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Employee health-relevant personality traits are associated with the psychosocial work environment and leadership

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ABSTRACT

Objectives: Little is known about personality in relation to assessments of the psychosocial work environment and leadership. Therefore the objective of this study is to explore possible associations and differences in mean values between employee health-relevant personality traits and assessments of the psychosocial work environment and leadership behaviors. **Methods:** 754 survey responses from ten organizations were selected from a large-scale intervention study. The Health-relevant Personality 5 inventory was used to assess personality. Five dimensions of the psychosocial work environment were assessed with 38 items from the QPS$_{Nordic}$ and 6 items from the Developmental Leadership Questionnaire were used to assess leadership behavior. **Results:** Positive correlations were found between Hedonic capacity (facet of Extraversion) and perceptions of the psychosocial work environment and leadership behavior. Negative correlations were found for Negative affectivity (facet of Neuroticism), Antagonism (facet of Agreeableness), Impulsivity (facet of Conscientiousness) and Alexithymia (facet of Openness). There were also significant differences in mean values of all work environment indicators between levels of health-relevant personality traits. Those with higher levels of hedonic capacity had higher (better) perceptions compared to those with lower levels. Those with higher levels of negative affectivity had lower (worse) perceptions compared to those with lower levels. **Conclusions:** The findings show a clear association between employee health-relevant personality traits and assessments of the psychosocial work environment and leadership behavior. Personality can be important to take into consideration for leaders when interpreting survey results and when designing organizational interventions.

Introduction

Personality has been of interest in organizational research for decades and in recent years the interest has flourished even more [1]. Indeed, the vast research contributions within this field have provided valuable knowledge about associations between personality traits and the psychosocial work environment [1]. These findings have also raised new questions, for instance if there are associations with and differences in perceptions of the psychosocial work environment between different levels of health-related personality traits. This will be further investigated in this paper.

Personality and psychosocial work environment assessments

Within research, personality is commonly organized into five main domains or traits according to the Five Factor Model. The main traits are Extraversion (e.g. positive), Neuroticism (e.g. negative), Conscientiousness (e.g. organized), Openness (e.g. curious) and Agreeableness (e.g. sympathetic) [2,3]. Previous research has reported that personality is related to perceptions of the work environment. More specifically, the trait negative affectivity (a facet of neuroticism) has been associated with job strain and job stressors. Higher levels of negative affectivity are associated with higher levels of perceived job stressors and strain for instance [4,5]. Personality in relation to job satisfaction has also been extensively investigated in the scientific literature [6–11]. The main findings indicate that conscientiousness and extraversion are positive predictors of job satisfaction whereas neuroticism and negative affectivity are negatively related predictors. This means that individuals who are prone to be joyful, pleasant, outgoing and well-organized experience higher job satisfaction and those who are prone to be anxious and distressed tend to experience lower job satisfaction. The results of various studies are however difficult to compare as measures of job satisfaction and personality differ between studies. It has furthermore been found that personality partly influences leadership assessments [12,13]. More specifically, employees who score high in the personality traits extraversion, openness, agreeableness and conscientiousness and low in neuroticism perceive more transformational

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or charismatic leadership (i.e. leader characteristics such as being inspirational, encouraging, supporting etc.) [12,14]. A possible explanation for these findings is the theory of similarity. The theoretical assumption is that when employees perceive they share certain behaviors and traits with their leader; such as being highly extrovert and agreeable, they are more likely to perceive them as transformational leaders [15,16]. These theoretical perspectives are indeed interesting, as leadership assessments may be challenging to interpret and understand [17]. A better understanding of *why* we perceive certain leader characteristics the way we do would most likely make leadership assessments easier to interpret. In practical terms, a better understanding of the constituents for perceptions of leadership could for instance guide leadership training interventions and programs. This may, as a result, make it easier for leaders to adapt their communication and leadership styles for more optimal outcomes.

Measuring personality in psychosocial work environment assessments

The established Five Factor Model [18] has predominantly been used as a framework for personality assessments. Numerous instruments have been suggested based on this framework, such as for instance the extensive and frequently used NEO-PI-R [2] with its advantages and disadvantages. One of the advantages is the fact that it is well-used, which makes comparisons easier [1,19]. On the other hand, Cohrs et al. [20] argue that short and specific measures of personality facets are easier to interpret. They may also be applied in practical settings where lengthy inventories are not feasible. An example of a specific personality instrument that emanates from the Five Factor Model is the health-relevant personality inventory (HP5i) [21]. The HP5i aims to measure sub-traits (denoted facets) relevant to health and health behavior (described in detail in the methods section). To the best of our knowledge, no previous studies have used health-relevant personality in relation to psychosocial work environment assessments. These traits could be important variables that are associated with how a person perceives and responds to questions about the work environment and leadership. Thus, there is a clear need to further elaborate possible associations and differences between health-relevant personality traits and perceptions of psychosocial work environment and leadership. This could yield important knowledge about how to assess data from work environment surveys with more nuances and perhaps tailor interventions as a result for achieving optimal outcomes.

Psychosocial work environment

Siegrist and Marmot [22] define the psychosocial work environment as the "range of sociostructural opportunities that is available to an individual person to meet his or her needs of well-being, productivity and positive self-experience" (p. 1465). Thus, the psychosocial work environment is a broad term that covers the individual, his or her work and the surrounding social context. Inviting employees to regularly assess the work environment is common practice in organizations and even statutory in some countries, e.g. in Sweden for organizations with more than 10 employees. The purpose of these assessments is to systematically maintain and improve the physical and psychosocial work environment for employees as well as to prevent ill-health, hazards and risks at work. Ultimately, a healthy and sustainable work environment could increase the chances of optimizing productivity, performance, health, well-being and much more [23]. The aspects that are included in regular work environment assessments may vary depending on the nature of the organization. Generally, both the physical and psychosocial work environment are assessed, but the emphasis on physical or psychosocial aspects varies depending on the type of workplace being assessed [24]. The outcomes of these employee assessments should serve as a basis for continuous workplace improvement efforts [15,24].

