

Part 1

**Examining the parallel health and business interest
of organisational health interventions**

Chapter 2

Vitality at work and its associations with lifestyle, self-determination, organizational culture, and with employees' performance and sustainable employability

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Work, A Journal of Prevention, Assessment & Rehabilitation, in press.

Abstract

Background: Vitality at work is an important factor for optimal functioning and sustainable employability. To date, knowledge on how to promote vitality at work is fragmented.

Objective: Contribute to knowledge on how to promote vitality at work.

Methods: Determinants of vitality at work are identified from three scientific fields, and used in a comprehensive model. Regression analyses on cross-sectional data from a Dutch dairy company (N=629) are performed to examine the associations between these factors, vitality at work, and employees' perceived effective personal functioning and sustainable employability.

Results: Vitality at work is most strongly associated with basic psychological needs of self-determination, but also with healthy lifestyle behavior, having a balanced workstyle, and social capital. Vitality at work is also associated with effective personal functioning and with sustainable employability.

Conclusions: The study confirms the multifactorial nature of vitality at work. Since organizational culture may support self-determination, and cultural aspects themselves are positively associated with vitality, organizational culture seems particularly important in promoting vitality at work. Additionally, a healthy lifestyle appears important. The associations between vitality at work and effective personal functioning and sustainable employability endorse the combined health-based, business-related and societal importance of vitality at work.

Key words: basic psychological needs, social capital, balanced work style.

Introduction

Vitality at work is seen as an important factor for employees' functioning and their sustainable employability [1]. Vitality at work therefore has become an important research issue in the field of work and health. Following the trend of positive psychology [2], vitality is seen as an indicator of personal health and well-being [3]; an important human value [4]. A person who is vital is energetic and feels physically and mentally well [5]. Vitality is also presumed to render people more resilient, and make them less vulnerable to stressors and negative functioning [6]. Since vitality at work is seen as a co-determining factor for effective human functioning, organizations seek ways to augment vitality and thereby enhance productivity [7], creativity [8], and innovative behavior [9]. Augmenting vitality in organizations, thus, may serve both health and business interests. These interests potentially enable prolonged attention towards vitality in the organizational setting, which in turn may positively influence the functioning and sustainable employability of large groups of people. Though researchers increasingly pay attention to vitality, research on this subject is still in its early stages, especially in work settings [5]. The business and societal relevance, however, is beyond doubt, especially with regard to the ageing workforce.

In the literature, there is a broad consensus that vitality consists both of physical and psychological components [3,10]. The physical component of vitality is characterized by high energy levels and feeling 'strong and fit', whereas the psychological component reflects well-being, less feelings of fatigue, mental resilience and perseverance [10]. Vitality is also presumed to be influenced by social circumstances [6]. The quality of relations between co-workers is seen as a key resource of individuals' feelings of vitality [5]. Social interactions can make people energized, but also stressed and drained. Vital employees are likely to energize those with whom they interact [9,11]. Vitality thus most probably will be influenced by physical and psychological elements, and by the social environment.

As a multifactorial construct, vitality is studied in different scientific fields. In medical health science, the main focus is on physical conditions or pathologies [10,12]. In social and personality psychology, vitality is mainly examined in relation with supportive

conditions for growth, self-regulation and self-actualization [3,6,13]. In organizational psychology and sociology, vitality is predominantly related with social conditions and interpersonal relationships between members of groups [5,14,15]. However, since most researchers tend to stay within their own field, current knowledge is fragmented, which makes it difficult for companies to determine how to promote vitality at work. Integrated knowledge that transcends the different scientific traditions is sensible to get a more comprehensive grasp on vitality at work.

By combining determinants of vitality at work recognized in three different scientific fields, this study lines up with the need for more integrated, multifactorial studies on vitality at work [1]. The overall aim is to contribute to knowledge on how to promote vitality at work, which, in turn, is presumed to contribute to an optimal and sustainable employability of employees. Therefore, this study investigates: a) the associations between lifestyle, basic psychological needs for self-determination, organizational-cultural factors and vitality at work, and b) the associations between these factors, vitality at work, and perceived effective personal functioning and sustainable employability among employees.

Below, first the concept of vitality at work, and some related constructs used in the organizational setting are described. Subsequently, a brief literature review on the determinants of vitality at work from three different scientific fields is described, culminating in the comprehensive model used in this study.

