

# Employee subjective well-being and physiological functioning: An integrative model

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## Abstract

Research shows that worker subjective well-being influences physiological functioning—an early signal of poor health outcomes. While several theoretical perspectives provide insights on this relationship, the literature lacks an integrative framework explaining the relationship. We develop a conceptual model explaining the link between subjective well-being and physiological functioning in the context of work. Integrating positive psychology and occupational stress perspectives, our model explains the relationship between subjective well-being and physiological functioning as a result of the direct influence of subjective well-being on physiological functioning and of their common relationships with work stress and personal resources, both of which are influenced by job conditions.

## Keywords

employee health, occupational stress, physiological functioning, positive psychology, subjective well-being

## Introduction

Emotional and cognitive reactions to work experiences, as captured by measures of worker subjective well-being (SWB; i.e. job satisfaction and job affect), evoke physiological responses that, over time, lead to costly, and sometimes fatal, diseases and illnesses. In fact, job affect and job satisfaction have been linked to various indicators of physiological functioning such as blood pressure, cortisol, cholesterol, and cytokines (Amati, 2010; Ilies et al., 2010; Matthews et al., 1987; Shirom et al., 2009). Impaired worker SWB, through its influence on physiological processes and subsequently on individual and societal health, produces a huge physical and financial burden for individuals and societies. Growing evidence that SWB influences health and other societal outcomes has led the United Nations to establish an International Day of Happiness to emphasize the importance of societal SWB as a key public policy objective (Diener and Tay, 2012; The United Nations, 2013).

Theoretical frameworks from the positive psychology and occupational stress traditions offer key insights about why SWB and physiological functioning are linked. Historically, these two traditions have employed distinct but complementary theoretical models to understand the antecedents of SWB

and physiological functioning. Occupational stress models (e.g. the Job Demands-Resources (JD-R) model; Demerouti et al., 2001) have historically emphasized the disease model of health, highlighting the effects of negative job conditions on strain and impaired physical and psychological health, and positive psychology models (e.g. the Broaden-and-Build theory of positive emotions; Fredrickson, 2001) have focused on the health-enhancing role of positive emotions and positive resources such as social support and resilience. As such, the combination of these two traditions can generate complementary insights on the linkage between SWB and physiological health outcomes. However, to date, no theoretical framework has integrated the complementary perspectives from these two traditions on the relationship between worker SWB and physiological health outcomes. This article fills this gap by providing a broad integrative framework on the relationship between worker SWB and physiological outcomes, drawing

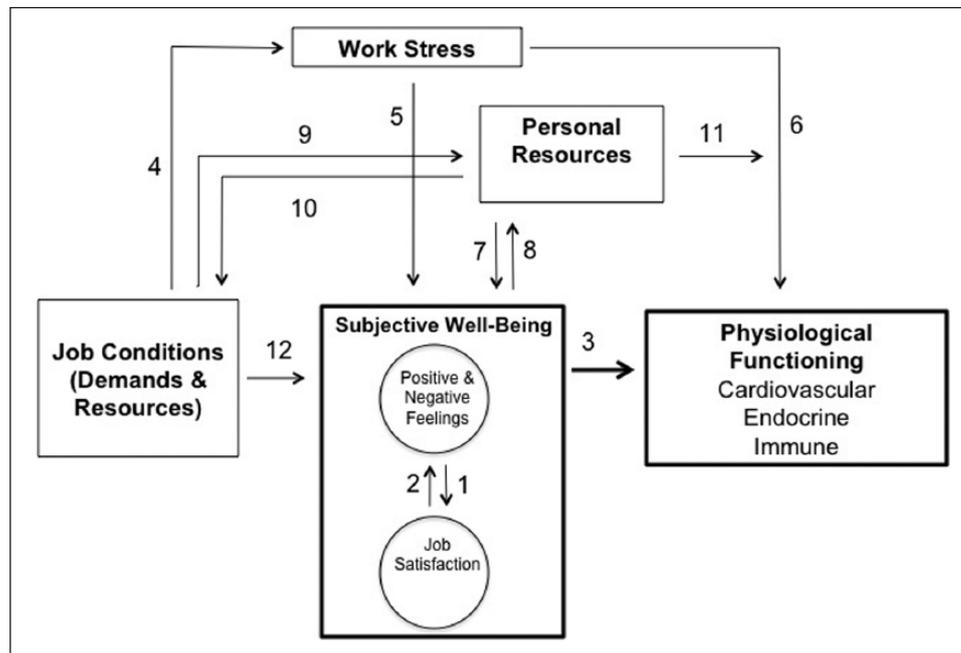
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**Figure 1.** Framework for subjective well-being and physiological functioning in the work context.

primarily from the Broaden-and-Build theory of positive emotions and the JD-R model.

A broad framework that explains the causal link between worker SWB and physiological outcomes is crucially important. Growing concern about employee health has energized a search for modifiable antecedents of the proximal processes (i.e. physiological functioning) influencing employee health. Highlighting the need for research on employee health, the Center for Disease Control recently reported that “productivity losses related to personal and family health problems cost U.S. employers \$1,685 per employee per year, or \$225.8 billion annually” (Stewart et al., 2003). These losses manifest in a variety of forms, including absenteeism, reduced performance, turnover-related training costs, disability losses, and high health insurance costs (Goetzl et al., 2003, 2004; Stewart et al., 2003). Lost productivity can exert tremendous social and financial burdens on society as a whole. As a result, large-scale programs such as the Total Worker Health initiative have emerged, focusing on integrative approaches to improve employee health (National Institute for Occupational Safety and Health, 2013).

Simultaneously, evidence has accumulated to show that SWB—an important predictor of health—is modifiable (Tay and Kuykendall, 2013) and, as such, is an ideal target for worker health interventions. However, in order to maximize the benefit of worker health interventions targeting SWB as a key antecedent, it is necessary to have an integrative understanding of the link between SWB and the proximal antecedent of health (i.e. physiological functioning) that draws upon and unifies complementary perspectives from the positive psychology and occupational stress traditions.

In this article, we establish the conceptual link between worker SWB and physiological health outcomes, focusing specifically on the context of work. We provide a parsimonious and integrative model of the link between SWB and physiological health outcomes, proposing that the linkages between SWB and physiological health stem not only from the direct influence of SWB but also from common effects of work stressors and personal resources. Our model implies that, by focusing on common causes, interventions can be designed to simultaneously enhance SWB and physiological health.

