker and colleagues (Pennebaker, Kiecolt-Glaser, & Glaser, 1998; Petrie, Booth, & Pennebaker, 1998), but were given no more instructions on how to do so. An *interest-taking* condition asked that participants not only express, but also take an interest or curiosity in their emotional experiences while doing so. Affect (specifically, anger, prosocial affect and internalization of rejection) was measured immediately after the writing and at the end of the study. Additionally, participants rated audiotaped speeches in which the individual who rejected them, and an unrelated individual, engaged in moderate levels of self-disclosure. Results showed no effects of condition immediately following the writing procedure, although individuals in the interest-taking condition showed lower implicit aggression immediately after writing. At the end of the study, however, interest-taking individuals reported less anger, more prosocial affect and less internalization of rejection as compared to the other groups. Individuals in all conditions judged the rejecting target similarly, but those in the interest-taking condition were kinder to unrelated targets. This indicated that, for participants in the interest-taking group, emotions were not inappropriately carried over to judgments of the new, innocent target. Mediation analyses showed that expected rejection and implicit aggression were responsible for the effects of condition on judgment.

### Autonomous lifestyles

A final reason that autonomous individuals are more resilient to stressors over time is that their selection of life contexts is often better optimized and less stressful. Broadly speaking, control-oriented individuals are constantly under pressure, both from environments that they select and from their self-imposed expectations and contingencies. Thus, whether or not the environment is stressful in its own right, they perceive and impose pressures onto themselves. Since control orientation frequently involves a contingent and fragile self-esteem that is highly susceptible to evaluative influences from the environment, the constant need to maintain or enhance self-esteem also frequently pushes control-oriented individuals constantly towards goals that are not fully self-endorsed. In addition, autonomy orientation encourages several qualities of a lifestyle relatively low in stressors and perceptions of stress. These will be discussed in further detail below; specifically, autonomy orientation relates to valuing and pursuing intrinsic

versus extrinsic aspirations that facilitate lower stress incursion (e.g. Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Secondly, an autonomous orientation leads people to select environments that satisfy the basic psychological needs of autonomy, relatedness and competence that are associated with lower stress incursion (Ryan & Deci, 2000). We discuss each of these factors in turn.

### Intrinsic and extrinsic aspirations

Though it is widely assumed that benefits to health and well-being are accrued as people attain their valued goals (Carver & Scheier, 1990; Emmons, 1986), studies demonstrate that the content of one's goals matters in terms of well-being and adjustment. Specifically, two types of aspirations can be distinguished by their central characteristics and their expected outcomes. *Extrinsic goals* are those focused on the pursuit of material or social rewards such as those reflected in money, fame and image. Generally speaking, as individuals pursue such goals they attain little satisfaction of basic psychological needs; rather, both extrinsic goal pursuit and attainment are largely orthogonal or negatively related to need satisfaction (Kasser, 2002). On the other hand, *intrinsic goals* are focused on pursuing and attaining outcomes that are inherently gratifying, such as community contributions, development of close relationships, personal growth and physical health. These goals reflect people's inherent growth tendencies and have the potential to satisfy needs. Accordingly they have been associated with greater wellness (Kasser & Ryan, 1996).

One way that intrinsic and extrinsic aspirations may relate to stress and coping is by their capacity to impact on basic psychological needs (Ryan, Sheldon, Kasser, & Deci, 1996). Specifically, when individuals pursue intrinsic aspirations and when they attain their desired goal outcomes, they experience satisfaction of their basic psychological needs, but neither pursuit nor attainment of extrinsic goals results in such satisfaction. These assertions were initially supported in single-point correlational studies by Kasser and Ryan (1996). Research by Niemiec et al. (2009) also showed that as young, post-college adults pursued and attained progress at intrinsic goals, they experienced more positive wellness outcomes and fewer signs of stress, anxiety and depression. In contrast, over the same period young adults' pursuit and attainment of extrinsic goals was associated with more signs of ill health and no enhancement of wellness. These differences were mediated by satisfaction of autonomy, relatedness and competence needs, as predicted within SDT.

