Workplace design

Conceptualizing and measuring workplace characteristics for motivation

Maria Karanika-Murray
Division of Psychology, Nottingham Trent University, Nottingham, UK, and
George Michaelides
Department of Organizational Psychology, Birkbeck, University of London, London, UK

Abstract

Purpose – Although both job design and its broader context are likely to drive motivation, little is known about the specific workplace characteristics that are important for motivation. The purpose of this paper is to present the Workplace Characteristics Model, which describes the workplace characteristics that can foster motivation, and the corresponding multilevel Workplace Design Questionnaire.

Design/methodology/approach – The model is configured as nine workplace attributes describing climate for motivation at two levels, psychological and organizational. The multilevel multi-time questionnaire was validated with data from 4,287 individuals and 212 workplaces and with integrated regulation as the criterion outcome.

Findings – Multilevel factor analysis and regression indicated good internal reliability, construct validity, and stability over time, and excellent concurrent and predictive validity of the questionnaire.

Practical implications – The model could help to optimize job and workplace design by contextualizing motivation. The questionnaire offers advancement over single-level climate measures as it is validated simultaneously at two levels. Further research can focus on overcoming the low response rate typical for online surveys, on need fulfillment as the mediating variable, and on the joint influence of job and workplace characteristics on organizational behavior.

Originality/value – This work responds to calls to incorporate context in research into organizational behavior and job design. An understanding of the workplace is a first step in this direction. This questionnaire is the first to be validated at multiple levels of analysis. Ultimately, workplace design could support job design and the development of inherently motivating workplaces.

Keywords Motivation, Climate, Job design, Workplace Characteristics Model, Workplace design, Workplace Design Questionnaire

Paper type Research paper

Building on the cornerstone Job Characteristics Model (Hackman and Oldham, 1975), a substantial body of job design research has focussed on the relationship between job attributes and organizational behavior (Morgeson and Campion, 2003). In recent years, however, scholars have argued for the importance of the broader context in organizational behavior (Bamberger, 2008; Grant *et al.*, 2010; Johns, 2006, 2010; Rousseau, 2011; Rousseau and Fried, 2001). Because of the shared nature of work, if we try to understand individual experiences by focussing on either the job or the work environment only, we are likely to fail. It is therefore important to understand the attributes of the workplace, beyond the immediate job, in relation to work outcomes and organizational behavior. To address this,

Journal of Organizational Effectiveness: People and Performance
Vol. 2 No. 3, 2015
pp. 224-243

2051-6614
DOI 10.1108/JOEPP-08-2014-0048

This research was supported by the UK Economic and Social Research Council's First Grant Scheme (Grant Number RES-061-25-0344, 2009-2011) awarded to Dr Maria Karanika-Murray.

we present the Workplace Characteristics Model (WPCM) that describes the attributes of the workplace that have a motivating potential and present the development of the multilevel Workplace Design Questionnaire (WPDQ) to assess these, in this way testing the model.

The WPCM

The WPCM is grounded on the axiom that individuals working in a given workplace are not independent from each other or their shared environment. Rather, to paraphrase Schneider (1990), individuals share and shape their workplace. Furthermore, the job and the workplace provide the environmental context to the work experience. Understanding the attributes of meaningful and motivating workplaces can add to our understanding of meaningful and motivating jobs. The WPCM posits that a number of workplace attributes can increase the probability that individuals will find jobs meaningful and worthwhile, as reflected in their increased motivation. Here, we present the model's main elements before we outline its constituent attributes.

Motivation as the criterion outcome

Motivation to engage with work and perform well is fundamental in organizational behavior. Indeed, job design theory places motivation as the causal output of job characteristics (Job Characteristics Model, Hackman and Oldham, 1975; Work Characteristics Model (WCM), Morgeson and Humphrey, 2006). But motivation is also sourced in the workplace climate (Parker *et al.*, 2003), such that "system norms and values provide a climate that primes a particular motivational orientation within an organization" (Zaccaro *et al.*, 2008, p. 333). In conceptualizing the attributes of the workplace for motivation, we can go beyond motivational orientation and the drive to act. In line with Self-Determination Theory (SDT; Deci and Ryan, 1985, 2000; Ryan and Deci, 2000a) we view the sense that individuals' own behavior originates in themselves as the ultimate in motivation. People function and develop most effectively as a consequence of social-environmental supports for motivation. A clearer understanding of how the workplace impacts on motivation can help to transcend the dominant modus operandi of focussing on individuals' job experiences and overlooking the effects of the broader context (Johns, 2010; Rousseau and Fried, 2001). Because SDT goes beyond the notion of meaningful jobs to describe the broader context for motivation, it offers an appropriate lens for the WPCM.