An approach allowing for the simultaneous improvement of employee SWB and health would be invaluable, as SWB and physiological functioning are critically important to both workers and organizations. Worker SWB is associated with a wide range of work outcomes including job performance (Riketta, 2008), turnover decisions (Hom et al., 1979), organizational citizenship behaviors (Bateman and Organ, 1983; Farrell, 1983), and hostile behaviors toward coworkers and supervisors (Hershcovis et al., 2007). Furthermore, employee ill-health, as proximally caused by poor physiological outcomes, results in increased medical costs for organizations (Goetzl et al., 2003) and decreased productivity (Burton et al., 1999).

Our article is structured as follows. First, we define SWB and physiological functioning. Second, we provide a brief background on the perspectives we draw upon to build our theoretical model—the positive psychology perspective and the occupational stress perspective. We then provide our integrative framework as shown in Figure 1 and discuss each of the mechanisms that link SWB and physiological health.

Finally, we conclude with implications of our model for interventions simultaneously targeting worker SWB and health. Our article contributes to the literature on worker well-being and health by proposing an integrative model that assimilates both the positive psychology and occupational stress traditions to explain the linkage between worker SWB and physiological functioning.

## SWB and physiological functioning

### SWB

Our conceptualization of worker SWB follows the model commonly used in well-being studies and positive psychology, which consists of both evaluative and affective components (Diener, 1984, 1994). Theoretical approaches to measure worker SWB reflect the model used in the broader psychological sciences. In the organizational sciences, measures of job satisfaction are typically understood to capture primarily the cognitive aspects of SWB, whereas measures of job affect primarily capture the affective aspects of SWB (Kaplan et al., 2009). Multi-dimensional measures of job satisfaction include dimensions such as satisfaction with work, supervisor, colleagues, pay, communication, and promotion (Job Descriptive Index (JDI); Smith et al., 1969). Indices of affective well-being at work include measures of frequent positive emotions and infrequent negative emotions in the work context. Popular measures include the Positive and Negative Affective Schedule (PANAS; Watson et al., 1988) and the Job-related Affective Well-Being Scale (Van Katwyk et al., 2000). Evidence that measures of job affect and job satisfaction are related but distinct comes from recent meta-analytic findings showing moderate correlations between measures of worker affect and job satisfaction, ranging from an uncorrected magnitude of .26 to .34 (Kaplan et al., 2009).

Consistent with theory and empirical findings, our model posits that cognitive and affective components of SWB are distinct but tightly connected because of the bidirectional relationship between the two (see Figure 1, Links 1 and 2). Compelling evidence for the influence of evaluations on feelings comes from the cognitive behavioral tradition, which holds that cognitive reactions to or interpretations of events drive affective reactions and subsequent behaviors. By learning to change default interpretations or evaluations of events, individuals are able to reduce undesired emotions and behaviors. The documented effectiveness of cognitive behavioral therapy in modifying a range of undesirable emotions (e.g. anger; Beck and Fernandez, 1998; anxiety; Hofmann and Smits, 2008) provides support for positing a causal path from cognitive SWB (i.e. job satisfaction) to affective SWB (i.e. feelings).

Additionally, a strong body of evidence also supports the assertion that feelings guide evaluations. For instance,

people tend to evaluate their life satisfaction as being higher when they are in happier moods than when they are in sad moods (Schwarz and Clore, 1983). Such findings are consistent with the affect-as-information hypothesis (Clore, 2001), which posits that affective cues such as mood and emotions influence judgments, “serving as experiential and bodily information regarding how one feels about the object of judgment” (Clore and Huntsinger, 2007). At a more basic level, affect can also direct attentional focus to emotionally congruent cues and information, thereby generating cognitive consistency with affect (Dalglish and Watts, 1990).

Based on the evidence supporting the cognitive behavioral perspective and the affect-as-information hypothesis, our model posits that job feelings influence job evaluations (Figure 1, Link 1) and that job evaluations influence job feelings (Figure 1, Link 2).

### Physiological functioning

Physiological functioning is commonly assessed as three distinct but closely interrelated components: the cardiovascular system, which serves to circulate the blood through the body; the immune system, which protects the body from disease caused by pathogens; and the endocrine system, which regulates the function of cells and organs in the body. These aspects of physiological functioning have been identified as likely biological mechanisms linking psychosocial factors to physical health (Miller et al., 2009) and have been implicated in the development and progression of common chronic diseases (Antoni and Lutgendorf, 2007; Rozanski et al., 1999). As such, impairments to physiological functioning are an easily detectable sign of underlying processes that lead to many of the most costly health endpoints such as hypertension, heart disease, acute myocardial infarction, and chronic obstructive pulmonary disease (Goetzel et al., 2003).

Poorer cardiovascular functioning is usually indexed by higher levels of blood pressure, heart rate, and pulse rate (Krantz and Manuck, 1984; Smith and Kampine, 1990). Endocrine functioning is indexed by different hormones such as catecholamines (epinephrine, norepinephrine, dopamine), cortisol, and prolactin. Higher levels of such hormones are often diagnostic of poorer health. Immune functioning is indexed by circulating concentrations of immune cells such as natural killer (NK) cells, B cells, and T cells; by the functional capacities of those cells; and by proteins produced by immune cells known as cytokines. Generally, greater numbers of immune cells are related to better immune response and more robust protection against diseases (Herbert and Cohen, 1993). High levels of anti-inflammatory cytokines and low levels of pro-inflammatory cytokines can also indicate better immune function (Herbert and Cohen, 1993). Given these specific physiological indicators, if SWB at work is related to better physiological

functioning, we would generally expect that SWB would be negatively related to cardiovascular and endocrine indicators, but positively related to most immune indicators.

### Complementary perspectives of occupational stress and positive psychology

With these definitions of SWB in physiological functioning in place, we now provide a brief overview of the two traditions our theoretical model integrates—the occupational stress tradition and the positive psychology tradition.

#### *Occupational stress tradition*

Research in the occupational stress tradition focuses on the effects of negative work conditions on impaired physical and psychological health. Examples of negative work conditions include—but are not limited to—hazardous physical working environments (e.g. exposure to toxins, extreme temperatures), non-optimal workload (i.e. too much or too difficult work), and negative aspects of the social context (e.g. bullying, sexual harassment, workplace conflict). A key goal of research in the occupational stress tradition is to identify important negative work conditions and to advance theory explaining how and when these conditions harm worker health and well-being with the goal of developing and promoting interventions that protect workers against these negative conditions. Some of the most prominent theories in this tradition include the Demand-Control Model (Karasek, 1979), the person-environment fit model (French et al., 1982), the Transactional Model of Stress (Lazarus, 1999), and the Job-Demands Resources Model (Demerouti et al., 2001).