General indicators of the psychosocial work environment

The psychosocial work environment involves a broad range of characteristics within psychological and social dimensions in relation to work, health and ill-health [25,26]. One of the most influential theories of the psychosocial work environment in relation to health is the demand-control-support model [23,27]. Emanating from this and other models, such as the effort-reward imbalance model [28], etc., several important characteristics for achieving a healthy psychosocial work environment have been identified and tested in the literature. A review finds that the most common indicators of the psychosocial work environment are leadership, cooperation and teamwork, autonomy, influence, role clarity, recognition and manageable workload [29]. However, there is neither a gold standard nor consensus as to which variables to assess when studying the psychosocial work environment. Rather, the focus of an intervention or prevalence of problems can influence what aspects are assessed. Leadership is an area within the psychosocial work environment that has received plenty of attention. It is safe to say that there is an association between leadership, employee health, ill-health and perceived psychosocial work environment [30–38]. It makes sense that employee assessments of leadership behavior are important for the continuous efforts to maintain or improve the psychosocial work environment. However, the varying theories, definitions and measures of leadership make it difficult to draw any general conclusions about possible explanations for these assessments. Therefore, a better understanding of the constituents for assessments of the psychosocial work environment and leadership aspects is important.

Aim

This study aims to explore if there are associations between health-relevant personality traits and employees' perceptions of the psychosocial work environment and leadership behaviors. We will also investigate if individuals with high, medium or low levels of certain personality traits differ in perceptions of the psychosocial work environment and leadership behaviors.

Materials and methods

This study is based on a two-year workplace intervention conducted in 2011–2013. Briefly described, employees in ten small (up to 50 employees), medium (51–100 employees) and large (101–900 employees) white-collar organizations in Stockholm, Sweden participated in an intervention with a web-based tool for health promotion, stress management and work environment improvement. The organizations represented both private and public sectors within industries such as media, telecom, pharmaceuticals, medical and IT research, financial auditing and government agencies. The intervention design and its components are described in detail elsewhere, for instance in [66].

Data collection

Web-based questionnaires with 150–200 items were distributed at the intervention baseline and followed-up at varying frequencies decided by the work groups or organizations. For the aim of the present study, only baseline data will be used in the analyses. The reasons for selecting baseline measures are twofold. Firstly, variability in time lag between the questionnaire distributions between different groups would require a substantially more advanced investigation, which is out of the scope of

this paper. To date, there is little knowledge about appropriate time lags in longitudinal organizational studies [39]. This aspect should thus be investigated in a separate future study. Secondly, the majority of the participating organizations conducted several organizational changes during the two-year study period. The most common changes were related to the organizational structure with work groups being merged or separated. Furthermore, staff and leadership turnover were frequent during the course of the study. Due to the participatory nature of the intervention, the main responsibility for registering turnover was given to the Human Resource (HR) department at each organization and not by the researchers. Unfortunately, we cannot guarantee the extent to which this was done properly and accurately. Therefore, for now data are analyzed cross-sectionally as a first step. Participation in the intervention was voluntary and all study participants provided their informed consent.

Participants

The flow of participants is described in Figure 1. The participants in larger organizations were recruited per work group or department and in smaller organizations all employees entered the intervention at the same point in time. In total, 2,519 individuals were invited to participate in the study, of which 1,693 enrolled. Of these, 1,284 individuals (76%) provided their written consent that their data could be used for research purposes. 409 individuals (24%) agreed to participate in the intervention but did not consent to their data being used for research purposes. Thus, our cohort, that both enrolled in the intervention and agreed for their data to be analyzed for research purposes, consisted of 1,284 individuals. This was a participatory intervention in the sense that the work groups/organizations were able to tailor some
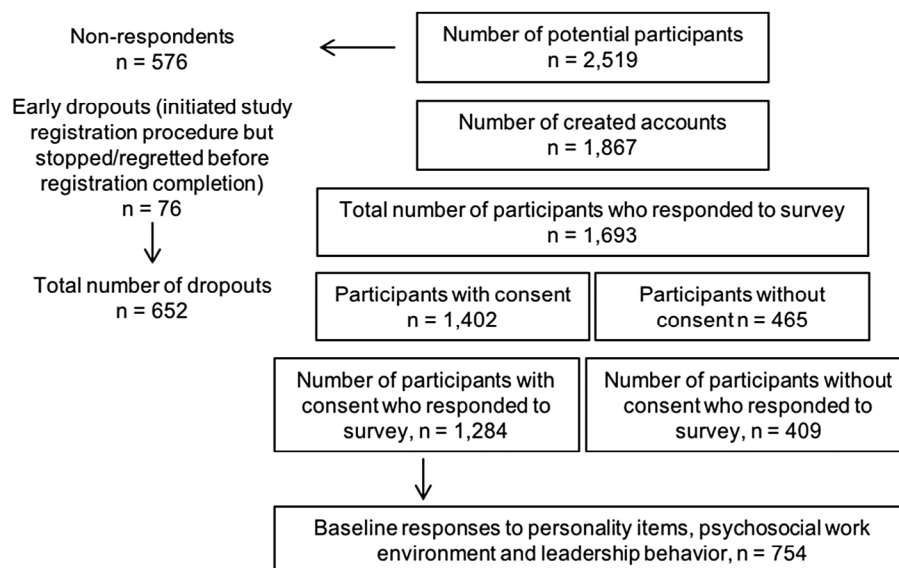

Figure 1. Flow of participants. Participants without consent refers to those who chose to participate in the intervention but declared that their data was not to be used for research purposes.

of the content in the questionnaire, meaning removing some questions (for instance about lifestyle, coping or personality). They were also able to add specific questions that were of interest to their work group or organization, for instance internal processes and work culture. Therefore, not all items of interest for the present study were included in all questionnaires. This did not impact the present study, other than a reduced study sample due to a few workgroups requesting to remove the section about health-relevant personality traits (described below). Thus, the inclusion criteria for this study were that:

(1) This was the employees' first response (baseline) to the questionnaire. This means that the organization or department might have responded to previous surveys, but for the individual, this was the first.

(2) All items of interest were included in the survey (see below).

In total, 754 participants (about 58% of the total population) met these inclusion criteria and constituted the final sample. These 754 individuals were included in the analyses.

Measures

Health-relevant personality

Personality was assessed using the 20-item HP5i [21]. This short inventory emanates from The Five Factor Model [18] and assesses facets or sub-traits relevant to health and health behavior. The HP5i was chosen because it was specifically developed for epidemiological, or large-scale intervention studies within the field of health science [21]. The scale has been previously used with satisfactory psychometric properties [40–42]. The five facets in HP5i will be briefly described in the following section. *Hedonic capacity* is a facet of extraversion and assesses the extent to which an individual is prone to enjoy life, be enthusiastic and engage in goal-oriented behavior. *Negative affectivity* is a facet of neuroticism and assesses the extent to which an individual is tense, stressed and prone to be nervous. The third facet; *antagonism*, is a facet of agreeableness and intends to capture the extent to which an individual is argumentative, sarcastic and oppositional. *Impulsivity* as a facet of conscientiousness assesses the extent to which an individual has a tendency to act on the spur of the moment and make rapid choices. Finally, *alexithymia* is a facet of openness and assesses the extent to which an individual is disinterested in identifying and understanding feelings and emotions. Responses on all items were given on a 4-point Likert scale with the alternatives "Applies completely," "Applies pretty much," "Does not apply very well" and "Does not apply at all." The following Cronbach alpha coefficients were obtained; Hedonic capacity: 0.70, Negative affectivity: 0.60, Impulsivity: 0.80, Antagonism: 0.68, Alexithymia: 0.66.