The shared nature of work

The shared nature of the workplace among individuals who work together and the workplace attributes that emerge from that are at the core of the WPCM. As Mowday and Sutton (1993) observe, "organization members do not think, feel, or behave in isolation" (p. 205) but they internalize (Gruys *et al.*, 2008) and enact values and beliefs common in the workplace. Furthermore, through processes of social interaction and from the groups that individuals belong to (Hackman, 1992), collective experiences emerge within groups of individuals who work together (Morgeson and Hofmann, 1999). These shared understandings are similar but not tautological to personal experiences (Morgeson and Hofmann, 1999). Although the notion of shared meaning is not new (Morgeson and Hofmann, 1999), it has largely been neglected in organizational behavior research. Thus, the WPCM distinguishes between the personal and shared perceptions of the workplace.

Workplace characteristics reflect the job and the work environment

Following the JCM and SDT, both the immediate job and the workplace or the broader environment in which the job is carried out are likely to determine motivation. The job design and self-determination literatures can be viewed as the provenance of workplace design and a starting point for identifying the workplace attributes that can foster motivation, as outlined below.

The JCM describes the core attributes of meaningful jobs that have a motivating potential and, in the longer term, can lead to higher overall job satisfaction and quality work outcomes (Oldham and Hackman, 2010). However, some job characteristics can also represent shared experiences of the workplace. For example, autonomy is an emergent property of the workplace as much as it is a characteristic of the job. Autonomy-supportive environments can promote performance and motivation (Vansteenkiste *et al.*, 2004). Similarly, feedback, which is influenced by communication and social comparison processes (Festinger, 1954), can be sourced in the workplace context. Furthermore, social support is a ubiquitous resource that can be sourced in colleagues or managers, potentially describing an emergent property of the workplace (e.g. sense of community).

Additional attributes unique to the workplace can also help to foster motivation. The WCM (Morgeson and Humphrey, 2006) extends the JCM by including aspects of the work context (i.e. ergonomics, physical demands, work conditions, equipment use) and acknowledging context as "the link between jobs and the broader environment" (p. 1322). However, use of single-level models of personal experiences to describe the uniqueness of the workplace would not be appropriate here. Similarly, aggregation of individual-level constructs to describe shared properties of the workplace would not be without problems. Therefore, it would be imprudent to base a theory of workplace attributes for motivation on the job design literature only.

A complementary path is offered by SDT, which focusses on the social-environmental conditions that enhance volition, self-regulation, and healthy psychological adjustment (Deci *et al.*, 1989; Deci and Ryan, 1985, 2000; Ryan and Deci, 2000a). According to SDT, "human beings [are] proactive organisms whose natural or intrinsic functioning can be either facilitated or impeded by the social context" (Deci *et al.*, 1994, p. 120). It suggests that the environment can facilitate motivation by supporting or thwarting three universal innate psychological needs: autonomy ("experiencing choice and feeling like the initiator of one's own actions"), competence ("succeeding at optimally challenging tasks and being able to attain desired outcomes"), and relatedness ("establishing a sense of mutual reliance with others," Baard *et al.*, 2004, p. 2046; Ryan and Deci, 2000b). Achieving autonomy, competence, and relatedness are essential for motivation (Baumeister and Leary, 1995; Deci and Ryan, 2000; Ilardi *et al.*, 1993), engagement (Meyer and Gagné, 2008), and performance (Baard *et al.*, 2004). Here, the autonomy-competence-relatedness triptych offers a useful configural approach to identifying the workplace attributes that can foster motivation.

Workplace characteristics for motivation

Based on these foundations, the WPCM describes a range of characteristics of the workplace context that can foster motivation. The process of identifying these included consultation the relevant literatures, interviews with experts, and piloting of the framework Michaelides and Karanika-Murray (2012). Here, we summarize the process but refer the reader to Michaelides and Karanika-Murray (2012) for a more detailed account of the specific steps. First, a range of workplace characteristics relevant to motivation were identified via a critical literature review. We used an iterative process

of conceptual analysis and debate to reach agreement on the most pertinent factors. We decided to limit the search to the workplace rather than broader organizational factors such as size or sector, because the latter are not amenable to change by design. Second, a qualitative interview study was used to explore the emergent pool of attributes with HR managers and health and well-being specialists. Finally, a pilot quantitative survey study was conducted with a distinct sample from one organization and six workplaces to assess the face validity of the model, adapt ambiguous items, and eliminate obsolete items. The Appendix lists the resulting workplace attributes, which are presented next.