Vitality at work and related constructs

In the literature, different interpretations and definitions of vitality are used. Vitality refers to: *'feelings of positive arousal and an elevated sense of energy, and reflects the subjective feelings of being alive, awake and alert'* [16,17]. Often used definitions of vitality are: *'the positive feeling of having energy to the self'* [18], and: *'a positive dynamic aspect of well-being, marked by subjective experience of energy and aliveness'* [3]. A well-known definition of vitality at work, used in the organizational setting is: *'high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties'* [19].

In the organizational setting, vitality is closely related to other positively toned constructs as thriving at work, work-engagement, human energy and happiness. However, vitality at work distinguishes itself from these constructs as well. In thriving at work [20], and in work-engagement [19,21], vitality is viewed as a constituent of these constructs. From this perspective, vitality is seen as a resource that one can harness or regulate for purposive actions [6]. However, from a human perspective, being vital *as such* is seen as a meaningful concept, recognized in almost all cultures [6], even if it is not coupled with its potential consequences in specific contexts. Vitality is a universal and innate desire, whereas thriving and work-engagement do not necessarily reflect such a need. Addressing vitality may therefore appeal to employees' inherent desire, while simultaneously contributing to company-specific targets.

Vitality at work also differs from human energy and happiness. Opposite to vitality, human energy does not necessarily always reflect a positive affect [3]. Energetic states like anger or anxiety are either unrelated or negatively related to vitality [6]. As vitality explicitly reflects a *positive* feeling of energy, vitality, as compared to human energy in general, potentially better represents the organizational aim to continuous growth and development of both individuals and the organization as a whole. Happiness and vitality are mainly distinguished by the activation level, with vitality being an activating affect, whereas happiness does not necessarily carry that implication [18]. In addition, vitality, as compared to happiness, reflects a process of living well, whereas happiness primarily reflects a hedonic outcome[4]. Since companies do need a process in which employees can perform well, vitality is probably a more useful construct compared to happiness.

Determinants of vitality at work

Lifestyle factors

In medical health science, one's physical state is a main focus in promoting vitality at work. The physical component of vitality is considered as a part of a health related fitness construct (aerobic fitness), muscular strength, flexibility and body composition [10]. Physical health is presumed to enhance vitality, while unhealthy physical conditions, physical dis-functioning, pain, and a high body-mass-index are presumed to reduce vitality [1,3]. Vitality in this field is considered to be closely related to health [10]. As the effects of a healthy lifestyle on physical health are well known, vitality is suggested to be influenced by lifestyle issues as exercising, smoking, alcohol intake, diet and reducing stress [6,12,22]. Indeed, an association between the highest rate of oxygen consumption during exhaustive exercise (VO₂ max) and vitality has been found [23]. Promoting a healthy lifestyle thus can be an important factor to keep the workforce vital.

Basic psychological needs for self-determination

The psychological component of vitality is particularly studied in social and personality psychology, and reflects the feelings of well-being, levels of fatigue, mental resilience and perseverance [10]. In this field, conditions that promote self-regulation and self-actualization are recognized as vitality-promoting factors [6,13]. On the other hand, psychopathology, depression, and anxiety are presumed to influence vitality in a negative way [1].

In this field, Self-Determination Theory (SDT) [24] is an often used theory. Self-Determination Theory, a motivational theory, is used to examine how to support intrinsic tendencies to behave in healthy and effective ways. In SDT, three basic psychological needs, when satisfied, are suggested to enhance vitality [1,3,18]. These basic needs are: autonomy, feelings of competence, and relatedness. Opposite to this, externally controlled situations, feelings of incompetence, and not being connected to others are expected to have a negative effect on vitality [1]. Autonomy is about intrinsic, volitional regulatory mechanisms, and is characterized by being in accord with one's values and interests. Autonomous behavior is found to increase vitality [25], while for example a controlled work value orientation, is found to be associated with less vitality [26]. The

need for competence refers to personal agency to act effectively in interaction with an environment. This second psychological need is somewhat related to self-efficacy: the perception of one's own cognitive ability to complete tasks and reach goals [27]. However, whereas self-efficacy stimulates a specific behavior, the need for competence reflects personal agency on a more general level [28]. This more general personal agency is particularly associated with vitality [13,28]. The third basic psychological need, relatedness, refers to the human striving for belongingness, and a sense of communication. Promoting a context in which these three basic psychological needs will be satisfied may thus be important to keep a vital workforce [1].

