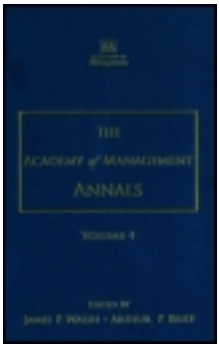
This article was downloaded by: [University of Michigan]
On: 08 May 2012, At: 11:00
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



The Academy of Management Annals

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rama20

Building a Sustainable Model of Human Energy in Organizations: Exploring the Critical Role of Resources

Ryan W. Quinn [a], Gretchen M. Spreitzer [b] & Chak FU Lam [b]

[a] Darden School of Business, University of Virginia, USA

[b] Ross School of Business, University of Michigan, USA

Available online: 02 May 2012

To cite this article: Ryan W. Quinn, Gretchen M. Spreitzer & Chak FU Lam (2012): Building a Sustainable Model of Human Energy in Organizations: Exploring the Critical Role of Resources, The Academy of Management Annals, DOI:10.1080/19416520.2012.676762

To link to this article: http://dx.doi.org/10.1080/19416520.2012.676762

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: http://www.tandfonline.com/page/terms-and-conditions

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan,

sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Downloaded by [University of Michigan] at 11:00 08 May 2012

The Academy of Management Annals
2012, 1–60, i*First* article

Downloaded by [University of Michigan] at 11:00 08 May 2012

Building a Sustainable Model of Human Energy in Organizations:
Exploring the Critical Role of Resources

RYAN W. QUINN*
Darden School of Business, University of Virginia, USA

GRETCHEN M. SPREITZER
Ross School of Business, University of Michigan, USA

CHAK FU LAM
Ross School of Business, University of Michigan, USA

Abstract

This article makes the critical role that the construct of energy plays in motivation research and reviews six literatures related to human energy in a work context: (1) conservation of resources, (2) attention restoration theory, (3) ego-depletion theory, (4) energetic activation, (5) interaction ritual chain, and (6) self-determination theory. We clarify definitions of human energy, show how they are related to constructs like flow, motivation, and resources, and show how ideas related to energy can be integrated across these literatures.

*Corresponding author. Email: quinnr@darden.virginia.edu

ISSN 1941-6520 print/ISSN 1941-6067 online
© 2012 Academy of Management
http://dx.doi.org/10.1080/19416520.2012.676762
http://www.tandfonline.com

We use the literatures to build and integrative model of human energy in organizations. The model captures the dynamics of human energy, demonstrates how energy can be both a scarce and an abundant resource, integrates resources and resourcing into the model, and how motivation needs to account for the creation of resources as well as the use of resources. We also use the model to provide insights into important future research in this area.

Introduction

In a recent interview, the Chairman of Domino's Pizza and athletic director at the University of Michigan was asked what he most looked for in hiring the best leaders. His response was that he looks for people with positive energy (Brandon & Davis-Blake, 2011). In a related example, when asked how he knew if a new venture was likely to be successful, a venture capitalist remarked, "I see what kind of energy I experience when I first walk into the firm". Claims like these by people who have significant influence on the design, funding, and operation of organizations demonstrate the value placed on human energy as a requisite condition for individual and organizational performance. In fact, when one peruses popular books, articles, and websites, people often make claims about how crucial energy is for personal and work performance. Loehr and Schwartz (2003) speak of a "human energy crisis", claiming that the many demands organizations face contribute to the depletion of human energy at work. Indeed, energy management is a recurring theme on Oprah Winfrey's websites, where her columnists frequently write about emotional and spiritual energy at work. Clearly, energy is a factor that influences human activity and decision-making in organizations, but what do practitioners really mean by energy? Is this a colloquial term for motivation? Can the academic literature provide more conceptual clarity?

Unfortunately, it does not. Social scientists and philosophers have used the term energy, and its synonyms, in different and sometimes incompatible ways for hundreds of years. For example, Aristotle used the term "energeia" to describe the activity which fuels one's potentiality (Witt, 2003). Freud articulated how people continuously generate what he calls psychic energy to fuel the mind and in turn accomplish tasks (Harding, 1973; Rieff, 1979). Jung regarded psychic energy as a basic life force which would manifest itself as needed for daily life functions (Harding, 1973). And Durkheim (1954 [1912], p. 91) saw energy as a dimension of one's sentiments, pointing out that "sentiments born and developed in the group have a greater energy than purely individual sentiments". Energy plays an important role in how each of these scholars develop their theories, but the word itself is often used loosely and applied in different ways to different domains of activity.

Recent scholarship shows a similar confusion. Some scholars use the term energy to refer to the literal bodily resource of glucose in the bloodstream

Downloaded by [University of Michigan] at 11:00 08 May 2012

that enables people to have the willpower to exert self-control (e.g. Baumeister & Tierney, 2011; Gailliot & Baumeister, 2007). Other scholars define energy as the attention that people invest in work (Kaplan, 1995; Kaplan & Kaplan, 1989), an affective experience like vitality (e.g. Collins, 1981; Ryan & Deci, 2000; Thayer, 1989) or a kind of disposition (Peterson, Park, Hall, & Seligman, 2009). Even when scholars use similar definitions, they often make different assumptions about how energy works, such as whether it is a scarce resource or an abundant one. Clarifying and understanding these definitions and assumptions is critical if scholars are to learn from the different streams of research being conducted on this topic and if practitioners are to make informed decisions about what role energy does and should play in the design, funding, and operation of organizational activities.

Ultimately, the clarification and integration of the definitions, assumptions, and operations of human energy at work is important because it enhances our understanding of some of organizational behavior's most central topics, including, as we discuss in this article, motivation. Motivation scholars often link or even equate motivation and energy, defining motivation as "the energy a person expends in relation to work" (Pinder, 1998, p. 1) or as "an unobservable force that directs, energizes, and sustains behavior over time across changing circumstances" (Diefendorff & Chandler, 2011, p. 66). Motivation captures people's decisions about how and in what activities to expend their energy (direction), how much energy to expend (intensity), and for how long (persistence) (Pinder, 2008), which explains, in part, why the study of human energy has been of such interest to organizational scholars in the past decade (e.g. Cross, Baker, & Parker, 2003; Feldman & Khademian, 2003; Jansen, 2004; Kark & Carmeli, 2009; Quinn & Dutton, 2005; Sonnentag, 2003). Energy and motivation are, of course, different but related constructs, and by clarifying the definitions, assumptions, antecedents, and consequences of human energy at work, scholars can address fundamental issues in motivation scholarship as well as research on energy.

One problem of recent interest to motivation scholars that a clarification and integration of research on human energy could help them grapple with is the question of how and why motivation changes over the course of activities (Diefendorff & Chandler, 2011). The integrative model that we build from a review of the research on human energy helps address this question by suggesting that motivation may be a function, in part, of the creation of work-related resources—where resources are defined as anything that actors can use to enact a schema (e.g. Feldman, 2004; Feldman & Worline, 2011; Orlikowski, 2000). The idea of resource creation, as will be shown, helps to clarify and integrate, and also to introduce dynamism into a model of motivation. Motivation research takes seriously the idea that motivation can be understood, at least in part, as the expenditure of resources (e.g. Vancouver, More, & Yoder, 2008), but has yet to consider the idea that people can also

Downloaded by [University of Michigan] at 11:00 08 May 2012

create resources as they engage in motivated activity. The creation of resources during motivated activity alters some of the fundamental equations of the motivation literature, suggesting that these should be dynamic rather than static. We propose a dynamic model of this process. This model provides an explicit explanation for the ebbs and flows of energy at work that scholars have only included implicitly in energy research so far (e.g. Baumeister, Gailliot, DeWall, & Oaten, 2006; Fritz & Sonnentag, 2006; Jansen, 2004). This model can explain virtuous and vicious cycles, growth, collapse, equilibrium, oscillation, and other dynamics as well.

A dynamic model of human energy in organizations also makes it possible to address another problem in the energy literatures: conflicting assumptions about the scarcity (e.g. Freud, 1961) or abundance (e.g. Durkheim, 1954 [1912]) of human energy. Researchers have provided evidence for both perspectives. For example, scholars who study recovery (e.g. Sonnentag, 2003) assume that work drains people's energy reserves; so they study how these reserves can be regenerated on evenings and weekends. Job insecurity increases worries that contribute to sleep disruption and higher levels of resource depletion (Sonnentag, Binnewies, & Mojza, 2008). Jobs have become more complex and interdependent with others (Griffin, Neal, & Parker, 2007), which requires more executive function, a key mechanism that depletes human energy (Baumeister, 2002). Cross et al. (2003) show how networks of human relationships drive the energy that people feel at work, and warn especially of the "de-energizers" that people encounter at work. At the same time, other scholars see energy as reflective of interest in one's work (e.g. Marks, 1977; Ryan & Deci, 2000) and therefore assume energy to be abundant rather than scarce. For example, activity can be sustained for long periods without eating when interest is high (Marks, 1977), energy is found to be contagious to others (Barsade, 2002), and people seek out repeated interactions with those who are "energizers" (Baker, Cross, & Wooten, 2003; Collins, 1993). A dynamic model of human energy can explain how both of these perspectives can be true, and how one perspective may be more prevalent than the other in some circumstances because of endogenous changes in the influence of some aspects of a human system relative to others.

This article begins by looking across the interdisciplinary literatures on human energy to articulate two fundamental definitions of energy, distinguish them from related constructs including burnout, flow, and motivation, and discuss the assumptions that are necessary to build a model of human energy at work. Once this groundwork is laid, each of the six literatures relating to human energy is reviewed. From key findings of each literature, we build a model of human or intra-individual energy which captures the dynamics of human energy over time in a work context.[1] We close the paper by articulating some important directions for future research.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Definitions and Distinctions of Human Energy

Definitions

A review of research on human energy reveals that sometimes definitions of energy are not explicit and that there is little cross-citation across literatures. As a result, scholars often use different terms to mean something similar or the same terms to mean different things. Synthesizing across these literatures, two core definitions of energy can be identified (see Figure 1 to see how the two definitions interrelate and are related to other energy-related ideas).

Physical energy. The first definition of human energy comes from the physical and biological sciences. It is "the capacity to do work", where work is a product of the force that is exerted on an object and the distance it moves. Physical energy can manifest as potential energy (energy that is available but unused) or kinetic energy (energy that an object has because of its motion). In humans, physical energy is stored as potential energy in the chemical bonds that make up glucose or adenosine triphosphate (ATP) (Brown, 1999). This potential energy is then transformed into kinetic energy as the bonds of these complex chemicals are broken and new, simpler chemicals are formed (Brown, 1999). Actions that expend physical energy can be either intentional (e.g. conscious thought, deliberate locomotion, mindful conversation, and active listening) or unintentional (breathing, the pumping of the heart, unconscious thought, and automatic response). Thus, physical energy is what enables individuals to move, to do, and to think.

Some scholars explicitly examine the role that physical energy plays in human behavior through manipulations such as the intake of food or through the measurement of blood glucose (e.g. Gailliot & Baumeister, 2007; Gailliot et al., 2007). Research that explicitly measures physical energy is relatively uncommon, most likely because it requires physiological intervention

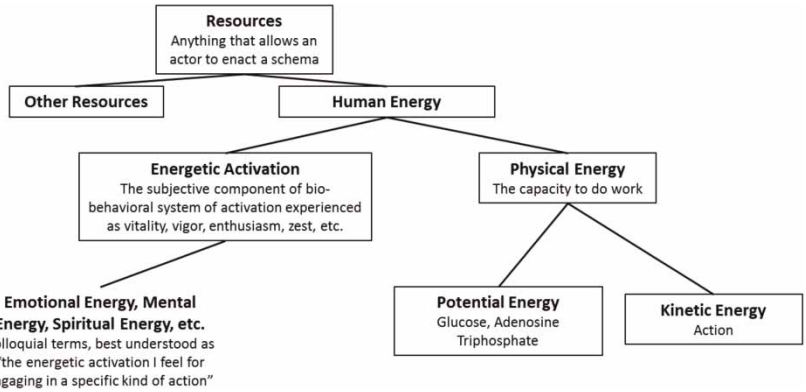


Figure 1 A Hierarchy of Energy Constructs.

(e.g. a blood test). More commonly, research assumes physical energy or attempts to measure physical energy through subjective means. For example, some scholars refer to physical energy (implying chemicals in the human body) in their theoretical development (e.g. Hobfoll & Stokes, 1988; Kaplan & Kaplan, 1989), but the research that tests these theories tends to use Likert-scale-based subjective assessments of research participants' energy (e.g. Hobfoll & Shirom, 2001). The assumption that physical energy can be assessed with subjective measures may seem appropriate because the degree to which people feel energized often corresponds with the effort they exert. The correlation between physical energy and subjective energy is less than one, however. Even tired people can push themselves to exert more physical energy, and those who have plenty of potential energy may not exert much effort (Marks, 1977). This suggests that a separate construct is needed to account for the degree to which people *feel* energized.

Energetic activation. Scholars use the phrase *energetic activation* to describe the degree to which people feel energized. Energetic activation is also referred to as energetic arousal (Thayer, 1989), positive activation (Watson, Wiese, Vaidya, & Tellegen, 1999), vitality (Ryan & Fredrick, 1997), emotional energy (Collins, 1981), subjective energy (Marks, 1977), or zest (Miller & Stiver, 1997; Peterson et al., 2009). We use the label "energetic activation" because (1) the word "energetic" makes the connection to human energy explicit and (2) contemporary psychologists tend to use the word "activation" over other terms like "arousal". Phrases like "emotional energy" or "subjective energy" may also be appropriate, but they can also imply that there are different types of energy, a problem that will be addressed shortly.

Energetic activation is the subjective component of a "biobehavioral system of activation" (Thayer, 1989; Watson et al., 1999, p. 847), experienced as feelings of vitality, vigor, or enthusiasm. It can manifest itself in emotions (feelings with short durations targeted toward a specific object, event, or person), moods (longer-lasting, less-targeted feelings), or dispositions (enduring tendencies to be energetic or not). People experience energetic activation in high-activation forms of positive affect, such as excitement or enthusiasm, but not in low-activation forms of positive affect, such as serenity or contentment (Watson et al., 1999).

Other uses of the term energy found in the literature. Sometimes, scholars add adjectives to the word energy to imply that there are different types of energy, depending on the type of activities that people do, such as mental energy (e.g. Mayer & Gavin, 2005), spiritual energy (e.g. Ashar & Lane-Maher, 2004), or social energy (e.g. Seibert, Kraimer, & Liden, 2001). This may be appropriate for colloquial use, but it is inaccurate and it makes integration across scholarly work difficult (Saravi, 1999). Energy is not "mental", "social", or "spiritual" *per se*. Rather, people invest their physical energy in, or feel energetic activation about, mental, social, or spiritual activities. When

Downloaded by [University of Michigan] at 11:00 08 May 2012

people say things like "I do not have the emotional energy for that right now", they are not making an assessment of how much glucose or ATP their body has available for emotional activities, but about how much energetic activation they feel when they think about investing physical energy into an activity that is likely to involve intense emotion. Humans with adequate nutrition generally store plenty of ATP for at least a day's worth of normal activity (Marks, 1977). Such phrases may be appropriate for everyday use, but in scientific studies, if language like this is not handled carefully, it promotes confusion between physical energy and energetic activation and incorrectly implies that different types of energy are used in different types of activities.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Relationships to Other Constructs

Physical energy and energetic activation are related to constructs such as burnout, flow, motivation, and resources. For example, burnout is defined as a psychological state reflecting emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslach, Schaufeli, & Leiter, 2001). The emotional exhaustion dimension has the clearest links to our two definitions of energy. Emotional exhaustion is measured with items including "feeling emotionally drained", "feeling used up", and "feeling at the end of my rope". Because of the emphasis on feeling, it is clear that emotional exhaustion is distinct from physical energy but closely related to energetic activation. In fact, emotional exhaustion is a state of low energetic activation coupled with a sense that one is *unable* to achieve high levels of energetic activation. In contrast, a person could feel perfectly capable of achieving high levels of energetic activation, but not now, not in this activity, or not with these people. In cases like these, even though energetic activation may be low, people would not experience burnout because the belief that one is capable of getting energized about an activity is still present. This sense of being unable to achieve energetic activation makes emotional exhaustion more specific than just a low level of energetic activation—it connotes a kind of helplessness.

