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Review Article

Towards an integration of recovery and restoration theories

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ABSTRACT

The attempts to balance between the actual and preferred states of activation or relaxation has been studied from a recovery and a restoration perspective. There are many noticeable parallels between restoration and recovery. Both traditions depart from understanding the need for the individual to regain finite resources that has been used to meet and handle external demands. There is some disagreement of the phenomena, and the terminology may differ as well as the implied meaning of the underlying concepts. Both traditions although consider resource use on one hand, and the processes to return to a state where these resources are replenished, on the other hand. To integrate the recovery and restoration traditions a tentative model is proposed, recognizing that both traditions departs from an interactive process perspective, where the need to replenish resources are consciously perceived.

1. Introduction

The experience of stress can have several unwanted consequences. A Danish newspaper (Jyllandsposten, 2010) reported that war veterans from Afghanistan escaped into the woods and began living there – it was difficult for them to adapt to life at home. Although we acknowledge that not all stress is directly comparable, this illustrates at least three aspects of stress and recovery or restoration. First, that the (self-) regulation perspective is central to this area (Zijlstra et al., 2014). When considering the heightened stress of the war veterans one might surmise that they experience a lack of fit with their home-environment when they return from the war. In a sense, they have to decide whether to change something about themselves, or change the environment. Second, that people are aware of a need to manage a stressful state (Sonnentag and Zijlstra, 2006). Third, the veteran story illustrates the importance of the physical environment, in this context the natural environment.

Recovery and restoration are two perspectives for studying the attempts to balance between actual and preferred states of activation or relaxation (Zijlstra et al., 2014). While the field of occupational health research forms the conceptual and developmental background for the recovery perspective, the restoration perspective has been central to the field of environmental psychology. There are many noticeable parallels between restoration and recovery. Both traditions consider resource use, and the processes to return to a re-charged state of increased vitality following the replenishment of these resources. For example, in the recovery tradition one might describe the return to a state not dominated by responses due to exertion (load reactions) (Sonnentag, 2001), while the restoration tradition may focus on the resting and "recharging" of attentional resources (Kaplan, 1995).

2. Main text

2.1. Restoration

Restoration theories attempt to explain how a restorative environment can improve mental wellbeing and concentration, with a focus on aspects or qualities of the environment that contribute to the processes of reducing the impact of stress, mental fatigue, and negative emotions. Restoration theories also aim to describe or define such aspects or attributes of the environment. Attention restoration theory, ART, (Kaplan, 1995; Kaplan and Kaplan, 1989), asserts that directed attention (i.e., maintaining focus, inhibiting distractions) is a resource that can become fatigued (termed directed attention fatigue) which can then lead to stress and irritability. However, exposure to an environment with certain properties can help to restore directed attention by allowing it to rest. Particularly beneficial environments in this regard are natural environments, which typically score high on all the four restorative properties defined in the literature (Herzog et al., 2003; Laumann et al., 2001), these are *being away, extent, fascination, and compatibility* (see Kaplan, 1995). In combination, these four properties refer to an environment that is large enough to accommodate immersion, is away from your normal environment (e.g., work), is fascinating to look at, and is compatible with what you would like to do there (Kaplan, 1995). Experimental research demonstrates that natural environments are superior to urban

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environments in restoring attentional resources (e.g., Berman et al., 2008; Hartig et al., 2003).

In general, restoration is a process that returns a mentally fatigued person or a person with heightened negative affect to a state wherein these responses are reduced. Kaplan and Kaplan (1989) describe the restorative process in terms of four not necessarily causally related and sequential stages, these are: 1) clearing one's head, 2) restoration of directed attention, 3) cognitive quiet, and 4) deep reflection. Now, these stages seem to indicate that a person moves through different states during restoration, and almost that a restored state solidifies. There is reason to believe that people may distinguish between at least two of these stages, namely 2 and 4, attentional recovery and reflection (Herzog et al., 1997). This indicates a two-step process, and the first three may be necessary conditions for deep reflection.