Organizational-cultural factors

In the field of organizational psychology and sociology, the social working conditions, interpersonal relationships between members of groups, and organizational culture are often related to vitality [5,14,15]. Vitality for example is associated with high quality relationships [5,16,16], and social support [29]. Organizational culture generally is seen as a dynamic interplay between behavior and other expressions in the company, interpersonal relationships, and its underlying values and basic assumptions [30]. Organizational culture may thus be reflected by behaviors, interpersonal relationships and value orientation. As concrete manifestations of culture, leadership style and work style have often been examined [30]. There is abundant evidence that leadership style is related to health and well-being [31]. Relational forms of leadership, like transformational leadership, are positively associated with mental health and vitality [5,14,32], whereas autocratic and malevolent leadership is found to be related to low vitality at work [33]. The (collective) employees' work style, seen as a response to work demands in a certain environment [34], is another vitality-influencing manifestation of organizational culture. Work style, is more often related to employees' health [35,36]. Since work nowadays tends to be more demanding, employees may work harder than before [37]. Maintaining a balanced work style, collectively, can thus be an important factor to keep a vital workforce. An organizational-cultural construct, representing a combination of interpersonal relationship and value orientation, is organizational social capital [38]. Social capital comprises features such as networks, shared norms and values, and social trust that facilitate coordination and cooperation for mutual benefit [39], and is

frequently associated with health [40,41]. In the organizational setting, social capital is about collaboration, trust and justice [38]. It represents the quality of relations and underlying norms and values. As a cultural-bound dimension, social capital is seen as an important vitality-influencing factor.

A comprehensive model on vitality at work

Figure 1 presents the comprehensive model used in this study. Based on the above brief literature review, lifestyle factors, basic psychological needs for self-determination, and organizational cultural factors are incorporated into this comprehensive model. To meet the assigned multiple (health, business, and societal) interests, the model also includes employees' effective personal functioning and sustainable employability.

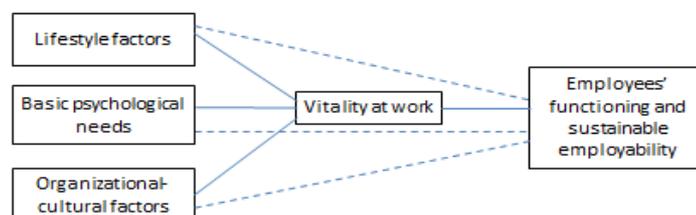


Figure 1 The comprehensive model on vitality at work

Methods

This study was conducted as part of a vitality project in a Dutch dairy company.

Study population

All employees (N=1132) of the company were asked to complete an online questionnaire. Employees with a company email account received an email with a link to the questionnaire (N=577). Employees without a company email account received a letter with a unique code to log in on a stand-alone computer (N=555). The employees were free to fill in the questionnaire at work or at home. In total, 629 employees (56%) completed the entire questionnaire.

Measurements

Covariates included: age (five-years' groups), gender (female/male), educational level (primary, secondary and higher education), shift work (no, two, three or five shifts), and kind of work (more physical work than mental work, both physical and mental work, more mental work than physical work). Shift work and kind of work were dichotomized (shift work: 0='no shift work', 1='shiftwork'; kind of work: 0='both physical and mental work or mainly mental work', 1= 'mainly physical work').

Lifestyle factors

- *Physical activity* was assessed by two items on weekly level of physical activity on a scale from zero till seven days a week. This question was derived from the Dutch physical activity public health guideline [42]. Items were: 'How many days a week do you spend at least 30 minutes on moderate intensity physical activities, comparable to walking or cycling?', and 'How many days a week during leisure time do you spend at least 20 minutes on vigorous intensity physical exercise or sports, which makes you sweat?'
- *Smoking and alcohol use* were each measured by one item: 'How many cigarettes do you smoke, as a rule, per week?', and 'How many alcoholic drinks do you use, as a rule, per week?' For smoking, the responses were dichotomized: 0='no smoking', 1='smoking'.
- *Healthy dietary habits* were assessed by three items of the Short Food Frequency questionnaire [43], on self-reported breakfast habits, vegetable intake, and fruit intake, respectively. Employees were asked how many days a week they have breakfast, eat vegetables, and eat fruit, respectively.
- *Relaxation* was measured with two items on five-point Likert scales (1 'totally disagree' to 5 'totally agree'). Items were: 'I experience enough relaxation moments during work', and 'I experience enough moments of relaxation in my private situation'.