Autonomy-supportive workplace characteristics: decision making, work scheduling, and role flexibility

Autonomy-supportive attributes of the workplace are those that can enable individuals to make decisions independently, to choose how to schedule or plan their work, and that allow them to be flexible and adaptable in fulfilling their roles. Decision-making or control is integral for motivation (JCM, Hackman and Oldham, 1975) and well-being (Demand-Control-Support Model, Karasek and Theorell, 1990). The main consideration here is that autonomy originates in the workplace rather than the job. Furthermore, work planning refers to the opportunities in the workplace that allow individuals some leeway in scheduling their work. Finally, role flexibility, the ability to adapt work roles to the needs of the situation, is viewed as an essential environmental resource (Wrzesniewski and Dutton, 2001). These three dimensions describe a workplace that is characterized by control, initiative, participation, and flexibility, allowing individuals to perceive themselves as the initiators of their own actions, thus facilitating motivation.

Competence-supportive workplace characteristics: feedback, appreciation, and supportive management

This dimension describes the attributes of the workplace that provide non-controlling feedback, where work effort is appreciated, and where the management is supportive. Feedback, or the degree to which there is clear and useable information on the effectiveness of one's work, is a core job dimension that can lead to positive outcomes by enhancing knowledge of results (Hackman and Oldham, 1975) and supporting self-determination (Ryan, 1982; Deci *et al.*, 1989). Here, feedback relates not to personal task feedback but also an attitude to sharing, offering, and accepting feedback among colleagues. Furthermore, appreciation, or the degree to which work effort is appreciated and personal recognition tends to be provided in the workplace, is also an important motivational work attribute that has been linked to successful coping and adaptation (Bakker *et al.*, 2007). Finally, the degree to which the management of the workplace shows concern and provides support to the employees can also support competence and motivation. Akin to the concept of transformational leadership (Rafferty and Griffin, 2004) management support in the form of consideration, encouragement, guidance, and direction is integral for supporting the need for competence and internal motivation.

Relatedness-supportive workplace characteristics: social support, trust, and sense of community

Workplaces that provide opportunities to establish a sense of connection and mutual reliance with colleagues, and are characterized by support among colleagues, trust, and a sense of community, are those that can also support an individual's relatedness.

Social support has been consistently linked with job satisfaction (de Jonge *et al.*, 2001) and can guard against high demands and low control (Karasek and Theorell, 1990). As an attribute of the workplace, social support describes not necessarily one-on-one task or personal support but rather an amicable and collegial interpersonal climate. Related to this, trust is essential where interdependence and working together efficiently is important (Mayer *et al.*, 1995) for organizational citizenship behavior and collegiality (McMillan and Chavis, 1986). Finally, a sense of community is important for developing a feeling of belonging and willingness for personal investment (McMillan and Chavis, 1986), therefore supporting the need for relatedness and increasing motivation.

The WPDQ

A measure that adequately captures the identified workplace attributes would be a measure of climate for motivation that distinguishes between personal and shared perceptions of the workplace. Climate represents a set of properties of the work environment that can impact on individual and organizational outcomes (Patterson *et al.*, 2005). A domain-specific perspective that incorporates both individual and collective representations of the climate offers the greatest potential for conceptualizing the workplace attributes for motivation. Although the relationship between climate and motivation is well established (Parker *et al.*, 2003), to our knowledge no available job design or climate measure can achieves this.

The WPCM describes a domain-specific rather than generic climate (Schneider, 1990; Schneider *et al.*, 2013). Because the focus of the climate measure matches the focus of the target outcomes, domain-specific climates have better predictive validity (Schneider, 1990; Schneider *et al.*, 2013). Here, the domain is motivation. Furthermore, the WPCM views climate at both individual and group levels of analysis (Schneider *et al.*, 2013). The psychological climate perspective argues that appraisals of the workplace are made by individuals and have a cognitive foundation (James, 1982; James *et al.*, 2008). Where agreement is high among individuals in the same workplace, aggregate scores of attitudinal measures describe organizational climate (Gillespie *et al.*, 2008). The organizational perspective, on the other hand, suggests that climate is an emergent property of the workplace (Schneider *et al.*, 2013).