Flow (Csikszentmihalyi, 1990) is also different from the two definitions of energy. Flow is the experience of merging one's situation awareness with the automatic application of activity-relevant knowledge and skills (Quinn, 2005). Physical energy is required to become and remain aware of a situation and to apply one's knowledge and skills to that situation. But, awareness and application are not the same as energetic activation. In fact, as Csikszentmihalyi (1997) pointed out, the positive feelings associated with flow tend to come after the flow experience. Indeed, the experience of flow at work has been linked to feeling more vigorous after work (Demerouti, Bakker, Sonnentag, & Fullagar, 2012). During the flow experience, people seldom have any cognitive space to pay attention to how they feel in the moment. Flow itself is an experience of investing all of one's conscious attention into staying aware of

an unfolding situation while simultaneously responding to that situation automatically, fluidly, and skillfully (Quinn, 2005).

The concepts of motivation and resources are more closely aligned with the two definitions of energy. In fact, some scholars equate energy with motivation (e.g. Pinder, 1998) or see energy as a key (or the key) resource in the motivation process (e.g. Baumeister, Schmeichel, & Vohs, 2007). There are, however, some important differences between motivation and the two definitions of energy. Motivation is an umbrella construct that encompasses the initiation, direction, intensity, persistence, and termination of effort (Landy & Becker, 1987). Effort, in turn, is a type of kinetic energy. It is not the only type of kinetic energy that the human body exhibits—involuntary behaviors like the beating of the heart also require the transformation of potential energy into kinetic energy as well. Thus, one way to think about motivation is in terms of the potential energy being transformed into kinetic energy in order to exert effort.

Effort is also related to energetic activation because action tends to be smooth and fluid when people experience it (Thayer, 1989). Energetic activation can increase the level and duration of effort that people invest in activities (e.g. Marks, 1977). People can, however, feel energized without investing any effort or engage in effort that they do not feel energized about (often referred to as self-control or willpower; Baumeister, Bratslavsky, Muraven, & Tice, 1998). Even so, people are likely to invest effort more eagerly and efficiently into activities for which they experience energetic activation (Baumeister et al., 2006; Marks, 1977; Moller, Deci, & Ryan, 2006; Thayer, 1989).

Some motivation scholars define effort in terms of the resources that a person invests into an activity, where energy is one type of resource that people can invest (Baumeister et al., 2007), along with other indicators such as time (e.g. Vancouver et al., 2008) and attention (Kanfer & Ackerman, 1989). Physical energy is but one of many types of resources that can be invested when effort is exerted. Energetic activation may also be viewed as a resource because it is a means for broadening thought–action repertoires (Fredrickson & Branigan, 2005), which in turn can create new or additional resources through affect-driven actions like play, relationship building, or exploration (Fredrickson, 1998b; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008).

In these ways, we can see important differences and/or relationships between our two types of energy and burnout, flow, motivation, effort, and resources. Because both types of energy are types of resources, and because organizational scholars are offering new insights into the nature and role of resources (Feldman, 2004; Feldman & Worline, 2011) as well as into energy, and because the inclusion of resources into a model of human energy makes that model more parsimonious, we make resources an important building block in our integrative model of human energy.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Energy as Resources: A Building Block in an Integrative Model of Human Energy at Work

Each of the literatures that examine human energy addresses, implicitly or explicitly, the concept of resources in one way or another, which suggests that resources should be a central part of a model of human energy and motivation. If resources are to be a building block in this model, then we must be clearer about defining resources.

Historically, organizational scholars have viewed resources as material or symbolic entities that individuals seek to possess because of the entity's inherent value (Barney, 1991; Eisenhardt & Martin, 2000; Pfeffer & Salancik, 1979). In the past decade, scholars have begun to view this definition as limited because individuals are often resourceful in using objects, properties, or relationships in ways that were unexpected or unintended (Orlikowski, 2000), and the usefulness of resources, therefore, has more to do with how those resources are used in practice (Feldman, 2004). This suggests a more expansive definition of a *resource* as "anything that allows an actor to enact a schema" (Feldman & Worline, 2011, p. 630), where a *schema* is a cognitive framework that people use to organize their understanding of a situation. Actors engage in *resourcing* when they put potential resources (which may include a much broader array of material and symbolic objects than is typically considered) into use. Thus, resources are defined by their use rather than their innate characteristics, which means that resources can be created more often than we typically assume. This resourcing depends as much on the creativity and agency of the users as it does on the quantity of resources a person has access to. For example, Feldman and Worline (2011) suggest that while bread is the ingredient that is most typically included with meat to make meatballs, bread, olives, or hummus are all potential resources that can be used to create meatballs, and they only become resources when actors realize they can put them into use and do so.

The fact that resources can be created more often than we typically assume does not mean that anything can be a resource or that there are no limits to the resources that can be created. One important limitation to resourcing is the schema, or frame, that an actor uses a resource to enact. Returning to the meatball example, Feldman and Worline (2011) suggest that shards of glass, pellets of metal, or rat poison do not contribute to a schema of cooking edible food and therefore are not potential resources. Bread, olives, and hummus are all potential resources, but one or more of them only become resources (or, more particularly, *resources-in-use*) if they are actually used to make meatballs. In most cases, bread crumbs are the only resource that gets put into use when cooking meatballs, while hummus and olives remain potential resources.

Potential resources versus resources-in-use. The distinction between potential resources and resources-in-use is relatively new. This distinction is

similar to the distinction between potential energy (a potential resource) and kinetic energy (a resource-in-use). This similarity may be a reason for why organizational scholars invoke energy metaphors in their theories of resources. For example, Katz and Kahn (1978) called resources "energic", and Feldman argued that resources "energize" schema (Feldman, 2004). Understanding how resources energize schema—and how energetic activation contributes to the production of resources (Fredrickson, 1998a)—is critical for building an integrative model of energy in organizations. In fact, this reciprocal influence between energetic activation and resources suggests a need for a model of human energy that can account for reciprocal causation and change over time.

Resources energize schema, at least in part, because the more resources people have that are relevant for the schema they are trying to enact, the more they feel energetic activation when they think about enacting that schema (Hobfoll & Stokes, 1988; Kaplan & Kaplan, 1989). In other words, when people have relevant resources, they feel more "eager to act and capable of acting" (Quinn & Dutton, 2005, p. 36). Further, energetic activation felt toward a specific activity or schema tends to lead individuals to act, transforming their potential energy into kinetic energy, thereby energizing those schemas with action (Marks, 1977; Moller et al., 2006; Thayer, 1989). Resources energize schema, then, by increasing energetic activation and by transforming potential energy into kinetic energy.

We model potential energy (ATP and glucose) as a type of resource within the broad category of potential resources, rather than as a separate and distinct construct. We do so because (1) physical energy is one of the many resources invested when effort is exerted (Diefendorff & Chandler, 2011), (2) it can be difficult to distinguish, when engaged in the practical considerations of empirical research, from time, attention, or other resources-in-use (e.g. Vancouver et al., 2008), and (3) the limiting factor for whether or not energy is invested in activities is not the availability of glucose/ATP, but whether or not a person feels energetic activation for those activities (Marks, 1977; Moller et al., 2006; Thayer, 1989). Thus, physical energy works exactly as Orlikowski (2000) and Feldman (2004) describe resources in general: potential energy becomes a resource as it is used (and only as it is used) in practice, by transforming it into action. Physical potential energy (e.g. glucose or ATP) is thus a potential resource while physical kinetic energy (manifested as thinking, communicating, and behaving) occurs when people engage in resourcing or in putting resources to use. Thus, in our model, we use the variables "potential resources" and "resources-in-use" instead of "potential energy" and "kinetic energy" because potential and kinetic energy are included within these broader resource categories and these resources behave in the same way that physical energy would, were it to be modeled separately.

Energetic activation, like physical energy, can be used as a resource (e.g. Quinn & Dutton, 2005), but it also serves other functions, and thus becomes

Downloaded by [University of Michigan] at 11:00 08 May 2012

both an important explanatory mechanism and a measurable outcome in our model. It is also the key variable that we can track in terms of explaining patterns of energy that people experience over time. Therefore, when integrating previous research into a single model, we include energetic activation as a distinct construct, separate from resources.

An Integrated Model of Human Energy at Work: Drawing Insights from Six Literatures

Six literatures on human energy were identified by searching organizational and social science databases using the term energy and its synonyms, including energetic activation, vitality, vigor, engagement, zest, and enthusiasm, as well as terms relating to the absence of energy such as fatigue and exhaustion.[2] Scholars who study human energy in psychology, sociology, kinesiology, and organizational studies were also asked for recommendations. Based on this search, six literatures, summarized in Table 1 were identified for review: conservation of resources (CoR) theory, attention restoration theory (ART), ego-depletion theory (EDT), energetic and tense activation, interaction ritual chain (IRC) theory, and self-determination theory (SDT). For each literature, Table 1 describes the definitions/measures of energy used in the literature, whether the literature assumes scarcity or abundance of human energy, and central theoretical and empirical insights.

Each of these literatures is discussed in the sections that follow. Looking across these literatures, many examples of reciprocal causation can be found. For example, CoR theory suggests that resources are depleted when people put them into use to meet job demands, and EDT suggests that people alter the effort they put into obtaining resources for use to reflect changes in demands. We account for this reciprocal causation by including feedback loops in the model (Weick, 1979). Feedback loops imply a dynamic model (Sterman, 2000), which means that this model could be used to explain changes in the behavior of variables over time. Therefore, after we extract key findings from each literature and use them to flesh out constructs, relationships, and loops in the model, we also use these loops to explain some typical behavior we would expect to see in people's energetic activation at work, including an explanation of how energy can be both abundant and scarce. A depiction of the complete model derived from these theories can be found in Figure 2.

Because this model includes feedback loops, it does not have independent variables or dependent variables. Or, stated another way, any variable in the model can be thought of as an independent variable and any variable can be thought of as a dependent variable. The power of a model like this is that it allows us to explain how these variables change over time endogenously. Other variables not included in this model may also influence variables in this model, but other variables are not needed to explain changes: The variables

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 1 Summary of Research Literatures

Literature	Definition and measure of human energy	Energy as scarce or abundant	Key insights for energy
Conservation of resources	Energy is a subjective experience we strive to retain, protect, and build, measured with a 12-item vigor scale	Scarce	Job demands deplete energy, whereas job resources enhance energy
Attention restoration theory	Energy is a capacity for attentional functioning, measured with an attentional function index	Scarce	Energy is depleted by directed attention. Energy is restored by exposure to the natural environment
Ego-depletion theory	Energy is glucose, which allows control of the self, measured by examining glucose in the bloodstream	Scarce	Energy is depleted through self-control activities. Energy has a biological underpinning—glucose. Use of energy can be increased through self-control practice
Energetic activation and tense activation	Energy is positive activation, associated most closely with emotions like excitement, enthusiasm, and interest, and is measured with an adjective checklist	Abundant	Energy is an affective experience. Energy can be generated through mild exercise. Energy can induce creativity (at individual level), mood contagion (at group level), and momentum (at org. level). Energy broadens thought and action repertoires and builds resources. Energy offsets the physiological impact of tension
Interaction ritual chain theory	Energy is positive activation associated with feelings of enthusiasm and confidence, and measured with various adjective-based instruments	Abundant	Energy is generated in social rituals. People like feeling energy and seek to recreate activities that will generate more energy. Repeated activities create social structures. People avoid interactions that decrease energy when possible
Self-determination theory	Energy is subjective vitality or a sense of aliveness and is measured with subjective vitality scale	Abundant	Meeting needs for autonomy, competence, and relatedness enhances energy. Performing activities that people find intrinsically interesting mitigates the depleting effects of self-control

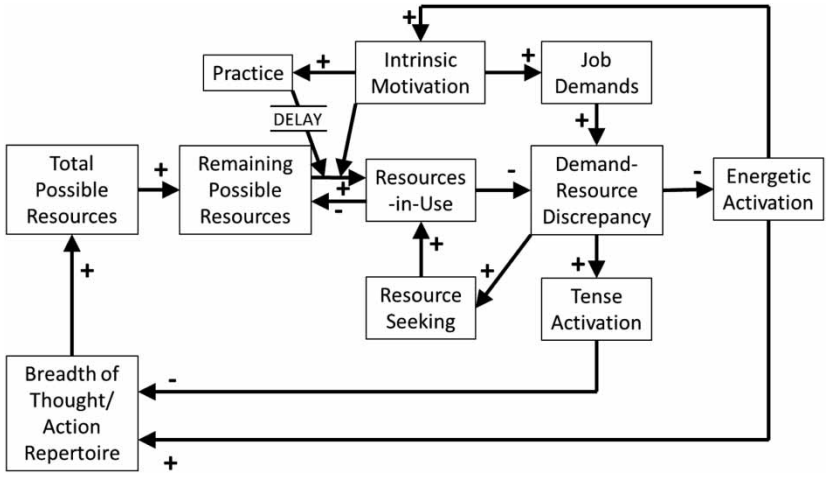


Figure 2 An Integrated Model of Human Energy.

and relationships in this model are sufficient to explain a wide range of dynamic behavior. We will focus, however, on the dynamic behavior of energetic activation because it is a measurable indicator of how a person feels their overall system of demands and resources is performing. In particular, in the discussion, we will use the model to explain how specific patterns of change in a person's energetic activation are likely to occur.

Literature 1: CoR Theory

CoR is a theory that was developed to explain differences in the ways that people handle the stressors that they encounter in life (Hobfoll, 1989). The core idea of this research is that people's responses to threats can be explained by the resources they have available to them to deal with stress. In CoR theory, energy is treated as a type of intrinsic resource known as vigor (Hobfoll & Shirom, 2001; Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002). CoR scholars measure vigor as a subjective assessment of a person's physical strength (e.g. "I feel I have physical strength"), mental acuity (e.g. "I feel I can think rapidly"), and emotional capacity (e.g. "I feel capable of being sympathetic to co-workers and customers"). While perhaps intending to measure physical energy (Hobfoll & Shirom, 2001), their multi-prong measures fall into the trap of assuming that there are multiple types of energy, and these measures more likely capture the subjective dimension of energetic activation directed toward physical, mental, and emotional activities. Thus, CoR research fits squarely in the realm of energetic activation.

CoR theory treats vigor (energetic activation) as scarce. When vigor decreases, it must be replenished (Hobfoll & Shirom, 2001; Sonnentag,

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Kuttler, & Fritz, 2010; Sonnentag & Zijlstra, 2006). Job demands such as workload and goal-disruptive events (Zohar, Tzischinski, & Epstein, 2003) deplete vigor while job resources such as supervisory and co-worker support (Demerouti, Bakker, de Jonge, Janssen, & Schaufeli, 2001), social capital (Carmeli, Ben-Hador, Waldman, & Rupp, 2009), justice (Maslach & Leiter, 2008), the experience of flow at work (Demerouti et al., 2012), and performance feedback (Schaufeli & Bakker, 2004) enhance vigor. Vigor predicts increased citizenship behavior and reduced deviant behavior (Little, Nelson, Wallace, & Johnson, 2011). Salanova, Agut, and Peiro (2005) also found that more organizational resources (i.e. training, autonomy, and technology) increased unit-level vigor, which in turn predicted customer service performance and customer loyalty.

The literature on recovery from job demands (Sonnentag, 2003) draws on the CoR theory. Recovery researchers examine how employees recover from job demands during off-work periods, such as vacations (Eden, 1990; Fritz & Sonnentag, 2006; Kühnel & Sonnentag, 2011; Westman & Eden, 1997), weekends (Fritz & Sonnentag, 2005), and evenings (Sonnentag, Binnewies, & Mojza, 2010). Sonnentag and Fritz (2007) identified four dimensions of recovery experiences that help recover vigor: psychological detachment from work (i.e. no thinking about work during an off-work period; Etzion, Eden, & Lapidot, 1998; Fritz, Yankelevich, Zarubin, & Barger, 2010; Sonnentag, Binnewies et al. 2010), relaxation, mastery experiences, and experiences of control during leisure time. However, research also suggests that short-term recovery experiences can fade out (Kühnel & Sonnentag, 2011), and a lack of long-term recovery may result in breakdowns of bodily functions in the long run (Michel, 2012). The citations, methods, settings, samples, findings, and arguments of each CoR paper related to energy can be found in Table 2.