Leadership behavior

Leadership behavior was assessed with six items derived from the Developmental Leadership Questionnaire (DLQ) [43]. The questionnaire was originally designed as a modification of the transformational leadership model by Bass and colleagues [44,45] and the six items selected for the present study were used as indicators of leadership behavior and not specifically transformational leadership as the complete DLQ aims to assess. The items used to create a short leadership scale were: "Does your immediate superior act in accordance with their expressed views?" "Does your immediate superior take responsibility for the organization – even in adversity?" "Does your immediate superior give you constructive feedback?" "Does your immediate superior handle difficult employees?" "Does your immediate superior encourage you to develop your abilities?" "Does your immediate superior deal with ambiguous situations in a good way?" Responses were given on a verbal rating scale (VRS) with 5 descriptors; "Never," "Rarely," "Sometimes," "Quite often" and "Always." A mean value-based index was created based on the six items and throughout this paper we will refer to this index as leadership behavior. Cronbach alpha was 0.90.

Psychosocial work environment

A modified, short version of the QPS$_{Nordic}$ (Questionnaire of Psychological and Social Factors at Work) [46] was used to assess five selected dimensions of the psychosocial work environment; managerial support, positive challenge at work, work demands, control and job clarity. The QPS$_{Nordic}$ originally contains 118 work-related items representing nine dimensions of the psychosocial work environment and 1–3 items from five of the dimensions were selected for the purpose of the intervention study. The rationale for not including all 118 original items was that the questionnaire would have been too lengthy and taken too long for the respondents to fill out. The modified version of the QPS$_{Nordic}$ with only selected items has been previously tested and evaluated [47]. Examples of a question from each dimension are as follows: *Managerial support*; "Does your immediate superior help and support you with your work?" *Positive challenge at work*; "Do you feel that your work is meaningful?" *Work demands*; "Do you have too much to do?" *Control;* "Can you influence decisions that are important to your work?" *Job clarity;* "Do you know exactly what is required of you at work?" The responses were given on two sets of scales for each question, and were thus treated as two separate scales in the analyses. Scale A, referred to as the frequency dimension, was a 5-point Likert scale with the response alternatives: "Very seldom/never," "Quite rarely," "Neither rarely nor often," "Quite often," "Very often/always." Scale B, referred to as the satisfaction dimension, was accompanied with the clarifying header "How satisfied or dissatisfied are you with that?" to indicate

that participants were to respond to Scale A (frequency) and Scale B (satisfaction) for each item. Scale B was also a 5-point Likert scale but with the response alternatives: "Very dissatisfied," "Quite dissatisfied," "Neither satisfied nor dissatisfied," "Quite satisfied," "Very satisfied." Thus, the 19 selected items were treated as 38 items due to the two sets of response alternatives (see Figure 2). Using the satisfaction dimension has previously shown to add information regarding the actual experience of work demands, and has the strongest link with employee well-being compared to the frequency dimension [48]. The rationale for using both sets of response alternatives is that they complete each other and simplifies interpretation. When the respondents value the results by stating satisfaction level, the risk for erroneous preconceptions is decreased. Thus, it is easier for the manager to lead a fact-based dialog with subordinates instead of emanating from biased assumptions. Also, these two aspects of the same phenomenon, i.e. frequency and satisfaction, may be related to personality in different ways. Cronbach alpha coefficients for the frequency dimensions ranged between 0.67–0.87 and between 0.74–0.88 for the satisfaction dimensions. The managerial support scale and leadership behavior are similar in the sense that they both aim to measure leadership behaviors. However, these measures differ in response alternatives and will be treated separately from each other in this study. Since the managerial support scale is part of the other work environment indicators in the QPS$_{Nordic}$ it will be kept as such in this study as well.

Ethical considerations

The ethical committee in Stockholm, Sweden approved the study in full (Protocol number 2010/1961-31/5).

Data analysis

Frequency distributions were performed on all variables of interest to visually inspect for normal distribution. Some, but not all variables were normally distributed which led us to continue with both parametric and non-parametric testing (described below). Indices were calculated after running Principal component factor analyses with Varimax rotations. The principal component method was used in this case since no strict assumption of normality is demanded to explore and estimate the factors [49]. Firstly, the five health-relevant personality facets were computed as has been done previously, i.e. based on mean value indices [21]. Secondly, mean value indices for the psychosocial work environment items were calculated as has been done previously [50]. Thirdly, a mean value index was created based on the six items from the DLQ. Pearson and Spearman's correlations were performed to investigate possible associations. One-way ANOVAs and Kruskall–Wallis tests were performed in order to assess possible differences in mean values of the psychosocial work environment indicators, leadership behavior and between levels of health-relevant personality traits (low, medium, high). The levels (low, medium, high) were obtained by trichotomization-based quartiles or near quartiles as has been done previously [21]. Analyses were performed using IBM SPSS Statistics version 23 and the level of statistical significance was set to 0.05. Analyses were performed for all (crude) and divided by sex.

Results

Table 1 presents the demographic characteristics of the study participants. There were slightly more women (56%) than men (44%) in the total sample. The age span

Figure 2. Example of how the responses were given on the frequency dimension (left side) and satisfaction dimension (right side).

Table 1. Demographic characteristics of the entire study population: sex marital status and level of education (n = 1283 – 1284).

		n	%
Sex	Men	562	44
	Women	722	56
Marital status	Married/in a relationship	1011	79
	Single	272	21
Highest education level	Elementary school	42	3
	Senior high school	464	36
	Academic degree (BA/MA)	679	53
	Higher academic degree (PhD)	99	8

varied from 20 years to 81 years and the mean age was 44 years (±10 SD). The selected sample for this study did not differ from the total sample regarding demographics.

Correlations between health-relevant personality, psychosocial work environment and leadership behavior

There were no major differences between the parametric and non-parametric correlations so Person's correlation coefficients will be presented here. The results demonstrated significant moderate to weak associations between all personality traits and dimensions of the psychosocial work environment as well as leadership behavior. These results will be described in more detail below and are depicted in Table 2.