It has been argued that because organizational climate is an emergent phenomenon, it should not be viewed as an aggregate of individuals' perceptions (Glick, 1985). However, we propose that combining both levels into a single multilevel measure is not only possible by using the workplace as the reference but is also advantageous for a range of reasons. It can help to addresses the tendency to use aggregation at the cost of ignoring individual variation, preventing errors of atomistic, and ecological fallacies (Diez-Roux, 1998). It can circumvent conceptual problems of aggregating measures developed at different levels. By integrating two different sources of variation, it can also explain variability both between groups and within the same group and avoid reducing rich data to central tendencies. Finally, a multilevel questionnaire would also have stronger construct validity. Currently, even well-developed organizational climate measures tend to be validated at the individual level (e.g. Patterson *et al.*, 2005).

Any measure should exhibit strong concurrent and predictive validity. A model of workplace attributes for motivation naturally has internal motivation as the criterion outcome. According to SDT, any environmental input can either be supporting or controlling and thwarting motivation and adjustment (Deci and Ryan, 1985; Ryan and Deci, 2000a). In the workplace, four motivation constructs are relevant, each closer to intrinsic motivation: extrinsic, introjected, identified, and integrated regulation. Here, the

criterion outcome is integrated regulation, or "the most autonomous form of extrinsic motivation," where "the more one internalizes the reasons for an action and assimilates them to the self, the more one's extrinsically motivated actions become self-determined" (Ryan and Deci, 2000c, p. 62). (Please note that although analyses were carried out on extrinsic, introjected, identified, and integrated regulation, only the results for integrated regulation are presented here. The analyses indicated progressively stronger support for internal motivation. Interested readers can contact the authors for the results). Because group-level constructs can explain additional variance in individual outcomes beyond the corresponding individual-level predictors (Spell and Arnold, 2007), we expect that both psychological and organizational climate levels will predict motivation:

H1. Workplace characteristics (at both psychological and organizational climate levels) will have a positive relationship with motivation (integrated regulation).

Method

Questionnaire development

The development of the WPDQ followed three principles. First, the referent-shift consensus model (Chan, 1998), where the intended nesting is used as the item referent, was used to phrase the items. Here, the referent was participants' workplace, which consists of co-located and interdependent individuals, focussing on one type of work activity, and reporting to one line manager. Within-group agreement tends to be higher when items have a group referent such as the first person plural personal pronoun "we" (Klein and Kozlowski, 2000a). Consequently, respondents were asked to indicate how true a range of statements were: "Considering the working conditions in your workplace in the last three months, indicate how true the following statements are for you. "In my workplace […]." Second, a seven-point Likert response scale was used (1 = strongly disagree to 7 = strongly agree) as seven points provide a better approximation to an interval scale than five points. Finally, because negatively worded items do not always denote opposites of the construct but can form a distinct dimension (Idaszak and Drasgow, 1987), all items were positively worded.

Overall, five or six items were developed for each attribute by adapting items from existing scales, adjusting wording, and adding new items. For example, the item "the job allows me to decide on the order in which things are done on the job" (Morgeson and Humphrey, 2006) was rephrased as "we can decide on the order in which things are done." As mentioned, a pilot study in one organization with six workplaces was conducted with a distinct sample Michaelides and Karanika-Murray, 2012 to assess the measure's face validity and to conduct preliminary psychometric analyses (inter-item correlations, scale loadings). A balance between questionnaire reliability and length was aimed for. This process resulted in a total of 29 items (see the Appendix). Here, we expand on these findings to report on the measure's concurrent and predictive validity.

Participants and procedure

In total, 17 UK organizations from a range of sectors (manufacturing, education, advertising, construction, finance, retail, emergency services, and local government) took part. A total of 10,004 questionnaires were collected online from 4,838 individuals and 278 workplaces, at four data collection waves with a three-month lag. Response rates ranged from 5 to 21 percent, which is typical of online questionnaires (e.g. Kaplowitz *et al.*, 2004) and in cases where line managers do not actively encourage

employees to participate. To ensure representativeness of the between-level estimates, workplaces with $n < 5$ were excluded from the analyses, reducing the sample to 8,912 questionnaires (4,597 individuals from 241 workplaces).

To ensure that agreement was adequate for aggregation, the $r_{wg(J)}$ for multiple items was calculated for each climate dimension (James *et al.*, 1984). While an $r_{wg(J)} > 0.70$ is considered adequate for aggregation, the values are largely affected by group size and for large groups this can be a very conservative estimate (Dunlap *et al.*, 2003). Therefore, instead of relying on the 0.70 cut-off value we evaluated the significance of the $r_{wg(J)}$ scores for each workgroup (Dunlap *et al.*, 2003), removing workplaces with non-significant $r_{wg(J)}$. Mmedian values for the $r_{wg(J)}$ scores ranged from 0.81 to 0.95, calculated separately for each data collection wave.