Other studies have also demonstrated that the two types of aspirations relate differently to health and well-being. Specifically, attaining intrinsic more than extrinsic aspirations related to less anxiety and more available energy within the context of a stressful college semester (Kasser & Ryan, 2001). Ryan et al. (1996) showed that attaining intrinsic but not extrinsic aspirations was

important for psychological health in Russian and US samples. Similarly, Sheldon and Kasser (1998) asked students to report on their progress in attaining intrinsic and extrinsic possible futures, and showed that depression and negative affect were reduced when students were able to progress towards attaining intrinsic possible futures but not extrinsic ones. When faced with challenging tasks, extrinsic goals also undermined people's persistence and performance (Vansteenkiste, Simons, Lens, Sheldon et al., 2004).

One reason that extrinsic goals thwart performance and well-being is that a focus on extrinsic goals is more likely to encourage an outward orientation (Vansteenkiste, Simons, Lens, Soenens, et al., 2004; Williams, Cox, Hedberg, & Deci, 2000). Vansteenkiste, Simons, Lens, Soenens et al. (2004) experimentally framed goals for participants as either extrinsic or intrinsic. They hypothesized that the competitive and evaluative nature of extrinsic goals would lead to higher feelings of competition in tasks and thus higher stress, and that engaging in tasks useful to attain extrinsic goals would increase the feelings that individuals are performing in comparison with others, again leading them to feel more stress. Participants were students who read a text as part of their classroom activities, knowing they would be later tested on this. Students whose task was framed such that it encouraged extrinsic goals rather than intrinsic goals experienced more stress while completing the task.

Not just pursuing but also attaining extrinsic goals leads to more self-reported anxiety, but achievement of intrinsic goals reduces anxiety (Kasser & Ryan, 1996). As noted, Niemiec et al. (2009) tested this relation using a longitudinal design and focusing on the second year after graduating from college, a difficult year developmentally and important for choices regarding paths of pursuit in life aspirations. The authors found that placing importance on extrinsic goals, but not on intrinsic goals, related to higher anxiety in one's life 1 year later. As well, the attainment of intrinsic goals, but not of extrinsic goals, was related to lower anxiety at time 2.

### Mindfulness

A longstanding tenet of SDT is that the foundations for autonomous forms of behavioural regulation lie in awareness (Deci & Ryan, 1980). Recently, SDT research has incorporated *mindfulness* into its framework as an inner resource that supports more autonomous functioning and psychological need satisfaction, and thus facilitates wellness. In particular, SDT research has focused on the relations between mindfulness, stress and self-regulation (Weinstein et al., 2009).

Mindfulness is described as a non-evaluative, receptive moment-to-moment attention or awareness (K. W. Brown & Ryan, 2003). Its three principal components—non-evaluation (non-judgment), open receptivity and present-centredness—together characterize the mindful

awareness state and are believed to work together in producing outcomes benefited by the state. Integral to this process is a tendency towards open-mindedness and curious introspection (Martin, 1997; Teasdale, Segal, Williams, & Mark, 1995). The degree to which an individual is mindful reflects the degree to which he or she is sensitive and aware of what is presently occurring, both externally and internally, in a relaxed and non-judgmental manner. These characteristics reflect a particular quality of attentional capacities. Attention, which can vary widely from being effectively absent (e.g. when daydreaming) to intensely active alertness, is widely implicated in the effectiveness of self-regulation. Yet attention needs to be flexibly deployed to both internal states and external circumstances to effectively support goal pursuits (K. W. Brown et al., 2007).