Key insights for the model. The dominant finding from CoR research is that the energetic activation that people feel is a function of the job demands that they face in a particular activity and their resources-in-use. Figure 2 captures these relationships in four of its variables—resources-in-use, job demands, the demand–resource discrepancy, and energetic activation—and in the direct relationships between these variables. Specifically, when people face job demands, they put resources into use to meet those demands. Both resources-in-use and job demands contribute to an appraisal of demand–resource discrepancy (e.g. Baumeister et al., 1998; Carver & Scheier, 1998, 2008; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004; Tomaka, Blascovich, Kelsey, & Leitten, 1993). The discrepancy between one's demands and the resources one is using is calculated by subtracting resources-in-use from job demands at any given moment. Thus, as demands exceed resources, people feel less energetic activation and as resources meet or exceed demands, people feel more energetic activation.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 2 Articles from the Literature on CoR Relating to Energy

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Demerouti, Bakker, Nachreiner et al. (2001)	Cross-sectional survey Organizational	Employees from human services, industry, and transport group from 21 different jobs	Job resources (feedback, rewards, job control, participation, job security, and supervisor support) are positively associated with work engagement
Demerouti et al. (2012)	Diary Organizational	Work groups from a variety of organizations	Feeling of vigor before bedtime is greater when individuals experience higher levels of enjoyment at work and higher levels of detachment at home
Fritz et al. (2011)	Cross-sectional survey Organizational	Knowledge workers in professional and clerical positions	Strategies related to learning, to the meaning of one's work, and to positive relationships are related to employee's energy.
Kühnel and Sonnentag (2011)	Longitudinal survey Organizational	Teachers from German schools	Work engagement increases after vacation, but job demand after vacation (e.g. pupil misconducts) contributes to faster fade-out of beneficial effects
Little et al. (2011)	Longitudinal survey Organizational	Employees from a large building facilities and maintenance organization	Those who exhibit secure attachment styles demonstrate greater levels of vigor at work. Vigor predicts more Organizational Citizenship Behaviors (OCBs) and less deviance behavior
Maslach and Leiter (2008)	Longitudinal survey Organizational	Employees from business and administrative services division of a North American university	Employees with high levels of cynicism move toward engagement when they consider their work as fair
Michel (2012)	Ethnographic Organizational	Employees from two investment banking firms	Physical body breakdowns starting in year four and, despite attempts to control their bodies, employee performance declined.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 2 Articles from the Literature on CoR Relating to Energy (Continued)

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
			Bodily breakdown further intensifies after year six, and employees can no longer ignore the issue
Salanova et al. (2005)	Cross-sectional survey Organizational	Restaurant work units (three contact employees and ten customers per unit)	Work engagement predicts service climate, which, in turn, predicts employee performance and customer loyalty
Schaufeli and Bakker (2004)	Cross-sectional survey Organizational	Employees from four different German companies: an insurance company, a pension fund company, an Occupational Health and Safety Service, and a home-care institution	Job resources predict work engagement. Work engagement predicts turnover intention
Schaufeli et al. (2002)	Cross-sectional survey Non-organizational	Undergraduate students from three European Universities	Work engagement is positively associated with academic performance
Sonnentag (2003)	Experience-sampling Organizational	Employees of six public service organizations	Day-level recovery predicts same-day work engagement, which predicts personal initiatives and pursuit of learning
Sonnentag, Binnewies, and Mojza (2010)	Longitudinal survey Organizational	Human service employees	High job demands predict lower levels of work engagement, but psychological detachment buffers the negative effect of job demands on engagement
Zohar et al. (2003)	Experience-sampling Organizational	Hospital residents	Residents experience more fatigue and negative emotions following goal-disrupting events and less positive emotions following goal-enhancing events when they also have limited energy resource available

Literature 2: ART

ART research, proposed by environmental psychologists (Kaplan & Kaplan, 1989), was developed to explain how contact with nature can support the functioning of people's attention. ART scholars conceptualize energy in terms of directed attention, which refers to the effort a person puts into focusing attention and processing information (Kaplan, 1993; Kaplan & Kaplan, 1989). Directed attention has been manipulated with experimental activities that require focused attention and is measured with self-ratings (Cimprich, 1993). Attention is therefore a form of effort (kinetic energy)—or resources-in-use—that can only be exerted by transforming glucose into attention. Thus, executive functions like inhibiting distractions (e.g. worry, stress, and unrelated thought) and information processing (like problem-solving which requires sifting through a vast array of information, much of which is irrelevant to a solution) can deplete stores of potential energy (Kaplan, 2001).

ART suggests that the energy depleted in executive function activities can be restored in ways beyond food, rest, and job resources (as found in CoR research). In ART, directed attention is found to be restored from individual actions including "being away" (similar to psychological detachment in the recovery from job demands literature), finding "fascination" (a type of attention which is assumed to be effortless and intrinsically motivated), and ensuring "compatibility" (engaging in activities that are consistent with one's preferences) (Berto, 2005; Kaplan, 2001; Kaplan, Bardwell, & Slakter, 1993; Korpela & Hartig, 1996; Korpela, Hartig, Kaiser, & Fuhrer, 2001; Kuo & Sullivan, 2001; Kweon, Ulrich, Walker, & Tassinary, 2008; Weinstein, Przybylski, & Ryan, 2009). However, like the CoR theory, ART suffers from a theoretical confusion between physical energy and energetic activation. Finding fascination and compatibility does not restore physical energy, but as discussed previously, it increases energetic activation as well as the efficiency with which potential energy is transformed into kinetic energy in one's work.

ART was developed by environmental psychologists, and ART research conducted in organizations focuses on the impact of the natural environment, such as the psychological benefits of windowed work settings (Biner, Butler, Lovegrove, & Burns, 1993). Individuals who have a view of nature reported fewer ailments than those who had more of an urban view (Kaplan, 1993). Those with a view of nature, such as those who worked outdoors, also had more positive feelings about their job and workplace setting including their work and life satisfaction (Kaplan &Talbot, 1983). And, Leather, Pyrgas, Beale, and Lawrence (1998) reported that a view of greenery buffered the effects of job stress on intention to quit and well-being. The citations, methods, settings, samples, findings, and arguments of each ART paper related to energy can be found in Table 3.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 3 Articles from the Literature on ART Relating to Energy

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Biner et al. (1993)	Cross-sectional survey Organizational	Students, full-time office workers	Employees use a variety of substitutes (e.g. skylights, paintings/art, living things such as plants, and panels) to compensate for the lack of windows in a workplace setting
Berto (2005)	Lab experiments Non-organizational	Undergraduate students	After performing a cognitively demanding task, participants exposed to restorative environments (as compared to those who were exposed to non-restorative environments or geometrical patterns) improved performance on the same task
Cimprich (1993)	Experimental intervention Non-organizational	Cancer patients	Women suffering from cancer demonstrate greater levels of attentional capacity over four time points after participating in activities that engage fascination. Women in the non-intervention group perform less consistently during the same period
Kaplan and Talbot (1988)	Cross-sectional survey Organizational	Employees from a large corporation and two public agencies	Employees working outdoor indicate that their job is significantly less demanding, feel less pressured, less frustrated, and less harried
Kaplan et al. (1993)	Study 1 Content analysis Non-organizational	Study 1: Archival data from *Insights,* a report of a major study of museum's visitors' attitudes and expectations	Visiting the museum has a restorative function akin to being exposed to natural environments. This is especially the case for those who are already comfortable with visiting museums on a frequent basis
	Study 2 Cross-sectional survey	Study 2: Museum visitors	

Downloaded by [University of Michigan] at 11:00 08 May 2012

	Non-organizational		
Korpela and Hartig (1996)	Cross-sectional survey Non-organizational	Undergraduates	Spending time at one's favorite place is associated with greater degrees of restoration. Individuals who spend time at the places they find pleasant also report greater levels of positive affect than those who spend time at unpleasant places
Korpela et al. (2001)	Cross-sectional survey Non-organizational	Undergraduates	Students who describe their experiences at pleasant places as significantly more restorative than students who describe their experiences at unpleasant places
Kuo and Sullivan (2001)	Field experiments Non-organizational	Urban public housing residents	Residents assigned to apartments with nearby nature demonstrate significantly lower levels of aggression and violence than individuals who live in barren conditions. Mental attentional fatigue fully explains the relationship
Kweon et al. (2008)	Lab experiment Non-organizational	Undergraduates	Individuals working in office environments with aesthetically engaging art posters experience significantly less stress and anger in response to task frustration
Leather et al. (1998)	Cross-sectional survey Organizational	Blue-collar workers	View of natural sceneries (e.g. trees, vegetation, and plants) buffer the negative effect of job stress on intention to quit and general well-being
Ryan, Weinstein, et al. (2010)	Cross-sectional survey, lab experiment, experience-sampling Non-organizational	Undergraduates	Being outdoors is associated with greater presence of natural elements, which is associated with greater degrees of subjective vitality

Key insights for the model. ART contributes a number of insights. It focuses on one type of effort—the directed attention for executive functioning like information processing. Like the CoR theory, ART focuses on energy as a scarce resource which must be restored through strategies including exposure to nature. Other literatures allow for more types of effort beyond attention and suggest introducing similar relationships into a model of energy at work. Therefore, we do not suggest additions to the model until after the next literature we review.

Literature 3: EDT

The energetic activation that employees feel, according to the CoR theory, is a product of the job demands they face and the resources they use to meet those demands (Demerouti, Bakker, Nachreiner et al. 2001). Sometimes, however, people do not want to do the work required to meet job demands. In cases like these, people must exercise willpower, or self-control, to perform work. Self-control is the focus of EDT (Baumeister et al., 1998), which was developed to understand what self-control is and how it works.

EDT examines the impact of self-control on human energy (Baumeister et al., 1998). Self-control occurs when people perform "deliberate, conscious, controlled responses" that are not a person's first inclination, and are therefore effortful to execute (Baumeister et al., 1998, pp. 1252–1253). Ego depletion is "a temporary reduction in the self's capacity to engage in volitional action . . . caused by prior exercise of volition" (Baumeister et al., 1998, p. 1253). EDT finds that when people exercise self-control in one task, like maintaining physical stamina (Muraven, Tice, & Baumeister, 1998), emotion regulation (Baumeister et al., 1998), thought suppression (Muraven et al., 1998), coping with stress (Muraven & Baumeister, 2000), persistence on unsolvable puzzles (Webb & Sheeran, 2003), and impulse resistance (Vohs & Heatherton, 2000), their capacity for subsequent self-regulation tasks is reduced (Fischer, Greitemeyer, & Frey, 2008; Schmeichel, Vohs, & Baumeister, 2003).

Self-control depletes people's capacities to control their behavior in the immediate future, at least in part, because it depletes their physical potential energy, particularly in the form of glucose. Multiple experiments have shown that self-control activities reduce bloodstream glucose, which in turn impairs subsequent self-control activities (Gailliot et al., 2007). The negative effect on subsequent self-control activities, however, is counteracted when subjects consume a glucose drink. Physical energy appears to be the underlying mechanism that explains the ego-depletion process, whether potential energy is restored through the consumption of food (Gailliot & Baumeister, 2007) or rest (Baumeister, 2002), which gives the body an opportunity to transform energy stores into a more easily usable form.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Another key finding from EDT is that people require less energy to exert the same amount of self-control if they practice self-control regularly (Baumeister et al., 2006). In fact, repeated exercise of self-control in one activity (e.g. using one's non-dominant hand) can even improve a person's ability to perform self-control in another unrelated activity (e.g. suppressing stereotypical thoughts) (Gailliot et al., 2007; Muraven, Baumeister, & Tice, 1999; Oaten & Cheng, 2006, 2007; Schmeichel, Harmon-Jones, & Harmon-Jones, 2010). Using energy for self-control, though draining in the short run, can actually reduce the energy depleted by self-control over the long run.

Organizational scholars have recently begun to draw on EDT. EDT first appeared in research on employee interaction with customers and subsequent customer service performance. Trougakos, Beal, Green, and Weiss (2008) studied camp counselors who, after taking a respite break between activities, were more likely to exhibit positive affective displays with campers (a kind of self-control). They did not explicitly measure either physical energy or energetic activation, however. It was simply implied as the mechanism that was enhanced during breaks. Using the EDT framework, Wang, Liao, Zhan, and Shi (2011) found that mistreatment by customers led service employees to sabotage the customer experience. They argued that when customers mistreated employees, customers imposed additional demands on employees' resources for controlling their behaviors in line with service rules, resulting in resource depletion. In a similar vein, Thau and Mitchell (2010) reported that employees directed by abusive supervisors were more likely to engage in deviant responses, because the abusive supervision drained the regulatory resources required to behave appropriately. In each case, energy is conceptualized but not actually measured in the research design.

EDT has also been invoked by organizational scholars to explain unethical behaviors. In a series of laboratory studies, Gino, Schweitzer, Mead, and Ariely (2011) found that the depletion of self-control resources was associated with reduced moral awareness, which contributed to cheating. Similarly, the lack of sleep (another self-control resource) was associated with unethical behavior (Barnes, Schaubroeck, Huth, & Ghumman, 2011) and workplace deviance (Christian & Ellis, 2011). In fact, EDT would suggest that unless employees routinely engage in proactive actions, ego depletion is likely to make volitional action less likely, as illustrated by laboratory participants who were less helpful after their glucose was depleted (DeWall, Baumeister, Gailliot, & Maner, 2008). In sum, the research on EDT captured in Table 4 represents an emerging paradigm that is gaining popularly in explaining emotional labor, unethical behavior, and citizenship behavior.

Key insights for the model. Three findings from EDT contribute to the integrative model of human energy at work. First, research in EDT suggests that self-control occurs when people recognize a discrepancy between the resources

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 4 Articles from the Literature on EDT Relating to Energy

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Barnes et al. (2011)	Lab experiments, cross-sectional surveys, Experience sampling Non-organizational	Undergraduates (study 1, 2, and 4); adult participants from study response project (study 3)	Lack of quality and quantity of sleep are associated with greater levels of unethical behaviors, and the relationship is explained by cognitive fatigue
Baumeister et al. (1998) Muraven et al. (1998) Vohs and Heatherton (2000)	Lab experiments Non-organizational	Undergraduates	These set of studies show that, after forcing themselves to engage in an effortful, energy-depleting activities, individuals perform subsequently worse in a second, seemingly unrelated activity that requires self-control
Christian and Ellis (2011)	Cross-sectional surveys and lab experiments Non-organizational	Nurses Undergraduates	Sleep deprivation drains self-regulatory resources and increases hostility. Hostility predicts increased workplace deviance
DeWall et al. (2008)	Lab experiments Non-organizational	Undergraduates	Depletion of self-regulatory resources reduces willingness to help
Fischer et al. (2008)	Lab experiments Non-organizational	Undergraduates	Individuals depleted with self-regulatory resource are more likely to prefer standpoint-consistent information than standpoint-inconsistent information
Gailliot et al. (2007)	Lab experiments Non-organizational	Undergraduates	The ability to self-control relies on glucose as a limited energy resource

Downloaded by [University of Michigan] at 11:00 08 May 2012

Gino et al. (2011)	Lab experiments Non-organizational	Undergraduates	Individuals short on self-control resources are more likely to behave dishonestly, because lack of self-control resources reduces moral awareness. Individuals high on moral identity, however, do not behave more dishonestly even when their self-control resources are depleted
Muraven et al. (1999) Oaten and Cheng (2006) Oaten and Cheng (2007)	Lab experiments Non-organizational	Undergraduates	These studies suggest that individuals who engage in repeated self-control exercises improve their ability to self-control in the long run
Thau and Mitchell (2010)	Cross-sectional surveys Organizational	Jurors (study 1), adult participants from Study response project (study 2), and working adults through a behavioral research lab website	Abusive supervision drains self-regulatory resources needed to maintain appropriate behavior, and the relationship is exacerbated by high levels of distributive justice when employees receive inconsistent information about their organizational membership. The moderation is explained by increased levels of self-regulatory resource impairment
Trougakos et al. (2008)	Experience sampling Organizational	Cheerleading instructors	Employees who engage in leisure (as opposed to chore) activities during break are better able to engage in positive affective display in the afternoon
Wang et al. (2011)	Daily survey Organizational	Call center employees	Employees mistreated by their customers are more likely to engage in customer-directed sabotage. Consistent with ego-depletion

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 4 Articles from the Literature on EDT Relating to Energy (Continued)

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
			perspective, those with a greater level of job tenure and service rule commitment are less susceptible to the depletion effect
Webb and Sheeran (2003)	Lab experiments Non-organizational	Undergraduates	Forming implementation intention (statements in the form of "As soon as situation *x* occurs, I will initiate goal-directed behavior *y*".) helps overcome ego-depletion effect

they need to meet their job demands and the resources that are already in use and intentionally seek more resources to put into use. Resource-seeking turns potential resources into resources-in-use. The relationships between the three variables—demand – resource discrepancy, resource-seeking, and resources-in-use—capture this process by forming a "self-control" loop.[3] Two of the relationships in this loop are positive, but the relationship between resources-in-use and demand – resource discrepancy is not. When resources-in-use are not sufficient to meet demands, people seek more resources and resources-in-use increase. The increase in resources-in-use decreases the discrepancy between resources-in-use and job demands; so people engage in less resource-seeking as the process continues, reducing the number of resources that are put into use.