#### *Positive psychology tradition*

In contrast, while research in the occupational stress tradition focuses on identifying negative work conditions and understanding their effects and how to alleviate their effects, research in the positive psychology tradition focuses on identifying positive emotions and resources that promote and protect health and well-being and understanding how to cultivate these emotions and resources in workers. Research in the positive psychology tradition is relatively new compared to research in the occupational stress tradition, and fewer theoretical frameworks have developed. Currently, a leading theoretical framework relevant to the current topic is the Broaden-and-Build theory of positive emotions (Fredrickson, 2001), which delineates health-enhancing benefits of positive emotions and positive resources such as social support and resilience. Because research in the occupational stress tradition and the positive psychology tradition both provide important findings relevant to the link between SWB and physiological functioning, yet do so through the distinct

approaches of protecting workers from negative work conditions (in the case of occupational stress) and promoting positive emotions and resources (in the case of positive psychology), they represent complementary perspectives, which can be integrated to form a more holistic understanding of the relationship between SWB and physiological functioning.

### An integrative framework

We propose an integrative framework that links worker SWB and physiological health as shown in Figure 1. In our model, we explain the relationship between worker SWB and physiological functioning as a result of the *protecting* and *promoting* influence of SWB on physiological functioning and also as a result of the common influences of stress and personal resources. Consistent with the positive psychological perspective, our model emphasizes that SWB promotes physiological functioning by directly enhancing physiological functioning. Consistent with occupational stress perspectives, our model highlights the role of work stress as a negative influence on both SWB and physiological functioning. Finally, consistent with both positive psychology perspectives and occupational stress perspectives, our model also highlights the importance of personal resources such as hope, resilience, optimism, and self-efficacy in protecting workers against the effects of work stress on SWB and physiological functioning. As such, SWB is linked to physiological health because of its causal influence on physiological functioning, but also because of the common influences of work stress and personal resources on both SWB and physiological functioning. We elaborate on these concepts and their linkages in the following.

#### *SWB influences physiological functioning*

*Influence of positive emotions.* Exemplifying the positive psychology tradition, the Broaden-and-Build theory of positive emotions explains that positive emotions promote health and well-being by broadening one's awareness and encouraging novel thoughts and actions, which eventually builds enduring social, intellectual, and emotional resources (Fredrickson, 1998, 2001). Because positive emotions generate opposite effects on awareness than negative emotions, which are known to narrow rather than broaden awareness, they serve as an antidote to the cardiovascular effects of negative emotions. Negative emotions are known to increase cardiovascular reactivity, which, if experienced frequently, can lead to heart disease and cardiac events (Kubzansky and Kawachi, 2000). An important determinant of whether frequent cardiovascular reactivity becomes harmful is how quickly individuals return to baseline levels of cardiovascular functioning after events that increase reactivity. Research has shown that individuals experiencing positive emotions

have a speedier recovery from the cardiovascular effects of negative emotions than individuals who do not experience positive emotions (Fredrickson and Levenson, 1998). This benefit of positive emotions is referred to in the Broaden-and-Build framework as the *undoing hypothesis*. The key point of the *undoing hypothesis* is that positive emotions *protect* physiological health by undoing the effects of negative emotions.

The positive psychological tradition has also shown that, in addition to protecting physiological health against the effects of negative emotions, positive emotions also appear to directly *promote* physiological health. Positive emotions, particularly deactivated positive emotions such as feelings of calmness and relaxation, decrease heart rate, blood pressure, cortisol levels, and inflammation (Pressman and Cohen, 2005). These relationships are independent of negative emotions and depressed mood, indicating that positive emotions have effects on physiological health over and above the effects of negative emotions (Steptoe et al., 2009). While few studies have looked specifically at the link between job affect and physiological functioning, those that have supported the link between deactivated positive emotions and improved physiological functioning (Shirom et al., 2009).

Furthermore, positive affect also promotes and protects physiological functioning by increasing the likelihood of individuals engaging in behaviors that improve physiological functioning and decreasing the likelihood of engaging in behaviors that harm physiological functioning. For instance, happy people—and by implication happy workers—are more likely to exercise (Lox et al., 1999; Mishra, 1992; Riddick, 1985; Veenhoven, 1984; Watson, 1988; Watson et al., 1992) and are less likely to engage in smoking, unhealthy eating, and drug and alcohol abuse (Graham et al., 2004; Piko et al., 2002). Thus, positive affect may influence physiological function through health behaviors.

**Influence of job satisfaction.** In contrast to positive and negative feelings, job satisfaction is presented in our model as having a more distal influence on physiological functioning. Because satisfaction evaluations are not thought to activate the same physiological processes as emotions, simply being satisfied or dissatisfied with one's job is not, by itself, likely to promote or protect health. However, because of the proposed bi-directional relationship between job satisfaction and job affect, we do expect a link between job satisfaction and physiological functioning. As shown in the model, evaluations of one's job likely influence feelings in the workplace and, as such, have a distal influence on physiological functioning via positive and negative feelings. The direct influence of SWB on physiological functioning, driven by the effects of positive emotions, negative emotions, and the distal influence of job satisfaction, is shown by Link 3 in Figure 1.

### **Work stress impairs SWB and physiological functioning**

While positive psychology focuses on positive emotions and resources, the rich tradition stemming from the “disease” model of health emphasizes the negative effects of stress on workers and the features that mitigate such effects. The occupational stress perspective has conventionally focused on stress as an effect of negative work characteristics. In this tradition, the JD-R model (Demerouti et al., 2001)—an adaptation of the Demand-Control Model (Karasek, 1979)—asserts that individuals will experience stress from their work when it makes high mental, physical, emotional, and other demands while affording few job resources such as support, autonomy, and feedback, subsequently leading to poor SWB (i.e. negative feelings of fatigue and exhaustion) and health problems.