Alternatively, the psycho-evolutionary theory of stress reduction suggests that human beings have a predisposition for beneficial responses to unthreatening natural environments (Ulrich, 1993). Unthreatening may refer to such characteristics as an unhindered view and a tranquil body of water, the absence of threats is relating both to form and to content. Moreover, being able to elicit restorative responses (reduced stress and negative emotion) in unthreatening natural environments may have been an advantage for early humans (Ulrich, 1993). Research has shown reductions in the levels of negative emotions in natural environments (Berman et al., 2008; Hartig et al., 2003). And although the available evidence is less conclusive, there may also be an objectively measurable stress-reducing impact of being in nature (e.g., Hartig et al., 2003; see also Bowler et al., 2010). Without explicit reference to restoration, some population-based epidemiological studies have reported associations between closeness to green environments and beneficial health outcomes (e.g., Mitchell and Popham, 2007, 2008).

Although several studies have used the term natural environment, it can refer to many different categories of landscapes or content (Velarde et al., 2007). One study has compared visits to an urban park, a managed forest environment, and a street, and found that the restorative potential of the two green environments may be comparable (Tyrväinen et al., 2014). Another study has investigated restoration in relation to the degree of openness, or prospect-refuge (Gatersleben and Andrews, 2013). Water-content may be relevant for restoration (e.g., White et al., 2010), or the perceptual processing speed of different environments (Joye & van den Berg, 2011). There are several interesting approaches and ideas in the literature. However, what we focus on here is that natural environments are different from street and traffic, they contain greenery and perhaps water, and they have some degree of openness. Moreover, it may be relevant to consider dynamic aspects here, e.g., movement between different environments. In addition, properties of the person-environment system is relevant, e.g., if a particular person is afraid of certain natural elements. If one perceives the natural environment as unsafe, it is not restorative (Ulrich, 1993).

Most studies in the restorative vein have been characterized by an experimental design, often with randomized assignment to an experiment group exposed to a green setting compared to a control group exposed to neutral, urban or other non-natural settings. These studies have often relied on student samples. In the indoor laboratory studies, pictures, slides or films with different environmental settings have often been used as proxies for in vivo environmental stimuli. There are few field studies of directly (objectively) measured restoration in real life situations. However, one recent study investigated park walks during lunch breaks at work. The researchers found a restorative effect of the intervention in the fall trial, but not in the spring trial (de Bloom et al., 2017).

2.2. Recovery

While reactivity refers to change in a psychological/physiological parameter when exposed to a potential stressor or challenge, recovery is understood as the time and completeness for the parameter to return to the baseline value, preceding the exposure (Linden et al., 1997). Similarly, recovery could be described as the organisms attempt to move from an actual state to a preferred/required state of activation (Ursin and Eriksen, 2004, 2010). In the recovery process the individual is regaining and rebuilding the physiological and mental resources, spent during the reactivity to a demanding exposure (Meijman and Mulder, 1998). Important components of the recovery process are, according to Sonnentag and Fritz (2015), detachment from work, relaxation, mastery, control, meaning and affiliation.

Although the recovery concept can be applied to any type of stress exposure, recovery from work has gained a central role in the occupational health literature (Zijlstra et al., 2014). According to the same authors, research on work-related recovery has mainly been theoretically influenced been by the Effort-Recovery Model (Meijman and Mulder, 1998) and the Conservation of Resources Model (COR) (Hobfoll, 1989; Hobfoll and Schumm, 2009). It has been argued that the time to recover and the completeness of the recovery process may be as important to the health outcomes of stress exposure as reactivity (Linden et al., 1997; Lundberg, 2005; Pavlides et al., 2002). While shorter periods of need for recovery is understood as a reversible imbalance between a preferred and the actual state, chronic need for recovery is associated with often irreversible allostatic load (McEwen, 1998; Meijman and Mulder, 1998). Lack of recovery from work has been related to outcomes such as disturbed cortisol secretion (Rydstedt et al., 2009; Sluiter, Fring-Dresen, van der Beek & Meijman, 2001), cardiovascular mortality (Kivimäki et al., 2006), and disturbed sleep (Åkerstedt et al., 2002).

