

Health and Work Psychology

People Performance Scales (PPS): A multi-company, cross-sectional psychometric assessment

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Gottenborg, S., Hoff, T., Rydstedt, L. & Øvergård, K. I. (2022). People Performance Scales (PPS): A multi-company, cross-sectional psychometric assessment. *Scandinavian Journal of Psychology*, 63, 109–123.

This study aims to test the nomological validity of the People Performance Scales (PPS) using the job demands-resources (JD-R) model. All employees at two large companies in Norway (a governmental agency and a worker's union) were invited to complete the PPS questionnaire electronically. A total of 2,469 respondents completed the questionnaire, resulting in an 87 percent response rate. Data was analyzed Structural Equation Modelling. First, all 15 scales included in the PPS showed excellent internal and construct validity. PPS was also found to have configural-, construct-level metric- and scale-level metric invariance across age groups and genders. Second, findings indicate that the PPS can be used for both research and consultancy based upon the JD-R model, while simultaneously assessing constructs of particular importance in Norwegian and Scandinavian legislation. The PPS represents a short and efficient questionnaire which measures the most relevant working environment constructs in a reliable and distinct way. The questionnaire has great psychometric characteristics and is well suited for use in organizations to measure employees' experience of working environment factors, allowing organizations to identify areas of improvement and to support organizational development.

Key words: Psychosocial, work environment, psychometric assessment, questionnaire.

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INTRODUCTION

The aim of this study is to present and test the validity and reliability of the People Performance Scales (PPS). PPS is a novel research-based survey instrument measuring the most important characteristics of the working environment. It is intended for use in both research and the development of working environments in organizations. As the PPS was developed in a Norwegian (and Scandinavian) context, it includes key psychosocial topics in the Norwegian Working Environment Act (2005), such as employee involvement, information, autonomy, possibility for individual development, as well as health-promoting aspects of work such as work engagement.

Reasons for development of PPS

The PPS is developed for use in applied settings, including consultancy services measuring the working environment to aid organizational development or change. There are two main reasons for the development of the PPS.¹ First, internationally developed questionnaires tend to not include constructs of high importance in a Norwegian context, such as the topics in the Norwegian Working Environment Act (2005) mentioned above. Second, many companies use non-scientific work environment surveys for organizational development. These non-scientific surveys have several drawbacks, such as a lack of an underlying

theoretical framework or model, an inability to adequately separate between causal and outcome variables, and unknown scale reliability and construct validity. One consequence of these shortcomings is poor data quality which are not suitable for managerial decision making (Hoff & Lone, 2014).

Of course, comprehensive and valid questionnaires designed for scientific purposes are available (e.g., COPSOQ III, Burr *et al.*, 2019). However, such questionnaires are often too extensive and time-consuming for applied use in organizations striving to reduce costs (see comparison between PPS with other existing questionnaires in Appendix A). In our experience organizations seek to spend as little time as possible on answering questionnaires while still obtaining high-quality data. Consequently, questionnaires for applied organizational use ought to be both short *and* include the appropriate constructs *while* exhibiting acceptable psychometric properties, such as good differentiation between scales in a factor analysis and high internal reliability for all factors.

The development process of the PPS

Selection of the scales in the PPS was made using six criteria. Recommendations for employee survey design by Kuvaas (2008) was used as an initial guide. The recommendations were as follows: first, constructs should be relevant across different organizational sectors, areas of business, etc. Second, constructs should be based on sound theory and empirically tested. Third, constructs of particular importance in the Norwegian Working Environment Act (2005) should be included. Fourth, constructs should enable constructive dialogue in organizations developing

Data set used in this publication is freely available at the University of South-eastern Norway Research Data Archive at <https://doi.org/10.23642/usn.13365587>.

their psychosocial working environment, both at the organizational and work unit levels. This meant including constructs that were perceived as useful in the survey feedback process, and which leads to balanced discussions that allows employees to discuss both advantages and disadvantages of different work environment factors. Additionally, the constructs should be something the organization or work unit could affect, thereby focusing the work environment survey on what an organization can do to improve the work environment. Fifth, the final configuration of constructs should reflect task, interpersonal, and organizational (contextual) levels of the working environment, as proposed by Hoff and Lone (2014). Lastly, when selecting among similar constructs, we chose those constructs that was closest to the constructs used in the JD-R model (Bakker & Demerouti, 2007, 2014; Bakker, Demerouti & Sanz Vergel, 2014). The reason for this was that the JD-R model is one of the most used for work environment research the last two decades, ensuring that the empirical and scientific basis for PPS was as large as possible and enabling a larger set of research articles that can be used to compare individual organizational results with.

The PPS is intended to be short but general by covering the most important work environment factors while still allowing researchers and organizations to add supplementary scales (but not requiring them to do so). The reason why we allow for inclusion of other constructs is that in our practical experience, job demands, and contextual job resources are work environment factors whose importance varies the most between organizations. Hence, the PPS places less emphasis on job demands and contextual job resources in its pre-selected scales as these may be added by the organization. Similarly, in accordance with the fourth selection criterion (mentioned above), the PPS does not include intra-individual constructs. While such measures could both be important explanatory tools and relevant to researchers and organizations, we believe such measures could impede survey feedback sessions and processes linked to improvement initiatives. For instance, constructs related to personality could invite discussions focusing on who employees are, rather than what employees do.

The selected set of constructs used in PPS were originally developed by different researchers, and for differing purposes (e.g., theoretical framework, measurement level – individual or climate etc.). Thus, all constructs and items were translated and adapted to correspond to a similar mode of expression and a five-point Likert scale format. As the PPS is an instrument intended for commercial use, the number of items is of particular importance, as organizations strive for expedience in answering organizational surveys.

Translation of constructs was based on a committee and expert team approach, as described by Douglas and Craig (2007) and Okazaki and Mueller (2007). This approach is collaborative and iterative, focusing on conceptual equivalence, comprehension and meaning for respondents, as opposed to traditional approaches such as back translation (Brislin, 1970). Besides the primary team responsible for translation, input was provided through dialogue with key employees responsible for carrying out employee surveys using PPS in their organizations (such as HR staff, formal leaders, and employee electives). The purpose of these discussions was to further develop the formulation of items by

understanding how respondents perceive constructs and items, as suggested by Willis and Artino (2013).

The job demands-resources model

The PPS is structured on the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007) The JD-R model is one of the main work stress-motivation models (Schaufeli & Taris, 2014), and the general claims of JD-R theory has been assessed and corroborated in a wide range of studies (see e.g., Hakonen, Schaufeli & Ahola, 2008; Llorens Gumbau, Schaufeli & Salanova, 2007; Schaufeli & Bakker, 2004).

According to the JD-R model working environment factors can be divided into either job resources or job demands. Demerouti, Nachreiner and Schaufeli (2001) defined job resources as physical, social, or organizational job aspects that may help the achievement of work goals, reduce demands, or stimulate personal growth and development. Conversely, they defined job demands as physical, social, organizational job aspects that are associated with physiological or psychological costs.

Job resources contribute to a motivational or salutogenic process producing well-being and positive outcomes (Bakker & Demerouti, 2007) such as increased productivity, while also moderating relationships between job-demands and strain. Job demands contribute a pathogenic process producing reduced well-being, burnout and negative outcomes (Jenny, Bauer, Vinje, Vogt & Torp, 2017), such as reduced productivity, increased turnover intention (Wright & Cropanzano, 1998), as well as poorer health and increased sickness absence (Toppinen-Tanner, Ojajarvi, Väänänen, Kalimo & Jäppinen, 2005). Accordingly, the combined effect of these pathogenic and motivational processes leads to outcomes on individual and organizational levels in terms of health variability, productivity, turnover rates, and job absenteeism (Bakker & Demerouti, 2014).