Basic psychological needs for self-determination

The Work-Related Basic Need Satisfaction scale (W-BNS) [44] was used to assess the basic needs of self-determination, each of them with six items on five-point Likert scales (1='totally disagree' to 5='totally agree'). The three factor structure of this scale, its

discriminant validity, the reliability of its subscales and its predictive validity have been confirmed in a previous study [44].

- *Autonomy* represents individuals' need to feel volitional and to experience a sense of choice when carrying out activities. An item example is: 'I feel like I can be myself at my job'; Cronbach $\alpha=.77$.
- *Competence* is defined as individuals' need to feel effective in interaction with the environment. An item example is: 'I feel competent at my job'; Cronbach $\alpha=.80$.
- *Relatedness* is defined as individuals' propensity to be connected to others. This need is satisfied when people experience a sense of communication and develop close relationships with others. An item example is: 'I don't really mix with other people at my job' (reversed); Cronbach $\alpha=.70$.

Organizational-cultural factors

- *Transformational leadership* was measured with a four-item scale adapted from the Charismatic Leadership in Organizations Questionnaire (CLIO) [45] on five-point Likert scales (1='totally disagree' to 5='totally agree'). An example item is: 'My manager stimulates me to develop my talents'; Cronbach $\alpha=.90$.
- Having a *balanced work style* was measured with six-items, derived from a work style scale, developed by Feuerstein et al [46] and Feuerstein & Nicholas [34]. Items on the use of breaks, physical complaints, making high demands on one's own performance at work and on having energy after work, were assessed on five-point Likert scales (1= 'almost never' to 5='almost always'). Item examples are: 'At work, I take breaks to have a lunch', and 'At the end of a working day, I experience physical complaints that are due to my work style' (reversed); Cronbach $\alpha=.65$.
- *Organizational social capital* was assessed by the eight-item social capital scale of Kouvonen et al. [47], on five-point Likert scales (1='totally disagree' to 5='totally agree'). An item example is: 'We have a "we are together" attitude'; Cronbach $\alpha=.84$.

Vitality at work was measured with the vitality subscale of the Utrecht Work Engagement Scale, UWES [19]. This six-item scale was assessed on seven-point Likert scales (0='never'

to 6='always'). An item example is: 'At my work, I feel bursting with energy'; Cronbach $\alpha=.88$.

Effective personal functioning was assessed by using three items of the Health Performance Questionnaire [48], on five point Likert scales (1='almost never', 5='almost always'). An item example is: 'How often was the quality of your work lower than it should have been? (reversed)'; Cronbach $\alpha=.79$.

Sustainable employability was assessed with one item: 'Taken into consideration your health, do you expect that you are still able to do this work the following 5-10 years?' (1 = No, I will definitely not be able to work another 5-10 years in this work, 2 = Maybe, 3 = Yes, I certainly will be able to work another 5-10 years in this work).

Compliance on ethical procedures

In accordance with Dutch legislation, the study was checked by the Medical Ethics Committee of the VU University Medical Centre, which ruled that for this study a written informed consent was not necessary.

Statistical procedures

Multiple regression analyses were performed to investigate the associations between the identified vitality-related factors and vitality at work. For this, vitality at work was regressed onto the lifestyle factors, the basic psychological needs for self-determination, and the organizational-cultural factors. In this model, vitality at work was used as the dependent variable and lifestyle, basic psychological needs for self-determination and organizational-cultural factors were used as independent variables. Subsequently, multiple regression analyses were performed to investigate the association between the vitality-related factors, vitality at work, effective personal functioning and sustainable employability. For this, effective personal functioning and sustainable employability were regressed onto the lifestyle factors, basic psychological needs for self-determination, organizational-cultural factors, *and* on vitality at work. For all analyses, $p<.05$ was considered to be statistically significant. All analyses were adjusted for the covariates age, gender, educational level, shift work, and kind of work.

Results

Table 1 presents the characteristics of the sample.