It has also been found that the malignant impact of stressors may continue even after stress exposure has ended, due to remaining cognitive representations of the stressor appearing as un-voluntary, repetitive thoughts – rumination or perseverative thinking (Brosschot et al., 2005, 2006). Empirical studies (Cropley et al., 2013; Querstret and Cropley, 2012) have demonstrated that rumination interferes with, and reduces the efficiency of the recovery process. Furthermore, Brosschot et al. (2014) have shown that cognitive perseverative processes may also operate on a non-conscious level, but still interfering with recovery.

Despite the recent interest, the recovery concept has not been properly defined (Zijlstra et al., 2014). Recovery has often been operationalized as "lack of recovery" or "need for recovery" or by the proxy "fatigue", which is related but not identical to (need for) recovery. A reason behind the vague and inconclusive definition of recovery is, according to these authors, to be found in the fact that while recovery is to be understood in dynamic process terms it has most often been operationalized as a static concept, where the individual is either recovered or not recovered. Zijlstra et al. (2014) argue that recovery should be understood in dynamic process terms, where the external demands facing the individual as well as the circadian rhythm are to be taken into account. To meet the external demands, for example from work, the individual is required to mobilize energetic resources, while these resources spent to meet the demands are to be replenished during non-work time. Recovery should thus be understood in relation to this dynamic process of spending and regaining energy resources.

2.3. Recovery and restoration - conceptual and methodological overlaps and divergences

Occupational health studies on recovery from work have mainly relied upon epidemiological research (Åkerstedt et al., 2002; Kivimäki et al., 2006), or field studies where the influences of various types of potentially strenuous working conditions have been analysed (Geurts and Sonnentag, 2006; Sluiter et al., 2001). In the same way, field study design, often with diary data, has mainly been utilized to explore the relations between off-work activities and psychological/physiological indicators of recovery (Sonnentag and Fritz, 2015). A key finding in the studies on off-work activities has been that activities that promote detachment from work are of particular importance for recovery. Psychological detachment from the demands and stressors are central within

both the recovery tradition and the restoration tradition, but most research on this theme has been conducted within the recovery tradition (Sonnentag and Fritz, 2015). However, conceptually the recovery and restoration traditions seems to concur. Kaplan (1995) claims that being away mentally is highly important for the restorative process, since it is possible to maintain a high level of reactivity even if physically distanced from the stressor (e.g., by ruminating on previous or anticipated stress exposure).

To summarize – the central theme for recovery as well as for the restoration traditions concerns the attempts and strategies to replenish finite limited energetic or mental resources having been spent to accomplish activities necessary for social and environmental adjustment and continuance. While the recovery tradition mainly has focused its attention on the psycho-physiological resources used in work, the main focus of restoration research has been on the replenishment or mental, cognitive resources. While recovery research mainly has relied upon field studies, the restoration tradition has been characterized by an experimental approach.

2.4. A process sketch to integrate recovery and restoration

To integrate the recovery and restoration traditions, the present approach begins with a discussion on whether the traditions depart from an interactive process perspective, where the individual attempts to bring her actual state of activation to a preferred state (Ursin and Eriksen, 2004). The first step of this process is the perception of imbalance. The consequence of workload in the E-R model is fatigue (Meijman and Mulder, 1998), defined as a psycho-physiological state characterized by low energy, high irritability, and a lack of motivation. Thus, the individual perceives fatigue, and the subsequent need for recovery, as an imbalance between his/her actual and a preferred (energetic) state. When discussing a possible integration, it is important to be clear on the different aspects of self-regulation. One may consider self-regulation from three perspectives: monitoring, standards/goals, and strength (Tice and Bratslavsky, 2000). Monitoring aligns closely with perceiving imbalance, goals/standards may be related to perceived demands, and strength may be an internal resource. If no demands are placed on the individual, no imbalance should be perceived. Accordingly, perceived demands is what triggers the fatigue state. When we discuss mental states and self-regulation, it is also important to distinguish between the immediate, non-analytical consciousness and the reflective and analytical consciousness or awareness (Heft, 2003). For example, a person can experience the environment through immediate awareness, but may decide to utilize the environment mainly through reflective consciousness. That is, thinking about demands and resources, and the possibility of seeking restoration.