This preparation yielded a final of 8,316 observations from 4,287 individuals in 212 workplaces (65.4 percent women $M_{age} = 42.5$ years, age range: 18-69 years) (2,026 respondents completed the questionnaire once, 1,006 twice, 742 three times, and 513 four times). The majority (50.8 percent) were educated at secondary level, 34.2 percent had an undergraduate, and 15.0 percent a postgraduate degree. Job tenure was 10.7 years (range: under 1 to 48.9 years). A range of occupations were represented: administrative, manual, professionals, services, and management.

Measures

The WPDQ was used to assess the nine workplace characteristics, as described above. The Motivation at Work Scale (MAWS; Gagné *et al.*, 2010) was used to assess motivation and specifically integrated regulation (e.g. "because I enjoy this work very much") on a seven-point Likert scale (1 = completely disagree to 7 = completely agree). MAWS has been shown to have good psychometric properties in a range of occupational samples and sectors (Gagné *et al.*, 2010). Age and gender were correlated with motivation and were therefore used as control variables.

Analytical procedure

Analyses were performed with R 2.15.3 (R Core Team, 2014) and M*plus* 4.21 (Muthén and Muthén, 1998-2010). A four-step process to examining the questionnaire's factor structure and reliability was used. First, a second-order single-level confirmatory factor analysis (CFA) model was tested using data from wave 1. To account for the nested nature of the data, a sandwich estimator was used to estimate maximum likelihood with robust standard errors and χ^2. Expectation maximization was used in the maximum likelihood estimation of the covariance matrix. Second, the higher order part of the model was tested and refined using item parceling with a multilevel confirmatory factor analysis (MCFA). For the first two steps the model was developed using data from the first data collection wave and refitted using data from the subsequent waves. Third, stability over time of the MCFA model was evaluated with data from data collection waves 2-4. A multi-group approach was used to compare the structure and stability of the factor loadings and intercepts of models from the first and subsequent waves. The multi-group approach rather than latent growth modeling (Vandenberg and Lance, 2000) was preferred, as the latter would have required participants from all four data collection waves, restricting the usable sample size. Finally, the validity of the questionnaire was evaluated against motivation as the concurrent outcome (*H1*) using concurrent measurements (concurrent validity) and lagged measurements (predictive validity). For these models all data collection waves were used with individual-level repeated observations nested in individuals, and group-level repeated measures nested

in workplaces. For the latter, the interaction between workplaces and data collection wave was adopted to avoid using two random effects for the time variable (or two growth curves), which can complicate interpretation. Subsequently, the two groupings were specified as a crossed-classified (non-nested) instead of a using three-level structure. An additional fourth level was added to account for organizational-level variation. As such, the model involved three random intercepts (for individuals, for the interaction between workplaces and time, and for the organizations) and one random slope (for the individual growth curve). The exact equation used for evaluating the predictive validity of the questionnaire is available from the authors.

Results

Factor structure: second-order CFA and MCFA

A range of indices are used to interpret the overall fit of the measure. These include the χ^2 (and $\Delta\chi^2$ for comparing models), comparative fit index (CFI), Tucker-Lewis index (TLI), the root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). Higher CFI and TLI values (> 0.90) and lower RMSEA ($\leqslant 0.05$) and SRMR ($\leqslant 0.80$) values generally indicate good fit (Hu and Bentler, 1999).

The results for the second-order single-level CFA indicate very good fit for the model, with χ^2 (365) = 1,725.69 ($N_{\text{individuals}} = 2{,}374$, $N_{\text{workplaces}} = 154$), CFI = 0.96, TLI = 0.96, RMSEA = 0.04, and SMRM = 0.06. The results were comparable for wave 2 ($\chi^2(365) = 1{,}962.61$, $N_{\text{individuals}} = 2{,}548$, $N_{\text{workplaces}} = 186$), wave 3 ($\chi^2(365) = 1{,}573.58$, $N_{\text{individuals}} = 1{,}855$, $N_{\text{workplaces}} = 156$), and wave 4 ($\chi^2(365) = 1{,}403.94$, $N_{\text{individuals}} = 1{,}539$, $N_{\text{workplaces}} = 147$). All other indices were the same as for wave 1, with the exception of wave 3 CFI = 0.97. In comparison, a model with nine first-order factors but a single second-level factor showed fairly good fit ($\chi^2(365) = 3{,}667.67$ ($N_{\text{individuals}} = 2{,}374$, $N_{\text{workplaces}} = 154$), CFI = 0.91, TLI = 0.90, RMSEA = 0.06, and SMRM = 0.10) but fared significantly worse than the three-factor model as indicated by the Satorra-Bentler test ($\Delta\chi^2 = 282.06$, $p < 0.001$) (Satorra and Bentler, 2001). The coefficients of the model developed using data from the first data collection are available from the authors.