The manner in which one is aware of the environment is centrally important to the quality of attributions, feelings and resultant actions when stressful experiences occur (Nyanaponika, 1973). Typically, what people attend to is rapidly processed through cognitive schemas and emotional reactions that colour what is being experienced (Wells, 2002). As described in Brown et al. (2007), an individual's reactions to events are frequently judgmental; i.e. the initial appraisal of an experience is determined to be 'good', 'bad' or 'neutral', with reference to expectations or goals. Secondly, these reactions are often shaped by past experiences that evoke associations in memory. Thirdly, because of these judgments and associations, the particulars of events are assimilated into pre-existing cognitive schemas and conceptions. Consequently, concepts, labels and judgments are imposed, often automatically, on that which is encountered (Leary, 2004). This style of processing results in perceptions of the environment that are heavily filtered, sensitive to influence by past experiences, and thus potentially biased or incomplete. When a stressor is introduced, such biases may lead individuals to attribute more stress and anxiety to the event and perform more poorly after exposure to the stressor.

Research on mindfulness interventions fully supports these assertions. Substantial evidence for this relation can be found in mindfulness intervention research (see review by Brown et al., 2007). The vast majority of research on mindfulness has focused on the effects of clinical interventions either based on or incorporating practices to enhance this quality of consciousness. *Mindfulness-based Stress Reduction* (MBSR) was the first intervention to use mindfulness inductions for facilitating mental health; other interventions soon followed that focused on treatments of other disorders (Linehan, 1993; Segal, Williams, & Teasdale, 2002). MBSR and related techniques aim to cultivate non-judgmental awareness of the here and now to facilitate reduction in stress. Furthermore, MBSR endeavours to facilitate the restructuring of thoughts so that individuals can better recognize the subjectivity of their perspectives and understand that they may not accurately



reflect reality (K. W. Brown & Ryan, 2003; Kabat-Zinn, 1994). In this way, persons trained in MBSR are more able to let go of judgment and attachment and learn to volitionally respond to stressful situations instead of automatically reacting to them (Bishop, 2002).

This method has demonstrated some success; overall, MBSR has been shown to be effective in reducing stress (Astin, 1997) and to facilitate relaxation (Marks, 1999). Physiological data further reveal better immune functioning, as indicated by increases in antibody titres after participation in a MBSR programme (Davidson, Kabat-Zinn, & Schumacher, 2003). Moreover, clinical trials have shown that stress reduction exists as long as 4 years after treatment (Kabat-Zinn, Lipworth, Burney, & Sellers, 1987). Mindfulness intervention research has also provided evidence for reductions in a variety of psychopathological symptoms, while enhancing mental health and well-being. For example, randomized clinical trials of MBSR with healthy and patient populations show that MBSR is effective in reducing self-reported distress (Astin, 1997; Tacon, McComb, Caldera, & Randolph, 2003; Williams, Kolar, Reger, & Pearson, 2001) and stress symptoms and mood disturbance (Specia, Carlson, Goodey, & Angen, 2000), while increasing affect regulation (Tacon et al., 2003) and perceptions of control (Astin, 1997). Supporting the role of mindfulness enhancement in producing MBSR effects, Specia et al. (2000) showed that more time spent in home- and group-based mindfulness practice was associated with greater reductions in stress symptoms and mood disturbance.

Interestingly, despite this evidence, mindfulness has not been assessed individually or been discussed as a resilience factor in many non-clinical populations. Further, although the above studies provide a compelling argument for the role of mindfulness in stress, they also conflate the mindfulness approach with meditative practices, and they generally have not addressed the potential of naturally occurring individual differences in mindfulness for providing a powerful and readily measurable indicator of resilience and adaptation to stress.