When there are an odd number of negative relationships in a loop, the variables in the loop gravitate to a level set by another variable that acts as the "goal" of the loop (Weick, 1979). For example, in Figure 2, job demands serve as a goal: people generally seek to invest enough resources to meet job demands. If they do not have enough resources to meet demands, they seek to invest more. If they have more resources invested than they need to meet job demands, they tend to invest fewer resources. This loop is similar to self-regulation models (e.g. Carver & Scheier, 2008): Regulated behavior is driven by the comparison of input level to goal level, and inputs tend to gravitate toward the specified goal level.

An example of this could be an employee whose boss asks her to complete a tedious report—a task the employee has no interest in. The employee may procrastinate trying to marshal the energy and other resources she needs to start the report writing (demand – resource discrepancy). One way this employee may go about seeking the resources she needs to complete the report may be by coming up with good reasons to complete it, with some reasons being more compelling than others. As some reasons are selected, other reasons come more quickly to mind and her body also begins to transform glucose (a potential resource) into simpler chemicals as she invests effort (now resource-in-use) into the task. This continues—with more glucose, reasons, and other resources being put into use until her effort is sufficient to accomplish her task.

The second key finding from EDT suggests that although this fictional report writer may complete the report, it is likely to be depleting for her: more resources put into use means that there are less potential resources (like glucose) available. This process of ego depletion is captured in Figure 2 in the loop between resources-in-use and potential resources and in the addition of one more variable: total possible resources. Total possible resources is not part of the loop. Rather, it is a maximum, or an upper constraint, on how many possible resources a person can have. This captures the idea from EDT that the human body stores limited supplies of

Downloaded by [University of Michigan] at 11:00 08 May 2012

glucose that can be transformed into action over a given period. EDT focuses only on glucose, but a similar argument could be made for other resources as well, which is why, in Figure 2, this phenomenon is captured by the resource variables. The total number of possible resources a person has in a given activity over a given period of time is defined by the schema that a person is trying to enact (Feldman & Worline, 2011). The report writer, for example, may find some reasons to be relevant and other reasons irrelevant for getting herself to start writing. Thus, in any given situation and time period, with a given schema, there is a limit to what resources are available, appropriate, or considered. The second construct, remaining possible resources, is simply the difference between the total possible resources and the resources-in-use. The more remaining possible resources there are, the more resources a person can put into use, but the more resources a person puts into use, the less remaining possible resources there are.[4]

The third key finding from EDT is the finding that when people practice self-control over time, self-control begins to require less glucose to accomplish. We capture this finding by introducing the variable, "practice", in the model and drawing an arrow from practice to arrow between remaining possible resources and resources-in-use. Practice involves the repetition of regulated activities. Practice, then, can make self-control less costly and can also help people acquire skills. And, skills can also enable people to use fewer resources to meet the same job demands. We can see this, for example, in the cognitive efficiency with which experts execute their activities in Klein's (1998) research on expert decision-making. Skillful people may not take as much time or money, need to call in as many favors, or use as much machinery and equipment, just as practiced self-control requires people to use less glucose to exercise subsequent self-control. As a result, practice moderates the relationship between remaining possible resources and resources-in-use because it increases the efficiency of resource use, making less resources necessary for meeting the same job demands.

Baumeister et al. (2006) also observed, however, that there is a delay in the relationship between practice and the efficiency of resource use. People use less glucose for self-regulation as they practice controlling their behavior *over time*. Similarly, skills must be built up over time to create efficiency. Therefore, we mark this relationship between practice and remaining potential resources with the word "DELAY" in Figure 2. (There could be delays in other relationships in the model, but those relationships may or may not occur on a delayed basis, while the delay between practice and remaining potential resources has been shown to occur necessarily.) We depict practice as having a positive impact on remaining possible resources, then, because when people practice self-control, they do not need to put as many resources into use to accomplish their activities.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Literature 4: Energetic and Tense Activation

Energetic activation and tense activation are the subjective components of two "biobehavioral system[s] of activation" (Watson et al., 1999, p. 847). Thayer originally referred to these constructs as energetic arousal and tense arousal, but modern psychologists tend to prefer the term "activation" over arousal. Research on these two systems of activation gained momentum as scholars like Thayer (1989) and Watson, Clark, and Tellegen (1988) identified energetic (or positive) activation and tense (or negative) activation as two dimensions of mood.[5] These scholars used words from the Activation–Deactivation Adjective Checklist such as energetic, vigorous, lively, and full-of-pep to measure the subjective experience of energetic activation and words like tense, jittery, and fearful to measure tense activation (Thayer, 1989).

Energetic activation and tense activation are important in research on emotions and dispositions as well as moods. Fredrickson (1998a) found that the energetic activation that accompanies positive emotions can speed up cardiovascular recovery after experiencing the tense activation that comes with negative emotions. Tense activation focuses people's attention on perceived negative interruptions and motivates people to address those interruptions (Mandler, 1984). This is an adaptive response to unexpected, potentially threatening situations (Yerkes & Dodson, 1908). At high levels, though, tense activation can lead people to hyper-focus, revert to over-learned (and sometimes inappropriate) behaviors, and exhibit fight, flight, or freezing behaviors (Barthol & Ku, 1959; Cannon, 1963; Staw, Sandelands, & Dutton, 1981). Tense activation coils up bodily subsystems like a spring in preparation to respond to threats, transforming physical potential energy rapidly into action (Thayer, 1989).

Energetic activation also pre-disposes a person to act, but in different ways from tense activation. The positive emotions associated with energetic activation have been shown to broaden the repertoire of thoughts and actions that a person has available to them in a given situation (Fredrickson, 1998b). A broad repertoire of thoughts and actions enables a person to come up with more ideas (Fredrickson & Branigan, 2005), be more inclusive with out-groups (Johnson & Fredrickson, 2005) as well as in-groups (Waugh & Fredrickson, 2006), and to be more creative (Isen, 2000). Energetic activation is also associated with automatic, fluid, efficient action (Thayer, 1989). With a broader repertoire and fluid actions, those who are energetically activated tend to create more resources, both in terms of bodily capabilities and by applying a broader array of thoughts and actions in creative ways (Fredrickson et al., 2008). In sum, resources are created in use (Feldman, 2004; Orlikowski, 2000), and when accompanied by energetic activation, the breadth of these resources is likely to increase.

It is beyond the scope of this article to review all of the ways in which organizational scholars have studied of energetic activation (reviews of the literature

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

on affect in organization, such as those conducted by Brief and Weiss (2002) or Elfenbein (2007) would be appropriate sources for this), but we focus here on a few of those that are most relevant to building an integrative model of human energy at work. For example, managers' energetic activation associated with radical organizational change enables more follower commitment to a major change (Huy, 2002), and the collective energetic activation employees feel about an organizational change is a gauge of the organization's change momentum (Jansen, 2004). Further, energetic activation is associated with creative outcomes (e.g. De Dreu, Baas, & Nijstad, 2008), entrepreneurial passion (Cardon, Zietsma, Saparito, Matherne, & Davis, 2005; Chen, Yao, & Kotha, 2009), performance quality (Rothbard & Wilk, 2011), and mood convergence and emotional contagion in work groups (Bartel & Saavedra, 2000).

Findings about broadening of thought and action repertoires are consistent with Feldman's (Feldman, 2004; Feldman & Worline, 2011) theory of resourcing. Resources are anything that enables a person to enact a schema. A schema defines what situation a person faces, what the person is trying to accomplish, what gets labeled as obstacles or opportunities, and what gets labeled as a resource or a liability (see, e.g. Weick, 1995). Schemas can be, and often are, relatively fixed, as people exert much of their effort and attention into enacting them (e.g. Salancik, 1977). Schemas can change, however, and when they change the way objects that are included in the schema are labeled can change as well. This means that what gets labeled (implicitly or explicitly) as a possible resource can also change, thereby increasing or decreasing the total number of possible resources in the process. The breadth of a person's repertoire of thoughts and actions is likely to influence whether a schema changes, how expansive that schema is, and whether additional schemata will be considered (Fredrickson, 2009). This helps people to see more objects, ideas, people, symbols, relationships, skills, and characteristics as possible resources, expanding the total possible resources. In contrast, narrowness or exclusiveness in thoughts and actions makes objects, ideas, people, symbols, relationships, skills, and characteristics seem less useful, reducing the total number of possible resources (Isen, 1987) (Table 5).

Key insights for the model. For our purposes, four points from the literature on energetic and tense activation are particularly important for an integrative model of human energy at work. First, energetic activation increases the breadth of a person's repertoire of thoughts and actions (Fredrickson & Branigan, 2005). We depict this in Figure 2 by including the variable, "breadth of thought/action repertoire" and including an arrow from energetic activation to breadth of repertoire.

Second, when repertoires of thoughts and actions broaden, people's schemas for what is a resource can also broaden (Feldman & Worline, 2011), increasing the total possible resources (e.g. Fredrickson et al., 2008). In other words, the breadth of a person's thought and action repertoire has

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 5 Articles from the Literature on Energetic Activation and Tense Activation Relating to Energy

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Bartel and Saavedra (2000)	Observational; cross-sectional surveys Organizational	Work groups from a variety of organization based on observer teams' selection (observer team comprises undergraduates from organizational psychology)	Groups experience eight distinct mood categories, one of which is high positive energetic activation. Convergence in mood experiences among group members is associated with greater levels of social interdependence, membership stability, and mood regulation norms
Chen et al. (2009)	Lab experiments; cross-sectional surveys Organizational	Lab study: Executive MBA and day-time MBA students Field study: investors	Perceived preparedness, rather than perceived passion, positively predicts investors' decision to fund a pitched venture
De Dreu et al. (2008)	Lab experiments Non-organizational	Undergraduates	Activating moods (e.g. excitement, enthusiasm) are more likely to increase creativity than non-activating moods (e.g. calm). Furthermore, positive activating moods increase creativity through enhanced cognitive flexibility
Fredrickson and Branigan (2005)	Lab experiments Non-organizational	Undergraduates	Attention and thought–action repertoires were compared across emotional experiences and found to be broader in positive (energetic) states
Fredrickson et al. (2008)	Field experiment Organizational	Employees at a business software and information technology services company	An intervention program emphasizing loving-kindness meditation increases a range of personal resources (e.g. increased mindfulness, purpose in life, social support, and decreased illness symptoms). In turn, increases in personal

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 5 Articles from the Literature on Energetic Activation and Tense Activation Relating to Energy (Continued)

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
			resources predict increased life satisfaction and reduced depressive symptoms
Huy (2002)	Interviews Organizational	Employees from a service-providing company in the information technology industry	Emotionally committing to change project and high commitment to change recipients' emotions facilitate organizational adaptation: change, continuity in providing quality in customer service, and developing new knowledge and skills
Jansen (2004)	Interviews: longitudinal survey Organizational	US Military Academy	Early momentum for change (characterized by enthusiasm and excitement about the change project) is positively associated with progress toward goal attainment, which maintains subsequent momentum
Johnson and Fredrickson (2005)	Lab experiments Non-organizational	Undergraduates	Positive emotion (energetic activation) is shown to significantly reduce the known phenomenon of own-race bias in face recognition
Rothbard and Wilk (2011)	Experience-sampling; archival and coded performance Organizational	Call center employees	Start-of-the-day positive mood is positively associated with perceptions of customer positive affective display, which, in turn, is positively associated with call quality
Waugh and Fredrickson (2006)	Repeated surveys Non-organizational	Undergraduate roommates	Positive emotion (energetic activation) is shown to reduce outgroup bias, facilitate relationship development, and enable people to see others more complexly

a positive influence on total possible resources, also shown in Figure 2. This relationship completes another loop in which energetic activation broadens people's repertoires of thoughts and actions, increasing the range of possible resources, enabling a person to put more resources into use, reducing the demand resource discrepancy, thus increasing subsequent energetic activation. This loop has an even number of negative relationships, which means that variables in the loop have positive influences on themselves; increases lead to more increases and decreases lead to more decreases (Weick, 1979). In contrast with the previous goal-seeking feedback loops we introduced, this is a reinforcing feedback loop (Sterman, 2000).

Third, the discrepancy between people's demands and resources can increase tense activation, because this discrepancy threatens a person's job performance (Mandler, 1984; Thayer, 1989). Tense activation, in turn, can decrease the breadth of a person's thought and action repertoire because it narrows people's attention, limiting the scope of options they consider (e.g. Barthol & Ku, 1959; Cannon, 1963; Staw et al., 1981). This completes another loop in which tense activation narrows people's repertoires of thoughts and actions, making them see less possible resources, reducing the resources that can be put into use, increasing demand–resource discrepancy, and hence reinforcing tense activation (another reinforcing loop). Reinforcing loops can generate both virtuous and vicious cycles, causing systems to experience exponential growth or exponential decline (Sterman, 2000). Whether a system experiences exponential growth or decline depends on how the system starts. Small amounts of growth amplify up, and small amounts of decline amplify down.

Literature 5: IRC Theory

IRC (Collins, 1981, 2004) is a theory of how the interactions of individual actors create social structures such as organizations (Collins, 1981), stratification (Collins, 1990), markets (Collins, 1993), and social trends (Collins, 2004). Energetic activation is a key mechanism in explaining how this process occurs. Collins (1993, p. 211) uses the term "emotional energy", which is synonymous with energetic activation: a feeling that ranges from "enthusiasm and confidence" to "apathy and depression". Energetic activation is tropic: people like to feel energized. They seek to re-create energizing experiences by re-engaging in activities that they think will increase their energetic activation (Collins, 1993). This repetition, particularly when it involves social interaction, creates chains of repeated activities that become defined as social structures.

Interactions energize people when they are ritualistic (Collins, 1981), defined by four variables: the degree to which the people who are interacting are present to each other, have boundaries defining their interaction, share the same focus of attention, and experience similar feelings about whatever

Downloaded by [University of Michigan] at 11:00 08 May 2012

they are focusing on (Collins, 1993). When this happens, the shared emotions increase until the people involved become entrained in each other's bodily micro-rhythms (e.g. Field, 1985; Metiu & Rothbard, forthcoming). Entrainment increases participants' solidarity and subsequent energetic activation.

Interactions can take on ritualistic properties, then, even in situations that we do not normally think of as ritualistic. For example, if an employee and a boss have a private (i.e. social boundary) face-to-face conversation (co-presence) about the employee's job demands, neither of them is distracted by other events in the office (same focus of attention), and both of them feel the same way or end up feeling the same way about the job demands (similar feelings), then the conversation is high on ritualistic properties and is likely to generate energetic activation.

Some experimental research supports the core ideas of IRC about the microdynamics of interpersonal exchange. For example, Lawler and Yoon (1993, p. 474) found that "agreement in negotiated exchange energizes participants" and that when people feel energetic activation in these exchanges they are more likely to stay in relationships even when it is not advantageous to do so and to give gifts to others in the relationships. These effects were greater than the effects of pleasure/satisfaction in the same relationships. This study and other related studies combine items measuring energy with items measuring interest into a single scale. In other studies (Lawler, Thye, & Yoon, 2000; Lawler & Yoon, 1996, 1998), pleasure/satisfaction had more significant effects than interest/excitement on various measures of relational cohesion, but interest/excitement, like pleasure/satisfaction, had varying levels of significance in these relationships across all of these studies.

Organizational scholars have used IRC theory in a few different ways. Dutton (2003) argued that energy increases when people engage in specific relational activities: respectful engagement, task enabling, and trust. Dutton and Heaphy (2003) argued that when people engage in these relational activities, energetic activation goes up because people experience more meaning, self-worth, empowerment, and personal growth. Carmeli and Spreitzer (2009) found support for the relationship between co-worker connectivity and energetic activation. Quinn (2007) also pointed out that the quality of relationships can be an outcome of as well as an input to the energy that people bring to their interactions. Quinn and Dutton (2005) described how the coordination that people engage in is, in part, a product of the energy they feel. Dacin, Munir, and Tracey (2010) demonstrate how stories, portraits, and artifacts serve as props to produce a mutual focus of attention that allows emotional energy to be shared among people.