For the MCFA, a model with three latent variables and nine indicators (the nine dimensions obtained using CFA) was tested. The MCFA models were examined for each wave using two different aggregation methods for the first-order factors: as factor scores estimated by M*plus* using the loadings as weights (parceled factors estimated from single-level model) and as means of the original items (parceled factors estimated as means of the items). This allowed to obtain consistent results regardless of the items parceling method (using the single-level analysis or directly using the means). For responses with missing values on any of the indicators the mean scores were estimated using the available indicators.

Table I shows the means (M) and standard deviations (SD), ICC values and associated F scores, Cronbach's α reliability coefficients and correlations (r) for all first-order factors. Although the ICC values are relatively low, the associated F-statistic was significant for all variables, indicating that we can reliably distinguish between different workplaces based on their scores. Further experimentation with subsets of the data set revealed that the ICC values were not consistent in different organizations, which can be explained by between-organization differences in climate. For example, if autonomy is more important in one organization, more variance would be explained by workplace in that specific organization.

Table I.
Cronbach's α, ICC1 and ICC2 reliability coefficients, F-values, means, standard deviations, and correlations among parceled first-order factors

	α	ICC1	ICC2	F	M	SD	1	2	3	4	5	6	7	8
1 Decision making	0.82	0.07	0.53	2.14 (153, 2,216)***	5.42	1.25								
2 Work planning	0.91	0.08	0.56	2.29 (153, 2,214)***	5.67	1.20	0.71							
3 Role flexibility	0.90	0.05	0.45	1.80 (153, 2,181)***	5.42	1.20	0.53	0.52						
4 Feedback	0.86	0.04	0.38	1.61 (153, 2,091)***	4.37	1.41	0.37	0.34	0.43					
5 Appreciation	0.92	0.04	0.40	1.67 (153, 2,087)***	4.35	1.62	0.37	0.34	0.42	0.79				
6 Supportive management	0.95	0.05	0.44	1.78 (153, 2,071)***	4.65	1.57	0.39	0.35	0.41	0.65	0.78			
7 Social support	0.89	0.03	0.30	1.44 (153, 2,077)***	5.51	1.09	0.29	0.29	0.32	0.37	0.38	0.43		
8 Trust	0.84	0.02	0.22	1.28 (153, 2,072)*	5.48	1.14	0.34	0.33	0.37	0.45	0.49	0.54	0.50	
9 Sense of community	0.95	0.05	0.43	1.77 (153, 2,076)***	5.43	1.31	0.29	0.29	0.36	0.40	0.44	0.44	0.52	0.68

Notes: Mean scores were used for the parceling of the items. Results obtained using the parceled factors estimated from the first model were comparable. All correlations: $p \leqslant 0.001$; *$p \leqslant 0.05$; **$p \leqslant 0.01$; ***$p \leqslant 0.001$

Table II shows the MCFA results for each of the four data collection waves using both parceling techniques. The models that used loadings weighting were marginally better than the models that used mean scores. However, the results were close enough to suggest that adopting the simpler approach of mean scores in future research is preferable ($\chi^2(57) = 464.49$, $N_{\text{individuals}} = 2{,}200$, $N_{\text{workplaces}} = 154$), CFI = 0.96, TLI = 0.95, RMSEA = 0.06, $\text{SMRM}_{\text{within}} = 0.05$, and $\text{SMRM}_{\text{between}} = 0.17$). All models had very good fit. Although the literature recommends SMRM values of above 0.08, the $\text{SMRM}_{\text{between}}$ value in all models tested was consistently above 0.08. However we do not consider this to be a problem as these recommendations apply to the within level and to our knowledge, no empirical evaluations of the SRMR of simulated multilevel data exist. Finally, we evaluated a single factor two-level model for comparison purposes. The results showed that the single factor model did not fit the data well ($\chi^2(63) = 2{,}943.80$, $N_{\text{individuals}} = 2{,}200$, $N_{\text{workplaces}} = 154$), CFI = 0.67, TLI = 0.63, RMSEA = 0.14, $\text{SMRM}_{\text{within}} = 0.11$, and $\text{SMRM}_{\text{between}} = 0.83$) indicating that the three factor model is preferable. Model coefficients are presented in Table III.