In addition, and important for the present paper, mindfulness regulation also supports autonomous regulation. When individuals have more information and more awareness, behaviour can be more autonomous because they can consider openly their own needs and values (Ryan, 1995). Rather than imposing judgments on their own desires, they accept those judgments as they are, and can therefore pursue their own interests and values as they appear, without imposing personal contingencies and expectations on them. When one is mindful of the present, one can more reflectively follow important and currently interesting pursuits, making decisions with sensitivity to one's present needs and desires. The characteristics of willing exposure, non-attachment, insight and more effective processing of stress, all bespeak the potentially central role of mind-

fulness in integrated functioning, leaving individuals more capable of acting in ways that are more choiceful and more openly attentive to and aware of themselves and the situations in which they find themselves (Brown et al., 2007). Thus, when individuals have more information and more awareness, behaviour can be more autonomous (Hodgins & Knee, 2002; Niemiec, Ryan & Brown, 2008). Empirical studies support this, showing a relation between the two constructs; those high in dispositional mindfulness more consistently act from an autonomous motivation in their day-to-day lives (Brown & Ryan, 2003; Levesque & Brown, 2007).

In a recent series of studies, Weinstein et al. (2009) proposed that, in part because they are autonomously functioning, mindful individuals are more resilient to stress; i.e. they attribute less stress to stressful events and they cope more effectively with those events. Four studies supported this view, showing that participants scoring highly on the *Mindfulness Awareness Attention Inventory* (Brown & Ryan, 2003)—which assesses both dispositional and state mindfulness—tended to attribute less stress and used constructive and non-avoidant coping strategies in response to stress. These studies also showed that stress attributions and coping were at least in part responsible for the effects that mindfulness has on well-being (vitality, positive affect, absence of negative affect), a linkage that had been repeatedly demonstrated in previous research.

Adaptive stress processing, including more benign cognitive appraisals of stress situations and adaptive coping with stress, is considered a key underpinning for mental health and well-being (Gross & Munoz, 1995; Lazarus & Folkman, 1984). Using a variety of methodological designs and measures, studies by Weinstein et al. (2009) found that more mindful individuals were likely to view demanding situations as less stressful or threatening. More mindful individuals were also more likely to cope with stress in adaptive ways, particularly using less avoidant-oriented strategies in stress situations. Moreover, Studies 1 and 2 in this series showed that, both in laboratory and real-life settings, mindfulness effects were present above and beyond those of optimism and neuroticism. The results of these studies indicated that in general, both forms of stress processing helped to explain why mindfulness was related to higher psychological well-being.

### Vitality

In many ways stress and vitality are antithetical. As discussed in the seminal work of Hans Selye (1956), a pioneer of modern stress research, stress is the perception that challenges overwhelm capacity. Stress saps what he called *adaptation energy* and, conversely, those with a sufficient reservoir of energy or vitality could be more resilient to demands and challenges. In Selye's view, adaptation energy was not equivalent to caloric energy and could be lost both to psychological and physical demands. Within SDT, *subjective vitality*, or the

phenomenal sense of aliveness and energy available to the self (Ryan & Frederick, 1997; Weinstein & Ryan, 2009), has become an object of much research (see Ryan & Deci, 2008 for a review).

Autonomous motivations, attention quality and aspirations all have an impact on subjective vitality. Importantly, vital feelings are distinct from negative arousal states such as anxiety or jitteriness, which arise when individuals fail to self-regulate or cope with stressful events (Ryan & Frederick, 1997). Stressors that undermine the capacity for self-regulation, because their burden is greater than the capacity for individuals to deal with them or because individuals lack effective coping strategies, are expected to reduce the sense of vitality. Autonomy can be thought to act as a buffer to maintaining vitality, particularly during stressful periods. Indeed, Sheldon, Ryan and Reis (1996) showed, using a daily diary design, that autonomous individuals experienced more vitality in their day-to-day lives. More specifically addressing this hypothesis, Weinstein and Hodgins (2009) demonstrated that controlled (as compared to autonomous) individuals exposed to an emotionally challenging event were less vital (or more energy depleted), as was indicated by self-report and by lower capacity to hold a handgrip designed to strain hand muscles. The sense of vitality gives individuals greater capacity to cope with stress, leading to lower detriments for mental and physical health. Clinical studies also demonstrate links between feelings of energy and an absence of somatic concerns (e.g. Stewart, Hays, & Ware, 1992). Ryan and Frederick (1997) further defined the physical health correlates of vitality, such as reduced lower pain and other common physical symptoms.