PPS: PEOPLE PERFORMANCE SCALES

The PPS is composed of the 14 scales with 57 items in total (additional scales that the organization may add are not included in this list, see also Fig. 1). The first ten are independent variables, which comprises task, interpersonal, and contextual factors of the working environment, are used to measure psychosocial work environment factors of importance for the Norwegian work life. Of these ten, the first nine constitute job resources, and include *Information, Involvement, Autonomy, Feedback, Investment in employee development, Leadership quality, Support from colleagues, Clarity of goals and Internal cooperation*. The tenth scale is *Workload*, the sole job demand. The four outcome indicators used in PPS are *Work-engagement, Extra-role behavior, Burnout, and Turnover intention* are outcome variables which are (partly) caused by the measured job demands and job resources. PPS includes both outcome indicators and job resources/demands to allow for assessments of the extent that work environment factors affect outcome variables. This information may inform organizational measures made to improve the psychosocial work environment. It is important to differentiate between outcome variables and job resources/demands as outcome variables cannot be affected directly but are dependent on changes in job resources

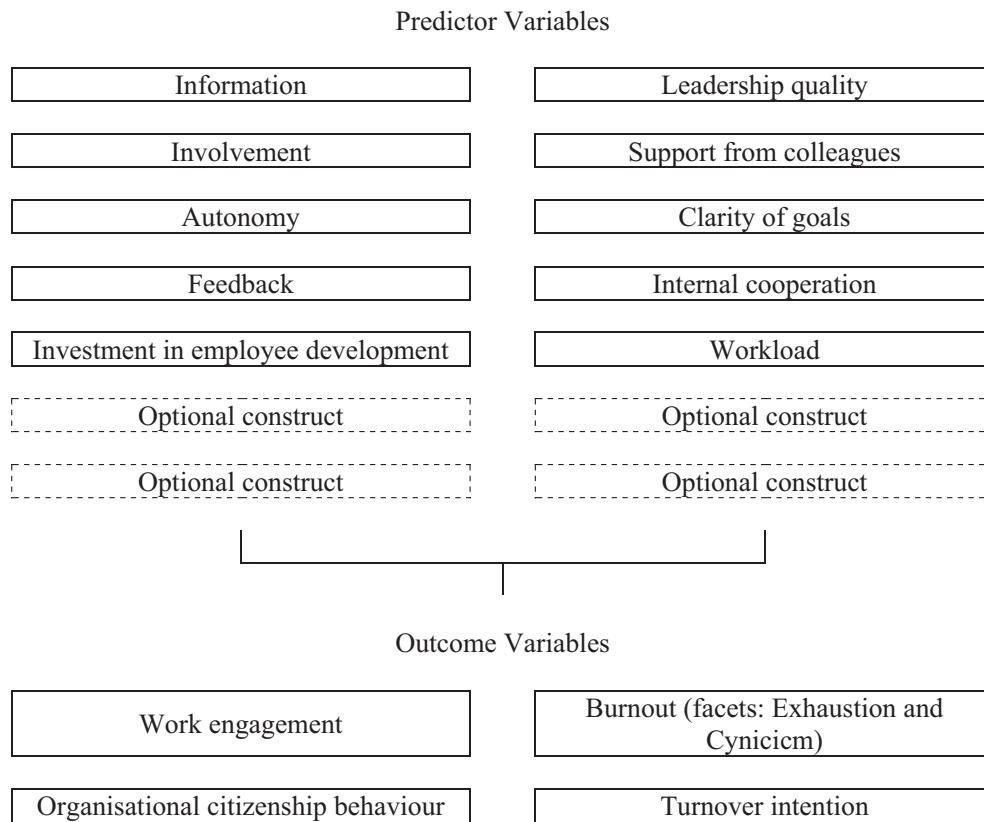


Fig. 1. The theoretical framework of PPS with 14 default constructs and four optional constructs.

or job demands (Hoff & Lone, 2014) The outcome variables in turn affect factors such as productivity, staff turnover and sickness absenteeism (Hakanen *et al.*, 2008; Schaufeli & Bakker, 2004). Each of the 14 scales are presented below, while the working model for PPS is presented in Fig. 1, with a full overview of scales and items presented in Appendix B.

Information refers to the employees’ perceived degree of information, either provided or available, enabling effective task completion. As most organizations use electronic interfaces to share information (e.g., intranet solutions, e-mail, Facebook at work) they are dependent on employees searching and locating relevant information for themselves. Consequently, the scale used does not specify the source of information, but rather inquire whether the information received is perceived to be satisfactory. The information scale is based upon predictability scale in COPSOQ II (Pejtersen, Kristensen, Borg & Bjorner, 2010) and the two items was translated and the response format was changed to a five-point likert scale.

Involvement refers to employees being given opportunity to influence decisions affecting their work, and is a central component of the Norwegian Working Environment Act (2005). The scale used was based on Norwegian version of the participation scale of the Organizational Climate Measure (Bernström, Lone, Bjørkli, Ulleberg & Hoff, 2013; Patterson, West, Shackleton *et al.*, 2005). The scale was changed from a climate measurement level to an individual measurement level and consists of three items.

Autonomy refers to an employees’ degree of independence and freedom in making decisions regarding work scheduling, work

methods or procedures, pace and effort (Hackman & Oldham, 1975; Morgeson & Humphrey, 2006; Spreitzer, 1995). The Autonomy scale used in PPS was translated from Spreitzer’s (1995) Self-determination scale, itself originally based on the Autonomy scale from Hackman and Oldham (1980). The scale consists of three items.

Feedback refers to the degree to which employees can obtain direct and clear information about the effectiveness of their performance (Hackman & Oldham, 1975). The scale used in the PPS does not specify the source of feedback and can incorporate feedback from several sources such as co-workers, leaders, or customers. As such, Feedback in PPS is a task and social construct. The scale consists of three items from Kuvaas’ (2011) scale “jevnlige feedback og tilbakemelding” (“Consistent feedback”), and is chosen as this also emphasizes frequency and immediacy, elements discussed and recommended by Kuvaas and colleagues (Kuvaas, Buch & Dysvik, 2016).

Investment in employee development refers to the organizations’ interest and focus on the development of its employees’ abilities and skills, as perceived by the employees (Kuvaas & Dysvik, 2009; Lee & Bruvold, 2003). Employee development is particularly emphasized in the Norwegian Working Environment Act (2005), and is accordingly an important part of employee surveys in Norway. The scale contained three items from from Lee and Bruvold’s (2003) scale “oppfatninger om investering i medarbeiderutvikling” (“perceptions of investment in employee development”). Since this scale had multiple examples following each item, we adapted the question by removing the examples as the we did not want to focus on specific measures for employee

development as employees might differ with regards to their needs for employee development.

Leadership quality refers to employees' perceptions of their formal leader measuring five facets of transformational leadership (Idealized Influence – Attribute, Idealized Influence – Behavior, Inspirational Motivation, Intellectual Stimulation, and Individual Consideration) according to (Dumdum, Lowe & Avolio, 2002). This model is slightly different from the traditional four-factor model of transformational leadership (Bass & Avolio, 1994). The difference is that the factor “idealized influence” is divided into two new factors focusing on employees' attribution of the leader “Attributed charisma” and the whether the leader acts as a role model “Idealized influence” (Dumdum *et al.*, 2002). We chose to use the five-factor model of transformational leadership following Dumdum *et al.* (2002) as this has better psychometric properties than the original four-factor model of transformational leadership (Antonakis, 2001), and because all five facets of transformational leadership were highly correlated with perceived leader and work group effectiveness (Dumdum *et al.*, 2002). Thus, it was decided to measure this specifically, as opposed to task or social support from supervisors.

Support from colleagues refers to the degree to which employees perceive other members of their work group or department to provide support when needed. The support construct includes items related to both socioemotional and task-related support, as suggested by Karasek *et al.* (1998). The scale used items from the teamwork scale used in the current version of the Norwegian Organizational Climate Measure (as presented in Hoff & Lone, 2014), and consists of seven items which were changed a climate measurement level to an individual measurement level.

Clarity of goals refers to the employees understanding of, and internalization of organizational goals. As described by Goal Setting Theory (Locke & Latham, 1990; Locke, 1991), clearly defined and understood goals are conducive to task motivation and increased performance on an individual and group level, and should therefore aid related concepts, such as feedback, involvement, and cooperation. The clarity of goals-scale is from the Norwegian Organizational Climate Measure (Bernstrøm *et al.*, 2013), and consists of three items which were altered from a climate measurement level to an individual measurement level.