This process is depicted in our model as job conditions inducing work stress (Link 4) and work stress influencing both SWB (Link 5) and physiological functioning (Link 6). We conceptualize job conditions as objective or perceived characteristics of the job or work environment that may generate demands or afford resources and stress as a psychological reaction to demanding conditions. We adopt definitions of job demands and job resources from the JD-R model, defining job demands as “those physical, social, or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs” and job resources as

those physical, social, or organizational aspects of the job that may do any of the following: (a) be functional in achieving work goals; (b) reduce job demands and the associated physiological and psychological costs; (c) stimulate personal growth and development. (Demerouti et al., 2001: 501)

Common examples of job demands include interpersonal conflict, emotional labor, work overload, job ambiguity, and unsafe work environments. In contrast, common examples of job resources include feedback, job control, and social support.

**Work stress and SWB.** The relationship between stress and SWB has garnered strong evidence. A recent meta-analysis found the unadjusted correlation between stress, measured as anxiety and strain, and job satisfaction to be  $-.32$  (Faragher et al., 2005). Numerous studies examining various work contexts have shown that specific job characteristics are stressful, leading to lower job satisfaction (Bogg and Cooper, 1995; Evans and Carrère, 1991; Mark and Smith, 2012). Research has also found that stressful work characteristics are related to negative job evaluations and feelings, including job dissatisfaction and emotional exhaustion (Dollard and Winefield, 1998). Experience sampling research using worker samples has demonstrated that

stressful events are related to experiences of greater negative feelings (Teuchmann et al., 1999; Van Eck et al., 1998; Zohar, 1999). The stress–SWB link appears to be pan-cultural as a representative sample across the world found that the experience of stress predicts lower SWB (Ng et al., 2009).

**Work stress and physiological functioning.** Work stress not only affects SWB but also influences physiological functioning. Much of the research in the occupational stress tradition has emphasized the link between job conditions and physiological functioning—with work stress being the posited, but often not explicitly measured, link between these conditions and physiological outcomes. Research has shown that job conditions such as high job demands and low job control influence physiological outcomes such as cortisol, heart rate, and blood pressure (Gallo et al., 2004; Kunz-Ebrecht et al., 2004). Despite the relatively low number of studies documenting the link between work stress and measures of worker physiological functioning (e.g. Almadi et al., 2012), compelling evidence for the influence of stress on SWB has been shown by employee stress management interventions. A meta-analysis on the effectiveness of employee stress management interventions revealed that such interventions enhance physiological functioning ( $d = .29$ ; Richardson and Rothstein, 2008). Furthermore, the effects of work stress on the disease endpoints proximally influenced by physiological functioning, and the biological processes by which poor physiological functioning leads to diseases, have been clearly documented (Miller et al., 2007).

### **Personal resources enhance SWB and physiological functioning**

In our model, we propose that personal resources also provide an important link between SWB and physiological health. The accumulation of personal resources can enhance SWB and physiological health. To avoid confusion with job conditions, our model focuses solely on personal resources, “the psychological characteristics or aspects of the self that are generally associated with resiliency and that refer to the ability to control and impact one’s environment successfully” (Schaufeli and Taris, 2014: 49), such as self-efficacy, self-esteem, optimism, hope, and resilience.

**Personal resources and SWB.** Personal resources have been a focus of both positive psychological perspectives and occupational stress perspectives. Positive psychological perspectives illuminate how SWB can enhance personal resources, which in turn lead to higher SWB. One of the fundamental tenets of the Broaden-and-Build theory (Fredrickson, 1998, 2001) is that positive emotions broaden attention and influence thought-action repertoires—the range of potential actions the body and mind are prepared

to engage in—such that individuals are more likely to engage in novel and exploratory behaviors such as meeting new people or playing a new game. In this respect, positive emotions stand in contrast to negative emotions, which tend to be associated with very narrow action tendencies such as fleeing as a response to experiencing fear.

Although novel and exploratory behavior is not immediately critical to safety or survival, as are the immediate benefits of specific fight-or-flight action tendencies associated with negative emotions, such novel and exploratory behaviors generated by positive emotions serve to build important personal resources over time. The Broaden-and-Build theory posits “positive spirals” or feedback loops between SWB and personal resources such that SWB facilitates personal resources via novel and exploratory behaviors and, in turn, personal resources enhance SWB. The bi-directional nature of the relationship between personal resources and SWB leads to a self-perpetuating system that underpins both the development of lasting personal resources and long-lasting SWB changes (see review by Garland et al., 2010). Applying this concept to workers, an experimental intervention that manipulated worker positive emotions via loving kindness meditations influenced a wide range of personal resources, which subsequently increased life satisfaction, providing support for the bi-directional relationship between SWB and personal resources (Fredrickson et al., 2008).

Contextualizing the concept of positive resources to the work context, researchers have developed a taxonomy of job-related positive personal resources, including hope, resilience, optimism, and self-efficacy (Luthans et al., 2007; Luthans and Youssef, 2007). Recent longitudinal studies have shown evidence for a bi-directional relationship between job-related personal resources and worker SWB. For instance, job-related positive emotions predicted job-related personal resources (e.g. hope, optimism, and self-efficacy in the work context) 6 months later (Ouweneel et al., 2012), and psychological capital—a combination of hope, optimism, efficacy, and resiliency—predicted psychological well-being, which includes an affective component, 3 weeks later, controlling for psychological well-being at Time 1 (Avey et al., 2010). Links 7 and 8 in our model reflect this bi-directional relationship between personal resources and SWB.

The link between SWB and personal resources has also been incorporated into the occupational stress tradition, as the JD-R model has been expanded to include personal resources (Xanthopoulou et al., 2007). Specifically, the JD-R model (Demerouti et al., 2001) emphasizes that while negative job characteristics (e.g. job demands) cause stress and harm health and well-being, positive job characteristics (e.g. job resources) increase personal resources and subsequently enhance employee well-being. In the JD-R model, personal resources function as a mechanism by which job resources influence SWB. Specifically, researchers have

posited that job resources activate employees' personal resources, allowing them to feel capable, perform confidently, be satisfied and happy with their work, and experience fewer negative feelings such as exhaustion (Luthans et al., 2006; Xanthopoulou et al., 2007). Researchers have found initial support that personal resources (i.e. self-efficacy, organizational-based self-esteem, and optimism) mediate the relationship between job resources (i.e. autonomy, social support, supervisory coaching, and opportunities for professional development) and feelings of exhaustion and engagement (Xanthopoulou et al., 2007, 2009b).