Table 1. Characteristics of the sample (N = 629)

Characteristics	Response traits	Prevalence (%)
Age (years)	16-25	7.6
	26-35	18.9
	36-45	28.3
	46-55	33.0
	> 56	12.2
Gender	Male	78.2
	Female	21.8
Educational level	Primary	27.9
	Secondary	37.0
	Higher	35.1
Shift work	Yes	29.6
	No	70.4
Kind of work	Mainly physical	34.3
	Mainly mental	65.7

Table 2 presents the means, standard deviations, and bivariate correlations of the variables. Organizational social capital and transformational leadership were highly correlated ($r=.71$). To prevent multi collinearity, transformational leadership was excluded from further analysis.

Table 3 present the associations between lifestyle factors, basic psychological needs for self-determination, organizational-cultural factors, and vitality at work. By using this comprehensive model, about 33% of the variance in vitality could be explained (Adjusted $R^2=.33$).

Vitality at work was most strongly and positively associated with autonomy ($\beta=+.23$, $p<.05$), and with competence ($\beta=+.19$, $p<.05$). This indicates that vitality at work is most

strongly associated with these basic psychological needs for self-determination. The more positive feelings of autonomy and competence, the more vital employees were.

Regarding the lifestyle factors, physical activity ($\beta=+.18, p<.05$), and healthy dietary habits ($\beta=+.08, p<.05$) were positively associated with vitality at work. Employees with a more healthy lifestyle regarding physical activity and, to a lesser extent, healthy dietary habits were more vital.

Regarding the organizational cultural factors, having a balanced work style ($\beta=+.13, p<.05$), and organizational social capital ($\beta=+.12, p<.05$) were both positively associated with vitality at work. Employees who scored higher on these organizational-cultural aspects, were more vital. All three clusters (lifestyle factors, basic psychological needs for self-determination, and organizational-cultural factors) make a significant contribution to vitality at work (Table 3). Lifestyle factors explained about 10% of the variance in vitality at work, basic psychological needs for self-determination about 24%, and the organizational-cultural factors about 20%.

Table 2. Means, standard deviations, and Pearson correlation coefficients of the variables (N=629)

Variables	mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Physical activity (0-7 days)	3.11	1.46	1													
2. Smoking (0 'no'-1 'yes')	.23	.42	-.06	1												
3. Alcohol use (drinks/week)	6.65	7.13	+.02	+.22*	1											
4. Healthy dietary habits (0-7 days)	5.40	1.24	+.16*	-.22*	-.23*	1										
5. Relaxation (1 'low'-5 'high')	3.65	.76	+.17*	+.02	+.02	+.00	1									
6. Autonomy (1 'low'-5 'high')	3.63	.65	+.01	-.06	-.04	+.01	+.25*	1								
7. Competence (1 'low'-5 'high')	4.04	.52	+.05	+.07	-.02	-.03	+.16*	+.26*	1							
8. Relatedness (1 'low'-5 'high')	3.61	.53	+.03	+.03	+.02	+.06	+.23*	+.42*	+.31*	1						
9. Transformational leadership (1 'low'-5 'high')	3.69	.75	+.02	-.04	-.03	+.11*	+.14*	+.56*	+.10*	+.34*	1					
10. Balanced work style (1 'low'-5 'high')	4.03	.64	+.19*	+.01	+.03	+.05	+.45*	+.36*	+.18*	+.28*	+.18*	1				
11. Organizational social capital (1 'low'-5 'high')	3.68	.55	+.04	-.02	-.03	+.08	+.23*	+.51*	+.16*	+.45*	+.71*	+.30*	1			
12. Vitality at work (0 'low'-6 'high')	4.67	.91	+.24*	+.02	-.02	+.11*	+.24*	+.42*	+.33*	+.34*	+.30*	+.35*	+.37*	1		
13. Effective personal functioning (1 'low'-5 'high')	4.18	.77	+.13*	+.03	+.06	-.06	+.26*	+.24*	+.26*	+.22*	+.08*	+.41*	+.18*	+.30*	1	
14. Sustainable employability (1 'low'-3 'high')	2.76	.48	+.03	-.07	-.05	+.01	+.16*	+.33*	+.15*	+.17*	+.29*	+.23*	+.26*	+.21*	+.11*	1

* $p < .05$ (two tailed)

Table 3. Regression analyses of lifestyle factors, basic psychological needs for self-determination and organizational-cultural factors on vitality at work