Hedonic capacity

There were moderate and weak positive correlations between hedonic capacity and all dimensions of the psychosocial work environment and leadership behavior (Table 2). In other words, higher levels of hedonic capacity were associated with higher (i.e. better) ratings of managerial support, positive challenge at work, work demands, control, job clarity, and leadership behavior (r range = 0.13–0.35, $p < 0.01$). The strongest correlations were found for both dimensions of positive challenges at work (i.e. frequency; $r = 0.349$, $p < 0.01$ and satisfaction; $r = 0.337$, $p < 0.01$). Thus, higher levels of hedonic capacity were correlated with both higher frequency of and satisfaction with positive challenges at work. When analyzing women and men separately, the same patterns were found for women (r range = 0.10–0.28, $p < 0.05$). The strongest correlation for women was found for the satisfaction dimension of positive challenges at work ($r = 0.28$, $p < 0.05$). For men (r range = 0.13–0.48, $p < 0.05$) the strongest correlation was found for the frequency dimension of positive challenges at work ($r = 0.48$, $p < 0.01$).

Negative affectivity

Weak negative correlations (r range = −0.12 to −0.25, $p < 0.01$) were found between most dimensions of the psychosocial work environment, leadership behavior and negative affectivity (i.e. all dimensions except frequency

of job demands). This implies that higher levels of negative affectivity were associated with lower (worse) ratings of psychosocial work environment aspects and leadership behavior. In general, there were no sex-related differences even if there were a few exceptions (see Table 2).

Antagonism

Antagonism was negatively associated with all dimensions of the psychosocial work environment except for the frequency of work demands and control as well as leadership behavior (r range = −0.09 to −0.15, $p < 0.01$). Thus, higher levels of this trait were associated with lower (worse) perceptions of these aspects. Similar patterns were found when women were analyzed separately. For men, a slightly different pattern appeared. There were weak negative correlations between both dimensions of positive challenges at work, control and the satisfaction dimension of demands and job clarity.

Impulsivity

The trait impulsivity was negatively correlated with positive challenges at work (frequency dimension: $r = −0.08$, $p < 0.05$; satisfaction dimension: $r = −0.10$ $p < 0.01$), clarity (frequency dimension: $r = −0.11$, $p < 0.01$; satisfaction dimension: $r = −0.09$ $p < 0.05$) and with leadership behavior ($r = −0.08$, $p < 0.05$). This implies that higher levels of impulsivity were associated with lower (worse) perceptions of the psychosocial work environment and leadership behavior. Analyzing women and men separately revealed that for women, only the frequency dimension of clarity was negatively associated with impulsivity ($r = −0.10$, $p < 0.05$). For men, the frequency dimensions of positive challenges at work ($r = −0.16$, $p < 0.01$) and clarity ($r = −0.12$, $p < 0.05$) were negatively associated with impulsivity.

Alexithymia

The trait alexithymia was negatively associated with the psychosocial work environment. More specifically, both dimensions of positive challenges at work (frequency dimension: $r = −0.14$, $p < 0.01$; satisfaction dimension: $r = −0.13$ $p < 0.01$) and the frequency dimension of work demands ($r = −0.08$, $p < 0.05$) correlated negatively with alexithymia. Thus, higher levels of alexithymia were associated with worse psychosocial work environment perceptions. In the sex-separated analyses, there were no significant associations for women. For men, negative correlations were found between alexithymia and positive challenges at work (frequency dimension: $r = −0.20$, $p < 0.01$; satisfaction dimension: $r = −0.22$ $p < 0.01$), clarity (frequency dimension: $r = −0.20$, $p < 0.01$; satisfaction dimension: $r = −0.14$ $p < 0.05$) and the satisfaction dimension of work demands ($r = −0.16$, $p < 0.01$).

To sum up, all health-relevant personality traits were associated with perceptions of the psychosocial work environment and leadership behavior to various extents. Higher levels of hedonic capacity were associated with

Table 2. Person correlations between personality, psychosocial work environment indicators (i.e. managerial support, positive challenge at work, work demands, control, and job clarity) and leadership behavior.

	Managerial support		Positive challenges		Work demands		Control		Job clarity		Leadership behavior
	Frequency	Satisfaction	Frequency	Satisfaction	Frequency	Satisfaction	Frequency	Satisfaction	Frequency	Satisfaction	
Hedonic capacity (Crude/all)	.157**	.149**	.349**	.337**	.155**	.245**	.182**	.229**	.200**	.233**	.134**
Women	.176***	.158***	.250***	.282***	.105*	.268***	.210***	.234***	.164***	.186***	.159***
Men	.144*	.191***	.484***	.427***	.243***	.257***	.183***	.250***	.258***	.338***	.129*
Negative affectivity (Crude/all)	−.139***	−.178***	−.122**	−.161**	.029	−.196***	−.123***	−.178***	−.230***	−.245***	−.128**
Women	−.143***	−.161***	−.09	−.137**	.076	−.177**	−.064	−.162**	−.225***	−.235***	−.118*
Men	−.136*	−.168**	−.216***	−.219***	−.073	−.205***	−.192***	−.200***	−.263***	−.256***	−.125*
Antagonism (Crude/all)	−.099**	−.104**	−.129***	−.120**	.04	−.094**	−.071	−.127**	−.146**	−.147**	−.132**
Women	−.113*	−.141**	−.091	−.099*	.058	−.096*	−.028	−.124**	−.177**	−.173**	−.182**
Men	−.091	−.100	−.164***	−.148***	.022	−.125*	−.166***	−.150**	−.106	−.136*	−.093
Impulsivity (Crude/all)	−.018	−.052	−.078*	−.096**	.024	−.036	.008	−.024	−.108***	−.090*	−.132***
Women	.012	−.008	−.041	−.092	.002	−.04	.081	.029	−.102*	−.076	−.060
Men	−.063	−.096	−.159***	−.109	.060	−.010	−.088	−.099	−.123*	−.100	−.089
Alexithymia (Crude/all)	−.049	−.025	−.143***	−.131***	−.081*	−.063	−.016	−.049	−.070	−.043	−.012
Women	−.072	−.044	−.087	−.061	−.075	−.023	−.033	−.030	.028	.003	−.047
Men	−.030	−.054	−.196***	−.223***	−.090	−.155**	−.031	−.095	−.198***	−.135*	.004

Note: Bold indicates significant correlation coefficients. $n = 747 – 754$ (women $n = 421 – 432$, men $n = 316 – 322$).
*$p < 0.05$; **$p < 0.01$ level (2-tailed).

higher (better) perceptions of the psychosocial work environment and leadership behavior. Higher levels of negative affectivity, antagonism, impulsivity and alexithymia, respectively, were associated with lower (worse) perceptions of the psychosocial work environment and leadership behavior (Table 2).