In the restoration tradition, the processes that serve self-regulation and executive functioning are processes which are hypothesised to rely upon a common mental resource – which in turn is assumed to be finite and somewhat easily depleted (Kaplan and Berman, 2010). According to these authors, the resource demanding effort or wilful direction of attention is a central component in acts of executive functioning and self-regulation (Kaplan and Berman, 2010). Frequent or intense requirements of wilful direction of attention will finally lead to ego depletion (Baumeister et al., 1998), a temporary depletion of this finite resource, which relates to the strength aspect of self-regulation (Tice and Bratslavsky, 2000). A meta-analysis shows that there is empirical support for the ego depletion phenomenon (Hagger et al., 2010). Furthermore, there is some empirical support for the notion that nature may counteract ego depletion (Beute and de Kort, 2014; Chow and Lau, 2015). However, there is also an ongoing theoretical discussion; some authors view ego depletion as a process where shifts in motivations for self-control drive the attentional focus (Inzlicht and Schmeichel, 2012). Reduced motivation to self-regulate then becomes an alternative explanation for the idea of a depleted resource, originally suggested by Baumeister et al. (1998).

The concepts we use matter, and avoiding the resource metaphor reduces the risk for reification. However, to some extent, the reduced motivation to self-regulate is a rationalistic reinterpretation of the depleted resource to self-regulate. Arguably, both ideas might have to do with underlying mental states.

It is important to point out that the ego depletion process is only one of several aspects of the recovery/restoration process. Motivation is of course highly relevant for recovery as well as for restoration, and it is entirely possible that reduced motivation is the primary process for ego depletion. Arguably, it is important to focus on both the mechanics (e.g., Inzlicht and Schmeichel, 2012), and the constructive process of fatigue. The states that emerge from this process may be more or less stable, similarly to distinctions between emotions and moods (see Larsen, 2000).

Thus, the recovery as well as the restoration traditions depart from understanding the need for the individual to regain finite resources that have been used to meet and handle external demands. Secondly, in both traditions it is assumed that the individual feels fatigued, and may perceive that the valued resource is about to become used up. According to the E-R model (Meijman and Mulder, 1998) fatigue signalizes need for recovery by for example irritability and reduced motivation to carry on, while fatigue and irritability in the restoration tradition follow from (depletion) an inability to direct attention (Kaplan and Kaplan, 1989; Kaplan, 1995; Kaplan and Berman, 2010).

Furthermore, when the perceived imbalance between the actual and preferred state becomes conscious both traditions predict that the individual may take measures to reduce or counteract the discomforting/unwanted effects of fatigue or overload. Beside from withdrawing from the demands of work by the end of the working day, it is also of key importance for the worker to mentally detach herself from work (Sonnentag, 2012; Sonnentag and Fritz, 2015). An overall conclusion from the studies on the relations between the disposition of the non-work time and wellbeing is that the type of activities that best promote recovery are the ones that contrast to the work content, and thereby activate contrasting physical and mental systems (Sonnentag, 2012; Sonnentag and Fritz, 2015). Essentially, processes that may “deconstruct” a fatigue state.

To restore the mental resource depleted by an overuse of directed attention, ART researchers (Kaplan and Kaplan, 1989; Kaplan, 1995; Kaplan and Berman, 2010) suggest three primary means for replenishment: sleep, meditation and promotion of involuntary attention. The latter strategy is facilitated by environments characterized by soft fascination, where especially natural environments are assumed to be “able to capture involuntary attention without monopolizing attentional capacity” (Kaplan and Berman, 2010, p. 48). Besides being softly fascinating, a restorative environment has to be compatible with individual intentions, of sufficient extent, and also to promote psychological distance from ordinary demands, the sense of being away (Hartig et al., 2003; Kaplan and Kaplan, 1989; Kaplan and Berman, 2010).