		Factors	Vitality at work β (CI)	
Covariates	}	Age	+0.03 (-0.05 - +0.10)	
		Gender	+0.07 (-0.00 - +0.15)	
		Educational level	-0.08 (-0.16 - +0.01)	
		Shift Work	-0.06 (-0.14 - +0.02)	
		Kind of work	+0.01 (-0.07 - +0.09)	
	Adj.R ²			.003
Lifestyle factors	}	Physical activity	+0.18* (+0.12 - +0.25)	
		Smoking	+0.05 (-0.02 - +0.11)	
		Alcohol use	-0.03 (-0.10 - +0.04)	
		Healthy dietary habits	+0.08*(+0.01 - +0.16)	
		Relaxation	+0.01 (-0.06 - +0.08)	
	Adj. R ²			.10
Basic psychological needs for self-determination	}	Autonomy	+0.23* (+0.14 - +0.31)	
		Competence	+0.19* (+0.12 - +0.26)	
		Relatedness	+0.07 (-0.00 - +0.15)	
	Adj. R ²			.24
Organizational-cultural factors	}	Balanced work style	+0.13* (+0.05 - +0.21)	
		Organizational social capital	+0.12* (+0.04 - +0.20)	
	Adj. R ²			.20
Adj. R ²			.33	

* $p < .05$ (two tailed)

Table 4 presents the associations between lifestyle factors, basic psychological needs for self-determination, organizational-cultural factors, vitality at work, and employees' perceived effective personal functioning and sustainable employability.

Effective personal functioning was positively associated with competence ($\beta=+.13, p<.05$), and with having a balanced work style ($\beta=+.25, p<.05$). Also, a positive association between

vitality at work and effective personal functioning was found ($\beta=+.11, p<.05$). Vital employees thus reported more effective functioning.

Sustainable employability was positively associated with autonomy ($\beta=+.15, p<.05$), and with having a balanced work style ($\beta=+.12, p<.05$). Also a positive association between vitality at work and sustainable employability was found ($\beta=+.09, p<.05$).

Table 4. Regression analyses of lifestyle factors, basic psychological needs for self-determination, organizational-cultural factors, and vitality at work on effective personal functioning and sustainable employability

Factors		Effective personal functioning β (CI)	Sustainable employability β (CI)
Covariates	Age	+0.00 (-0.08 - +0.08)	-.37* (-.45 - -.29)
	Gender	-.01 (-0.09 - +0.07)	+0.01 (-.07 - +.08)
	Educational level	-.09 (-.17 - +.00)	+0.08 (-.00 - +.17)
	Shift Work	+0.09* (+.01 - +.17)	-.05 (-.13 - +.03)
	Kind of work	+0.08* (+.00 - +.17)	-.06 (-.14 - +.02)
Lifestyle factors	Physical activity	+0.03 (-.04 - +.11)	-.05 (-.12 - +.02)
	Smoking	-.03 (-.10 - +.05)	-.06 (-.13 - +.01)
	Alcohol use	+0.03 (-.04 - +.11)	-.03 (-.10 - +.05)
	Healthy dietary habits	-.06 (-.13 - +.02)	+0.02 (-.06 - +.09)
	Relaxation	+0.05 (-.03 - +.13)	+0.06 (-.02 - +.13)
Basic psychological needs for self-determination	Autonomy	+0.08 (-.02 - +.17)	+0.15* (+.07 - +.24)
	Competence	+0.13* (+.06 - +.21)	+0.06 (-.02 - +.13)
	Relatedness	+0.03 (-.06 - +.11)	-.02 (-.10 - +.06)
Organizational cultural factors	Balanced work style	+0.25* (+.17 - +.34)	+0.12* (+.04 - +.20)
	Organizational social capital	-.01 (-.09 - +.08)	+0.06 (-.02 - +.15)
	Vitality at work	+0.11*(+.03 - +.19)	+0.09* (+.01 - +.17)
Adj R ²		.25	.30

* $p < .05$ (two tailed)

Figure 2 shows all associations found. As can be seen in Figure 2, competence and having a balanced work style were both directly and indirectly, through vitality at work, associated with effective personal functioning. Likewise, autonomy and having a balanced work style were both directly and indirectly, through vitality at work, associated with sustainable employability.