Differences in mean psychosocial work environment and leadership ratings between high, medium and low levels of a personality trait

Both parametric and non-parametric tests showed the same patterns, so the results from the ANOVAs will be presented here. There were statistically significant differences in mean values of the psychosocial work environment items and leadership behavior for different levels of personality traits (Table 3.). These will be described more thoroughly below.

Hedonic capacity

There were significant differences in mean values for all indicators of the psychosocial work environment as well as leadership behavior. Bonferroni *post hoc* tests clarified that the differences were between those with high, medium and low levels of hedonic capacity for most items. This implies that those with high levels of hedonic capacity had higher (better) perceptions (i.e. mean values) of the psychosocial work environment indicators and leadership behavior compared to those with medium or low levels of the trait. Similar patterns were found when analyzing women and men separately.

Negative affectivity

There were significant differences in mean values for all indicators except for the frequency dimension of work demands. The *post hoc* tests revealed that the differences were between those with high, medium and low levels of negative affectivity for most items. Thus, those with high levels of negative affectivity perceived worse managerial support, positive challenges at work, control, job clarity and leadership behavior compared to those with medium or low levels of that trait. Analyzing women and men separately revealed similar patterns.

Antagonism

Significant differences in mean values were found between levels of antagonism and all tested items except for the frequency dimension of control and both dimensions of work demands. The differences were found between those with high/low or high/medium levels of antagonism, implying that those with high levels of antagonism perceived the psychosocial work environment and leadership behavior as being worse compared to those with medium or low levels of antagonism. The sex separated analyses showed different patterns for men and women. For women, there were significant differences in both dimensions of job clarity, the satisfaction dimension of both managerial support and control as well as leadership behavior. All differences were between those with low/high levels of antagonism. For men, there was a significant difference in the frequency dimension of control between those with low/high levels of antagonism.

Impulsivity

There were significant differences in mean values between different levels of impulsivity and all indicators of the psychosocial work environment except for the frequency dimensions of managerial support, work demands and control. Separate analyses for women showed significant differences for both dimensions of control, the satisfaction dimensions of work demands and job clarity as well as leadership behavior. All differences were between those with low/medium except for the satisfaction dimension of control where the differences were found between medium/high levels of impulsivity. For men, there was a significant difference for both dimensions of positive challenges at work between those with low/medium levels of impulsivity. The same differences were also found for the satisfaction dimensions of work demands and job clarity.

Alexithymia

There were significant differences in mean values between levels of this trait and positive challenges at work (both dimensions) as well as the frequency dimension of managerial support. These results imply that those with lower levels of alexithymia perceived better positive challenges at work and managerial support compared to those with higher levels of this trait. When analyzing women separately, no significant differences in mean values were found. For men, there were significant differences in mean values for both dimensions of positive challenges at work, the frequency dimension of job clarity as well as for the satisfaction dimension of work demands. The differences were found between those with low/high levels. For work demands, the differences were between those with low/high and medium/high levels of alexithymia.

Discussion

The aim of the present study was to investigate possible associations between employee health-relevant personality and perceptions of the psychosocial work environment and leadership behaviors. The results demonstrated significant correlations for all tested personality aspects. Whereas positive correlations were found for hedonic capacity, negative correlations were found for negative affectivity, antagonism, impulsivity, and alexithymia. Furthermore, there were statistically significant differences in mean values, i.e. absolute levels, of the psychosocial work environment and leadership behavior between different levels of personality traits. The results clearly indicate that these personality traits are associated with perceptions of the work environment and leadership behavior. These findings are important for

Table 3. One-way ANOVA (crude) for personality traits with mean ratings (±SE) and Bonferroni *post hoc* test where bold indicates significant differences between low, medium, high levels of each trait. Df = 2 for all variables. All psychosocial work environment items are coded from 1 to 5, leadership behavior coded 0–4, *n* = 737 – 754.

	Psychosocial work environment dimensions	*F*	*p*-value	Hedonic capacity		Post hoc tests (Bonferroni)
				Mean rating (±SE)		
Managerial support	Frequency	**7.286**	**0.001**	Low	3.20 (0.08)	Low – Medium
				Medium	3.38 (0.05)	**Low–High**
				High	3.57 (0.06)	**Medium–High**
	Satisfaction	**6.661**	**0.001**	Low	3.44 (0.08)	**Low–Medium**
				Medium	3.69 (0.05)	**Low–High**
				High	3.81 (0.06)	Medium–High
Positive challenges at work	Frequency	**46.725**	**0.000**	Low	3.86 (0.06)	**Low–Medium**
				Medium	4.21 (0.03)	**Low–High**
				High	4.48 (0.04)	**Medium–High**
	Satisfaction	**42.607**	**0.000**	Low	3.77 (0.07)	**Low–Medium**
				Medium	4.22 (0.04)	**Low–High**
				High	4.49 (0.04)	**Medium–High**
Work demands	Frequency	**9.272**	**0.000**	Low	3.39 (0.07)	**Low–Medium**
				Medium	3.57 (0.03)	**Low–High**
				High	3.70 (0.04)	Medium–High
	Satisfaction	**23.576**	**0.000**	Low	3.33 (0.06)	**Low–Medium**
				Medium	3.60 (0.04)	**Low–High**
				High	3.82 (0.04)	**Medium–High**
Control	Frequency	**13.753**	**0.000**	Low	3.55 (0.05)	Low–Medium
				Medium	3.68 (0.03)	**Low–High**
				High	3.87 (0.04)	**Medium–High**
	Satisfaction	**20.436**	**0.000**	Low	3.65 (0.06)	**Low–Medium**
				Medium	3.87 (0.04)	**Low–High**
				High	4.09 (0.04)	**Medium–High**
Job Clarity	Frequency	**11.09**	**0.000**	Low	3.72 (0.08)	**Low–Medium**
				Medium	3.94 (0.04)	**Low–High**
				High	4.14 (0.05)	**Medium–High**
	Satisfaction	**15.372**	**0.000**	Low	3.52 (0.08)	**Low–Medium**
				Medium	3.76 (0.05)	**Low–High**
				High	4.03 (0.06)	**Medium–High**
Leadership behavior	Frequency	**5.061**	**0.007**	Low	2.53 (0.08)	Low–Medium
				Medium	2.65 (0.05)	**Low–High**
				High	2.83 (0.06)	Medium–High
	Psychosocial work environment dimensions	*F*	*p*-value	Negative affectivity		
				Mean rating (±SE)		
Managerial support	Frequency	**6.585**	**0.001**	Low	3.57 (0.07)	Low–Medium
				Medium	3.45 (0.05)	**Low–High**
				High	3.24 (0.07)	**Medium–High**
	Satisfaction	**9.485**	**0.000**	Low	3.91 (0.07)	Low–Medium
				Medium	3.71 (0.05)	**Low–High**
				High	3.49 (0.07)	**Medium–High**
Positive challenges at work	Frequency	**7.586**	**0.001**	Low	4.41 (0.04)	**Low–Medium**
				Medium	4.23 (0.04)	**Low–High**
				High	4.15 (0.05)	Medium–High
	Satisfaction	**11.16**	**0.000**	Low	4.47 (0.05)	**Low–Medium**
				Medium	4.21 (0.04)	**Low–High**
				High	4.11 (0.06)	Medium–High
Work demands	Frequency	0.118	ns	Low	3.58 (0.05)	Low–Medium
				Medium	3.58 (0.04)	Low–High
				High	3.61 (0.05)	Medium–High
	Satisfaction	**15.821**	**0.000**	Low	3.85 (0.05)	**Low–Medium**
				Medium	3.64 (0.03)	**Low–High**
				High	3.45 (0.05)	**Medium–High**
Control	Frequency	**7.701**	**0.000**	Low	3.87 (0.05)	**Low–Medium**
				Medium	3.71 (0.03)	**Low–High**
				High	3.63 (0.05)	Medium–High
	Satisfaction	**13.518**	**0.000**	Low	4.13 (0.07)	**Low–Medium**
				Medium	3.83 (0.05)	**Low–High**
				High	3.54 (0.07)	Medium–High
Job Clarity	Frequency	**16.347**	**0.000**	Low	4.23 (0.06)	**Low–Medium**
				Medium	3.99 (0.04)	**Low–High**
				High	3.74 (0.07)	**High–Medium**
	Satisfaction	**20.648**	**0.000**	Low	4.13 (0.07)	**Low–Medium**
				Medium	3.83 (0.05)	**Low–High**
				High	3.54 (0.07)	**Medium–High**
Leadership behavior	Frequency	**5.27**	**0.005**	Low	2.85 (0.07)	Low–Medium
				Medium	2.71 (0.05)	**Low–High**
				High	2.54 (0.07)	Medium–High