Internal cooperation refers to the degree of trust and cooperation between work groups and departments in an organization. An ability to cooperate efficiently, coordinate goals and activities, and generate synergies are of paramount importance for interdependent organizational units (Nauta & Sanders, 2000; Patterson *et al.*, 2005). Accordingly, the scale measures the willingness to cooperate in work groups or departments which have common goals. The scale consists of five items from the psychological cooperative climate measure (“sosialt samarbeidsklima” – “social cooperative climate”) used in Kuvaas and Dysvik (2009), originally developed by Chatman and Flynn (2001).

Workload refers to the degree to which employees perceive quantitative and/or time demands in such way that it impairs work performance. The scale is based on three items from the Norwegian Organizational Climate Measure (Bernstrøm *et al.*, 2013). Items were changed from climate measurement level

(e.g., “in our group we often have high workload”) to individual level (e.g., “I often experience high workload”).

Work Engagement is the primary indicator of well-being in PPS, and an indicator of the health-promoting impact of work (Torp, Grimsmo, Hagen, Duran & Gudbergsson, 2013). It refers to a work-related state of mind, in which employees feel positive and fulfilled, characterized by vigor, dedication, and absorption (Schaufeli & Bakker, 2004; Schaufeli, Salanova & González-Romá, 2002). This construct was included for its close ties to the Job Demands-Resources Model, and its links to positive organizational outcomes, such as increased task performance (Bakker *et al.*, 2014). Work engagement based upon a translation of six items from the Utrecht Work Engagement Scale (Schaufeli & Salanova, 2006) and the response format was changed to a five-point Likert scale.

Extra-role behavior refers to positive behaviors whereby employees are proactive, encouraging, or cause things to happen, that are not specified, expected or required by their job description (Van Dyne & LePine, 1998). It is closely linked to Organizational citizenship behavior (Podsakoff, Mackenzie, Paine & Bachrach, 2000), as has previously been linked to increased work-group performance (Podsakoff, Ahearne & Mackenzie, 1997). The construct was primarily included for its potential to address the topic of employee behaviors in organizations, with pertinent indicators such as sportsmanship, helping- and voice behaviors. The scale used in PPS consists of four items from Kuvaas and Dysvik's (2009) translation of the scale used in Van Dyne and LePine (1998).

Burnout is the primary indicator of strain, and in PPS refers to a state characterized by high levels of *Exhaustion* and negative attitudes (*Cynicism*) towards one's work tasks (Demerouti, Mostert & Bakker, 2010). The depersonalization facet of burnout is not included in PPS as this contains negative attitudes towards the recipients of one's work (e.g., customers, clients, other companies, etc.) which the company cannot affect directly (as opposed to cynicism which can be affected by changes in work tasks). The Exhaustion scale consists of four items from Pejtersen *et al.* (2010), and the cynicism scale consisted of three items translated from Bang and Reio (2017). All items were translated from English to Norwegian and response format changed to a five-point Likert format.

Turnover Intention refers to the degree which employees think about quitting their job. The scale uses three items translated from Kuvaas' (2006) scale turnover intention.

METHODS

Data collection

Data was collected from two organizations as part of the organizations' working environment surveys. Both organizations were clients of the HR consultancy firm EBHR, who administered the questionnaire, using EBHR.com for data collection. Both companies represent modern workplaces with high degrees of office and computer use and low degrees of physical labor (the specific distribution is difficult as we did not measure each person's work tasks or educational status). Respondents received an invitation to answer the survey on their work email address, with information on the purpose and use of the data, questionnaire, storing of data and anonymity. Participants were informed that anonymized data could be used for research purposes. Each respondent received an

individual link to the survey, showing their name and formal leader, ensuring that their answers were connected to the appropriate organizational work unit. All respondents were given three weeks to complete the survey. Reminders were sent to those who had not answered or completed the questionnaire. Both datasets were anonymized before being made available for this study.

Sample

A total of 2,819 persons from two companies was invited to answer the PPS questionnaire. The final sample consisted of 2,469 respondents, resulting in an 87% response rate. These respondents ranged from 19 to 72 years of age ($M = 46.9$, $SD = 10.6$, $n = 2,427$, 42 missing). Among the 2,411 that indicated their gender (58 missing) women were in the majority with 58.2% ($n = 1,403$). The sample was composed of 254 leaders (10.4%) and 2,188 employees (88.6%). Data regarding leader/employee was missing for 27 persons.

Analyses

IBM SPSS 28 and AMOS 26 were used for data analysis. Multiple indices were used to examine overall fit of the hypothesized model and alternative models to the data. Absolute goodness-of-fit was tested using the chi-square test, root mean square error of approximation (RMSEA), and standardized root mean square residuals (SRMR). A value below 0.05 indicate a good fit for the RMSEA, while values below 0.08 is generally considered a good fit for the SRMR (Hu & Bentler, 1999). The chi-square test examines the difference between the empirical covariance matrix with the covariance matrix of the default model. While the chi-square test results are reported, it is worth mentioning that for models with large sample sizes the significance of the chi-square test is not a good starting point for rejecting or accepting a model as small differences between the observed and the reproduced covariance matrices will make the chi-square test significant (Vandenberg, 2006). Accordingly, the chi-square test will not be used exclusively to compare different models as we cannot expect a non-significant chi-square test.

Relative goodness-of-fit was tested using comparative fit index (CFI) and Tucker–Lewis index (TLI). The common threshold scores were used, in which values over 0.90 indicate a good fit (Hu & Bentler, 1999; Marsh, Hau & Wen, 2004). Comparison of different models was assessed using changes in chi-square values, and the Akaike information criterion (AIC). The lower the AIC, the better the fit (Akaike, 1974). Measurement invariance testing was done following the three first steps of Cheung and Rensvold (2002) testing configural (equal factorial form), construct-level metric (equal factor loading) and item-level scale invariance (equal

indicator intercepts) across genders and age groups. We used ΔCFI (threshold <0.02), $\Delta \Gamma$ (threshold <0.015) and ΔMc (threshold <0.02) as comparative model fit indices to investigate differences between configural, construct-level metric and item-level metric invariance model testing (Cheung & Rensvold, 2002). We used Cohen's w as an effect size measurement of the difference between the chi-square for the goodness of fit of the statistical models. (Cohen, 1992) have given the following thresholds for determining the sizes of Cohen's w , "small" = 0.1, "medium" = 0.3, and "large" = 0.5).

RESULTS

Scale characteristics

Internal scale reliability was calculated using Cronbach's alpha. All scales showed high to very high inter-item correlations (Cronbach's alpha between 0.751 and 0.933). Cronbach's alphas above 0.9 were found for the scales Exhaustion, Autonomy, Feedback, Investment in Employee Development, Leadership quality, and Support from Colleagues, indicating that some items in the scales might be redundant. However, PPS are already using scales with a reduced number of indicators. Descriptive statistics and the associated Cronbach's alpha for all scales in PPS are presented in Table 1.

As seen in Table 1, mean scores ranged from 2.09 (turnover intention) to 4.24 (Extra-Role Behavior). Ceiling and Floor effects were calculated by the percentage of respondents which scored maximum (5) or minimum (1) on the indicators of the scale. The scales Extra-Role Behavior, Autonomy, Leadership Quality, and Support from Colleagues showed some ceiling effects ($>15.0\%$). Conversely, a floor effect ($>15.0\%$) was observed for the scales Turnover Intention and Cynicism. Correlations between all scales are presented in Table 2.