Measurement invariance

Measurement invariance was examined using a multi-group comparison between the four data collection waves and examining invariance of the factor loadings and of the intercepts. To ensure the versatility and robustness of the measure we used the mean estimates of the factor scores with multilevel CFA models, as discussed above. The tests involved comparing a baseline model with no measurement invariance (everything allowed to vary) to models with different invariance restrictions using the Satorra-Bentler $\Delta\chi^2$-test (Satorra and Bentler, 2001). Table IV shows all model comparisons where a non-significant effect indicates measurement invariance. The restricted (invariant)

	Wave 1	Wave 2	Wave 3	Wave 4
Parceled factors estimated from single-level model				
$N_{\text{individuals}}$	2,374	2,548	1,855	1,539
$N_{\text{workplaces}}$	154	186	156	147
χ^2 (57)	426.208	392.35	301.69	282.57
CF1	0.98	0.98	0.98	0.98
TLI	0.98	0.98	0.98	0.98
RMSEA	0.05	0.05	0.05	0.05
$\text{SRMR}_{\text{within}}$	0.05	0.05	0.05	0.05
$\text{SRMR}_{\text{between}}$	0.15	0.18	0.20	0.47
Parceled factors estimated as means of the items				
$N_{\text{individuals}}$	2,200	2,411	1,752	1,459
$N_{\text{workplaces}}$	154	186	156	147
χ^2 (57)	464.49	412.42	327.47	285.58
CF1	0.96	0.97	97	0.97
TLI	0.95	0.96	0.96	0.96
RMSEA	0.05	0.05	0.05	0.05
$\text{SRMR}_{\text{within}}$	0.05	0.05	0.05	0.05
$\text{SRMR}_{\text{between}}$	0.17	0.23	0.25	0.25

Note: *n* is smaller when parceling is based on means because of missing values

Table II.
Fit indices for the MCFA model

	Psychological climate			Organizational climate		
	Estimate	SE	Standardized	Estimate	SE	Standardized
Autonomy-supportive climate dimensions						
Decision making	1.00	–	0.84	1.00	–	1.00
Work planning	0.93	0.03	0.81	0.91	0.16	1.00
Role flexibility	0.75	0.03	0.64	0.61	0.08	0.99
Competence-supportive climate dimensions						
Feedback	1.00	–	0.83	1.00	–	0.99
Appreciation	1.31	0.03	0.94	1.32	0.28	0.99
Supportive management	1.09	0.03	0.82	2.05	0.52	0.99
Relatedness-supportive climate dimensions						
Social support	1.00	–	0.62	1.00	–	0.99
Trust	1.43	0.07	0.84	1.07	0.28	0.99
Sense of community	1.52	0.07	0.80	1.83	0.48	0.99
Correlations						
Autonomy – Competence	0.60	0.04	0.52	0.03	0.01	0.56
Competence – Relatedness	0.48	0.03	0.63	0.02	0.01	0.74
Autonomy – Relatedness	0.35	0.03	0.52	0.02	0.01	0.40

Note: All $p \leqslant 0.001$

Table III.
Model coefficients for the MCFA model

	No invariance (baseline)	Within factor loadings	Between factor loadings	All factor loadings	Partial invariance: within factor	Partial invariance: all loadings	Intercepts
χ^2 (df)	1,538.84 (228)	1,533.87 (246)	1,504.01 (246)	1,506.69 (264)	1,526.08 (245)	1,492.59 (263)	1,561.05 (290)
Scaling	0.97	1.01	1.02	1.05	0.99	1.05	1.06
$\Delta\chi^2$ (df)		35.22** (18)	25.09 (18)	58.15* (36)	23.85 (17)	46.29 (35)	78.99 *** (27)
CFI	0.96	0.96	0.96	0.96	0.96	0.96	0.96
TLI	0.95	0.95	0.96	0.96	0.95	0.96	0.96
RMSEA	0.05	0.05	0.05	0.05	0.05	0.05	0.05
$SRMR_{within}$	0.05	0.05	0.05	0.05	0.05	0.05	0.05
$SRMR_{between}$	0.23	0.22	0.18	0.18	0.23	0.18	0.17

Notes: No invariance: baseline model where all parameters are allowed to vary between the different data collection waves; within factor loadings: within factor loadings are restricted to be equal for all four waves; between factor loadings: between factor loadings are restricted to be equal for all four waves; all factor loadings: both within and between factor loadings are restricted to be equal for all four waves; partial invariance within: within factor loading are restricted to be equal for all four waves except role flexibility; partial invariance all loadings: both within and between factor loadings are restricted to be equal for all four waves except role flexibility; intercepts: intercepts are fixed. *$p \leqslant 0.05$; **$p \leqslant 0.01$; ***$p \leqslant 0.001$

Table IV.
Measurement invariance

model is as good as the baseline model where everything is allowed to vary. Overall, the results supported full invariance at the between level, partial invariance at the within level, where role flexibility is not invariant but everything else is, and no support for intercept invariance.