(*Continued*)

Table 3. (*Continued*).

	Psychosocial work environ-ment dimensions	F	p-value	Antagonism Mean rating (±SE)		
Managerial support	Frequency	**3.895**	**0.021**	Low	3.53 (0.07)	Low–Medium
				Medium	3.43 (0.05)	**Low–High**
				High	3.26 (0.07)	Medium–High
	Satisfaction	**4.713**	**0.009**	Low	3.81 (0.07)	Low–Medium
				Medium	3.71 (0.05)	**Low–High**
				High	3.52 (0.07)	Medium–High
Positive challenges at work	Frequency	**8.992**	**0.000**	Low	4.32 (0.06)	Low–Medium
				Medium	4.29 (0.03)	**Low–High**
				High	4.07 (0.05)	**Medium–High**
	Satisfaction	**8.263**	**0.000**	Low	4.30 (0.06)	Low–Medium
				Medium	4.30 (0.04)	**Low–High**
				High	4.04 (0.06)	**Medium–High**
Work demands	Frequency	2.106	ns	Low	3.51 (0.05)	Low–Medium
				Medium	3.63 (0.03)	Low–High
				High	3.59 (0.05)	Medium–High
	Satisfaction	2.784	ns	Low	3.71 (0.05)	Low–Medium
				Medium	3.63 (0.04)	Low–High
				High	3.54 (0.05)	Medium–High
Control	Frequency	2.714	ns	Low	3.75 (0.05)	Low–Medium
				Medium	3.75 (0.03)	Low–High
				High	3.63 (0.05)	Medium–High
	Satisfaction	**5.488**	**0.004**	Low	3.99 (0.05)	Low–Medium
				Medium	3.93 (0.03)	**Low–High**
				High	3.77 (0.05)	**Medium–High**
Job Clarity	Frequency	**5.457**	**0.004**	Low	4.11 (0.06)	Low–Medium
				Medium	3.97 (0.04)	**Low–High**
				High	3.82 (0.07)	Medium–High
	Satisfaction	**6.309**	**0.002**	Low	3.95 (0.06)	Low–Medium
				Medium	3.83 (0.05)	**Low–High**
				High	3.63 (0.07)	**Medium–High**
Leadership behavior	Frequency	**6.582**	**0.001**	Low	2.84 (0.07)	Low–Medium
				Medium	2.71 (0.05)	**Low–High**
				High	2.49 (0.07)	**Medium–High**
	Psychosocial work environ-ment dimensions	F	p-value	Impulsivity Mean rating (±SE)		
Managerial support	Frequency	1.778	ns	Low	3.52 (0.06)	Low–Medium
				Medium	3.36 (0.05)	Low–High
				High	3.42 (0.07)	Medium–High
	Satisfaction	**5.14**	**0.006**	Low	3.87 (0.06)	**Low–Medium**
				Medium	3.59 (0.05)	Low - High
				High	3.70 (0.07)	Medium–High
Positive challenges at work	Frequency	**4.596**	**0.010**	Low	4.37 (0.05)	**Low–Medium**
				Medium	4.20 (0.03)	**Low–High**
				High	4.21 (0.05)	Medium–High
	Satisfaction	**7.123**	**0.001**	Low	4.42 (0.06)	**Low–Medium**
				Medium	4.16 (0.04)	**Low–High**
				High	4.20 (0.06)	Medium–High
Work demands	Frequency	**3.215**	**0.041**	Low	3.51 (0.05)	Low–Medium
				Medium	3.65 (0.03)	Low–High
				High	3.54 (0.05)	Medium–High
	Satisfaction	**7.249**	**0.001**	Low	3.76 (0.05)	**Low–Medium**
				Medium	3.53 (0.04)	Low–High
				High	3.69 (0.05)	**Medium–High**
Control	Frequency	1.343	ns	Low	3.74 (0.05)	**Low–Medium**
				Medium	3.69 (0.03)	**Low–High**
				High	3.77 (0.04)	Medium – High
	Satisfaction	**4.884**	**0.008**	Low	4.01 (0.05)	**Low–Medium**
				Medium	3.83 (0.03)	Low–High
				High	3.95 (0.05)	Medium–High
Job Clarity	Frequency	**6.92**	**0.001**	Low	4.17 (0.05)	Low–Medium
				Medium	3.89 (0.05)	Low–High
				High	3.95 (0.06)	Medium–High
	Satisfaction	**7.812**	**0.000**	Low	4.02 (0.06)	**Low–Medium**
				Medium	3.70 (0.05)	Low - High
				High	3.82 (0.07)	Medium–High
Leadership behavior	Frequency	**4.812**	**0.008**	Low	2.88 (0.06)	**Low–Medium**
				Medium	2.62 (0.05)	**Low–High**
				High	2.64 (0.07)	Medium–High
	Psychosocial work environ-ment dimensions	F	p-value	Alexithymia Mean rating (±SE)		
Managerial support	Frequency	**3.336**	**0.036**	Low	3.60 (0.08)	**Low–Medium**
				Medium	3.37 (0.05)	Low–High
				High	3.37 (0.06)	Medium–High
	Satisfaction	0.679	ns	Low	3.78 (0.08)	Low–Medium
				Medium	3.67 (0.05)	Low–High
				High	3.67 (0.06)	Medium–High