Furthermore, researchers have suggested that personal resources can reduce perceptions of poor job conditions, which subsequently reduces stress. Such reasoning is consistent with interactional models of stress, which assert that resources such as optimism can influence both the perception of and the response to one's environment. Some studies provide support for this reciprocal relationship (Kohn and Schooler, 1982; Xanthopoulou et al., 2007, 2009a). For instance, in a sample of Dutch employees, personal resources (i.e. optimism, self-efficacy, and organizational-based self-esteem) predicted the perception of job resources (e.g. autonomy, social support, supervisory coaching, and professional development) (Xanthopoulou et al., 2007). Links 9 and 10 in our model capture the bi-directional relationship between job resources and personal resources. Furthermore, the path from job conditions to SWB via Links 9 and 7 reflect personal resources as a mediator of the relationship between job conditions and SWB.

**Personal resources and physiological functioning.** Personal resources likely mitigate the influence of work stress on cardiovascular, immune, and neuroendocrine functioning (Link 11). Research in the positive psychological tradition has shown that individuals who possess the personal resources such as optimism and hope tend to engage in more effective stress coping strategies (Fontaine et al., 1993; Scheier et al., 1986; Snyder et al., 1991) and, as a result, tend to experience quicker alleviation from stress and its associated effects on cardiovascular, immune, and neuroendocrine functioning.

Such reasoning is consistent with findings showing a link between personal resources and health outcomes. In fact, studies have shown that optimism is robustly associated with protection against poor cardiovascular functioning, as indicated by optimistic individuals showing a slower rate of carotid atherosclerosis progression and a reduced risk of developing hypertension than less optimistic individuals (Boehm and Kubzansky, 2012; Matthews et al., 2004; Richman et al., 2005) and optimism being associated with low inflammation—an indicator of good physiological functioning (Ikeda et al., 2011). Finally, a recent meta-analysis found that optimism predicts immune functioning ( $r=.21$ ) and physiological functioning ( $r=.17$ ) in prospective studies (Rasmussen et al., 2009).

## Job conditions

Finally, we argue that job conditions—objective or perceived characteristics of the job or work environment that may generate demands or afford resources—have a direct influence on SWB, and subsequently on physiological functioning, that is not mediated by work stress or positive resources. A central tenet of the JD-R model is that negative job conditions (i.e. job demands) cause stress (Link 4), which subsequently harms well-being and health (Links 5 and 6), whereas positive job conditions (i.e. job resources) generate personal resources (Link 9), which enhances well-being and protects health (Links 7 and 11). These two predictions have garnered strong support (Schaufeli and Taris, 2014). Negative job conditions, specifically job demands, evoke negative employee reactions, particularly in the form of job dissatisfaction and negative feelings, whereas positive job resources lead to positive reactions, including job satisfaction and positive feelings. For instance, workers who reported job demands in the form of high safety risk perceptions were less satisfied with their jobs than workers who did not report high safety risks. In contrast, workers who reported positive job resources in the form of a positive safety climate had higher levels of job satisfaction than workers who did not report a positive safety climate (Nielsen et al., 2011).

We propose that, in addition to job conditions influencing SWB via work stress and personal resources, job conditions can also directly influence SWB because of their effects on feelings other than stress. Feelings of stress and anxiety are characterized by high activation and negative valence (Russell, 1980). While such feelings are a common response to negative job characteristics, they are likely not the only affective response evoked by negative job characteristics and work events (Weiss and Cropanzano, 1996). For instance, interpersonal conflict at work or role overload may cause individuals to feel sad or disappointed, in addition to feeling stressed. Such low-activation negative emotions reflect a possible linkage between job conditions and SWB that is not mediated by stress. Link 12 in Figure 1 shows the direct influence of job conditions on SWB that is prompted by job conditions that evoke low-activation negative emotions.

## Discussion

### Theoretical contributions

Our perspective is the first to integrate occupational stress and positive psychological perspectives on the relationship between SWB and physiological health. This integration is crucial because examining the relationship from only one of these perspectives omits important causal paths and potential confounding factors. For instance, the occupational stress perspective focuses on the effects of work conditions and the personal and organizational factors that

mitigate the effects of those job conditions on both SWB and health. However, by omitting the direct influence of SWB on physiological functioning, the effects of factors such as job conditions and work stress may be overestimated. In contrast, by focusing primarily on the mechanisms linking positive emotions and health, the positive psychological perspective is limited because of a lack of consideration of the broader factors confounding the relationship between SWB and physiological functioning such as job conditions and work stress. Our model provides a framework for incorporating the important perspectives of each approach such that no key confounding factors are omitted.

By showing that the relationship between SWB and physiological functioning is partially driven by common influences of work stress, personal resources, and job conditions, our integrative model provides the foundation for interventions that simultaneously enhance both SWB and physiological functioning by targeting their common antecedents rather than focusing solely on the antecedents emphasized either by the occupational stress perspective or the positive psychological perspective.

### *Implications for research*

Our integrative model implies that, by targeting both work stress and personal resources, researchers can simultaneously enhance SWB and physiological functioning. A great deal of research has identified effective interventions to improve job conditions (National Institute for Occupational Safety and Health, 2013) and reduce work stress (Richardson and Rothstein, 2008). Fewer studies have examined interventions to enhance worker personal resources (Kirk et al., 2011; McNatt and Judge, 2008), although some initial evidence shows that psychological capital—a combination of hope, optimism, efficacy, and resiliency—can be developed in employees using short “micro-interventions” (Luthans et al., 2006). However, no studies have examined interventions simultaneously targeting personal resources, work stress, and job conditions. Future research is needed to determine how to best combine interventions targeting all three of these identified common influences. Two key issues that need to be addressed when designing integrative interventions are the level of the intervention (organizational or individual) and the degree of “match” between job conditions, stress, and personal resources.

*Level of intervention.* Concerning the level of intervention, interventions targeting stress and personal resources can have individual- or organization-level targets. For instance, work stress interventions focused on the individual often target coping styles, meditation, and progressive muscle relaxation, whereas interventions focused on the organization often target job conditions that commonly evoke stress

such as ambiguity, interpersonal conflict, safety problems, and high job demands. Similarly, personal resource interventions focused on the individual often target self-efficacy, whereas interventions focused on the organization target developing positive job resources such as supportive work environments.