Exploratory factor analysis (EFA)

Exploratory factor analysis (EFA) with 15 factors (all scales with Burnout represented by its two facets Exhaustion and Cynicism) was conducted using IBM SPSS 28. We used a maximum likelihood method of factor extraction with varimax rotation

Table 1. Descriptive statistics and Cronbach's alpha for the scales in PPS

Scale (number of items)	N	M	SD	Skew	Kurtosis	Floor pct.	Ceiling pct.	Cronbach's alpha
Work Engagement (6)	2449	4.04	0.73	-1.019	1.406	0.45	9.88	0.899
Extra-Role Behavior (4)	2450	4.24	0.59	-0.74	1.033	0.08	18.33	0.751
Turnover intention (3)	2450	2.09	1.19	0.856	-0.404	37.06	3.35	0.881
Exhaustion (4)	2465	2.44	1.02	0.458	-0.559	11.65	1.83	0.906
Cynicism (3)	2465	2.10	1.05	0.859	-0.057	26.34	1.75	0.883
Information (2)	2450	3.59	1.00	-0.654	-0.181	2.24	12.65	0.855
Involvement (3)	2450	3.58	0.98	-0.475	-0.34	1.63	12.20	0.837
Autonomy (3)	2450	3.96	0.87	-0.937	0.843	0.90	21.02	0.901
Feedback (3)	2450	3.39	1.03	-0.464	-0.453	3.51	9.31	0.933
Investment in Emp. Dev. (3)	2450	3.32	1.06	-0.396	-0.518	4.65	8.69	0.921
Leadership Quality (5)	2450	3.97	0.92	-0.983	0.639	1.06	18.04	0.923
Support from Coll. (7)	2450	4.21	0.74	-1.17	1.517	0.20	19.43	0.926
Clarity of Goals (3)	2450	3.53	0.92	-0.474	-0.04	1.80	9.51	0.887
Internal Cooperation (5)	2450	3.85	0.68	-0.484	0.432	0.08	6.49	0.793
Workload (3)	2450	3.10	1.04	-0.157	-0.582	5.63	5.51	0.853

Notes: N = number of observations, M = Mean, SD = Standard deviation, skew = skewness. Standard error for Skewness is 0.049 and 0.099 for Kurtosis.

Table 2. Inter-scale correlations for all scales in PPS

	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Work Engagement	6	—														
2 Burnout	7	-0.639*	—													
3 Exhaustion	4	-0.461*	0.905*	—												
4 Cynicism	3	-0.683*	0.834*	0.520*	—											
5 Extra-Role Behavior	4	0.445*	-0.227*	-0.149*	-0.262*	—										
6 Turnover Intention	3	-0.498*	0.527*	0.379*	0.566*	-0.359*	—									
7 Information	2	0.421*	-0.441*	-0.352*	-0.428*	0.127*	0.626*	—								
8 Involvement	3	0.398*	-0.447*	-0.354*	-0.437*	0.187*	0.337*	0.432*	—							
9 Autonomy	3	0.390*	-0.357*	-0.285*	-0.347*	0.210*	0.514*	0.426*	0.237*	—						
10 Feedback	3	0.399*	-0.391*	-0.296*	-0.399*	0.175*	0.301*	0.426*	0.246*	0.387*	—					
11 Inv. In Emp. Dev.	3	0.350*	-0.377*	-0.288*	-0.381*	0.127*	0.447*	0.375*	0.237*	0.389*	0.392*	—				
12 Leadership Quality	5	0.405*	-0.450*	-0.347*	-0.452*	0.150*	0.565*	0.562*	0.389*	0.564*	0.329*	0.536*	—			
13 Sup. Colleagues	7	0.449*	-0.455*	-0.354*	-0.453*	0.271*	0.317*	0.482*	0.334*	0.394*	0.302*	0.384*	0.351*	—		
14 Clarity of Goals	3	0.389*	-0.374*	-0.274*	-0.393*	0.172*	0.479*	0.355*	0.195*	0.381*	0.502*	0.384*	0.512*	0.561*	—	
15 Int. Cooperation	5	0.429*	-0.429*	-0.322*	-0.443*	0.231*	-0.329*	0.477*	0.290*	0.386*	0.464*	0.450*	0.512*	0.561*	0.561*	—
16 Workload	3	-0.034	0.262*	0.366*	0.051*	0.106*	0.092*	-0.152*	-0.087*	-0.085*	-0.098*	-0.111*	-0.119*	-0.054*	-0.108*	-0.052*

*p < 0.05.

which explained 68% of the variance in the data. The rotated factor structure showed excellent separation of all scales, with factor loadings ranging from low (0.38) to high (0.86). We retained the items with low factor loadings because Cronbach's alpha was very good for all scales, and we wanted to retain a broad measurement of the construct as possible with few indicators. The factor loadings of all items measured using PPS are presented in Table 3.

Model fit indices

IBM AMOS 28 was used to test how well the theoretical factor structure fit with the data. We tested three models. Covariances between all latent factors are estimated. To assess model fit we used the common threshold scores of TLI and CFI > 0.9, and Chi-square fit statistics/degrees of freedom (CMIN/DF) < 5, SRMR < 0.08, and RMSEA < 0.06 (Hu & Bentler, 1999; Marsh et al., 2004). The results of the Chi-square test were used to compare different models. Model fit indices for all three models are presented in Table 4.

The first model (Model 1) was a 14-factor model with all the items for exhaustion and cynicism loading directly to burnout. The results for this model did not demonstrate adequate model fit as threshold scores were only satisfactory for SRMR.

The second model (Model 2) had 14 factors and two facets with items for exhaustion and cynicism loading to its facets which then loaded to the burnout factor. Only the burnout factor was set up with covariances to the other work environment factors. This model had satisfactory model fit for all indices except CMIN/DF which was above 5.

The third model (Model 3) was a 15-factor model with the facets exhaustion and cynicism represented as separate factors which replaced the burnout factor. The Exhaustion and Cynicism factors was set to correlate with the other working environment factors. This model had satisfactory fit on all model fit indices and all-over better model fit indices than the two other models. Consequently, the results indicate that the third model provides best representation of the data.

Measurement invariance testing for gender

Measurement invariance of the best-fitting model (Model 3, see Table 4) across age groups and genders was tested with IBM AMOS 28. Testing of model fit for each individual group of men and women both showed acceptable fit to the data (see Table 5).

Tests of configural invariance (the same subset of items are associated with the same construct in all groups), construct-level metric invariance (the strength of relationship between items and underlying constructs are the same across groups) and item-level scale invariance (that the strength between each item and the underlying construct is the same for all groups) was calculated in AMOS 28. Results are shown in Table 6.

As can be seen in Table 6, all fit indices for all three measurement invariance models are below the threshold levels for ΔMc, ΔGH, and ΔCFI (Cheung & Rensvold, 2002). The Δchi-square are statistically significant; however, the effect is well below the "small" threshold for Cohen's w. This indicates that the significant difference may be due to the large sample size, and

Table 3. Pattern matrix after exploratory factor analysis with 15 factors, maximum likelihood estimation and varimax rotation