(*Continued*)

	Psychosocial work environment dimensions	F	p-value	Antagonism Mean rating (±SE)		
Positive challenges at work	Frequency	**6.698**	**0.001**	Low	4.38 (0.06)	Low–Medium
				Medium	4.26 (0.03)	**Low–High**
				High	4.13 (0.04)	**Medium–High**
	Satisfaction	**5.89**	**0.003**	Low	4.38 (0.07)	Low–Medium
				Medium	4.26 (0.04)	**Low–High**
				High	4.11 (0.05)	Medium–High
Work demands	Frequency	**3.247**	**0.039**	Low	3.67 (0.06)	Low–Medium
				Medium	3.61 (0.03)	Low–High
				High	3.50 (0.04)	Medium–High
	Satisfaction	2.455	ns	Low	3.68 (0.06)	Low–Medium
				Medium	3.66 (0.04)	Low–High
				High	3.54 (0.05)	Medium–High
Control	Frequency	0.484	ns	Low	3.76 (0.06)	Low–Medium
				Medium	3.73 (0.03)	Low–High
				High	3.70 (0.04)	Medium–High
	Satisfaction	1.275	ns	Low	3.97 (0.06)	Low–Medium
				Medium	3.92 (0.03)	Low–High
				High	3.85 (0.04)	Medium–High
Job Clarity	Frequency	1.631	ns	Low	4.06 (0.08)	Low–Medium
				Medium	3.99 (0.04)	Low–High
				High	3.90 (0.05)	Medium–High
	Satisfaction	0.735	ns	Low	3.87 (0.09)	Low–Medium
				Medium	3.83 (0.05)	Low–High
				High	3.75 (0.06)	Medium–High
Leadership behavior	Frequency	1.073	ns	Low	2.79 (0.08)	Low–Medium
				Medium	2.65 (0.05)	Low–High
				High	2.70 (0.06)	Medium–High

better understanding the responses to work environment questionnaires. If the perceptions are partially influenced by personality traits, this may require different ways of interpreting the results and intervening upon them.

Present findings in relation to previous research

As this study is, to our knowledge, the first to explicitly examine health-relevant personality traits in relation to psychosocial work environment and leadership behavior, no direct comparisons can be made with previous research. However, the pattern in our findings is in line with previous studies regarding employee personality and perceived leadership and job satisfaction [6,7,9–13,15,51]. Our findings concur with earlier findings that employees who tend to be more positive, joyful, and pleasant rate their leaders as better and are more satisfied with their jobs compared to those who score lower on those dispositions. Furthermore, employees who tend to be more negative, easily distressed, and anxious tend to rate their leader as worse and are less satisfied with aspects in the work environment compared to those who score lower on those dispositions. The degree to which personality explains how we perceive and rate leadership and aspects in the psychosocial work environment has also been brought up elsewhere. For instance, previous research within the field of job stress found that personality only partly (2 to 5%) accounts for the variability in ratings [5]. In a similar analysis, Connolly and Viswesvaran [6] found that that 10–15% of the variation in job satisfaction could be explained by differences in personality. Thus, personality seems to explain a certain proportion of the variation in responses about work environment factors.

Our findings raise reflections both in theoretical and practical terms. As leaders are faced with results from employee assessments, they will need to understand and interpret them in order to apply appropriate actions upon them (if needed). By taking personality into consideration, the likelihood of depicting a more complete picture when interpreting these assessments may increase. For instance, if leaders are aware that personality influences the responses in these assessments, they may be better prepared to handle and evaluate them [15]. Thus, if the workgroup consists of highly hedonic employees, the leader might expect better ratings and overall higher satisfaction. Similarly, if the workgroup consists of employees that display higher levels of negative affectivity, a leader might expect and be prepared for lower (worse) ratings. This also means that, relatively speaking, a poorer result in a group with a majority of employees with higher levels of negative affectivity might be less severe than an equal result in a group with a majority of hedonic employees. Reasoning this way about results will substantially increase the complexity in the interpretation of survey results. It will require leaders to understand the concept of relative results, i.e. that the same result can have different meanings in different groups. When the results are not too bad in one group, it could actually mean something positive, whereas the opposite can be true for another group with a different constellation. Considering this increased complexity with the relativity, dynamics and interpretation of the results, it is important to provide leaders with practical guidance for and training in how to interpret and act on the results of workplace-based surveys.

Taking personality into consideration may positively impact the effects of the subsequent organizational interventions. This ultimately opens up for further challenges regarding how to design future interventions taking these variables into account. It would require a delicate

balance of addressing individual differences in work environment interventions without violating personal integrity. A possible first step in this direction could be to increase the awareness among leaders that health-relevant personality traits play a certain role in the perception of work environment and will impact the survey results. For leaders, this could be a learning opportunity in order to better understand their workgroup by asking clarifying questions about needs and expectations regarding leadership and work environment [15]. This could be done in private or using joint discussions in group sessions. After the individual or group discussions have been conducted, possible interventions can be proposed based on the collected facts. In turn, such an approach will require leaders to be able to evaluate and determine if, how and for whom possible changes or improvement efforts are to be implemented. This way, potential interventions are based on a deeper understanding of what the assessments actually represent. Moreover, interventions could be tailored in a way to be meaningful for all types of personalities. The challenge would consequently be how to design such interventions that are tailored and adjusted in order to meet different individuals' expectations, needs, motivators, and prerequisites for adherence. This might undoubtedly be a difficult task and future studies need to explore how to best design interventions that take personality into consideration. Such studies need a mixed methods approach with qualitative and quantitative components. The quantitative analyses could identify personality types and other scalable variables whereas interviews and open-ended questions could yield important information of their needs, expectations, ways of communicating, reasoning, etc. A comprehensive approach like this will most probably yield a deeper and more thorough understanding of the different components that turn out to be important in future organizational interventions.