While individual-level variables (e.g. stress and resources) are more proximal to SWB and physiological functioning than organization-level variables (e.g. job conditions), choosing an individual-directed intervention, rather than an organization-directed intervention, to reduce negative work experiences such as stress can send a message to employees that they, rather than the organization, are culpable for their negative experiences. Because of this risk, the National Institute for Occupational Safety and Health (2013) has emphasized the importance of approaches that seek to simultaneously address organization-level and individual-level causes of negative experiences. Furthermore, the National Institute for Occupational Safety and Health (2013) has provided compelling evidence that workers are most likely to benefit from individual health-promotion interventions when the relevant organization-level features are simultaneously addressed. As such, interventions targeting work stress need to ensure that any individual-directed solutions are complemented by organization-directed solutions.

Whether the same principle applies to personal resources is a topic for further research. Whereas a number of interventions have targeted job resources, fewer studies have targeted individual-level personal resources. Further research is needed on effective individual-directed personal resource interventions, particularly whether interventions are most effective when both job resources and personal resources are targeted.

In summary, we suggest that researchers can enhance SWB and physiological functioning by designing interventions that simultaneously improve job conditions, enhance personal resources, and reduce work stress. However, in doing so, careful attention needs to be given to whether the interventions target the individual or the organization. When addressing negative individual features such as stress, it is important that employees are not implicitly blamed for their experiences. Researchers can ensure this by including both individual-level and organization-level interventions.

*Triple-matching.* In addition to the level of the intervention targets, it is also important to consider the “match” across specific types of job conditions, stressors, and personal resources. The triple-match principle (De Jonge and Dormann, 2006) posits that resources are most likely to mitigate the effects of stress when stressors (conceptualized as similar to our definition of job conditions), strains (conceptualized as similar to our definition of stress), and resources are of the same type (i.e. emotional, cognitive, or physical).

Initial research appears to support the matching principle, particularly for emotional and physical stressors (De Jonge and Dormann, 2006). Because personal resources, as conceptualized in our article, are largely emotional, personal resource interventions may be most effective when used in contexts involving emotional stressors (e.g. emotional labor). As such, future research should examine whether the type of stressor is a boundary condition on our integrative model or whether personal resources can buffer the effects of stress on the SWB and health of workers even when the stress is primarily cognitive or physical in nature.

## Conclusion

Both employee SWB and health are of great importance to workers and organizations. Because employee SWB and physiological outcomes share common antecedents, interventions targeting these common antecedents are expected to result in enhanced SWB and physiological outcomes. By focusing employee interventions on the common antecedents of stress and resources, organizations can enhance and protect both SWB and health.

## Declaration of conflicting interests

The authors declare that there is no conflict of interest.

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## References

- Almadi T, Cathers I, Hamdan Mansour AM, et al. (2012) The association between work stress and inflammatory biomarkers in Jordanian male workers. *Psychophysiology* 49(2): 172–177.
- Amati M, Tomasetti M, Ciucciarelli M, et al. (2010) Relationship of job satisfaction, psychological distress and stress-related biological parameters among healthy nurses: A longitudinal study. *Journal of Occupational Health* 52: 31–38.
- Antoni MH and Lutgendorf S (2007) Psychosocial factors and disease progression in cancer. *Current Directions in Psychological Science* 16: 42–46.
- Avey JB, Luthans F, Smith RM, et al. (2010) Impact of positive psychological capital on employee well-being over time. *Journal of Occupational Health Psychology* 15: 17–28.
- Bateman TS and Organ DW (1983) Job satisfaction and the good soldier: The relationship between affect and employee “citizenship.” *Academy of Management Journal* 26(4): 587–595.
- Beck R and Fernandez E (1998) Cognitive-behavioral therapy in the treatment of anger: A meta-analysis. *Cognitive Therapy and Research* 22(1): 63–74.
- Boehm JK and Kubzansky LD (2012) The heart’s content: The association between positive psychological well-being and cardiovascular health. *Psychological Bulletin* 138(4): 655–691.
- Bogg J and Cooper CL (1995) Job satisfaction, mental health, and occupational stress among senior civil servants. *Human Relations* 48: 327–341.
- Burton WN, Conti DJ, Chen CY, et al. (1999) The role of health risk factors and disease on worker productivity. *Journal of Occupational and Environmental Medicine* 41(10): 863–877.
- Clore GL (2001) Affective feelings as feedback: Some cognitive consequences. In: Martin LL and Clore GL (eds) *Theories of Mood and Cognition: A User’s Guidebook*. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 63–84.
- Clore GL and Huntsinger JR (2007) How emotions inform judgment and regulate thought. *Trends in Cognitive Sciences* 11(9): 393–399.
- Dalgleish T and Watts FN (1990) Biases of attention and memory in disorders of anxiety and depression. *Clinical Psychology Review* 10: 589–604.
- De Jonge J and Dormann C (2006) Stressors, resources, and strain at work: A longitudinal test of the triple-match principle. *Journal of Applied Psychology* 91(6): 1359–1374.
- Demerouti E, Bakker AB, Nachreiner F, et al. (2001) The job demands-resources model of burnout. *Journal of Applied Psychology* 86(3): 499–512.
- Diener E (1984) Subjective well-being. *Psychological Bulletin* 95: 542–575.
- Diener E (1994) Assessing subjective well-being: Progress and opportunities. *Social Indicators Research* 31: 103–157.
- Diener E and Tay L (2012) A scientific review of the remarkable benefits of happiness for successful and healthy living. Report of the Well-Being Working Group, Royal Government of Bhutan. Report to the United Nations General Assembly, Well-Being and Happiness: A New Development Paradigm. Available at: [http://www.researchgate.net/profile/Louis\\_Tay/publication/236272980\\_A\\_scientific\\_review\\_of\\_the\\_remarkable\\_benefits\\_of\\_happiness\\_for\\_successful\\_and\\_healthy\\_living/links/54a2e7830cf267bdb9042bb8.pdf](http://www.researchgate.net/profile/Louis_Tay/publication/236272980_A_scientific_review_of_the_remarkable_benefits_of_happiness_for_successful_and_healthy_living/links/54a2e7830cf267bdb9042bb8.pdf)
- Dollard MF and Winefield AH (1998) A test of the Demand-Control/Support model of work stress in correctional officers. *Journal of Occupational Health Psychology* 3: 243–264.
- Evans GW and Carrère S (1991) Traffic congestion, perceived control, and psychophysiological stress among urban bus drivers. *Journal of Applied Psychology* 76(5): 658–666.
- Faragher EB, Cass M and Cooper CL (2005) The relationship between job satisfaction and health: A meta-analysis. *Occupational Environmental Medicine* 62: 105–112.
- Farrell D (1983) Exit, voice, loyalty, and neglect as responses to job dissatisfaction: A multidimensional scaling study. *Academy of Management Journal* 26: 596–607.
- Fontaine KR, Manstead AS and Wagner H (1993) Optimism, perceived control over stress, and coping. *European Journal of Personality* 7(4): 267–281.
- Fredrickson BL (1998) What good are positive emotions? *Review of General Psychology* 2: 300–319.
- Fredrickson BL (2001) The role of positive emotions in positive psychology: The Broaden-and-Build theory of positive emotions. *American Psychologist* 56: 218–226.
- Fredrickson BL and Levenson RW (1998) Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition & Emotion* 12: 191–220.