In addition to autonomy orientations, the quality of aspirations impacts on available energy or vitality, allowing individuals to cope more effectively with stress. Sheldon and Kasser (1998) showed that, even after accounting for motivation, intrinsic rather than extrinsic aspirations lead to a higher sense of subjective vitality. Finally, need-supportive environments can facilitate vital feelings as well as those of autonomy, which in turn further encourage vitality (Ryan and Frederick, 1997). Reis, Sheldon, Gable, Roscoe and Ryan (2000) found that daily satisfaction of each of the three needs (competence, relatedness and autonomy) predicted a greater sense of vitality and energy to deal with day-to-day challenges among college students. More recently Ryan, Bernstein and Brown (2010) found similar results with working adults. They identified a big increase in vitality on weekends, when workers experienced greater autonomy and relatedness than while at work. In fact, need satisfaction mediated day-of-week effects on wellness outcomes, demonstrating how many of the negative effects of work are due to the low need satisfaction many workers experience on the job. As we now discuss, need-supportive versus need-thwarting environments have quite an impact on stress

and stress responding, both directly and indirectly through their impact on motivation and vitality.

## Part II: supportive environments

As described above, SDT proposes that satisfaction of basic psychological needs is necessary for continuing growth, resilience and flourishing. In other words, individuals will orient towards growth and experience greater wellness to the extent that their valued environments (largely speaking, their central life tasks and important people in their lives) respond to them in ways supporting of needs. SDT identifies three specific needs that are necessary for growth and well-being, namely competence, autonomy and relatedness (see Deci & Ryan, 2000). These have been shown to be important for well-being in Western individualistic cultures as well as in Eastern collectivistic ones (e.g. Chirkov, Ryan, Kim, & Kaplan, 2003; Jang, Reeve, Ryan, & Kim, 2009; Ryan, La Guardia, Solky-Butzel, Chirkov, & Kim, 2005). Individuals are satisfied in their need for competence when they perceive themselves as being able to effectively act on the world (White, 1959). Environments can support the competence need by providing positive and constructive feedback and by presenting challenges that are optimally challenging. Individuals feel a sense of relatedness when they perceive themselves as close and connected to others, supported when others relate authentically to them and express care and concern. Finally, people experience autonomy when they experience their behaviours as self-volitional and congruent (de Charms, 1968; Ryan & Connell, 1989). Autonomy is supported in environments that encourage behaviour congruent with the individual's desires and values, rather than those that serve others' interests.

Numerous studies have shown that basic need satisfaction relates to supports for autonomy (e.g. Deci, Koestner, & Ryan, 1999; Ryan & Deci, 2000). That is, when individuals are allowed to exercise autonomy they tend also to obtain more competence and relatedness satisfaction (e.g. Baard, Deci, & Ryan, 2004). When the environment allows individuals to satisfy their needs, they can begin to pursue a course that is filled with deep feelings of both meaning and aliveness (e.g. Ryan & Frederick, 1997). As well, consistent deprivation of needs is considered a cumulative risk factor for stress incursion and poor stress response. Studies have shown that need satisfaction plays a role in stress regulation, being associated with lower anxiety, symptoms of depression, burnout and higher vitality (e.g. Gagné, Ryan, & Bergmann, 2003; Lynch, Plant, & Ryan, 2005; Reis et al., 2000).

In line with models outlined by Cohen and Ashby Wills (1985), we propose that need satisfaction acts as a buffer in times of stress, reducing both initial appraisals of stress and encouraging adaptive coping after stress-related events occur. The second important characteristic to consider is that the effects of need

satisfaction ultimately rely not on the provision of need support, but on the perceptions of need gratification. Of course higher environmental support is likely to relate to the perceptions of need satisfaction, but the two are distinct.