An alternative approach to understand the relations between environmental qualities that best facilitate stress reduction was suggested within the psycho-evolutionary research framework (Ulrich, 1993). Departing from an evolutionary perspective it is suggested that human beings have an inherited preference for calm, unthreatening natural environments. Empirical findings within this framework (e.g., Ulrich et al., 1991) have also identified the natural environments as stress reducing, and as generally preferred compared to urban environments. In relation to the psycho-evolutionary perspective, it can also be pointed out that the physiological stress responses have proven adaptive for humans as well as for animals in relation to the type of acute physical threats associated with the possible dangers in a natural environment (Lundberg, 2005). The seemingly good evolutionary fit between the stress response system and natural environments may provide further support for beneficial health effects of natural surroundings.

Studies on recovery and detachment may benefit by taking the impact of environmental factors into account. Several studies have been conducted on how different types of off-work activities affect post-work recovery/detachment from work (Sonnentag, 2001; Sonnentag and Fritz, 2015; Zijlstra and Sonnentag, 2006). In none of those studies, although,

have the possible impact of the environmental setting for these relations been considered. Besides the contrast to the work-tasks and the counterbalancing physiological effects on strain it seems possible that physical activities carried out in natural settings might further contribute to the recovery process.

Although rumination and perseverative thoughts have not been given any direct consideration in the restoration research tradition, it would be of importance to further explore how these processes may interfere with, or be reduced by restoration. For example, restoring attention may either increase your ability to ruminate or it might increase your resistance to negative cognitions (see Johnsen, 2011). That is, when the cognitive capacity increases, this increased capacity may be spent thinking more closely about problems. In theory, it may be possible to apply considerable effort thinking about difficulties while simultaneously being restored in a natural environment. This state of affairs may have been evolutionary adaptive for human beings (Johnsen, 2011). On the other hand, effective self-regulation also involves the ability to stop thinking about a problem at some point. That is, resisting rumination. Considering that natural environments also have positive emotional effects (e.g., Hartig et al., 2003), it seems possible that, in a dynamic sense, exposure to nature will tend to pull the person-environment system away from extensive rumination, although this would depend upon the person.

To summarize, the focus in both the recovery and the restoration traditions concerns how to replenish and to restore the finite cognitive or energetic resources the individual has spent on voluntary but demanding activities. While the focus in occupational stress research has been on how off-work activities affect recovery and health (Sonnentag and Fritz, 2015), the more cognitive and experimental restoration tradition has given attention to what environmental qualities promotes replenishment and restoration. Obviously, these two approaches are to be understood as complementary, rather than conflicting. Most work tasks in contemporary working life are cognitively demanding and thus much of the workload to be recovered from can be understood as attention depleting and be analyzed from the perspective of cognitive restoration.

Restoration research might benefit from including and perhaps directly using concepts such as psychological detachment in order to capture the notion of being away mentally. Restoration research could also benefit from the potential interactions between restoration and rumination/perseverative thinking as possible obstacles in the process of restoration. Even though rumination has been found to be affected by external load, it has also been assumed to have a more stable trait-like component (Zoccola and Dickerson, 2015) and may therefore affect the environment-restoration relationship.