- Fredrickson BL, Cohn MA, Coffey KA, et al. (2008) Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology* 95(5): 1045–1062.
- French JR, Caplan RD and Van Harrison R (1982) *The Mechanisms of Job Stress and Strain*, vol. 7. Chichester and New York: John Wiley & Sons Ltd.
- Gallo LC, Bogart LM, Vranceanu A-M, et al. (2004) Job characteristics, occupational status, and ambulatory cardiovascular activity in women. *Annals of Behavioral Medicine* 28(1): 62–73.
- Garland EL, Fredrickson BL, Kring AM, et al. (2010) Upward spirals of positive emotions counter downward spirals of negativity: Insights from the Broaden-and-Build theory and affective neuroscience on the treatment of emotion dysfunctions and deficits in psychopathology. *Clinical Psychology Review* 30: 849–864.
- Goetzel RZ, Hawkins K, Ozminkowski RJ, et al. (2003) The health and productivity cost burden of the “top 10” physical and mental health conditions affecting six large US employers in 1999. *Journal of Occupational and Environmental Medicine* 45(1): 5–14.
- Goetzel RZ, Long SR, Ozminkowski RJ, et al. (2004) Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting US employers. *Journal of Occupational and Environmental Medicine* 46(4): 398–412.
- Graham C, Eggers A and Sukhtankar S (2004) Does happiness pay? An exploration based on panel data from Russia. *Journal of Economic Behavior & Organization* 55(3): 319–342.
- Herbert TB and Cohen S (1993) Stress and immunity in humans: A meta-analytic review. *Psychosomatic Medicine* 55: 364–379.
- Hershcovis MS, Turner N, Barling J, et al. (2007) Predicting workplace aggression: A meta-analysis. *Journal of Applied Psychology* 92(1): 228–238.
- Hofmann SG and Smits JA (2008) Cognitive-behavioral therapy for adult anxiety disorders: A meta-analysis of randomized placebo-controlled trials. *The Journal of Clinical Psychiatry* 69(4): 621–632.
- Hom PW, Katerberg R and Hulin CL (1979) Comparative examination of three approaches to the prediction of turnover. *Journal of Applied Psychology* 64(3): 280–290.
- Ikeda A, Schwartz J, Peters JL, et al. (2011) Optimism in relation to inflammation and endothelial dysfunction in older men: The VA Normative Aging Study. *Psychosomatic Medicine* 73(8): 664–671.
- Ilies R, Dimitakis N and De Pater IE (2010) Psychological and physiological reactions to high workloads: Implications for well-being. *Personnel Psychology* 63(2): 407–436.
- Kaplan SA, Warren CR, Barsky AP, et al. (2009) A note on the relationship between affect(ivity) and differing conceptualizations of job satisfaction: Some unexpected meta-analytic findings. *European Journal of Work and Organizational Psychology* 18(1): 29–54.
- Karasek R (1979) Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly* 24: 285–308.
- Kirk BA, Schutte NS and Hine DW (2011) The effect of an expressive-writing intervention for employees on emotional self-efficacy, emotional intelligence, affect, and workplace incivility. *Journal of Applied Social Psychology* 41(1): 179–195.
- Kohn ML and Schooler C (1982) Job conditions and personality: A longitudinal assessment of their reciprocal effects. *American Journal of Sociology* 87: 1257–1286.
- Krantz DS and Manuck SB (1984) Acute psychophysiological reactivity and risk of cardiovascular disease: A review and methodologic critique. *Psychological Bulletin* 96: 435–464.
- Kubzansky LD and Kawachi I (2000) Going to the heart of the matter: Do negative emotions cause coronary heart disease? *Journal of Psychosomatic Research* 48(4): 323–337.
- Kunz-Ebrecht SR, Kirschbaum C and Steptoe A (2004) Work stress, socioeconomic status and neuroendocrine activation over the working day. *Social Science & Medicine* 58(8): 1523–1530.
- Lazarus RS (1999) *Stress and Emotion: A New Synthesis*. London: Free Association Books.
- Lox CL, Burns SP, Treasure DC, et al. (1999) Physical and psychological predictors of exercise dosage in healthy adults. *Medicine and Science in Sports and Exercise* 31: 1060–1064.
- Luthans F and Youssef CM (2007) Emerging positive organizational behavior. *Journal of Management* 33: 321–349.
- Luthans F, Avey JB, Avolio BJ, et al. (2006) Psychological capital development: Toward a micro-intervention. *Journal of Organizational Behavior* 27(3): 387–393.
- Luthans F, Youssef CM and Avolio BJ (2007) *Psychological Capital: Developing the Human Competitive Edge*. New York: Oxford University Press.
- McNatt DB and Judge TA (2008) Self-efficacy intervention, job attitudes, and turnover: A field experiment with employees in role transition. *Human Relations* 61(6): 783–810.
- Mark G and Smith AP (2012) Effects of occupational stress, job characteristics, coping, and attributional style on the mental health and job satisfaction of university employees. *Anxiety, Stress and Coping* 25(1): 63–78.
- Matthews KA, Cottingham EM, Talbott E, et al. (1987) Stressful work conditions and diastolic blood pressure among blue collar factory workers. *American Journal of Epidemiology* 126(2): 280–291.
- Matthews KA, Räikkönen K, Sutton-Tyrrell K, et al. (2004) Optimistic attitudes protect against progression of carotid atherosclerosis in healthy middle-aged women. *Psychosomatic Medicine* 66(5): 640–644.
- Miller GE, Chen E and Cole SW (2009) Health psychology: Developing biologically plausible models linking the social world and physical health. *Annual Review of Psychology* 60: 501–524.
- Miller GE, Chen E and Zhou ES (2007) If it goes up, must it come down? Chronic stress and the hypothalamic-pituitary-adrenocortical axis in humans. *Psychological Bulletin* 113: 25–45.
- Mishra S (1992) Leisure activities and life satisfaction in old age: A case study of retired government employees living in urban areas. *Activities, Adaptation, & Aging* 16: 7–26.
- National Institute for Occupational Safety and Health (2013) Essential elements of effective workplace programs. Available at: <http://www.cdc.gov/niosh/twh/essentials.html>
- Ng W, Diener E, Aurora R, et al. (2009) Affluence, feelings of stress, and well-being. *Social Indicators Research* 94: 257–271.