More specific studies, particularly those in the workplace where stress and pressures are often high, have demonstrated the importance of satisfaction of each of the basic needs, separately, for lower stress incursion. Perceived competence (also tested in terms of self-efficacy) is important for incurring less stress. Specifically, research has shown that self-efficacy perceptions buffer the typically harmful effects of low role clarity on stress (Jex, Bliese, Buzzell, & Primeau, 2001). More specifically, having a sense of competence prevents incursion of stress in contexts in which high energy is required or in which there are high demands (Karasek, 1979). Similarly, De Rijk, Le Blanc, Schaufeli, and De Jonge (1998) showed that job control negatively relates to exhaustion and that both job control and employees' attitudes (i.e. active coping) moderate the relationship between job demands and emotional exhaustion, as well as that between job demands and disengagement. Competence influences not only perceived stress, but also the capacity to deal with it. Studies show that perceiving more competence impacts on coping behaviour, such that when individuals feel more competent they are more flexible with selecting coping behaviours appropriate to the situation, resulting in better health and lower maladaptive health-related behaviours. In contrast, when competence is thwarted, people are more likely to be inflexible in their coping. One study of almost 2000 adolescents showed that academic competence was a protective buffer to make adolescents more resilient to stress, leading them to lower substance use (Wills & Cleary, 1996).

In addition, autonomy at work has been shown to relate to lower stress incursion. Job autonomy has typically been defined as the extent to which a job allows discretion, freedom and independence to schedule work, or allows employees to make decisions and select methods to execute their tasks (Morgeson, Delaney-Klinger, & Hemingway, 2005). Studies have demonstrated the importance of autonomy for reducing stress. When engaging in tasks, those who feel autonomous experience less anxiety and frustration around the task (De Cuyper & De Witte, 2006; Spector & Jex, 1991) and feel less emotional exhaustion as a function of anxiety (Xie & Johns, 1995). In addition, one study of over 300 managers showed that a climate that supports autonomy at work results in less anxiety and tension for workers because they experience lower stress at work (Parker & DeCotiis, 1983). In another study, these processes were shown to be universal. Across 42 countries, when individuals had higher autonomy or choice at work, they experienced less job stress (Karasek & Theorell, 1990). This research was conducted with both adolescents and adults (Greenberger, Steinberg, & Vaux, 1981).

These findings have also been replicated in non-Western countries. For example, Tai and Liu (2007) presented data on employees in northern Taiwan. When autonomous, they reported more challenge (versus threat) stressors, less hindrance stress and less disengagement (though the authors found no relation with exhaustion). Overall, studies demonstrate consistent effects of perceived autonomy on perceived stress and outcomes immediate to stress. As a result of these immediate stress outcomes, autonomy can also lead, indirectly, to short- and long-term mental health, including lower depression (Frone, Russell, & Cooper, 1995), lasting as long as 12 months after an autonomy-supportive intervention (Wall & Clegg, 1981).

The largest set of findings is for the association between relatedness and stress regulation. Stress both affects and is affected by interpersonal relationships (Brooks, 1999; Gaine & La Guardia, 2009). Relatedness need satisfaction, often discussed in the context of social support, is widely recognized as one of the most important buffers to stressful responses (Cobb, 1985; Cohen & Ashby Wills, 1985; Kaplan, Cassel, & Gore, 1997). Numerous studies show that less contact with friends, less satisfaction with friends and relatives and less satisfactory marital relationships all lead to higher stress perceptions that in turn lead to the development of psychological disorders and lower physical health (see Coyne & Downey, 1991 for a review). Studies demonstrating the effects of relatedness on stress responding have spanned many contexts, including those examining work stress (showing that, e.g. employees rely on close relationships at work to experience less stress as a function for job responsibilities, e.g. Mohr & Wolfram, 2010). Moreover, relatedness leads to lower stress over long periods, and *perceptions* of relatedness are important for buffering stress. In fact, field research following hurricane victims shows that received social support leads to lower distress as long as 2 years after the stressful event, and that perceived social support mediated this effect (Norris & Kaniasty, 1996). As well, relatedness impacts on physiological as well as perceived or attributed stress. In their day-to-day lives, individuals higher in loneliness demonstrate higher total-peripheral resistance, particularly in times of stress, and lower cardiac output, a concerning finding because these physiological patterns, over the long term, contribute to development of hypertension and put people at risk for cardiovascular problems (M. J. Brown & Haydock, 2000; Hawkey, Burleson, Berntson, & Cacioppo, 2003).