IRC theory can also be used to explain the development of social networks in organizations. Baker et al. (2003) identified patterns in network behavior based on the energy creation or depletion attributed to particular relationships. They and Casciaro and Lobo (2008) showed that employees have a tendency to

Downloaded by [University of Michigan] at 11:00 08 May 2012

avoid people they perceive to be de-energizing, even at the expense of getting the help and information that they need. Quinn and Baker (2012) used a computer simulation buttressed with empirical network data to show, however, that the tendency to lose information at the individual level in favor of maintaining feelings of energetic activation can actually enhance information sharing at the organizational level.

Other domains of organizational scholarship that have drawn from IRC theory include research on strategic conversations, the dynamics of inclusion, and entrepreneurship. Westley (1990) described how employees could be more or less energized about developing and implementing a firm's strategy depending on the degree to which they were included in, dominated, or ideologically involved in strategic conversations. Similarly, Brundin and Nordqvist (2008) found that power and status dynamics in the boardroom depended on the energy that participants experienced. Goss (2008) and Goss, Jones, Betta, and Latham (2011) posited that the more central an individual's membership status within an interaction ritual, the more emotional energy the individual experienced, and the more likely the individual would be attracted to the entrepreneurial role. In line with Goss's argument, Soderstrom and Weber (2011) found that successful IRCs created emotional energy that motivated activities to form coalitions and favor some issues over others (Table 6).

Key findings for the model. IRC theory suggests that social structures are created, perpetuated, or discontinued based on the energetic activation that people experience, their desire to experience more energetic activation, and the resources that their interactions give them access to. In contrast, the integrative model of human energy at work in Figure 2 focuses almost exclusively on the individual level of analysis. As a result, IRC adds only one variable and two relationships to the integrated model, but it also opens up a number of ideas about how energetic activation influences higher levels of analysis that should be considered in future research and will be discussed later.

The variable that IRC theory adds to the model is intrinsic motivation. Intrinsic motivation is the motivation that people derive from taking pleasure in an activity rather than from the reward received from succeeding at the activity. When Collins (1993) argues that energetic activation is tropic, his point is that energetic activation is intrinsically motivating—motivation is derived from the activity itself. Thus, energetic activation is a cause of intrinsic motivation, as depicted by the arrow from energetic activation to intrinsic motivation in Figure 2.

Intrinsic motivation leads people to repeat the activities that they experienced energetic activation in (Collins, 1993). When people repeat activities that require self-control—and most work activities require at least some—they are practicing. Thus, Figure 2 also includes an arrow from intrinsic motivation to practice. This arrow completes another causal loop, including energetic activation, intrinsic motivation, practice, remaining possible resources,

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 6 Articles from the Literature on IRC Theory Relating to Energy

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Baker et al. (2003)	Network analysis (social network surveys and interviews) Organizational	Various organizations including strategy consulting firm, financial services company, petrochemical company, a government agency, two software companies, and a technology company	Employees tend to avoid individuals who are perceived to be de-energizing, even if de-energizers possess information that employees need
Brundin and Nordqvist (2008)	Longitudinal observations and content analysis Organizational	Board members	Display of positive emotions serves as power and status energizer in boardroom dynamics. Positive emotion is a source of energy that affects board work, which, in turn, affects board members' task performance
Casciaro and Lobo (2008)	Social network surveys Organizational	Study 1: An Entrepreneurial information technology (IT) company; Study 2: an academic institution; Study 3: IT corporation	Within an organization, information is more likely to be shared when individuals possess a high degree of competence *and* liking. When a person is disliked, competence may be irrelevant to whether people seek out the task resources from and tap into the knowledge of the disliked person
Dacin et al. (2010)	Interviews and observations Organizational	Participants at the Formal Dining at Cambridge Colleges	Stories, portraits, and artifacts serve as props to produce a mutual focus of attention that allows emotional energy to be shared among people

Downloaded by [University of Michigan] at 11:00 08 May 2012

Goss et al. (2011)	Longitudinal Autobiographical narrative Non-organizational	Text from Sanghera's (2007) *Shame*	Emotional energy serves to motivate employees to embark upon a challenge to a dominant authority.
Lawler and Yoon (1993)	Repeated episodes experiment Non-organizational	Experimental subjects' population unidentified	Interest/excitement is a product of repeated agreements in negotiated exchange and increases the probability of subsequently staying in a relationship in spite of incentives to do otherwise and to give gifts in those relationships
Metiu and Rothbard (forthcoming)	Ethnographic (interviews and observations) Organizational	Members of two software development project groups	Mutual focus of attention on an issue enhances shared emotion, which sustain mutual focus of attention over time. Mutual focus of attention also enhance group members' ability to problem-solve effectively. Mutual focus, shared emotion, and effective problem-solving enhance emotional energy, whereas lack of mutual focus and shared emotion, as well as poor problem-solving drain energy
Quinn and Baker (2012) working paper	Computer simulation and network analysis Organizational	Employees in a consultancy, heavy manufacturing, a multi-functional task force, an industry learning team, and a non-profit organization	The tendency to avoid de-energizers, even when they have needed information, does not lead to massive information loss at the organizational level, but can actually increase information flow. Selecting for energetic dispositions has the highest

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 6 Articles from the Literature on IRC Theory Relating to Energy (Continued)

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
			impact on the flow of energetic activation and information
Soderstrom and Weber (2011), working paper	Longitudinal interviews, observations, and archival data Organizational	Employees from Multinational biomedical firm	Successful IRCs that generate high levels of emotional energy motivate individuals to create coalition and to successfully promote some emerging sustainability agenda over others

resources-in-use, and the demand–resource discrepancy. This is a reinforcing causal loop: increases in any of these variables lead to increases in the others as well.

Literature 6: Self-Determination Theory

SDT, the final theory that invokes the topic of human energy, was developed to examine why people act in ways that are "curious, vital, and self-motivated" or not (Ryan & Deci, 2000, p. 68). It suggests that self-motivation and the integration of one's personality are products of growth tendencies and innate psychological needs, and that some environmental factors tend to undermine the growth and the meeting of needs. When growth is pursued and needs are met, however, the results tend to be intrinsic motivation, social development, and physical and psychological well-being.

SDT posits that energetic activation—referred to as vitality—is a feeling of enthusiasm and aliveness (Ryan & Fredrick, 1997), and finds that intrinsic motivation and vitality are highly correlated (Nix, Ryan, Manly, & Deci, 1999; Ryan & Deci, 2000). The scales that SDT scholars use to measure vitality (e.g. "I feel alive and vital", "I have energy and spirit", and "I feel energized") are similar, and in some cases identical, to those used for measuring energetic activation. Even so, SDT adds new insights into the role that energetic activation can play in organizational behavior. For example, SDT posits that feelings of subjective vitality occur when individual needs for relatedness, competence, and autonomy are met (Ryan & Deci, 2000)—needs which can be met by features of organizational activities, interactions, or contexts (e.g. Quinn & Dutton, 2005). Experience sampling, experimental, and field research all confirm that self-directed activity results in greater feelings of vitality than other-directed, or controlled, activity; similar effects are found for activities where people feel competent and feel that they belong (Nix et al., 1999; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan & Deci, 2000; Sheldon, Ryan, & Reis, 1996).

Researchers have also begun to incorporate EDT with SDT. For example, in a series of experimental activities typical of ego-depletion research, Moller et al. (2006) found that participants who were given autonomous choice in their activities showed much less evidence of ego depletion than those who had no choice. Muraven, Gagné, and Rosman (2008) had similar findings, even after controlling for anxiety, stress, unpleasantness, and reduced motivation. A number of studies explain this effect. For example, Baumeister (2002) found that energetic activation reduced the energy lost in ego depletion. Energetic activation leads to the creation of resources (Fredrickson, 1998b), which may mean that less glucose is required to accomplish the same activity. Further, SDT scholars have also linked energetic activation to organismic well-being, including better mental health and fewer reports of physical symptoms

Downloaded by [University of Michigan] at 11:00 08 May 2012

Downloaded by [University of Michigan] at 11:00 08 May 2012

(Ryan & Fredrick, 1997). And Thayer (1989) observed that energetic activation is associated with automatic, free-flowing activity, rather than the more controlled action people engage in when they feel tense activation, suggesting that the action (i.e. kinetic energy) associated with energetic activation may require less glucose to be transformed into kinetic energy to meet the same job demands. For example, in a study of health outcomes following a natural disaster, individuals who reported feeling energetic activation before the disaster were less depressed afterward (Tremblay, Blanchard, Pelletier, & Vallerand, 2006). And in three experiments, the vitality that came from autonomous behavior was related to reduced physical symptoms, faster recovery from fatigue, and increased performance (Muraven et al., 2008).

SDT has also been applied to research in organizational settings. For example, Ryan, Bernstein, and Brown (2010) found that work settings tend to generate less vitality for people than non-work settings, because autonomy and relatedness tend to be lower in work settings. When leaders encouraged collaboration and open communication and shaped a trustful and enabling work environment, they cultivated better quality relationship that led to enhanced vitality (Carmeli et al., 2009). In fact, sometimes people choose to direct themselves rather than wait for bosses to give them autonomy, crafting their jobs (Wrzesniewski & Dutton, 2001) or seeking out more challenging work (Wood & Bandura, 1989) in the process. People who experience vitality at work have been shown to be more creative at work (Atwater & Carmeli, 2009; Kark & Carmeli, 2009). When employees felt that their work had positive meaning at the start of the day, they tended to feel more vital and learn more by the end of the day (Niessen, Sonnentag, & Sach, 2012) (Table 7).

Key findings for the model. Two insights from SDT complete our integrated model of human energy at work. First, SDT suggests that when people feel energetic activation for their work, they experience less resource depletion as they engage in regulated activities. As Moller and his colleagues (2006) found, if people are intrinsically motivated to self-regulate, then even the short-term drop in potential energy disappears, perhaps in part because of the restorative effects of energetic activation (Baumeister, 2002; Fredrickson, 1998a; Marks, 1977). This means that simply enjoying an activity can make the performance of that activity more efficient. This idea is captured by the arrow in Figure 2 from intrinsic motivation to the arrow between remaining possible resources and resources-in-use, suggesting that intrinsic motivation moderates this relationship, without the delay involved when practice moderates the effect.

A second insight from SDT is that intrinsic motivation can motivate people to seek greater challenges at work (e.g. Ryan & Deci, 2000). This idea is captured by drawing arrows from intrinsic motivation to job demands. For example, some of the people that Wrzesniewski and Dutton (2001) use as examples of people crafting their jobs do so in order to make their work

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 7 Articles from the Literature on SDT Relating to Energy

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Atwater and Carmeli (2009)	Longitudinal survey Organizational	Employees from a variety of jobs and industries	Greater levels of leader-member exchange are associated with individual feeling of energy, which in turn predicts involvement in creative work
Carmeli et al. (2009)	Cross-sectional survey Organizational	Employees in Israeli community centers	Relational behaviors by leaders cultivate high-quality relations and bonding among members at work. This increases subjective feeling of vigor, which, in turn, increases manager's rating of job performance
Carmeli and Spreitzer (2009)	Longitudinal survey Non-organizational	Employees from a variety of jobs and industries	Trust at Time 1 predicts connectivity (relationships that are open and encourage generativity). Connectivity predicts thriving and innovative work behaviors
Kark and Carmeli (2009)	Longitudinal survey Non-organizational	Graduate students	Employee sense of psychological safety is positively associated with feelings of vitality, which, in turn, increases employee involvement in creative work
Muraven et al. (2008)	Laboratory Experiments Non-organizational	Undergraduates	Decline in self-control abilities is mediated by measures of subjective vitality. Feelings of autonomy helps restore vitality, and increased vitality help replenish lost ego-strength, improving self-control performance subsequently
Moller et al. (2006)			
Niessen et al. (2012)	Experience-sampling Organizational	Employees from social assistance services	Daily experience of positive meaning at work increases agentic work behavior. Agentic work behavior increases vitality and learning (i.e. thriving)

Downloaded by [University of Michigan] at 11:00 08 May 2012

Table 7 Articles from the Literature on SDT Relating to Energy (Continued)

Author(s), publication year	Method(s)/setting	Samples	Findings and arguments related to energy
Nix et al. (1999)	Laboratory experiments Non-organizational	Undergraduates	Doing well when autonomously motivated results in greater levels of subjective vitality (but not happiness), as compared with doing well while feeling controlled in one's motivation
Peterson et al. (2009)	Cross-sectional survey Organizational	Working adult	Zest, a positive trait reflecting a person's approach to life with energy and excitement, is positively associated with work as a calling, work satisfaction, and general life satisfaction
Reis et al. (2000)	Experience-sampling Non-organizational	Undergraduates	Daily activities that satisfy needs for autonomy, competence, or relatedness are associated with greater levels of subjective vitality
Sheldon et al. (1996)			
Ryan, Bernstein, and Brown (2010)	Experience-sampling Non-organizational	Employees recruited from newspaper and poster advertisements	Weekends offer a feeling of autonomy and relatedness that increases subjective vitality
Ryan and Fredrick (1997)	Cross-sectional and longitudinal survey; experience-sampling Non-organizational	Undergraduates and adult participants	A series of studies that validate the concept of subjective vitality, including discriminant validity from positive affect and negative affect, predictive validity on increased psychological well-being and reduced somatic complaints, and increased motivation to maintain weight loss among patients treated for obesity
Tremblay et al. (2006)	Cross-sectional survey Non-organizational	Undergraduates	Life satisfaction is positively associated with subjective vitality, which relates to lower level of ill-health

more interesting by increasing how challenging it is. In contrast, an example of negative demand-seeking (or demand-escaping) might be the social loafing that sometimes occurs when unmotivated individuals work in teams (e.g. Latane, Williams, & Harkins, 1979). If people like their work, they want it to continue to be interesting (Collins, 1993). Often, what is required to make work more interesting is challenge (Csikszentmihalyi, 1990); so people will often seek ways to increase their challenge (Spreitzer, Sutcliffe, Dutton, Sonenshein, & Grant, 2005; Wood & Bandura, 1989; Wrzesniewski & Dutton, 2001). Given that organizations have plenty of demands to meet (March & Simon, 1958; Thompson, 1967), when employees seek demands, their job demands are likely to increase, sometimes by crafting new demands into their jobs (Wrzesniewski & Dutton, 2001). The effect of intrinsic motivation on job demands completes one final loop in the model: energetic activation increases intrinsic motivation, which leads people to seek more demands, which increases the discrepancy between job demands and resources, which decreases energetic activation. This is a goal-seeking feedback loop. Including job demands in a feedback loop suggests that job demands can change as well as resources, which makes it even more challenging for people to find the right level of resources to put into use.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Discussion

Contributions of an Integrated Model

We identified three key problems in the disparate literatures addressing human energy in organization at the outset of this article, which we now use the model in Figure 2 to address. The first problem we identified was a lack of coherence in research on energy across multiple disparate literatures. To address this problem, we provided coherent definitions of physical energy and energetic activation, and distinguished both from related constructs. We have reviewed the various ways in which physical energy (along with other resources) influences energetic activation, and the many ways in which energetic activation, in turn, influences physical energy (and other resources). In this way, we clarify what researchers mean when they define motivation in terms of the energy a person expends at work. This conceptual clarity will also help those who have followed specific literatures in studying human energy by providing the opportunity to learn from and build on each other.

In addition to showing how the two types of energy influence each other, this model also integrates a typically micro-topic (energetic activation) with a topic that is often considered the domain of more macro-organizational scholarship (resources). Resources are a central construct in resource dependence theory (Pfeffer & Salancik, 1979), contingency theory (Thompson, 1967), the resource-based view of strategic management (Barney, 1991), institutional theory (Leblebici, Salancik, Copay, & King, 1991), and open systems

theory (Katz & Kahn, 1978), as well as theories of practice (Feldman, 2004). When we integrate work on resourcing (Feldman, 2004) with work on human energy, we can see how interrelated these constructs are because energy is a resource itself (Hobfoll, 1989; Pfeffer, 1992) and, in the form of energetic activation, it can be manifest as a positive emotion that is instrumental in creating new resources (Fredrickson, 1998b) and in mobilizing current resources in new ways (Feldman, 2004). This integration has implications for addressing the other problems we identified as well.