- Nielsen MB, Mearns K, Matthiesen SB, et al. (2011) Using the Job Demands–Resources model to investigate risk perception, safety climate and job satisfaction in safety critical organizations. *Scandinavian Journal of Psychology* 52(5): 465–475.
- Ouweneel E, Le Blanc PM and Schaufeli WB (2012) Don't leave your heart at home: Gain cycles of positive emotions, resources, and engagement at work. *Career Development International* 17(6): 537–556.
- Piko BF, Gibbons FX, Luszczynska A, et al. (2002) Does culture matter? Cross-cultural comparison of smoking patterns among adolescents. In: Leal I, Botelho T and Ribeiro JP (eds) Proceedings of the 16th Conference of the Health Psychology Society. Lisbon: Institute for the Application of Psychology, pp. 9–12.
- Pressman SD and Cohen S (2005) Does positive affect influence health? *Psychological Bulletin* 131: 925–971.
- Rasmussen HN, Scheier MF and Greenhouse JB (2009) Optimism and physical health: A meta-analytic review. *Annals of Behavioral Medicine* 37(3): 239–256.
- Richardson KM and Rothstein HR (2008) Effects of occupational stress management intervention programs: A meta-analysis. *Journal of Occupational Health Psychology* 13(1): 69–93.
- Richman LS, Kubzansky L, Maselko J, et al. (2005) Positive emotion and health: Going beyond the negative. *Health Psychology* 24(4): 422–429.
- Riddick CC (1985) Life satisfaction determinants of older males and females. *Leisure Sciences* 7: 47–63.
- Riketta M (2008) The causal relation between job attitudes and performance: A meta-analysis of panel studies. *Journal of Applied Psychology* 93(2): 472–481.
- Rozanski A, Blumenthal JA and Kaplan J (1999) Impact of psychological factors on the pathogenesis of cardiovascular disease. *Circulation* 99: 2192–2217.
- Russell JA (1980) A circumplex model of affect. *Journal of Personality and Social Psychology* 39: 1161–1178.
- Schaufeli WB and Taris TW (2014) A critical review of the Job Demands-Resources Model: Implications for improving work and health. In: Bauer G and Hämmig O (eds) *Bridging Occupational, Organizational and Public Health*. Dordrecht: Springer, pp. 43–68.
- Scheier MF, Weintraub JK and Carver CS (1986) Coping with stress: Divergent strategies of optimists and pessimists. *Journal of Personality and Social Psychology* 51(6): 1257–1264.
- Schwarz N and Clore GL (1983) Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology* 45(3): 513–523.
- Shirom A, Melamed S, Berliner S, et al. (2009) Aroused versus calm positive affects as predictors of lipids. *Health Psychology* 28(6): 649–659.
- Smith JJ and Kampine JP (1990) *Circulatory Physiology*. London: Williams & Wilkins.
- Smith PC, Kendall LM and Hulin CL (1969) *The Measurement of Satisfaction in Work and Retirement: A Strategy for the Study of Attitudes*. Chicago, IL: Rand McNally.
- Snyder CR, Harris C, Anderson JR, et al. (1991) The will and the ways: Development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology* 60(4): 570–585.
- Steptoe A, Dockray S and Wardle J (2009) Positive affect and psychobiological processes relevant to health. *Journal of Personality* 77: 1747–1775.
- Stewart WF, Ricci JA, Chee E, et al. (2003) Lost productive time and cost due to common pain conditions in the US workforce. *The Journal of the American Medical Association* 290(18): 2443–2454.
- Tay L and Kuykendall L (2013) Promoting happiness: The malleability of individual and societal subjective wellbeing. *International Journal of Psychology* 48(3): 159–176.
- Teuchmann K, Totterdell P and Parker SK (1999) Rushed, unhappy, and drained: An experience sampling study of relations between time pressure, perceived control, mood and emotional exhaustion in a group of accountants. *Journal of Occupational Health Psychology* 4: 37–54.
- The United Nations (2013) International day of happiness: The pursuit of happiness is a fundamental human goal. Available at: <http://www.un.org/en/events/happinessday/>
- Van Eck M, Nicolson NA and Berkhof J (1998) Effects of stressful daily events on mood states: Relationship to global perceived stress. *Journal of Personality and Social Psychology* 75(6): 1572–1585.
- Van Katwyk PT, Fox S, Spector PE, et al. (2000) Using the Job-Related Affective Well-Being Scale (JAWS) to investigate affective responses to work stressors. *Journal of Occupational Health Psychology* 5(2): 219–230.
- Veenhoven R (1984) *Conditions of Happiness*. Dordrecht: D. Reidel Publishing Company.
- Watson D (1988) Intraindividual and interindividual analyses of positive and negative affect: Their relation to health complaints, perceived stress, and daily activities. *Journal of Personality and Social Psychology* 54: 1020–1030.
- Watson D, Clark LA and Tellegen A (1988) Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology* 54: 1063–1070.
- Watson D, Clark LA, McIntyre CW, et al. (1992) Affect, personality, and social activity. *Journal of Personality and Social Psychology* 63: 1011–1025.
- Weiss HM and Cropanzano R (1996) Affective events theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work. *Research in Organizational Behavior* 19: 1–74.
- Xanthopoulou D, Bakker AB, Demerouti E, et al. (2007) The role of personal resources in the Job Demands-Resources model. *International Journal of Stress Management* 14(2): 121–141.
- Xanthopoulou D, Bakker AB, Demerouti E, et al. (2009a) Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior* 74(3): 235–244.
- Xanthopoulou D, Bakker AB, Demerouti E, et al. (2009b) Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of Occupational and Organizational Psychology* 82(1): 183–200.
- Zohar D (1999) When things go wrong: The effect of daily work hassles on effort, exertion and negative mood. *Journal of Occupational and Organizational Psychology* 72(3): 265–283.