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SupCol 1	0.778	0.159	0.119	-0.099	0.008	0.040	0.099	0.108	0.075	0.057	0.006	0.062	0.085	-0.035	0.005
SupCol 2	0.776	0.093	0.110	-0.084	0.061	0.021	0.042	0.164	0.022	0.044	-0.027	0.061	0.050	-0.049	0.006
SupCol 3	0.766	0.181	0.087	-0.112	0.088	0.066	0.055	0.142	0.067	0.072	-0.011	0.074	0.057	-0.032	0.011
SupCol 4	0.746	0.109	0.222	-0.088	0.088	0.076	0.102	0.119	0.068	0.044	-0.003	0.086	0.089	-0.046	0.085
SupCol 5	0.721	0.153	0.167	-0.082	0.103	0.060	0.078	0.121	0.075	0.061	-0.003	0.103	0.071	-0.059	0.010
SupCol 6	0.708	0.106	0.228	-0.082	0.080	0.094	0.114	0.128	0.054	0.057	-0.002	0.127	0.058	-0.047	0.055
SupCol 7	0.619	0.111	0.235	-0.066	0.152	0.111	0.058	0.157	0.118	0.092	-0.018	0.063	0.168	-0.035	0.264
Eng 1	0.179	0.765	0.126	-0.145	0.089	0.069	0.095	0.093	0.078	0.137	0.066	0.197	0.062	-0.078	0.025
Eng 2	0.181	0.732	0.144	-0.111	0.101	0.071	0.134	0.129	0.065	0.161	0.068	0.125	0.100	-0.111	0.056
Eng 3	0.147	0.689	0.107	-0.254	0.141	0.084	0.078	0.102	0.115	0.138	-0.007	0.175	0.031	-0.055	0.063
Eng 4	0.199	0.643	0.100	-0.262	0.092	0.084	0.126	0.103	0.100	0.190	-0.047	0.144	0.064	-0.070	0.037
Eng 5	0.138	0.577	0.095	-0.130	0.021	0.050	0.129	0.086	0.052	0.088	-0.059	0.229	0.064	-0.034	0.020
Eng 6	0.095	0.570	0.046	-0.004	0.105	0.097	0.093	0.056	0.117	0.098	-0.007	0.263	0.030	-0.063	0.059
LQual 1	0.222	0.151	0.813	-0.088	0.145	0.076	0.116	0.117	0.079	0.094	-0.057	0.009	0.114	-0.048	0.057
LQual 2	0.246	0.106	0.770	-0.106	0.120	0.070	0.115	0.138	0.052	0.064	-0.042	0.024	0.134	-0.024	0.048
LQual 3	0.256	0.091	0.766	-0.108	0.174	0.119	0.160	0.102	0.047	0.058	-0.034	0.010	0.112	-0.050	0.043
LQual 4	0.233	0.162	0.653	-0.094	0.250	0.119	0.091	0.108	0.157	0.118	-0.036	0.021	0.135	-0.086	0.114
LQual 5	0.194	0.101	0.619	-0.053	0.206	0.111	0.124	0.112	0.122	0.066	-0.024	0.053	0.099	-0.052	0.078
Exh 1	-0.128	-0.150	0.094	0.839	-0.031	-0.058	0.027	-0.076	-0.039	-0.062	0.174	-0.047	-0.050	0.027	-0.002
Exh 2	-0.118	-0.167	-0.105	0.815	-0.061	-0.054	-0.080	-0.076	-0.044	-0.092	0.232	-0.008	-0.062	0.065	-0.052
Exh 3	-0.096	-0.213	-0.037	0.682	-0.097	-0.097	-0.055	-0.082	-0.072	-0.095	0.174	-0.086	-0.060	0.066	-0.059
Exh 4	-0.210	-0.224	-0.162	0.681	-0.065	-0.060	-0.093	-0.085	-0.057	-0.164	0.144	0.004	-0.105	0.139	-0.025
Fback 1	0.144	0.143	0.238	-0.096	0.830	0.127	0.027	0.104	0.117	0.071	-0.035	0.049	0.083	-0.035	0.073
Fback 2	0.154	0.153	0.280	-0.071	0.787	0.096	0.063	0.092	0.095	0.070	-0.032	0.068	0.100	-0.040	0.059
Fback 3	0.160	0.157	0.277	-0.086	0.772	0.141	0.068	0.123	0.123	0.075	-0.037	0.057	0.083	-0.064	0.103
InvEmp 1	0.114	0.107	0.111	-0.084	0.079	0.855	0.054	0.159	0.163	0.120	-0.010	0.021	0.081	-0.038	0.029
InvEmp 2	0.092	0.126	0.121	-0.070	0.113	0.843	0.048	0.155	0.216	0.130	-0.046	0.010	0.056	-0.059	0.066
InvEmp 3	0.137	0.129	0.178	-0.105	0.166	0.704	0.090	0.166	0.167	0.102	-0.074	0.043	0.099	-0.035	0.090
Aut 1	0.136	0.172	0.160	-0.092	0.051	0.061	0.832	0.084	0.020	0.069	-0.018	0.078	0.109	-0.036	0.042
Aut 2	0.139	0.127	0.153	-0.080	0.015	0.030	0.822	0.062	0.026	0.056	-0.021	0.060	0.085	-0.027	0.047
Aut 3	0.122	0.172	0.134	-0.086	0.070	0.076	0.766	0.062	0.035	0.052	-0.057	0.096	0.108	-0.050	0.023
IntColl 1	0.249	0.110	0.085	-0.096	0.069	0.088	0.069	0.688	0.104	0.012	-0.009	0.072	0.058	-0.036	0.045
IntColl 2	0.171	0.161	0.129	-0.043	0.124	0.151	0.036	0.646	0.327	0.089	-0.048	0.049	0.027	-0.044	0.078
IntColl 3	0.231	0.175	0.145	-0.066	0.136	0.145	0.070	0.548	0.244	0.076	0.015	0.077	0.106	-0.033	0.093
IntColl 4	0.140	0.033	0.103	-0.062	0.030	0.073	0.036	0.471	0.041	0.038	0.036	0.057	0.166	-0.038	0.020
IntColl 5	0.227	0.150	0.145	-0.107	0.033	0.203	0.117	0.375	0.196	0.103	-0.024	0.054	0.060	-0.051	0.021
CIgs 1	0.092	0.133	0.095	-0.067	0.119	0.206	0.026	0.176	0.864	0.100	-0.066	0.062	0.044	-0.031	0.063
CIgs 2	0.104	0.135	0.142	-0.063	0.121	0.213	0.025	0.200	0.761	0.093	-0.038	0.059	0.078	-0.038	0.104
CIgs 3	0.182	0.168	0.131	-0.082	0.088	0.151	0.040	0.316	0.601	0.083	-0.029	0.040	0.068	-0.069	0.030
TrnInt 1	-0.077	-0.197	-0.087	0.098	-0.057	-0.103	-0.050	-0.057	-0.070	-0.807	0.026	-0.032	-0.056	0.046	-0.012
TrnInt 2	-0.105	-0.220	-0.106	0.101	-0.066	-0.127	-0.063	-0.062	-0.100	-0.761	0.036	-0.011	-0.057	0.070	-0.053
TrnInt 3	-0.146	-0.379	-0.122	0.218	-0.084	-0.122	-0.094	-0.110	-0.099	-0.683	0.016	-0.014	-0.114	0.185	-0.063
Wrk1	0.037	0.060	-0.009	0.112	-0.024	-0.027	-0.019	0.057	-0.021	0.834	0.834	0.094	0.012	-0.033	-0.026
Wrk1 2	-0.031	-0.021	-0.056	0.193	-0.033	-0.043	-0.022	-0.012	-0.045	-0.047	0.830	0.046	-0.002	0.008	-0.042

(continued)

Table 3. (continued)

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wrkl 3	-0.031	-0.011	-0.052	0.213	-0.017	-0.022	-0.037	-0.043	-0.031	-0.010	0.712	0.058	-0.046	0.006	0.007
ERB 1	0.015	0.098	0.010	-0.004	0.038	-0.002	0.011	0.004	0.044	0.021	0.004	0.726	-0.010	-0.013	0.018
ERB 2	0.201	0.272	0.062	-0.049	0.049	0.049	0.044	0.126	0.038	0.057	0.022	0.604	0.024	-0.022	0.017
ERB 3	0.161	0.168	0.002	-0.002	0.051	0.015	0.022	0.085	0.013	0.011	0.109	0.587	0.040	0.005	0.024
ERB 4	0.041	0.173	0.009	-0.058	-0.011	0.004	0.113	0.013	0.019	-0.027	0.065	0.571	0.035	-0.031	-0.045
Part 1	0.191	0.113	0.238	-0.117	0.116	0.117	0.159	0.171	0.103	0.105	-0.018	0.049	0.753	-0.062	0.128
Part 2	0.183	0.118	0.204	-0.108	0.088	0.083	0.135	0.175	0.049	0.087	-0.030	0.040	0.652	-0.047	0.068
Part 3	0.242	0.129	0.309	-0.102	0.163	0.104	0.255	0.161	0.078	0.081	-0.004	0.071	0.470	-0.048	0.230
Cyn 1	-0.200	-0.471	-0.183	0.265	-0.097	-0.098	-0.106	-0.117	-0.093	-0.244	-0.019	-0.064	-0.108	0.628	-0.021
Cyn 2	-0.199	-0.464	-0.150	0.228	-0.095	-0.084	-0.112	-0.120	-0.073	-0.245	-0.063	-0.050	-0.083	0.612	-0.013
Cyn 3	-0.160	-0.349	-0.122	0.212	-0.118	-0.137	-0.074	-0.154	-0.143	-0.218	0.027	-0.085	-0.091	0.403	-0.089
Info 1	0.209	0.156	0.261	-0.099	0.191	0.142	0.094	0.169	0.197	0.093	-0.067	0.008	0.312	-0.040	0.612
Info 2	0.226	0.172	0.273	-0.115	0.231	0.178	0.131	0.179	0.189	0.100	-0.082	-0.017	0.211	-0.034	0.580

Notes: SupCol = Support from Colleagues, Eng = Engagement, LQual = Leadership Quality, Overld = Exhaustion, Fback = Feedback on Performance, InvEmp = Investment in Employee Development, Aut = Autonomy, IntColl = Internal Collaboration, CIGs = Clarity of goals, Trmlnt = Turnover intentions, Wrkl = Workload, ERP = Extra-Role Behavior, Part = Participation in decision-making, Cyn = Cynicism, Info = Information.