The definitions of recovery all refer to the time and completeness required to come back to baseline in the activated psychological or psychophysiological parameter after exposure to a stressor. In the case of exposure to one well-defined acute stressor, for individuals with a well-defined baseline value of the actual parameter, this may be fairly straightforward. On the other hand, considering the more chronic nature of work-related stress, often emanating from several interacting stressors (Lazarus and Folkman, 1984) as well as from perseverative thinking, it may in fact be difficult to establish when stress exposure has ended. Furthermore, it may also be equivocal to establish the "real" baseline value of the measured outcome parameter(-s). Are we in fact referring to an individual's baseline value as a value under "ideal" circumstances or a value as good as it can get under the actual circumstances, even if the subject in fact is under chronic stress. Moreover, recovery should be understood in a process perspective (Zijlstra et al., 2014), where the value of parameter best fitted to meet external requirements changes over time, which further complicates establishing whether the individual in fact is recovered.

For these reasons, we suggest moving away from the baseline concept and instead focus on the (idiosyncratic) mental states of fatigue and vitality.

2.5. Resource status is psychologically constructed

A possible avenue for the integration of restoration and recovery may be to discuss whether these experiences are psychologically constructed – that people who experience load reactions or are fatigued recognize these states by "observing" some form of similarity with previous experiences of fatigue. We suggest that people are, at least to some extent, aware of their resource status (i.e., state of being fatigued, restored, or vitalized) but not of their psycho-physiological strain indicators (e.g., cortisol secretion). This may seem uncontroversial, but forms a suitable starting point for discussing this idea. The inspiration comes from emotion theory, specifically the psychological construction theory of emotions (Barrett, 2006; Russell, 2003). This theory states that emotions, and other mental states, are not unique in form, but constructed from constituent ingredients (Russell, 2003; Gross and Barrett, 2011). Emotions are not directly caused by underlying processes, but rather emerge as products of a continuous constructive process (Gross and Barrett, 2011). Similarly, resource status is an emergent phenomenon, and not based on a one-to-one relationship with the information it builds on (e.g., physiological stress, perceived demands, attentional resources, and mood).

From this perspective, resource status is a psychologically constructed state based on several interacting ingredients, which themselves can be processes as well. We also suggest that this psychological construction forms a basis for (self-) regulation. However, similarly to emotion (Gross and Barrett, 2011), it is difficult to make a sharp distinction between resource status and regulation, because the differences between activating and regulatory processes may not be meaningful. Arguably, resource status has been used as an implied concept in the literature for some time. Sonnentag and Bayer (2005) have used survey items to measure the depletion of resources. In addition, Sonnentag and Zijlstra (2006) have defined need for recovery as an emotional state, which essentially involves a reluctance to continue with the demanding activities. Resource status can also be considered from the positive side, as a state of being vitalized (feeling energized), and being highly motivated (Ryan and Frederick, 1997).

Now, rather than continuing this discussion with a focus on the constructive process, we want to draw attention to the state space of resource status. There are three reasons for this. First, a full discussion of resource status, while interesting, would necessarily be somewhat speculative. Second, the topic requires more space to be sufficiently covered. Third, considering process dynamics rather than psychological construction may be more relevant for research. The next section brings together the resource status concept and the previous section.

2.6. The process dynamics of restoration/recovery

Inspired by Markov models (e.g., Costa et al., 2013), we define a discrete state space comprising three states (Fig. 1) – although we do recognize that these may not be completely discrete. Note that these are psychologically constructed states. Furthermore, there are two important categories of factors in this sketch. First, those that are relevant in making the system change from one state to another, for example *becoming* restored after being fatigued. Second, factors that are important in keeping the system in a certain state, for example factors that cause people to *remain* fatigued. Stated simply, a regulatory system can move between different states (Carver and Scheier, 1982). External circumstances and individual differences will stabilize the system; however, there are also circumstances and individual differences that may move the system to a different state. For example, a stressful environment or an emotionally reactive constitution. Perceived demands may trigger this constructive process, but there are several other potentially constructive elements as well, for example internal aspects such as emotions and motivation, and the environment as immediately perceived (see Heft, 2003). There are also physiological constraints.