Correlations between health-relevant personality traits and work environment outcomes

Overall, the correlations between health-relevant personality, psychosocial work environment and leadership were statistically significant, but relatively weak or moderate. Comparing our findings with for instance the job satisfaction literature, weak to moderate correlations have also been the case in some previous studies [10]. It is reasonable that personality traits only account for part of the variance in such multidimensional concepts as perceptions of work environment and leadership. It has been suggested by others that weak correlations between personality and job satisfaction are partly explained by the established relationship between personality and workplace selection [7]. Thus, a highly hedonic person is more likely to seek a workplace and vocation that requires for instance enthusiasm and positivity whereas a highly negative person might not [52].

Similarly, a highly negative person is more likely to seek a stressful workplace [5]. It is indeed reasonable to assume that personality will only be partly correlated with the perception of work environment and leadership. This naturally implies that the concepts of personality, work environment, and leadership are multidimensional and will be associated with and influenced by other situational and more stable variables [1,7,53].

Sex differences

Our findings showed overall similar patterns in women and men, although some results differed slightly. To our knowledge, men and women have rarely been analyzed separately in similar studies. As an exception, Felfe and Schyns [54] found in their experimental study that women rated their leaders to be more transformational than men did, and that the women in their sample were more extroverted than men. Our findings suggest that the correlations between hedonic capacity (a facet of extraversion) and perceived psychosocial work environment and leadership were generally somewhat stronger for men than for women. Thus, given the slightly different patterns found for women and men, future studies should also analyze them separately as a complement to crude analyses in order to better understand potential sex-related patterns. The importance of investigating sex differences has also been highlighted in studies regarding for instance personality and job performance [55,56].

Methodological considerations

As with all studies, there are methodological aspects to be discussed. Firstly, due to the cross-sectional nature of these data no conclusions can be drawn about causality. The current study exhibits systematic findings for both the correlations and absolute levels, indicating robust results. This warrants efforts for more detailed investigations regarding causality. However, to study organizational settings over time is difficult considering all additional potential confounders, such as organizational changes, that may influence the results. Thus, studying causal mechanisms in the work environment and for occupational health interventions is indeed a challenging task and there is no gold standard as to how such data should be analyzed [57–59]. Nonetheless, it would be valuable to investigate causality as an extension to the present study.

Secondly, as previous research within this field has used different measures of personality, psychosocial work environment and leadership, direct comparisons are not possible to make. Most of our results are however in line with previous findings, indicating validity. We additionally show in this study that brief versions of established scales yield overall similar psychometric properties as the original scales. The brief scales therefore also seem to be comparable with other studies. The

interest in brief scales has increased substantially in recent years and there are several examples of studies showing that short scales can be valid alternatives in some circumstances; for instance, in personality [60–62] and coping (related to personality) [63]. These have shown overall acceptable psychometric properties and to be viable alternatives when extensive and lengthy alternatives are not practically possible. Furthermore, a recent review shows that short scales can be useful, reliable and valid alternatives in work and organizational research where lengthy questionnaires are to be avoided [64]. Brief scales have generally shown to increase the chances that participants will have the time to respond [61,64,65]. In addition, short scales have been recommended as a way to avoid participant fatigue and frustration, something that lengthy and time-consuming scales often face. This is also particularly advantageous considering that employees in our study were asked to respond to the questionnaire during their working hours and with limited time to spend. Thus, when carefully weighing advantages and disadvantages, using short and psychometrically solid scales can be favorable in studies like the present one where different scales needed to be used in order to assess different aspects of work environment and leadership. In addition, the factor loadings in our study were acceptable and analyses exhibited that the scales had reliable psychometric properties. Concurring with Gosling et al. [61], this is not to suggest that brief scales should replace extensive ones with generally superior psychometric properties. On the other hand, the choice of scales should be guided by the research questions, circumstances, such as time constraints and practicality, as well as psychometric properties [64].

A possible bias in this study concerns the selection of the participants. Since personality seems to guide the choice of workplace [52], there might be a risk for selection bias which would negatively influence the generalizability of the results. However, in our judgment, the risk for this form of bias is low in the present study due to the number and diversity of the participating organizations. Considering that we included white-collar workers from small, medium and large organizations within various industries, we most likely covered a broader range of personality types. Therefore, we assume that the results are generalizable.

Practical implications

The findings in the present study can most likely be useful in practical terms. Knowing more about work environment and leadership assessments can be valuable for organizations and leaders as they initiate action plans, interventions and training programs, based on employee assessments [15,24]. Indeed, a profound understanding of the assessments and of course, the context in which they are given, is crucial for conducting appropriate and meaningful organizational interventions. Knowing that

employees differ in their perceptions of the psychosocial work environment and leadership behavior is one thing – knowing why they differ and how to handle it is another. Both of these aspects can be highly relevant for interpreting work environment and leadership assessments. Subsequently, organizational interventions could be tailored to various extents in order to be meaningful for the employee, the workgroup, the leader and the organization. The present findings also raise important ethical aspects to be addressed. For instance, personality trait screening when recruiting should not be used as a means to preclude employment since personality traits do not indicate the actual competence. Furthermore, awareness of the role of personality in work environment assessments does not rationalize overestimating its role as a way to discard important outcomes. Thus, personality has some influence and most of the variation in the assessments is explained by other variables. Instead, these findings can have important practical implications for leaders as they strive to better understand and address the employees' needs and expectations. A mutual understanding of the needs and expectations will most likely guide leaders in regulating their behaviors and increase the chances for interventions to be successful.

Conclusions

In conclusion, the present study demonstrate clear and systematic associations between employee health-relevant personality traits and perceptions of the psychosocial work environment and leadership behavior. The strongest positive correlation was found for hedonic capacity (a facet of extraversion) where higher levels of hedonic capacity were associated with higher (better) perceptions of the psychosocial work environment and leadership behavior. Negative correlations were found for negative affectivity (a facet of neuroticism), implying that higher levels of this trait were associated with lower (worse) perceptions. There were also significant differences in mean values between levels of health-relevant personality traits, indicating that survey results can be influenced by personality. These findings highlight the importance for leaders to assess and understand the interactions of health-relevant personality traits. If taken into account when interpreting results, interventions can be tailored and adapted with the aim for more optimal outcomes. Thus, addressing health-relevant personality traits can be valuable for organizations in the systematic and continuous efforts to ensure good psychosocial work environment.

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