All factor loadings above 0.30 is marked in bold text. Cross-loadings to other factors above 0.30 is marked in italics.

that PPS have been shown to have configural, construct-level metric- and Item-level metric invariance across genders.

Measurement invariance for age groups

Using the same method we used to assess measurement invariance across genders, we tested the best-fitting model (Model 3) for each of the each of the age groups 19–40 years, 41–50 years and 51–72 years of age. All three groups had satisfactory fit to the data (see Table 7).

Configural, construct-level metric and item-level metric measurement invariance were tested for three age groups (see Table 8).

As can be seen, model fit indices CFI and TLI as well as RMSEA indicate good fit for all three models. Differences between models as measured by ΔMc, ΔGH, and ΔCFI was also below threshold values (Cheung & Rensvold, 2002). The Δchi is statistically significant but Cohen’s *w* again indicate that the effect size of the difference is very small (0.02 compared to Cohen’s, 1992 threshold level for “small” effect of 0.1) and with little practical effect. Based upon these results, we argue that PPS have shown configural, construct-level metric, and item-level metric invariance across genders and age groups.

DISCUSSION

The present study tested the psychometric properties of the PPS. We found that the internal reliability measures were adequate for all scales. That the best fitting configural model consisted of 15 factors with the exhaustion and cynicism facets of burnout being represented as single factors. Testing this 15-factor model we also found that PPS shows configural-, construct-level metric, and item-level metric invariance across genders and age groups. Thus, results indicate that the PPS has satisfactory psychometric characteristics and is well suited for use in organizations to measure employees’ experience of working environment factors.

Using a questionnaire with known and acceptable psychometric properties improves data quality and enable organizations and practitioners to better prioritize between different improvement initiatives. Furthermore, multiple measurements at different times allow monitoring of important work environment indicators and can be used to receive an early warning of organizational groups at risk (Kuvaas, 2008). Accordingly, we believe the use of a practically oriented short-form questionnaire with acceptable psychometric qualities (such as PPS) in organizations could improve HR related decision making.

In assessing and choosing areas for improvement and change initiatives, analyses based on PPS data could aid prioritization. The structure of the PPS, with independent- and outcome measures, should allow analysis of relative importance of constructs in individual organizations by using driver analyses like linear regression or the like. The use of empirically based constructs, let organizations and practitioners consult the research literature to gain further understanding, find inspiration for improvement initiatives, and assess links to important organizational outcomes.

One of the criteria for selection of constructs in the PPS, was that these should reflect task related, social and contextual aspects of the work environment. A more comprehensive set of variables

Table 4. Model fit indices for three different factorial models

Model	χ^2	df	p	CMIN/DF	CFI	RMSEA (90% CI)	SRMR	TLI	AIC
Model 1	11700.27	Df = 1448	p < 0.000	8.080	0.897	0.054 [0.053, 0.055]	0.0605	0.887	12110.27
Model 2	7575.00	Df = 1446	p < 0.000	5.239	0.938	0.042 [0.041, 0.043]	0.0488	0.932	7988.96
Model 3	7155.90	Df = 1434	p < 0.000	4.990	0.943	0.040 [0.039, 0.041]	0.0477	0.936	7593.90

Notes: Model 1 is a 14-factor model with items for exhaustion and cynicism loading directly on burnout. Model 2 uses 14 factors and a two-facet model of Burnout. Model 3 is a 15-factor model with Cynicism and Exhaustion as individual factors.

Table 5. Model fit for single groups solutions

Gender	N	Chi	df	p	CMIN/DF	CFI	RMSEA 90%CI)	SRMR	TLI	AIC
Men	1003	4056.7	1434	<0.0001	2.829	0.934	0.043 (0.041, 0.044)	0.0485	0.927	4494.71
Women	1389	4920.3	1434	<0.0001	3.431	0.94	0.042 (0.041, 0.043)	0.0465	0.933	5358.35

Table 6. Tests for measurement invariance across genders

Invariance	Chi	df	Δ Chi	Δ df	w	CFI	Δ CFI	Mc	Δ Mc	GH	Δ GH	TLI	RMSEA (90% CI)
Configural	8977.1	2868				0.938		0.279		0.919		0.931	0.03 [0.029, 0.031]
Metric	9062.9	2910	85.8	42	0.029	0.937	0.001	0.276	0.0025	0.918	0.001	0.931	0.03 [0.029, 0.031]
Scale	9143.9	2953	81	43	0.028	0.937	0	0.274	0.0022	0.917	0.001	0.932	0.03 [0.029, 0.030]

Notes: GH = Gamma Hat, Mc = McDonald’s NCI, w = Cohen’s w, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index. We used Δ CFI (threshold <0.02), Δ Gamma hat (threshold <0.015) and Δ McDonald’s Noncentrality Index (Δ Mc, threshold <0.02) as comparative model fit indices to investigate differences between configural, metric and scale invariance model testing (Cheung & Rensvold, 2002). Cohen (1992) have given the following thresholds for determining the sizes of Cohen’s w, “small” = 0.1, “medium” = 0.3, and “large” = 0.5).

Table 7. Model fit for Model 3 for single age group solutions

Age groups	N	Chi	df	p	CMIN/DF	CFI	RMSEA 90%CI)	SRMR	TLI	AIC
19–40	714	3237.5	1434	<.0001	2.258	0.935	0.042 (0.040, 0.044)	0.0535	0.928	3675.48
41–50	760	3513.4	1434	<.0001	2.45	0.93	0.044 (0.042, 0.046)	0.0501	0.922	3951.36
51–72	933	3913.1	1434	<.0001	2.729	0.94	0.043 (0.041, 0.045)	0.0452	0.933	4351.08

Table 8. Tests for measurement invariance between age groups

	Chi	df	Δ Chi	Δ df	w	CFI	Δ CFI	MC	Δ MC	GH	Δ GH	TLI	RMSEA (90% CI)
Configural	10662.3	4302				0.936		0.265		0.917		0.928	0.025 (0.024, 0.025)
Metric	10822.9	4386	160.6	84	0.028	0.935	0.001	0.260	0.004	0.915	0.002	0.929	0.025 (0.024, 0.025)
Scale	11157.4	4486	334.5	100	0.037	0.932	0.003	0.248	0.013	0.911	0.004	0.928	0.025 (0.024, 0.025)

Notes: GH = Gamma Hat, Mc = McDonald’s NCI, w = Cohen’s w, CFI=Comparative Fit Index, TLI = Tucker-Lewis Index. We used Δ CFI (threshold <0.02), Δ Gamma hat (threshold <0.015) and Δ McDonald’s Noncentrality Index (Δ Mc, threshold <0.02) as comparative model fit indices to investigate differences between configural, metric and scale invariance model testing (Cheung & Rensvold, 2002).

should facilitate balanced discussions in work teams (Hoff & Lone, 2014), broadening the scope of potential improvement areas. Accordingly, we hope the PPS can be an useful tool for reflection and improvement at all organizational levels.

Limitations

First, Some of the observed ceiling and floor effects are similar to findings in other studies (e.g., Berthelsen, Hakanen &

Westerlund, 2018), indicating that scales with notable positive or negative directionality could be more prone to such effects. However, we have not been able to test the invariance across different jobs or for people of different educational status as we did not have these data. Future studies could be conducted in other populations to assess these findings and further improve generalizability.

Second, another limitation is the cross-sectional research design, which does not allow us to investigate causal relationships

between the scales measuring work environment factors and the scales measuring individual work-related states (Work Engagement, Burnout, Turnover Intention and Extra-Role Performance). Even though we cannot model these causal relations in our data set, other research has shown that job demands are associated with burnout (Alarcon, 2011), meta-analytical longitudinal research have shown that job resources are drivers of work engagement (Lesener, Gusy, Jochmann & Wolter, 2020; Lesener, Gusy & Wolter, 2018) and that job demands longitudinally affect burnout (Lesener *et al.*, 2018). Hence, we can expect that PPS will show similar findings in the future even though our current research design hinders any longitudinal tests.