A second problem with the research on human energy at work has been that research on energy has recognized the importance of the dynamics of energy, but no explicitly dynamic models have been proposed to account for patterns of change over time. The model in Figure 2 draws on causal loops to more precisely capture these temporal dynamics. The causal loops in Figure 2 enable scholars to explain a wide array of temporal patterns of energy in organizations, over multiple time frames, such as minutes, hours, or days. We call it a sustainable model of human energy because, under the right circumstances, it could explain how it is possible for people to invest sustainable levels of effort into meeting job demands. It provides a contrast for some literature on energy that includes an implicit assumption of unchecked positive feedback between energetic activation and resources. A more sustainable model of employees' experience of energy over time includes negative feedback as well, and makes it possible for us to explain a wider array of behavior, including goal-seeking, virtuous and vicious cycles, oscillation, S-shaped growth, overshoot and collapse, and so forth.

We have discussed some of these dynamics, such as goal-seeking and virtuous and vicious cycles, as we built the model. Other dynamics depend on the possibility for job demands or total possible resources to change endogenously over time. For example, because total possible resources represents the carrying capacity (Sterman, 2000) for resources in the model, and because this carrying capacity can both increase and decrease, perhaps exponentially, it suggests that dramatic changes in possible resources could occur. This means that if employees are energized about work, but there is a delay in their ability to tell how the resources they put into use taxes their remaining possible resources, they could overtax their system past a point of recovery. This would lead to a pattern called "overshoot and collapse", where a person puts resources into use more quickly than his or her carrying capacity (total possible resources) can adapt, and as a result, extinguish the total possible resources, resources-in-use, and energetic activation. When this happens, employees experience burnout: no energetic activation and no resources remaining to put into use. Burnout, then, is more than low levels of energetic arousal. It is also low levels of resources-in-use and low levels of total possible resources. This dynamic is particularly interesting because it demonstrates how individuals can contribute to their own burnout endogenously, rather than rely solely

Downloaded by [University of Michigan] at 11:00 08 May 2012

on the exogenous explanations often provided in the literature (e.g. Lee & Ashforth, 1996; Maslach et al., 2001).

The same dynamics that can explain burnout (and other dynamics) can also be used to explain the third problem we identified at the outset of the article: how resources in general (and energy in particular) can be both scarce and abundant, and thus, how resourcefulness can be endogenous. If total possible resources (the carrying capacity) are low, people will experience those resources as scarce. And, because energetic activation is a function, in part, of resources, people with low levels of total possible resources will often feel like their energy is scarce as well, even though their glucose and ATP are adequate to address the challenges they face (Marks, 1977). (This will be especially true if there are exogenous factors that fix total possible resources at a low level for some reason.) The model in Figure 2 also suggests, however, that a person's total possible resources need not remain low. A person's total possible resources can increase, and as they increase, people are likely to experience those resources (and most likely, their energy) as abundant. Abundance and scarcity will be functions of the breadth of people's thought and action repertoires. People may also experience their resources and energy as abundant when they become more intrinsically interested in the activities or they have practiced in the activity and practiced self-regulation in general. As these variables increase, people can use their potential resources much more efficiently, which should create the experience of abundance, even though the number of total possible resources may not change.

If resources can be abundant as well as scarce, then the model in Figure 2 can also help explain endogenous resourcefulness—a topic of recent interest to organizational scholars (e.g. Dutton & Glynn, 2008; Feldman & Dutton, 2005). The model is a closed system of causal feedback loops. This means that the changes that we see in this model are generated endogenously by the system: Additional variables are not necessary to explain many of the dynamics we see. A closed system like this is necessary to explain how resourcefulness—the ability to find and create resources—can be endogenous, or done without external input. Two loops in particular are useful for explaining this. First, the loop with the demand–resource discrepancy, resource-seeking, and resources-in-use captures the way in which people put resources to use. Without resource-seeking on the part of individuals, they cannot find or create new resources from surprising or unexpected sources. Simply seeking resources is not sufficient if people are incapable of finding the resources they seek, however. This requires people to be able to broaden their repertoires of thoughts and actions, as captured in the loop with the demand–resource discrepancy, energetic activation, breadth of thought/action repertoire, total possible resources, remaining possible resources, and resources-in-use. These two loops can then influence each other, because people who seek resources can put more resources into use, feel more energized, broaden their thought and action repertoires, and create more

Downloaded by [University of Michigan] at 11:00 08 May 2012

possible resources as a result. Similarly, when people increase their total possible resources, it is easier for people to find the resources they seek, making resourcefulness viable as an endogenous phenomenon.

A contribution can be made to research on motivation by virtue of including an explanation of endogenous resourcefulness in a model of motivation, as has been done here. The relationship between the breadth of a person's thought and action repertoire and the construct of total possible resources suggests that motivation should be considered, at least partially, a function of innovation. By innovation, we mean the creation of previously unimagined resources, which must occur for the total number of possible resources to increase. Innovation scholars have included motivation implicitly or explicitly in their models (e.g. Obstfeld, 2005), but we know of no motivation research that suggests that motivation may also be a function of innovation. This idea could open up new research opportunities in motivation, because it suggests that classic equations of motivation, like those in expectancy (Vroom, 1964) or equity (Adams, 1963) theories, may be variable within activities as well as between them, and can be studied as such, helping to address the recent interest that motivation scholars have shown in trying to explain how people's motivation can change over time as they participate in the same activity (Diefendorff & Chandler, 2011).

Downloaded by [University of Michigan] at 11:00 08 May 2012

Directions for Future Research

Here, we move beyond the key contributions of the model to articulate an agenda for future research for energy scholars. A central focus of our review has been on the dynamics of energy. Future research should examine these dynamics, and the model we proposed could be used as a road map for doing so. People's work activities could be examined qualitatively for model fit and adapted where needed (e.g. in long-term projects or in work where it is difficult for people to assess how well the activity is unfolding, the model may need delays between the resources put into use and the demand–resource discrepancy) (e.g. Sterman, Repenning, & Kofman, 1997). Then, the adapted model could be simulated, participants' energetic activation could be measured over the course of the work activity, and the patterns of energetic activation experienced could be compared statistically against the patterns generated in the computer simulation (e.g. Barlas, 1989).

Some methods are particularly well suited for measuring energetic activation over time. For example, respondents can complete diaries tracking energetic activation over a period of time (such as a day, week, or a month; Rothbard & Wilk, 2011; Sonnentag et al., 2008) or experiential sampling where individuals are pinged at particular times to respond about their current energy level. Research might also track energy over time through interviews or questionnaires. Research on energy amid the change process serves as

exemplars (Huy, 2002; Jansen, 2004) of how energy ebbs and flows in the change process, particularly transformational or radical changes, in which burnout and exhaustion are common.

Other methods are more suited to measuring physical energy. Physical potential energy is most difficult to measure as it requires a physiological intervention (e.g. blood test). Physical kinetic energy, however, may be more straightforward to measure with validated scales of relevant cognitions (e.g. directed attention; Cimprich, 1993), by observing behaviors or by recording resources put into use.

Another important direction for future research is to expand the model beyond an individual level of analysis. Human energy in organizations is clearly a social phenomenon and thus future research should extend the model to collective levels of analyses. Some scholars have begun this process (e.g. Bruch & Vogel, 2011; Collins, 2004; Quinn and Baker, 2012; Quinn & Dutton 2005), but more needs to be done, particularly in terms of empirical research. Research provides some initial empirical evidence for energetic activation aggregating to the group level (Barsade, 2002) and the organization level (Bruch & Ghoshal, 2003; Bruch & Vogel, 2011; Cole, Bruch, & Vogel, 2011).

Two elements of the integrative model are particularly promising in extending to higher levels of analyses. First, when the activities involved in the practice variable that a person repeats over time are interdependent with the activities of other people, the repetition of these interdependent activities form social structures (Collins, 1981, 1993). Organizational scholars have only begun to explore the role of energy in the creation, maintenance, and destruction of the many social structures of interest to the field. Another point in the model that can help explain collective-level effects are the variables having to do with resources. For example, recent research by Howard-Grenville, Golden-Biddle, Irwin, and Mao (2011) examines how organizational actors together create resources and energize frameworks to facilitate organizational change. Their work complements prior research that examines how collective patterns of human energy can lubricate organizational change (Huy, 2002; Jansen, 2004).

Another direction for future research pertains to understanding a wider swath of outcomes resulting from energy depletion and generation. In the literatures that emphasize energy as a scarce resource, a growing body of research examines how energy depletion contributes to unethical behavior and workplace deviance (i.e. more of the negative spectrum of organizational behaviors). It will be fruitful for scholars to explore the effect of resource depletion on positive, volitional actions, such as organizational citizenship behaviors (OCBs, Smith, Organ, & Near, 1983) or proactive behaviors (Grant & Ashford, 2008). For example, can energy depletion potentially create urgency to be more agentic and to reach out more to help others? For example, crisis management research demonstrates how in challenging times, we are a likely to see

Downloaded by [University of Michigan] at 11:00 08 May 2012

pro-social and helping behaviors (James & Wooten, 2010). Similarly, the literatures that emphasize energy as an abundant resource demonstrate positive outcomes including performance (Fritz & Sonnentag, 2005) and creativity (Carmeli & Spreitzer, 2009; Kark & Carmeli, 2009). Future research may also address how an abundance of energy may be related to negative or deviant behaviors including groupthink, greed, and unethical behavior, for example.

An additional area for future research is how the context of work can restore human energy. Prior research that focused on energy restoration has tended to focus on non-work influences on energy such as sleep (Barnes et al., 2011), nutrition (e.g. Thayer, 1989), breaks (Trougakos et al., 2008), exercise (Thayer, 1987), exposure to the natural environment (Kaplan, 1993), and how time is spent on evenings, weekends, and vacations (Eden, 1990; Fritz & Sonnentag, 2005, 2006; Kühnel & Sonnentag, 2011; Sonnentag, Binnewies et al. 2010; Westman & Eden, 1997). Yet, we know much less about how energy can be restored in the doing of work (Fritz, Lam, & Spreitzer, 2011). New insight could be brought to this research by incorporating insights from research on IRC. For example, one finding in ART that suggests that one counter-intuitive way for people to restore themselves when they feel like their energy is depleted is to find fascination in their work (Kaplan et al., 1993). This raises the question of why more work would restore depleted energy. IRC theory, however, would suggest that fascination may be a form of ritual experience. When people are fascinated with their work, they are co-present with their work, there are boundaries that keep them from being distracted by other things, they focus intensely on what they are doing and, if their work involves other people, they feel the same way about the work that the other people involved feel. All of these conditions would lead to entrainment and an increase in energetic activation. Future research could test these possibilities, and it could also explore how organizational and workplace context, including organizational culture and structure, work design, team dynamics, and human resource practices, influence restorative (or depleting) experiences.

The example of using IRC theory to explain how finding fascination in one's work can be restorative raises other questions as well. For example, is it possible that when people find fascination in work that does not involve other people, they can still experience the same (or similar) ritualistic effects? Individual work can have co-presence, boundaries, and focus, and even though it does not involve other people who are experiencing the same emotions, people could derive emotion-consistent feedback from their work, and they could entrain themselves into a rhythm as they work with these objects, deriving a feeling of solidarity with the objects and energy from the work. Because this experience is tropic, people would seek to have those kinds of work experiences again and again, which may lead them to commit to particular professions,

Downloaded by [University of Michigan] at 11:00 08 May 2012

seek particular roles in organizations, or otherwise engage in a particular structuring of organizations.

The example of using IRC theory to explain the restorative effects of finding fascination in work also suggests, then, how the integration of IRC theory with the other, more individually-focused theories can help expand the potential of those theories to explain social and organizational phenomena. Another natural connection, for example, would be to expand the insights from SDT, which shares interests in intrinsic motivation and in belongingness with IRC, to examine the effects of meeting or failing to meet collective needs for belonging, competence, or autonomy on collective outcomes. In fact, IRC theory may even suggest that the needs for competence and autonomy are ultimately rooted in the need for belonging, and that the needs for competence and belonging are simply culturally conditioned versions of the need to belong.

Network research informed by this tradition has focused on the impacts of energizers and de-energizers in organizations (e.g. Baker et al., 2003). This interest would suggest a need to explore the qualities and characteristics that make individuals energizing and de-energizing. A closer examination of the dynamics of these networks (Quinn & Baker, 2012), however, suggests that the labels "energizers" and "de-energizers" may in fact be social constructions rooted in relationships rather than in individual characteristics, created and reinforced by a history of somewhat chance interactions. More work is needed to explore how and why this happens as well as whether and how these constructions, once reinforced, can be changed. Scholars should pay particular attention to these processes in organizational change, given the role that energy plays (Huy, 2002; Jansen, 2004).

We pointed out, at the outset of this article, that perhaps the most central reason for why organizational scholars are interested in energy is because of its role—implicitly or explicitly acknowledged—in motivation. The integrated model of human energy suggests a number of roles that energy can play in the motivation process, enhancing, diminishing, limiting, or ending effort, expanding the ways effort can be expended, and raising or lowering the challenges that effort will be expended to meet. We have also argued, in the process, that innovation or resourcing can have as much of an impact on motivation as motivation has on innovation. This is another avenue that could generate fruitful inquiry. How and under what circumstances do new resources raise or lower effort? Or change the direction in which effort is invested? Are there cases in which innovations terminate effort? If so, why? And how does the reciprocal influence of motivation and resourcing unfold over time? Questions like these can change the equations of expectancy theory or equity theory or job design, suggesting new ways to conceive the ways we view motivation at work.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Conclusion

Our integrative model brings coherence to a burgeoning literature on energy in a work context. In this way, our model of human energy in organizations coalesces with recent research in positive organizational scholarship (POS) (Cameron, Dutton, & Quinn, 2003). POS is focused on the generative dynamics in organizations that lead to the development of human strength, foster resiliency in employees, and cultivate extraordinary individual and organizational performance. Our sustainable model of human energy fleshes out the logic for core POS dynamics including endogenous resourcefulness (Dutton & Glynn, 2007) and the creation of resources beyond what might typically be expected (Feldman & Worline, 2011).

We hope that this model can encourage scholars to make energy dynamics more explicit in their research and sow the seeds for new research on the generative dynamics in and of organizations, particularly at more collective levels of analysis. The integrative model can also offer new avenues for motivation researchers to draw more on the ideas of resource seeking and resourcing as mechanisms for enhancing the initiative, duration, and persistence of effort.

Acknowledgements

We thank Royston Greenwood for helpful comments on this article. We would also like to thank Roy Baumeister, Barbara Fredrickson, Rachel Kaplan, and Stephen Kaplan for early guidance in exploring literatures. We also thank Bret Crane, Jane Dutton, Laura Rees, and Ned Wellman for feedback. An earlier version of this paper was presented at the Academy of Management Meetings.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Endnotes

1. Some literatures, such as open systems theory (Katz & Kahn, 1978), use the concept of energy metaphorically to describe the flow of money, people, information, and other resources through organizational systems, but in this paper, we focus on human energy, as this is the focus of most of the research we reviewed.
2. To keep the review focused on human energy in organizations, research in biology, chemistry, and physics is not included.
3. Typically, in a System Dynamics model, we would include a fourth variable in this causal loop to account for the speed with which resourcing is happening. Speed of resourcing refers to the amount of resources a person creates in a given time period. Variables that account for speed and acceleration are important to specify in a System Dynamics model because they account for the role of time in the model. The speed with which people put resources into use will depend on how much effort they invest in finding or creating resources that can be put to use. We can expect that the more people find and create resources, the more quickly they

will be able to put resources into use. If the speed of resourcing is negative, people can lose resources. And as people find resources more quickly, they will have more resources to put to use. We do not include this variable—or other time-based ratio variables—in this model in order to keep our model as simple as possible. To conduct simulations and empirical tests of the model, however, these variables would need to be included.

4. This is another example of a place where a System Dynamics researcher would introduce a time-based ratio variable like acceleration of resourcing. If acceleration is accounted for, researchers can account for the effects of upper and lower limits of resources on the dynamics of a system: when few of the possible resources are in use, resources can be found and put to use at an accelerating pace (there are plenty of good reasons for writing the report and plenty of glucose to convert into action), but when most of the possible resources are already in use, finding new ones becomes harder and the pace of resourcing slows down until no resources remain.
5. Earlier research on mood (Russell, 1980) categorized mood along the two dimensions of (1) pleasantness/unpleasantness and (2) degree of activation or arousal. Thayer's (1989) and Watson and Tellegen's (1985) work suggested that these dimensions could be rotated 45°, leading to separate dimensions of affect or arousal. Watson et al. (1999) later amended these terms, calling them positive activation and negative activation, because it is possible to experience positive or negative affect that is not high on activation. Following typical conventions in current psychology, we use the term "activation" rather than "arousal".