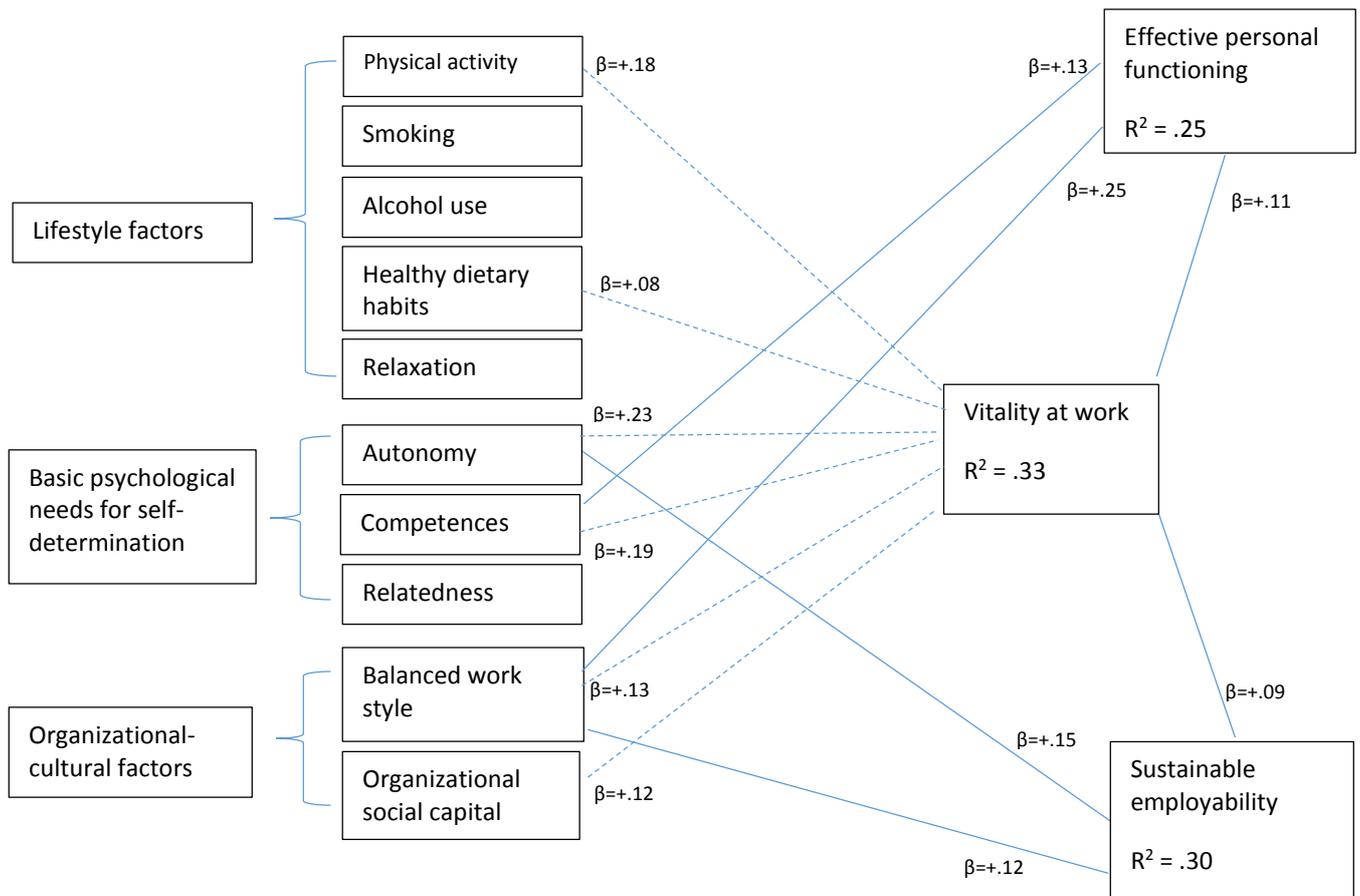


Figure 2 Significant associations found in the regression analyses.

Note: The dashed lines visualize the regression analysis on vitality at work. The solid lines visualize the regression analyses on effective personal functioning and on sustainable employability.

Discussion

This study contributes to the need for more comprehensive knowledge on how to promote vitality at work. To our knowledge, it is one of the first studies within an organizational setting, in which vitality-related factors from three scientific fields were combined. The business and societal relevance of vitality at work is confirmed in this study. Regarding the business relevance, vitality at work indeed was positively associated with effective personal functioning. This is an important finding, as business relevance appears to be crucial to encourage employers to invest in health [49]. The positive association found between vitality at work and sustainable employability is in line with the literature [1], and represents a major societal relevance. In times of ageing workforces, sustainable employability may become a decisive factor for business and societal functioning. Addressing the topic of vitality at work seems thus useful, from a health, business and societal perspective.