As well as affecting stress perceptions and physiological reactions, the level of relatedness influences the type of coping utilized. For example, a series of longitudinal studies showed that individuals with more social resources were more likely to rely on approach coping and less likely to use avoidance coping (Holahan & Moos, 1987). A higher proportion of approach relative to avoidance coping mediated the relation between

family support and health outcomes during times of stress (Holahan & Moos, 1990). In the lab, Pierce and Lydon (1998) showed that when priming closeness words such as 'accepting' and 'loving' versus distancing words such as 'rejecting' and 'distant', individuals responded with more growth-oriented coping after imagining a stressful event of an unplanned pregnancy and had less negative affect.

Research recently conducted by Quested et al. (2010) integrated these previous findings by testing dancers' challenge and threat responding, perceived stress and cortisol levels on four occasions: before a performance and at three time points after the performance on the same day. Quested et al. found that those who had received satisfaction of the three basic psychological needs before a performance had a higher challenge orientation (predictive of more positive responding to stress) and lower threat orientation (predictive of poor stress responding) immediately before the performance. In turn, challenge and threat responding predicted cognitive anxiety and cortisol in a manner consistent with expectations. Via their effects on challenge and threat response, basic psychological needs facilitated resilience in the face of the dance performance, helping to reduce initial and delayed cognitive anxiety and cortisol levels.

It is important to point out that even when people are connected with others formally, they do not always use these relationships to better cope with stress. Ryan et al. (2005) investigated people's emotional reliance on others or their willingness to turn to others at emotionally salient times. In a series of studies, including multiple cultural samples, they found that people were more willing to turn for support to others who were autonomy supportive. When others had controlling attitudes or styles, people relied on them less for support. Such studies indicate that effective support includes consideration of, and respect for, autonomy (see also Deci, La Guardia, Moller, Scheiner, & Ryan, 2006; Weinstein & Ryan, 2010).

## Summary and conclusions

As described above, SDT views human functioning in terms of an active, integrative organism that requires certain nutrients or supports to function optimally. Healthy functioning is characterized by awareness, intrinsic goals, self-regulation and need satisfaction (e.g. Ryan & Deci, 2000; Ryan, Huta, & Deci, 2008), and extant research suggests all of these factors play a role in stress and coping processes. In the present paper we reviewed research suggesting that people with higher mindfulness appraise demands differently and mindfulness fosters more active coping (Weinstein et al., 2009). Furthermore, mindfulness supports autonomous functioning, which results in better choices, more congruent activities and less stress and conflict. A growing literature suggests that an autonomous motivation orientation acts to reduce the harmful effects of stressors via four mechanisms: (1) by helping individuals to efficiently downregulate perceived stress; (2) by encouraging less defence in response to stress and more challenge versus threat appraisals; (3) by facilitating a healthy willingness to take an interest in one's own emotions; and (4) by directing people towards lifestyle choices that are less pressured and more need fulfilling. Need satisfaction therefore results in better regulation and more active coping, and boosts vitality and energy, which in turn add to resilience.

These positive, fully functioning lifestyles do not, however, happen in isolation, but they are dependent on supportive environments. Schools and workplaces are often outcome focused, and not responsive or supportive of their constituents' psychological needs. This neglect or thwarting of needs is manifest in stress and pathology. When considering stress interventions, it is critical from a SDT perspective to look at the specific affordances and barriers to need satisfaction a person faces, as these are the ultimate sources of stress and obstacles to wellness.

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