   Some scholars prefer to conceive of people as having only one form of activation that is interpreted to have positive or negative valence (Elfenbein, 2007). There is long-standing debate among psychologists over how many types of activation there may be in affective experience (Lang, 1995). We follow the two-activation-system approach here because of our focus on the distinct relationship between energetic activation and physical energy (Marks, 1977) and because research has shown that energetic activation has an "undoing" impact on the effects of tense activation (Fredrickson, 1998a).

Downloaded by [University of Michigan] at 11:00 08 May 2012

References

Adams, J.S. (1963). Toward an understanding of inequity. *Journal of Abnormal and Social Psychology*, *67,* 422–436.

Ashar, H., & Lane-Maher, M. (2004). Success and spirituality in the new business paradigm. *Journal of Management Inquiry*, *13,* 249–260.

Atwater, L., & Carmeli, A. (2009). Leader-member exchange, feelings of energy, and involvement in creative work. *The Leadership Quarterly*, *20,* 264–275.

Baker, W., Cross, R., & Wooten, M. (2003). Positive organizational network analysis and energizing relationships. In K.S. Cameron, J.E. Dutton, & R.E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (pp. 328–342). San Francisco, CA: Berrett-Koehler.

Barlas, Y. (1989). Multiple tests for validation of system dynamics type of simulation models. *European Journal of Operational Research*, *42,* 59–87.

Barnes, C.M., Schaubroeck, J., Huth, M., & Ghumman, S. (2011). Lack of sleep and unethical conduct. *Organizational Behavior and Human Decision Processes*, *115,* 169–180.

Barney, J.B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17,* 99–120.

Barsade, S.G. (2002). The ripple effect: Emotional contagion and its influence on group behavior. *Administrative Science Quarterly*, *47,* 644–675.

Bartel, C.A., & Saavedra, R. (2000). The collective construction of work group moods. *Administrative Science Quarterly*, *45,* 197–231.

Barthol, R.P., & Ku, N.D. (1959). Regression under stress to first learned behavior. *Journal of Abnormal and Social Psychology*, *59,* 134–136.

Baumeister, R.F. (2002). Ego depletion and self-control failure: An energy model of the self's executive function. *Self and Identity*, *1,* 129–136.

Baumeister, R.F., Bratslavsky, E., Muraven, M., & Tice, D.M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, *74,* 1252–1265.

Baumeister, R.F., Gailliot, M., DeWall, C.N., & Oaten, M. (2006). Self-regulation and personality: How interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of Personality*, *74,* 1773–1801.

Baumeister, R.F., Schmeichel, B.J., & Vohs, K.D. (2007). Self-regulation and the executive function: The self as controlling agent. In A.W. Kruglanski & E.T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 516–539). New York: The Guilford Press.

Baumeister, R., & Tierney, J. (2011). *Willpower: Rediscovering the greatest human strength*. New York: Penguin Press.

Berto, R. (2005). Exposure to restorative environments helps restore attentional capacity. *Journal of Environmental Psychology*, *25,* 249–259.

Biner, P.M., Butler, D.L., Lovegrove, T.E., & Burns, R.L. (1993). Windowlessness in the workplace: A reexamination of the compensation hypothesis. *Environment and Behavior*, *25,* 205–227.

Brandon, D., & Davis-Blake, A. (2011). Leading high performance teams. Retrieved from http://www.youtube.com/watch?v=fFKcEnAsAPE

Brief, A.P., & Weiss, H.M. (2002). Organizational behavior: Affect in the workplace. In S.T. Fiske, D.L. Schacter, & C. Zahn-Waxler (Eds.), *Annual review of psychology* (pp. 279–307). Palo Alto, CA: Annual Reviews.

Brown, G.C. (1999). *The energy of life: The science of what makes our minds and bodies work*. New York: Free Press.

Bruch, H., & Ghoshal, S. (2003). Unleashing organizational energy. *MIT Sloan Management Review*, *45,* 45–51.

Bruch, H., & Vogel, B. (2011). *Fully charged: How great leaders boost their organization's energy and ignite high performance*. Cambridge, MA: Harvard Business School Press.

Brundin, E., & Nordqvist, M. (2008). Beyond facts and figures: The role of emotions in boardroom dynamics. *Corporate Governance: An International Review*, *16,* 326–341.

Cameron, K.S., Dutton, J.E., & Quinn, R.E. (2003). *Positive organizational scholarship: Foundations of a new discipline*. San Francisco, CA: Berrett-Koehler.

Cannon, W.B. (1963). *Bodily changes in pain, hunger, fear and rage: An account of recent researches into the function of emotional excitement*. New York: Harper & Row.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Cardon, M.S., Zietsma, C., Saparito, P., Matherne, B.P., & Davis, C. (2005). A tale of passion: New insights into entrepreneurship from a parenthood metaphor. *Journal of Business Venturing*, *20,* 23–45.

Carmeli, A., Ben-Hador, B., Waldman, D.A., & Rupp, D.E. (2009). How leaders cultivate social capital and nurture employee vigor: Implications for job performance. *Journal of Applied Psychology*, *94,* 1553–1561.

Carmeli, A., & Spreitzer, G.M. (2009). Trust, connectivity, and thriving: Implications for innovative work behavior. *Journal of Creativity Research*, *43,* 169–191.

Carver, C.S., & Scheier, M.F. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.

Carver, C.S., & Scheier, M.F. (2008). Feedback processes in the simultaneous regulation of action and affect. In J.Y. Shah & W.L. Gardner (Eds.), *Handbook of motivation science* (pp. 308–324). New York: Guilford Press.

Casciaro, T., & Lobo, M.S. (2008). When competence is irrelevant: The role of interpersonal affect in task-related ties. *Administrative Science Quarterly*, *53,* 655–684.

Chen, X.-P., Yao, X., & Kotha, S. (2009). Passion and preparedness in entrepreneurs' business plan presentations: A persuasion analysis of venture capitalists' funding decisions. *Academy of Management Journal*, *52,* 199–214.

Christian, M.S., & Ellis, A.P. (2011). Examining the effects of sleep deprivation workplace deviance: A self-regulatory perspective. *Academy of Management Journal*, *54,* 913–934.

Cimprich, B. (1993). Development of an intervention to restore attention in cancer patients. *Cancer Nursing*, *16,* 83–92.

Cole, M., Bruch, H., & Vogel, G. (2011). Energy at work: A measurement validation and linkage to unit effectiveness. *Journal of Organizational Behavior*, *33*, 445–467.

Collins, R. (1981). On the micro-foundations of macro-sociology. *American Journal of Sociology*, *86,* 984–1014.

Collins, R. (1990). Stratification, emotional energy, and the transient emotions. In T.D. Kemper (Ed.), *Research agendas in the sociology of emotions* (pp. 27–57). Albany, NY: State University of New York Press.

Collins, R. (1993). Emotional energy as the common denominator of rational action. *Rationality and Society*, *5,* 203–230.

Collins, R. (2004). *Interaction ritual chains*. Princeton, NJ: Princeton University Press.

Cross, R., Baker, W.E., & Parker, A. (2003). What creates energy in organizations? *Sloan Management Review*, *44,* 51–57.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper Perennial.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life*. New York: Basic Books.

Dacin, T., Munir, K., & Tracey, P. (2010). Formal dining at Cambridge colleges: Linking ritual performance and institutional maintenance. *Academy of Management Journal*, *53,* 1393–1418.

De Dreu, C.K.W., Baas, M., & Nijstad, B.A. (2008). Hedonic tone and activation level in the mood-creativity link: Toward a dual pathway to creativity model. *Journal of Personality and Social Psychology*, *94,* 739–756.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Demerouti, E., Bakker, A.B., de Jonge, J., Janssen, P.P.M., & Schaufeli, W.B. (2001). Burnout and engagement at work as a function of demands and control. *Scandinavian Journal of Work, Environment & Health*, *27,* 279–286.

Demerouti, E., Bakker, A.B., Nachreiner, F., & Schaufeli, W.B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86,* 499–512.

Demerouti, E., Bakker, A.B., Sonnentag, S., & Fullagar, C.J. (2012). Work-related flow and energy at work and at home: A study on the role of daily recovery. *Journal of Organizational Behavior*, *33,* 276–295.

DeWall, C.N., Baumeister, R.F., Gailliot, M.T., & Maner, J.K. (2008). Depletion makes the heart grow less helpful: Helping as a function of self-regulatory energy and genetic relatedness. *Personality and Social Psychology Bulletin*, *34,* 1663–1676.

Diefendorff, J.M., & Chandler, M.M. (2011). Motivating employees. In S. Zedeck (Ed.), *Handbook of industrial and organizational psychology* (pp. 65–135). Washington, DC: American Psychological Association.

Durkheim, E. (1954). *The elementary forms of religious life*. New York: Free Press.

Dutton, J.E. (2003). *Energize your workplace: How to create and sustain high-quality connections at work*. San Francisco, CA: Jossey-Bass.

Dutton, J.E., & Glynn, M.A. (2007). Positive organizational scholarship. In C. Cooper & J. Barling (Eds.), *Handbook of organizational behavior* (pp. 693–711). Thousand Oaks, CA: Sage.

Dutton, J.E., & Glynn, M. (2008). Positive Organizational Scholarship. In C. Cooper & J. Barling (Eds.), *Handbook of organizational behavior* (pp. 693–712). London: Sage Publications.

Dutton, J.E., & Heaphy, E.D. (2003). The power of high quality connections. In K.S. Cameron, J.E. Dutton, & R.E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (pp. 263–278). San Francisco, CA: Berrett-Koehler.

Eden, D. (1990). Acute and chronic job stress, strain, and vacation relief. *Organizational Behavior and Human Decision Processes*, *45,* 175–193.

Eisenhardt, K.M., & Martin, J.A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, *21,* 1105–1121.

Elfenbein, H.A. (2007). Emotion in organizations. In A.P. Brief & J.P. Walsh (Eds.), *Academy of management annals* (Vol. 1, pp. 371–457). Amsterdam: Elsevier.

Etzion, D., Eden, D., & Lapidot, Y. (1998). Relief from job stressors and burnout: Reserve service as a respite. *Journal of Applied Psychology*, *83,* 577–585.

Feldman, M.S. (2004). Resources in emerging structures and processes of change. *Organization Science*, *15,* 295–309.

Feldman, M.S., & Dutton, J.E. (2005). *Creating capacity from within: Understanding endogenous resourcefulness in organizations*. Paper presented at the national meetings of The Academy of Management, Honolulu, HI.

Feldman, M.S., & Khademian, A.M. (2003). Empowerment and cascading vitality. In K.S. Cameron, J.E. Dutton, & R.E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (pp. 343–358). San Francisco, CA: Berrett-Koehler.

Feldman, M.S., & Worline, M.C. (2011). Resourcefulness: Resources, resourcing, and ampliative cycles in organizations. In K.S. Cameron & G.M. Spreitzer (Eds.), *Oxford handbook of positive organizational scholarshi* (pp. 629–641). Oxford: Oxford University Press.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Field, T. (1985). Attachment as psychobiological attunement: Being on the same wavelength. In M. Reite & T. Field (Eds.), *The psychobiology of attachment and separation* (pp. 415–454). Orlando, FL: Academic Press, Inc.

Fischer, P., Greitemeyer, T., & Frey, D. (2008). Self-regulation and selective exposure: The impact of depleted self-regulation resources on confirmatory information processing. *Journal of Personality and Social Psychology*, *94,* 382–395.

Fredrickson, B.L. (1998a). Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition and Emotion*, *12,* 191–220.

Fredrickson, B.L. (1998b). What good are positive emotions? *Review of General Psychology*, *2,* 300–319.

Fredrickson, B.L. (2009). *Positivity: Groundbreaking research reveals how to embrace the hidden strength of positive emotions, overcome negativity, and thrive*. New York: Crown Books.

Fredrickson, B.L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition and Emotion*, *19,* 313–332.

Fredrickson, B.L., Cohn, M.A., Coffey, K.A., Pek, J., & Finkel, S.M. (2008). Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology*, *95,* 1045–1062.

Freud, S. (1961). *Civilization and its discontents*. New York: Norton.

Fritz, C., Lam, C.F., & Spreitzer, G. (2011). It's the little things that matter: An examination of knowledge workers' energy management. *Academy of Management Perspectives*, *25,* 28–39.

Fritz, C., & Sonnentag, S. (2005). Recovery, health, and job performance: Effects of weekend experiences. *Journal of Occupational Health Psychology*, *10,* 187–199.

Fritz, C., & Sonnentag, S. (2006). Recovery, well-being, and performance-related outcomes: The role of workload and vacation experiences. *Journal of Applied Psychology*, *4,* 936–945.

Fritz, C., Yankelevich, M., Zarubin, A., & Barger, P. (2010). Happy, healthy, and productive: The role of psychological detachment from work during nonwork time. *Journal of Applied Psychology*, *95,* 977–983.

Gailliot, M.T., & Baumeister, R.F. (2007). The physiology of willpower linking blood glucose to self-control. *Personality and Social Psychology Review*, *11,* 303–327.

Gailliot, M.T., Baumeister, R.F., DeWall, C.N., Maner, J.K., Plant, E.A., Tice, D.M., … & Schmeichel, B.J. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, *92,* 325–336.

Gino, F., Schweitzer, M.E., Mead, N.L., & Ariely, D. (2011). Unable to resist temptation: How self-control depletion promotes unethical behavior. *Organizational Behavior and Human Decision Processes*, *115,* 191–203.

Goss, D. (2008). Enterprise ritual: A theory of entrepreneurial emotion and exchange. *British Journal of Management*, *19,* 120–137.

Goss, D., Jones, R., Betta, M., & Latham, J. (2011). Power as practice: A micro-sociological analysis of emancipatory entrepreneurship. *Organization Studies*, *32,* 211–229.

Grant, A.M., & Ashford, S.J. (2008). The dynamics of proactivity at work: Lessons from feedback-seeking and organizational citizenship behavior research. In B.M. Staw & R.M. Sutton (Eds.), *Research in organizational behavior* (Vol. 28, pp. 3–34). Amsterdam: Elsevier.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Griffin, M.A., Neal, A., & Parker, S.K. (2007). The new model of work role performance: Positive behavior uncertain and interdependent contexts. *Academy of Management Journal*, *50,* 327–347.

Harding, M.E. (1973). *Psychic energy: Its source and transformation*. Princeton, NJ: Princeton University Press.

Hobfoll, S.E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, *44,* 513–524.

Hobfoll, S.E., & Shirom, A. (2001). Conservation of resources theory: Applications to stress and management in the workplace. In R.T. Golembiewski (Ed.), *Handbook of organizational behavior* (2nd ed., pp. 57–80). New York: Marcel Dekker, Inc.

Hobfoll, S.E., & Stokes, J.P. (1988). The process and mechanics of social support. In S.W. Duck (Ed.), *Handbook of personal relationships* (pp. 497–517). New York: Wiley.

Howard-Grenville, J., Golden-Biddle, K., Irwin, J., & Mao, J. (2011). Liminality as cultural process for cultural change. *Organization Science*, *22,* 522–539.

Huy, Q.N. (2002). Emotional balancing of organizational continuity and radical change: The contribution of middle managers. *Administrative Science Quarterly*, *47,* 31–69.

Isen, A.M. (1987). Positive affect, cognitive-processes, and social behavior. *Advances in Experimental Social Psychology*, *20,* 203–253.

Isen, A.M. (2000). Positive affect and decision making. In M.L.J.M. Haviland-Jones (Ed.), *Handbook of emotions* (pp. 417–435). New York: Guilford Press.

James, E., & Wooten, L. (2010). *Leading under pressure: From surviving to thriving*. New York: Routledge.

Jansen, K. (2004). From persistence to pursuit: A longitudinal examination of momentum during the early stages of strategic change. *Organization Science*, *15,* 276–294.

Johnson, K.J., & Fredrickson, B.L. (2005). "We all look the same to me": Positive emotions eliminate the own-race bias in face recognition. *Psychological Science*, *16,* 875–881.

Kanfer, R.A., & Ackerman, P.L. (1989). Motivation and cognitive abilities: An integrative/aptitude-treatment interaction approach to skill acquisition. *Journal of Applied Pscyhology*, *74,* 657–690.

Kaplan, R. (1993). The role of nature in the context of the workplace. *Landscape and Urban Planning*, *26,* 193–201.

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, *15,* 169–182.

Kaplan, S. (2001). Meditation, restoration, and the management of mental fatigue. *Environment and Behavior*, *33,* 827–847.

Kaplan, S., Bardwell, L.V., & Slakter, D.B. (1993). The museum as a restorative environment. *Environment and Behavior*, *25,* 725–742.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York: Cambridge University Press.