Third, some of the very high internal reliability measures (>0.90) indicate that some scales might contain redundant items, and that the number of items in these scales might be reduced to further reduce the completion time of PPS. If one chooses to reduce the number of items in a scale it ought to be done while respecting the theoretical constructs the scales are meant to measure, for example, a multifaceted construct ought to have items measuring all facets of the construct. In this respect, future revisions could use the three-item version of the Work engagement scale UWES-3 with one item for each of the three facets of work engagement (Schaufeli, Shimazu, Hakanen, Salanova & De Witte, 2019). On the other hand, reduction of items in the Leadership quality scale would not be advisable as each of the five facets is represented by a single item. In this instance, if one wants to reduce this scale, it might be better to change the scale completely with another (single faceted) scale measuring other aspects of leader behavior with fewer than five items.

Fourth, low factorial loadings were also found for some items (e.g., the fifth question in Internal Cooperation scale “the various units pull together to achieve the organization’s goals,” “De ulike enhetene står samlet for å nå organisasjonens mål). We have kept these questions in order to keep the measurement breadth of the constructs, but these questions might be prime candidates for removal if one further wants to reduce the number of questions in PPS.

Fifth, the issue of cross-loadings in the exploratory factor analysis between cynicism and work engagement. Now, these cross-loadings are not unexpected, as cynicism (distancing oneself from one’s work) can be said to represent an opposition to work engagement where people who distance themselves from their work will have little work engagement and vice versa (as can be seen by the large negative correlation [$r = -0.683$] between cynicism and work engagement in Table 1). This interpretation is in line with other research on these dimensions (Demerouti *et al.*, 2010), and because of the nature of these constructs we can expect such cross-loadings in exploratory factor analysis. However, we also found acceptable model fit when we analyzed these data using a SEM approach (see Model 3 in Table 4) indicating that the observed cross-loading between cynicism and engagement is not detrimental to having an acceptable model fit to data.

Future work

The PPS includes individual state constructs such as work engagement and burnout. These constructs relationship to

organizational output like overall wellbeing, sick leave and self-reported health (Borritz, Rugulies, Christensen, Villadsen & Kristensen, 2006) or turnover warrant future studies. Specifically, future studies should include measures such as sick-leave or productivity to investigate the properties of the scales in PPS in relation to outcomes such as actual sickness absence, turnover, and productivity.

Furthermore, the distinct nature of scales and short and flexible nature of the PPS should allow for additional constructs to be included and used in differing organizations (see Fig. 1). JD-R is a broad framework, which should enable the inclusion of most work-related constructs, while still allowing easy interpretation for practitioners. In practice, the core scales in PPS are usually supplemented by two to four scales in each organization. For instance, context-specific negative causal variables such as emotional demands, work/home-conflict or digital demands could improve organizations’ ability to identify areas of in need of development.

CONCLUSION

The PPS represents a short and efficient questionnaire which measure the most relevant working environment constructs, including constructs of high importance in a Norwegian and Scandinavian context. Overall results indicate acceptable psychometric properties as well as configural-, construct-level metric-, and item-level metric invariance across gender and age groups. PPS should be well suited for Scandinavian organizations surveying their working environment to identify areas of improvement and to support organizational development.

ENDNOTE

¹ PPS represents a compromise between the scientific requirement for reliability and validity, and organizations’ need for a questionnaire that is quick and easy to fill out and that covers the most important working environment factors. We have relied on the combined evidence from the research literature, psychometric assessment, as well as experience as practitioner-scientists in consulting on working environment measurement.

DATA AVAILABILITY STATEMENT

The data file supporting the reported findings in the manuscript will be made public on acceptance of the paper. We have already saved a DOI for our data file at the Open Research Repository of the University of South-Eastern Norway.

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Received 11 December 2020, accepted 23 November 2021

APPENDIX A

A Comparison of constructs and number of items included in PPS, COPSOQ III, QPS-Nordic and OCM

PPS	(57)	COPSOQ III	(129)	QPS-Nordic	(80)	OCM	(82)
Information	(2)	Quantitative demands	(4)	Quantitative demands	(4)	Autonomy	(5)
Involvement	(3)	Work pace	(3)	Decision demands	(3)	Integration	(5)
Autonomy	(3)	Cognitive demands	(4)	Learning demands	(3)	Involvement	(6)
Feedback	(3)	Emotional demands	(3)	Role clarity	(3)	Supervisory support	(5)
Investment in employee development	(3)	Demands for hiding emotions	(4)	Role conflict	(3)	Training	(4)
Leadership Quality	(5)	Influence at work	(6)	Positive challenges at work	(3)	Welfare	(4)
Support from colleagues	(7)	Possibilities for development	(3)	Decision control	(5)	Formalisation	(5)
Clarity of goals	(3)	Variation of work	(2)	Work intensity control	(4)	Tradition	(4)
Internal cooperation	(5)	Control over working time	(5)	Predictability next month	(3)	Innovation and flexibility	(6)
Work pressure	(3)	Meaning of work	(2)	Predictability next two years	(2)	Outward focus	(5)
Work engagement	(6)	Predictability	(2)	Challenge preferences	(3)	Reflexivity	(5)
Organizational citizenship behavior	(4)	Recognition	(3)	Mastery of work	(4)	Clarity of organizational goals	(5)
Burnout	(7)	Role clarity	(3)	Support from supervisor	(3)	Efficiency	(4)
Turnover intention	(3)	Role conflicts	(2)	Support from colleagues	(2)	Effort	(5)
		Illegitimate tasks	(1)	Support from friend and family	(3)	Performance feedback	(5)
		Quality of leadership	(4)	Empowering leadership	(3)	Pressure to produce	(5)
		Social support from supervisor	(3)	Fair leadership	(3)	Quality	(4)
		Social support from colleagues	(3)	Social climate	(3)		
		Sense of community at work	(3)	Innovation culture	(3)		
		Commitment to the workplace	(5)	Differences	(2)		
		Work engagement	(3)	Significance of human resources	(3)		
		Job insecurity	(5)	Importance of work	(3)		
		Insecurity over working conditions	(5)	Organizational commitment	(3)		
		Quality of work	(2)	Experience of work group	(3)		
		Job satisfaction	(5)	Intrinsic motivation	(3)		
		Work life conflict	(5)	Extrinsic motivation	(3)		
		Horizontal trust	(3)				
		Vertical trust	(3)				
		Organizational justice	(4)				
		Sleeping troubles	(4)				
		Burnout	(4)				
		Stress	(3)				

(continued)

Appendix A (continued)

PPS	(57)	COPSOQ III	(129)	QPS-Nordic	(80)	OCM	(82)
		Somatic stress	(4)				
		Cognitive stress	(4)				
		Depressive symptoms	(4)				
		Self-efficacy	(6)				

Notes: The overview is structured in survey order. The table only includes work-environment scales. Single-item questions or individual- or demographic questions are excluded, unless presented as a scale by the creators. The included scales are retrieved from COPSOQ International Network (2019). COPSOQ III – Guidelines and questionnaire. Retrieved from <https://www.copsoq-network.org/assets/Uploads/COPSOQ-network-guidelines-an-questionnaire-COPSOQ-III-131119-signed.pdf>, Skogstad, A., Knardahl, S., Lindström, K., Elo, A.L., Dallner, M., Gamberale, F., Hottinen, V. & Ørhede, E. (2001). *Brukerveiledning QPS-Nordic – Generelt spørreskjema for psykologiske og sosiale faktorer i arbeid.* (STAMI Report, 1(2)). Retrieved from https://www.qps-nordic.org/no/doc/Brukerveiledning_qpsnordic.pdf, and Patterson, M. G., West, M. A., Shackleton, V. J., Dawson, J. F., Lawthom, R., Maitlis, S. *et al.* (2005). Validating the organizational climate measure: links to managerial practices, productivity and innovation. *Journal of Organizational Behavior*, 26(4), 379–408. doi:10.1002/job.312.