In a self-regulatory perspective, the person/system needs some sort of comparator to change between states (Carver and Scheier, 1982). The

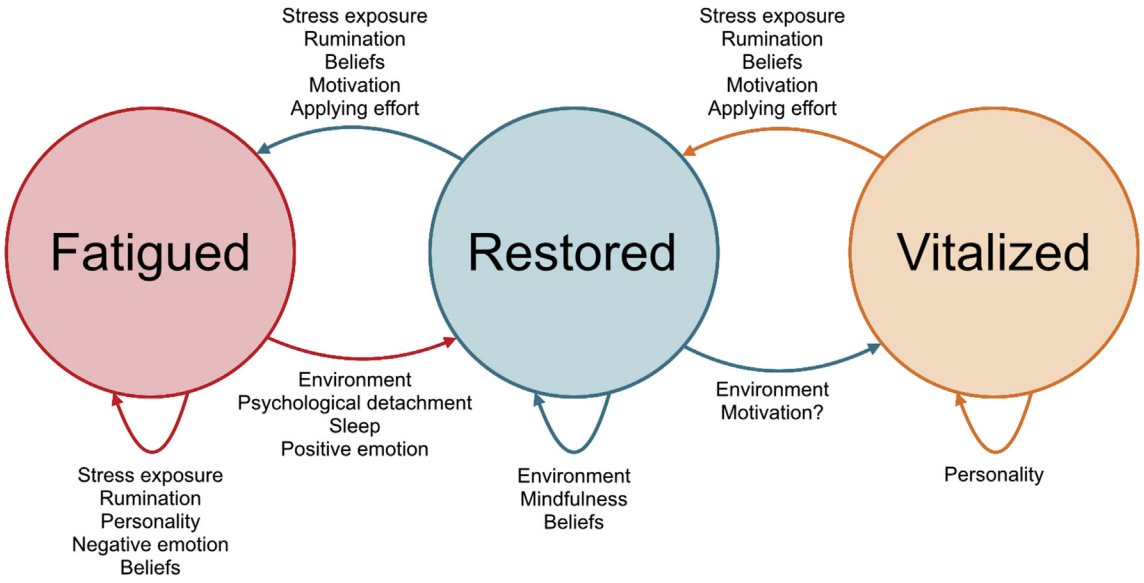

Fig. 1. Process dynamics of personal and environmental aspects of fatigue and recovery/restoration: A sketch.

comparator may be the preferred state – however it may not relate directly to immediate, non-reflective consciousness. That is, in a phenomenological sense, perceiving demands may produce an experience of fatigue because the person perceives a discrepancy (reflective awareness) between the resources available to meet the demands, which are inferred from the current state (non-reflective consciousness), and beliefs about the resources needed to meet these demands (reflective consciousness). In this example, the comparator is the latter, and this dynamic process demonstrates the construction and maintenance of a fatigued state based on beliefs (see Fig. 1). Psychological detachment or exposure to a restorative environment can pull the system towards a restored state, but beliefs, stress exposure, and negative emotion are examples of processes that work to maintain the fatigued state.

There are several factors included in the sketch; most derive from results and theory already presented. Motivation is included because it aligns with vitality (Ryan and Frederick, 1997), and some authors argue that ego depletion may interact with, or perhaps to some extent overlap with motivation (Inzlicht and Schmeichel, 2012). Beliefs may be important in many ways, but one example is that beliefs about what willpower actually is can moderate ego depletion effects (Job et al., 2010). The environment interacts with the restoration-recovery process, for example, (unthreatening) natural environments enhance restoration/recovery. Moreover, vitality may increase in nature as well (Ryan et al., 2010). Personality probably plays a role in fatigue (Sonnentag and Fritz, 2007), vitality (Ryan and Frederick, 1997), and concerning restoration, emotion regulation appears to mediate the impact of personality (Johnsen, 2013).

Other factors may be included. Recent theorizing indicates that people may remain fatigued when they do not perceive safety signals (Brosschot et al., 2016). Accordingly, not perceiving safety signals should be included below the arrow that returns to "fatigued", but might also be important for moving between states, illustrated by the importance of unthreatening nature. It may be unnecessary to mention that regulation is essential here, self-regulation may function both to stabilize a state and to move between states. For example, both the recovery perspective and the restoration perspective may suggest something other than work for the person who is experiencing fatigue due to work demands. However, it is possible to remain fatigued, even in nature (e.g., by ruminating).