The results confirm the multifactorial nature of vitality at work. Vitality was significantly associated with lifestyle factors, with basic psychological needs for self-determination, and with organizational-cultural factors. The results indicate that there are different options for companies to promote vitality at work. When regarding lifestyle factors, interventions through which employees are encouraged to be physically active and eat healthy, seem relevant. Companies may offer lifestyle programs in order to encourage their employees to healthy lifestyles. Improving lifestyle behavior can also include interventions aimed at the internalization of the value of healthy lifestyle behavior. Internalizing the value of physical activity [50,51], and of a healthy diet [52] is found to encourage people to have more healthy lifestyles. Dialogue on different levels on the value of vitality is seen as a useful strategy for this.

Though all three clusters (lifestyle factors, basic psychological needs for self-determination and organizational-cultural factors) were associated with vitality at work, the results imply a particular important role for organizational culture with respect to vitality at work. In the literature, organizational culture is considered as an important supporting factor to satisfy the basic psychological needs [14,53], which were found to be most strongly associated with vitality at work. In addition, organizational-cultural aspects *as such* were found to be associated with vitality as well. Organizational culture, thus, seems a key factor for promoting vitality at work. Two commonly used methods to develop organizational culture,

participative methods [54], and dialogue methodologies [55], seem therefore relevant for interventions to promote vitality at work.

A comprehensive model on vitality was composed based on literature from three scientific fields. The identified determinants of vitality were sufficiently distinctive to be considered separately, but may in some extent overlap. For example, relatedness and social capital, though conceptually distinctive, both address interpersonal relations, and in this study were significantly correlated ($r=.45$, see Table 2). Organizational social capital was found to be associated with vitality at work, while relatedness was not. As compared to relatedness, organizational social capital is a broader concept. It reflects not only interpersonal relationships on different hierarchical levels, but also the shared value orientation within the organization. Instead, relatedness mainly concerns the perceived relationships between employees. Based on the findings, a shared value orientation and relationships on different hierarchical levels, probably better reflect the need for being connected in the organizational setting, as compared to feeling relatedness with colleagues.

Relaxation and having a balanced work style may overlap to some extent as well ($r= .45$, see Table 2). Having a balanced work style was significantly associated with vitality at work, but relaxation was not. In this study, work style reflects the current behavior as a response to work demands, and thus is seen as a cultural aspect. In contrast, relaxation in this study reflects an estimation relative to what employees themselves find sufficient. The findings indicate that actual and cultural-bound behavior, rather than an individual's experience on relaxation, is associated with vitality at work.

A remark is needed about the UWES vitality subscale used [19]. The UWES scale was particularly developed to be used in organizational settings. However, in the literature, this scale is stated to reflect mainly the *mental* component of vitality [23]. The physical component of vitality may therefore have been underestimated in this study. As most jobs nowadays carry a substantial mental load and mental resilience is needed for almost every employee, the UWES vitality subscale is still seen as a proper reflection of the kind of vitality required in today's organizations. Health promoters and organizations, however, should be aware of this operationalization of vitality at work, especially when they aim to predominantly address the *physical* component of vitality at work.

All data in this study were self-reported, so common-method variance may have contaminated the findings. By making use of validated questionnaires and scales, in which both positively and negatively worded items were used, it was attempted to avoid common-method bias [56].

The data were collected cross-sectionally. In cross-sectional studies, causality may only be inferred based on well-conceived previous studies and theories [57,58]. In the literature, the vitality-related factors of the applied model are presumed to precede vitality. The results, therefore, may provide a guidance to improve vitality at work. Longitudinal studies, however, are required to draw more definitive conclusions regarding causality. Finally, generalizability may be limited, as the data were collected from one company. Since the work-environment and organizational development may influence individual outcomes [32], further research among employees in a variety of companies is recommended to provide a better understanding of the studied relations and the influence of organizational development.

Conclusions

The study confirms the multifactorial nature of vitality at work. An organizational culture in which the basic psychological needs for self-determination are supported, employees have a balanced work style, and perceive a high degree of social capital, seem particularly useful to promote vitality at work. Additionally, a healthy lifestyle is important for vitality at work. Since vitality at work was associated with employees' perceived effective functioning and sustainable employability, the study confirms the business and societal relevance of vitality at work as well.

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