Kaplan, S., & Talbot, J.F. (1983). Psychological benefits of a wilderness experience. In I. Altman & J. F. Wohlwill (Eds.), *Human behavior and environment* (Vol. 6, pp. 163–203). New York: Plenum Press.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Kaplan, R., & Talbot, J.F. (1988). Ethnicity and preference for natural settings: A review and recent findings. *Landscape & Urban Planning*, *15,* 107–117.

Kark, R., & Carmeli, A. (2009). Alive and creating: The mediating role of vitality and aliveness in the relationship between psychological safety and creative work involvement. *Journal of Organizational Behavior*, *30,* 785–804.

Katz, D., & Kahn, R.L. (1978). *The social psychology of organizations*. New York: Wiley.

Klein, G. (1998). *Sources of power: How people make decisions*. Cambridge, MA: The MIT Press.

Korpela, K.M., & Hartig, T. (1996). Restorative qualities of favorite places. *Journal of Environmental Psychology*, *16,* 221–233.

Korpela, K.M., Hartig, T., Kaiser, F.G., & Fuhrer, U. (2001). Restorative experience and self-regulation in favorite places. *Environment and Behavior*, *33,* 572–589.

Kühnel, J., & Sonnentag, S. (2011). How long do you benefit from vacation? A closer look at the fade-out of vacation effects. *Journal of Organizational Behavior*, *32,* 125–143.

Kuo, F.E., & Sullivan, W.C. (2001). Aggression and violence in the inner city: Effects of environment via mental fatigue. *Environment and Behavior*, *33,* 543–571.

Kweon, B., Ulrich, R.S., Walker, V.D., & Tassinary, L.G. (2008). Anger and stress: The role of landscape posters in an office setting. *Environment and Behavior*, *40,* 355–381.

Landy, F.J., & Becker, W.S. (1987). Motivation theory reconsidered. *Research in Organizational Behavior*, *9,* 1–38.

Lang, P.J. (1995). The emotion probe: Studies of motivation and attention. *American Psychologist*, *50,* 372–385.

Latane, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology*, *37,* 822–832.

Lawler, E.J., Thye, S.R., & Yoon, J. (2000). Emotion and group cohesion in productive exchange. *American Journal of Sociology*, *106,* 616–657.

Lawler, E.J., & Yoon, J. (1993). Power and the emergence of commitment behavior in negotiated exchange. *American Sociological Review*, *58,* 465–481.

Lawler, E.J., & Yoon, J. (1996). Commitment in exchange relations: Test of a theory of relational cohesion. *American Sociological Review*, *61,* 89–108.

Lawler, E.J., & Yoon, J. (1998). Network structure and emotion in exchange relations. *American Sociological Review*, *63,* 871–894.

Leather, P., Pyrgas, M., Beale, D., & Lawrence, C. (1998). Windows in the workplace: Sunlight, view, and occupational stress. *Environment and Behavior*, *30,* 739–762.

Leblebici, H., Salancik, G.R., Copay, A., & King, T. (1991). Institutional change and the transformation of interorganizational fields: An organizational history of the U.S. radio broadcasting industry. *Administrative Science Quarterly*, *36,* 333–363.

Lee, R.T., & Ashforth, B.E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, *81,* 123–133.

Little, L.M., Nelson, D.L., Wallace, J.C., & Johnson, P.D. (2011). Integrating attachment style, vigor at work, and extra-role performance. *Journal of Organizational Behavior*, *32,* 464–484.

Loehr, J., & Schwartz, T. (2003). *The power of full engagement: Managing energy, not time, is the key to high performance and renewal*. New York: Free Press.

Mandler, G. (1984). *Mind and body: Psychology of emotion and stress*. New York: Norton.

March, J.G., & Simon, H.A. (1958). *Organizations*. New York: Wiley.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Marks, S.R. (1977). Multiple roles and role strain: Some notes on human energy, time, and commitment. *American Sociological Review*, *42,* 921–936.
Maslach, C., & Leiter, M.P. (2008). Early predcitors of job burnout and engagement. *Journal of Applied Psychology*, *93,* 498–512.
Maslach, C., Schaufeli, W.B., & Leiter, M.P. (2001). Job burnout. *Annual Review of Psychology*, *52,* 397.
Mayer, R.C., & Gavin, M.B. (2005). Trust in management and performance: Who minds the shop while the employees watch the boss? *Academy of Management Journal*, *48,* 874–888.
Metiu, A., & Rothbard, N. (forthcoming). Task bubbles, artifacts, shared emotion, and mutual focus of attention: A comparative study of the micro-processes of group engagement. *Organization Science*.
Michel, A.A. (2012). Transcending socialization: A nine-year ethnography of the body's role in organizational control and knowledge workers' transformation. *Administrative Science Quarterly, 56,* 325–368.
Miller, J.B., & Stiver, I. (1997). *The healing connection*. Boston, MA: Beacon Press.
Moller, A.C., Deci, E.L., & Ryan, R.M. (2006). Choice and ego-depletion: The moderating role of autonomy. *Personality and Social Psychology Bulletin*, *32,* 1024–1036.
Muraven, M., & Baumeister, R.F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126,* 247–259.
Muraven, M., Baumeister, R.F., & Tice, D.M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *The Journal of Social Psychology*, *139,* 446–457.
Muraven, M., Gagné, M., & Rosman, H. (2008). Helpful self-control: Autonomy support, vitality, and depletion. *Journal of Experimental Social Psychology*, *44,* 573–585.
Muraven, M., Tice, D.M., & Baumeister, R.F. (1998). Self-control as limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology*, *74,* 774–789.
Niessen, C., Sonnentag, S., & Sach, F. (2012). Thriving at work—A diary study. *Journal of Organizational Behavior*, *33*(4), 468–487.
Nix, G.A., Ryan, R.M., Manly, J.B., & Deci, E.L. (1999). Revitalization through self-regulation: The effects of autonomous and controlled motivation on happiness and vitality. *Journal of Experimental Social Psychology*, *35,* 266–284.
Oaten, M., & Cheng, K. (2006). Improved self-control: The benefits of a regular program of academic study. *Basic and Applied Social Psychology*, *28,* 1–16.
Oaten, M., & Cheng, K. (2007). Improvements in self-control from financial monitoring. *Journal of Economic Psychology*, *28,* 487–501.
Obstfeld, D. (2005). Social networks, the tertius iungens orientation, and involvement in innovation. *Administrative Science Quarterly*, *50,* 100–130.
Orlikowski, W.J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science*, *11,* 404–428.
Peterson, C., Park, N., Hall, N., & Seligman, M. (2009). Zest and work. *Journal of Organizational Behavior*, *30,* 161–172.
Pfeffer, J. (1992). *Managing with power: Politics and influence in organizations*. Boston, MA: Harvard Business School Press.
Pfeffer, J., & Salancik, G.R. (1979). *The external control of organizations*. New York: Harper & Row.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Pinder, C.C. (1998). *Motivation in work organizations*. Upper Saddle River, NJ: Prentice-Hall.

Pinder, C.C. (2008). *Work motivation in organizational behavior* (2nd ed.). New York: Psychology Press.

Quinn, R.W. (2005). Flow in knowledge work: High performance experience in the design of national security technology. *Administrative Science Quarterly*, *50,* 610–641.

Quinn, R.W. (2007). Energizing others in work relationships. In J.E. Dutton & B.R. Ragins (Eds.), *Exploring positive relationships at work: Building a theoretical and research foundation* (pp. 73–90). New York: Routledge.

Quinn, R.W., & Baker, W.E. (2012). *Resource/affect tradeoffs in organizational networks*. Working Paper, University of Virginia, Charlottesville, VA.

Quinn, R.W., & Dutton, J.E. (2005). Coordination as energy-in-conversation. *Academy of Management Review*, *30,* 36–57.

Reis, H.T., Sheldon, K.M., Gable, S.L., Roscoe, J., & Ryan, R.M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, *26,* 419–435.

Rieff, P. (1979). *Freud: The mind of a moralist*. Chicago, IL: University of Chicago Press.

Rothbard, N.P., & Wilk, S.L. (2011). Waking up on the right or wrong side of the bed: start-of-workday mood, work events, employee affect, and performance. *Academy of Management Journal*, *54,* 959–980.

Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39,* 1161–1178.

Ryan, R.M., Bernstein, J.H., & Brown, K.W. (2010). Weekends, work, and well-being: Psychological need satisfactions and day of the week effects on mood, vitality, and physical symptoms. *Journal of Social and Clinical Psychology*, *29,* 95–122.

Ryan, R.M., & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55,* 68–78.

Ryan, R.M., & Fredrick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, *65,* 529–566.

Ryan, R.M., Weinstein, N., Bernstein, J., Brown, K.W., Mistretta, L., & Gagné, M. (2010). Vitalizing effects of being outdoors and in nature. *Journal of Environmental Psychology*, *30,* 159–168.

Salancik, G.R. (1977). Commitment and the control of organizational behavior and belief. In B.M. Staw & G.R. Salancik (Eds.), *New directions in organizational behavior* (pp. 1–54). Chicago, IL: St. Clair.

Salanova, M., Agut, S., & Peiro, J.M. (2005). Linking organizational resources and work engagement to employee performance and customer loyalty: The mediation of service climate. *Journal of Applied Psychology*, *90,* 1217–1227.

Sanghera, J. (2007). *Shame*. London: Hodder & Stoughton.

Saravi, F.D. (1999). Energy and the brain: Facts and fantasies. In S.D. Sala (Ed.), *Mind myths: Exploring popular assumptions about the mind and brain* (pp. 43–58). West Susssex, UK: Wiley.

Schaufeli, W.B., & Bakker, A.B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, *25,* 293–315.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Schaufeli, W.B., Salanova, M., Gonzalez-Roma, V., & Bakker, A.B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3,* 71–92.

Schmeichel, B.J., Harmon-Jones, C., & Harmon-Jones, E. (2010). Exercising self-control increases approach motivation. *Journal of Personality and Social Psychology*, *99,* 162–173.

Schmeichel, B.J., Vohs, K.D., & Baumeister, R.F. (2003). Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. *Journal of Personality and Social Psychology*, *85,* 33–46.

Seibert, S.E., Kraimer, M.L., & Liden, R.C. (2001). A social capital theory of career success. *Academy of Management Journal*, *44,* 219–237.

Sheldon, K.M., Ryan, R.M., & Reis, H.T. (1996). What makes for a good day? Competence and autonomy in the day and in the person. *Personality and Social Psychology Bulletin*, *22,* 1270–1279.

Smith, C.A., Organ, D.W., & Near, J.P. (1983). Organizational citizenship behavior: Its nature and antecedents. *Journal of Applied Psychology*, *68,* 653–663.

Soderstrom, S.B., & Weber, K. (2011). *Organizational sustainability agendas: An interaction ritual perspective on issue mobilization*. Working paper, University of Michigan, Ann Arbor, MI.

Sonnentag, S. (2003). Recovery, work engagement, and proactive behavior: A new look at the interface between nonwork and work. *Journal of Applied Psychology*, *88,* 518–528.

Sonnentag, S., Binnewies, C., & Mojza, E.J. (2008). "Did you have a nice evening?" A day-level study on recovery experiences, sleep, and affect. *Journal of Applied Psychology*, *93,* 674–684.

Sonnentag, S., Binnewies, C., & Mojza, E.J. (2010). Staying well and engaged when demands are high: The role of psychological detachment. *Journal of Applied Psychology*, *95,* 965–976.

Sonnentag, S., & Fritz, C. (2007). The recovery experience questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, *12,* 204–221.

Sonnentag, S., Kuttler, I., & Fritz, C. (2010). Job stressors, emotional exhaustion, and need for recovery: A multi-source study on the benefits of psychological detachment. *Journal of Vocational Behavior*, *76,* 355–365.

Sonnentag, S., & Zijlstra, F.R.H. (2006). Job characteristics and off-job activities as predictors of need for recovery, well-being, and fatigue. *Journal of Applied Psychology*, *91,* 330–350.

Spreitzer, G.M., Sutcliffe, K.M., Dutton, J.E., Sonenshein, S., & Grant, A.M. (2005). A socially-embedded model of thriving at work. *Organization Science*, *16,* 537–549.

Staw, B.M., Sandelands, L.E., & Dutton, J.E. (1981). Threat-rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly*, *26,* 501–524.

Sterman, J.D. (2000). *Business dynamics: Systems thinking and modeling for a complex world*. New York: Irwin.

Sterman, J.D., Repenning, N.P., & Kofman, F. (1997). Unanticipated side effects of successful quality programs: Exploring a paradox of organizational improvement. *Management Science*, *43,* 503–521.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Thau, S., & Mitchell, M.S. (2010). Self-gain or self-regulation impairment? Tests of competing explanations of the supervisor abuse and employee deviance relationship through perceptions of distributive justice. *Journal of Applied Psychology*, *95,* 1009–1031.

Thayer, R.E. (1987). Energy, tiredness, and tension effects of a sugar snack versu smoderate exercise. *Journal of Personality and Social Psychology*, *52,* 119–125.

Thayer, R.E. (1989). *The biopsychology of mood and arousal.* New York: Oxford University Press.

Thompson, J.D. (1967). *Organizations in action*. New York: McGraw-Hill.

Tomaka, J., Blascovich, J., Kelsey, R.M., & Leitten, C.L. (1993). Subjective, physiological, and behavioral effects of threat and challenge appraisal. *Journal of Personality and Social Psychology*, *65,* 248–260.

Tremblay, M.A., Blanchard, C.M., Pelletier, L.G., & Vallerand, R.J. (2006). A dual route in explaining health outcomes in natural disaster. *Journal of Applied Social Psychology*, *36,* 1502–1522.

Trougakos, J.P., Beal, D.J., Green, S.G., & Weiss, H.M. (2008). Making the break count: An episodic examination of recovery activities, emotional experiences, and positive affective displays. *Academy of Management Journal*, *51,* 131–146.

Vancouver, J.B., More, K.M., & Yoder, R.J. (2008). Self-efficacy and resource allocation: Support for a nonmonotonic, discontinuous model. *Journal of Applied Psychology*, *93,* 35–47.

Vohs, K.D., & Heatherton, T.F. (2000). Self-regulatory failure: A resource-depletion approach. *Psychological Science*, *121,* 249–254.

Vroom, V.H. (1964). *Work and motivation*. New York: Wiley.

Wang, M., Liao, H., Zhan, Y., & Shi, J. (2011). Daily customer mistreatment and employee sabotage against customers: Examining emotion and resource perspectives. *Academy of Management Journal*, *54,* 312–334.

Watson, D., Clark, L.A., & 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., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin*, *98,* 219–235.

Watson, D., Wiese, D., Vaidya, J., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations, and psychobiological evidence. *Journal of Personality and Social Psychology*, *76,* 820–838.

Waugh, C.E., & Fredrickson, B.L. (2006). Nice to know you: Positive emotions, self-other overlap, and complex understanding in the formation of new relationships. *Journal of Positive Psychology*, *1,* 93–106.

Webb, T.L., & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology*, *39,* 279–286.

Weick, K.E. (1979). *The social psychology of organizing*. New York: McGraw-Hill, Inc.

Weick, K.E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage Publications.

Weinstein, N., Przybylski, A.K., & Ryan, R.M. (2009). Can nature make us more caring? Effects of immersion in nature on intrinsic aspirations and generosity. *Personality and Social Psychology Bulletin, 35*, 1315–1329.

Westley, F.R. (1990). Middle managers and strategy: Microdynamics of inclusion. *Strategic Management Journal*, *11,* 337–351.

Downloaded by [University of Michigan] at 11:00 08 May 2012

Westman, M., & Eden, D. (1997). Effects of a respite from work on burnout: Vacation relief and fade-out. *Journal of Applied Psychology*, *82,* 516–527.

Witt, C. (2003). *Ways of being: Potentiality and actuality in aristotle's metaphysics*. Ithaca, NY: Cornell University Press.

Wood, R., & Bandura, A. (1989). Social cognitive theory of organizational management. *Academy of Management Review*, *14,* 361–384.

Wrzesniewski, A., & Dutton, J.E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review*, *26,* 179–202.

Yerkes, R.M., & Dodson, J.D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Nuerology and Psychology*, *18,* 459–482.

Zohar, D., Tzischinski, O., & Epstein, R. (2003). Effects of energy availability on immediate and delayed emotional reactions to work events. *Journal of Applied Psychology*, *88,* 1082–1093.

Downloaded by [University of Michigan] at 11:00 08 May 2012