Copenhagen Psychosocial Questionnaire, 3rd version (COPSOQ III)

COPSOQ International Network (2019). COPSOQ III – Guidelines and questionnaire. Retrieved from <https://www.copsoq-network.org/assets/Uploads/COPSOQ-network-guidelines-an-questionnaire-COPSOQ-III-131119-signed.pdf>

General Questionnaire for Psychological and Social Factors at Work (QPS-Nordic)

Skogstad, A., Knardahl, S., Lindström, K., Elo, A.L., Dallner, M., Gamberale, F., Hottinen, V., & Ørhede, E. (2001). *Brukerveiledning QPS-Nordic – Generelt spørreskjema for psykologiske og sosiale faktorer i arbeid.* (STAMI Report, 1(2)). Retrieved from https://www.qps-nordic.org/no/doc/Brukerveiledning_qpsnordic.pdf

Organizational Climate Measure (OCM)

Patterson, M. G., West, M. A., Shackleton, V. J., Dawson, J. F., Lawthom, R., Maitlis, S., . . . Wallace, A. M. (2005). Validating the organizational climate measure: links to managerial practices, productivity and innovation. *Journal of Organizational Behavior*, 26(4), 379–408. doi:10.1002/job.312

APPENDIX B

PPS scales with English and Norwegian items

Scale	Item no.	English item	Norwegian item
Information	1	I am informed well in advance of important decisions or changes.	Jeg mottar informasjon i god tid om viktige beslutninger eller endringer.
	2	I receive all the information I need to do my work well.	Jeg mottar all informasjonen jeg trenger for å løse oppgavene mine på en god måte.
Involvement	1	I am involved in decisions that affect me.	Jeg får medvirke i beslutninger som angår meg.
	2	Changes are made without my involvement. (Reversed)	Endringer blir gjort uten at jeg blir involvert. (Reversert)
	3	I often feel that decisions are made without my views being taken into account. (Reversed)	Jeg føler ofte at beslutninger tas uten at jeg har blitt hørt. (Reversert)
Autonomy	1	I have considerable freedom when it comes to deciding how I do my job.	Jeg har betydelig frihet når det gjelder å bestemme hvordan jeg gjør jobben min.
	2	I can decide for myself how I do my work.	Jeg kan selv bestemme hvordan jeg går frem når jeg jobber.
	3	I have a lot of independence and freedom at work.	Jeg har betydelig uavhengighet og frihet i jobben min.
Feedback	1	I receive frequent and continuous feedback on my performance at work.	Jeg får hyppig og kontinuerlig tilbakemelding på hvordan jeg utfører mitt arbeid.
	2	I receive feedback on an ongoing basis about what I have done well or what I could have done better at work.	Jeg får jevnlig vite hva jeg har gjort bra eller kunne gjort bedre i min jobb.
	3	I receive clear feedback about my work and my performance.	I min jobb får jeg klar informasjon om mine leveranser eller prestasjoner.
Investment in employee development	1	My organization invests considerable resources in the development of its employees.	Min organisasjon investerer mye ressurser i utvikling av sine medarbeidere.
	2	My organization attaches great importance to developing its employees' skills and abilities.	Min organisasjon er svært opptatt av å utvikle sine medarbeideres ferdigheter og evner.
	3		

(continued)

Appendix B (continued)

Scale	Item no.	English item	Norwegian item
Leadership quality		My organization ensures that I get the training and professional development I need to be able to do my work.	Min organisasjon sørger for nødvendige opplærings- og utviklingstiltak, slik at jeg kan løse nye arbeidsoppgaver.
	1	My supervisor communicates a clear and positive vision for the future.	Min leder kommuniserer en klar og positiv fremtidsvisjon.
	2	My supervisor treats all employees as individuals, is supportive and encourages personal development.	Min leder behandler de ansatte som enkeltmennesker, er støttende og oppfordrer til personlig utvikling.
	3	My supervisor questions established truths and encourage us to think outside the box.	Min leder stiller spørsmål ved etablerte sannheter og oppfordrer til å tenke på problemer på nye måter.
	4	My supervisors' actions are consistent with his/her values.	De er samsvar mellom min leders verdier og handlinger.
Support from colleagues	5	My supervisors' acts in a way that inspires pride and respect.	Min leder opptrer på en måte som skaper stolthet og respekt.
	1	My colleagues and I work well as a team.	Mine kolleger og jeg utgjør et godt team.
	2	There is an atmosphere of trust between the people I work most closely with.	Det er tillit mellom de personene jeg jobber nærmest med.
	3	In my unit, we challenge each other's ideas in a constructive way.	I min enhet utfordrer vi hverandres ideer på en konstruktiv måte.
	4	In my unit, people are willing to help each other.	I min enhet er folk villige til å hjelpe hverandre.
	5	Communication within my unit is open and free.	Det er fri og åpen kommunikasjon i min enhet.
Clarity of goals	6	In my unit, both the work and interpersonal relations are important.	I min enhet er både oppgavegjennomføring og sosiale relasjoner viktig.
	7	Information is shared well in my unit.	Min enhet preges av god informasjonsdeling.
	1	The future direction of this organization is clearly communicated to everyone.	Organisasjonens fremtidige retning blir klart og tydelig kommunisert til alle.
	2	Everyone who works here are aware of this organizations' plans and direction.	Alle som jobber her er bevisst på organisasjonens fremtidsplaner.
Internal cooperation	3	The employees have a clear understanding of this organizations' aims.	De ansatte har en god forståelse av organisasjonens formål.
	1	My organization attaches importance to maintaining a harmonious environment that is conducive to cooperation.	Det er viktig for organisasjonen å opprettholde et harmonisk samarbeidsklima.
	2	There is a great deal of cooperation between my unit and other units.	Det er stor grad av samarbeid mellom enhetene i organisasjonen.
	3	Employees in other units seem unwilling to share their knowledge with others. (Reversed)	Ansatte i andre enheter virker lite villige til å dele sin kunnskap med andre. (Reversert)
	4	My colleagues in other units are very willing to cooperate.	Jeg oppfatter mine medarbeidere i andre enheter som samarbeidsvillige.
Work pressure	5	The various units pull together to achieve the organizations' goals.	De ulike enhetene står samlet for å nå organisasjonens mål.
	1	I am expected to do too much during the course of a day.	Det forventes for mye av meg i løpet av en dag.
	2	I am required to work very hard.	Det kreves at jeg jobber veldig hardt.
Work engagement	3	I am under great pressure to meet my targets.	Jeg er under sterkt press for å nå målsettinger.
	1	I am full of energy at work.	Jeg er full av energi på jobb.
	2	I am enthusiastic about my work.	Jeg er entusiastisk i jobben min.
	3	My job inspires me.	Jeg blir inspirert av jobben min.
	4	I want to go to work when I get up in the morning.	Jeg har lyst til å gå på jobb når jeg står opp om morgenen.
	5	I feel happy when I am immersed in my work.	Jeg føler meg glad når jeg er fordypet i arbeidet mitt.
Extra-role behavior	6	I get completely carried away by my work.	Jeg blir fullstendig revet med av arbeidet mitt.
	1	I often take on tasks without being asked.	Jeg påtar meg ofte oppgaver uoppfordret.
	2	I often help others in my unit even though it is not strictly speaking part of my job.	Jeg bistår ofte enheten min selv om det strengt tatt ikke er en del av jobben.
	3	I get involved to help create the best possible working environment for the unit.	Jeg involverer meg for at enheten skal ha det best mulig.
Burnout (Exhaustion facet)	4	I help others in my unit to learn more about our various work tasks.	Jeg hjelper andre i min enhet til å lære mer om arbeidsoppgavene.
	1	I often feel worn out.	Jeg føler meg ofte utslitt.
	2	I often feel physically exhausted.	Jeg føler meg ofte fysisk utmattet.
	3	I often feel emotionally exhausted.	Jeg føler meg ofte emosjonelt utmattet.
	4	I often feel tired.	Jeg føler meg ofte trøtt.

(continued)

Appendix B (continued)

Scale	Item no.	English item	Norwegian item
Burnout (Cynicism facet)	1	I have become less interested in my work since I started in this job.	Jeg har blitt mindre interessert i arbeidet mitt siden jeg startet i denne jobben.
	2	I have become less enthusiastic about my work.	Jeg har blitt mindre entusiastisk i arbeidet mitt.
	3	I have become more cynical about whether my work contributes to anything.	Jeg har blitt mer kynisk med tanke på om arbeidet mitt bidrar til noe.
Turnover intention	1	I often think about leaving my current job.	Jeg tenker ofte på å slutte i min nåværende jobb.
	2	I may leave my current job during the course of this year.	Jeg kan komme til å slutte i min nåværende jobb i løpet av året.
	3	I will probably actively look for a new job during the course of the next year.	Jeg vil sannsynligvis lete aktivt etter en ny jobb det neste året.