People may be highly aware of their resource status, or largely unaware of it. This difference gives an indication of why people seek recovery/restoration, but also why it may sometimes not work. Being aware should be relevant for perceiving a need for recovery, and seeking respite. However, some people apparently remain unaware of their resource status until they suddenly "hit the wall". Awareness is also a possible explanation for how a sensitivity to demands can make people experience high levels of fatigue, seemingly in the absence of objective reasons – to put it bluntly, maintaining the state by ruminating on fatigue. This would continuously trigger the constructive process, and the state might eventually solidify. The person might also ignore safety signals (Brosschot et al., 2016). The presented ideas also offer several interesting avenues for research.

3. Conclusions

We have attempted to integrate recovery and restoration by focusing on regulation. We suggest that being fatigued, restored or vitalized are psychologically constructed states. The dynamics of this includes factors that may cause a person to remain in a state and factors that may cause a person to shift between different states. This sketch opens up a few avenues for research. First, one might conduct experimental studies on what makes people *remain* fatigued or vitalized, rather than on what makes people fatigued in the first place. Second, researchers interested in doing survey studies might focus on predictors of state change, rather than predictors of a certain state. Third, studying interactions in experimental settings should be interesting; specifically interactions between the factors that contribute to change, but also those that counteract change. For example, research on favourite places indicates that people may be motivated to seek a restorative environment in order to maintain psychological stability (Korpela, 2003), this is clearly in accordance with the self-regulation perspective – people use the environment to restore themselves. However, what factors interfere with this process, and how? Fourth, over time the resource status that is recognized, and learned, become familiar to us and may turn into a more stable disposition. With this in mind, research might focus on the processes that stabilize a fatigued state over long periods.

Restoration research might benefit from including and perhaps directly using concepts such as psychological detachment and rumination in order to capture the notion of being away mentally. The recovery tradition would benefit from improved insights on the role of the physical environment in the recovery process. This integrative view on recovery/restoration yields a possibility for focusing on how other aspects than the environment or work demands may contribute to our resource status, in the context of work demands, and environmental qualities – as elements of the dynamic constructive process.

Further research is called for on the role of the environment in moderating the stressor-strain relationship. What attributes of the physical environment at work contribute to a quick recovery, and what aspects of the home environment contribute to recovery from work? To what extent does a person need to actively engage with the environment? That is, unconscious vs. conscious regulation in the person-environment system. More research is needed on the understanding/interpretation people have of their own reactions in relation to the environment. Resource status may have a time-dimension similar to the mood – emotion distinction, this opens up the possibility for a more stable individual difference that may develop over time. The relationship between the immediate state, and the prolonged state should be developed further.

Research might attempt to develop further the concept of resource status. The psychological construction of resource status is conceived as a process within the individual. Group level survey research may not be the best way of studying this constructive process, although there is one avenue that may be fruitful: focusing on changes between states. That is, determinants of state-changes? This question may be relevant for restoration and recovery research both from a practical and a theoretical viewpoint. However, the most relevant approach may be to conduct qualitative studies of the constructive process.

To sum up, we suggest leaving behind both the baseline metaphor and the resource metaphor. There is no return to a pre-demand state, but rather a continuous and dynamic constructive process where the person adapts to the environment. Internal and external (traditionally considered) resources and demands are among the inputs to this constructive process.

Returning to the Danish war veterans, we may conclude that they causally attribute too much of their state to the physical surroundings. The story demonstrates the importance of distinguishing between immediate, non-reflective awareness, and reflective awareness (Heft, 2003). Even in nature, people can remain stressed, or maintain a fatigue state.

Declarations

Author contribution statement

Leif Rydstedt, Svein Åge Kjøs Johnsen: Analyzed and interpreted the data; Wrote the paper.

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