Concurrent and predictive validity

To evaluate the concurrent and predictive validity of the measure the analyses examined whether the within- and between-level latent variables predicted integrated regulation. The scale scores were estimated as means of the original items, which were then aggregated to form the workplace-level measures and to group-center the repeated observations. Table V presents the results of the growth models with concurrent measurement of both predictors and outcomes (concurrent validity). Table VI presents the equivalent models tested with a three-month time-lag for the outcomes (predictive validity). Supporting the hypothesis, excellent concurrent and predictive validity at both levels was observed.

Discussion

The present paper offered a way to conceptualize the attributes of the workplace that can support individual motivation and presented a measure and a study to test this model. The potential for developing the concept of workplace design is based on three observations: that individuals share and shape their workplace; that attributes of the workplace have a motivating potential in the same way that characteristics of the job have a motivating potential; and that these attributes can be described as both personal and collective experiences of the shared workplace. The WPCM consists of nine attributes of the workplace for motivation grouped under three climate dimensions (autonomy, competence, and relatedness). Motivation here is conceptualized not merely as drive but as a sense that individuals' own behavior originates in themselves

	Intrinsic motivation		
Fixed effects	*B*	*SE*	*LRT*
(Intercept)	0.47	0.29	
Wave	−0.05	0.01	21.74***
Age	0.01	0.00	10.21***
Gender (male)	−0.06	0.04	2.76
Autonomy(PC)	0.16	0.02	102.39***
Competence(PC)	0.21	0.01	252.56***
Relatedness(PC)	0.20	0.02	136.67***
Autonomy(OC)	0.18	0.05	15.44***
Competence(OC)	0.25	0.04	46.87***
Relatedness(OC)	0.31	0.05	37.56***
Random effects	*Var*		*Corr*
Individuals: intercept	1.03		
Individuals: wave	0.02		−0.31
Workplaces: intercept	0.01		
Organizations: intercept	0.08		
Residual	0.42		
Log likelihood	−10,547		

Notes: $N_{organizations} = 17$; $N_{workplaces} = 639$ (total for all data collection waves – 208 unique workplaces); intrinsic motivation $N_{observations} = 7{,}448$, $N_{individuals} = 3{,}716$. The referent category for gender is "female,". Autonomy (PC), competence (PC), and relatedness (PC) refer to psychological climate attibutes; autonomy (OC), competence (OC), and relatedness (OC) refer to the corresponding organizational climate attributes. Corr shows the correlation between the random effects for the individual level (intercept and β-coefficient for wave). The significance of individual predictors was assessed as a likelihood ratio test (LRT) between models with and without each of the predictors. *$p \leqslant 0.05$; **$p \leqslant 0.01$; ***$p \leqslant 0.001$

Table V.
Concurrent validity: growth model with concurrent DV and IVs

	Intrinsic motivation		
Fixed effects	*B*	*SE*	*LRT*
(Intercept)	0.82	0.47	
Wave	−0.02	0.02	0.64
Age	0.01	0.00	8.41**
Gender (male)	−0.04	0.06	0.48
Autonomy PC	0.08	0.02	9.43**
Competence PC	0.16	0.02	63.11***
Relatedness PC	0.14	0.03	30.39***
Autonomy OC	0.18	0.08	5.36*
Competence OC	0.23	0.06	12.57***
Relatedness OC	0.22	0.09	6.40*
Random effects	*Var*		*Corr*
Individuals: intercept	1.07		
Individuals: wave	0.03		−0.32
Workplaces: intercept	0.04		
Organizations: intercept	0.10		
Residual	0.49		
Log likelihood	−5,215		

Table VI.
Predictive validity: growth model with lagged time DV and IVs

Notes: $N_{\text{organizations}} = 17$, $N_{\text{workplaces}} = 434$ (total for all data collection waves – 181 unique workplaces); intrinsic motivation $N_{\text{observations}} = 3{,}468$, $N_{\text{individuals}} = 1{,}930$. The remainder notes are as for Table V. *$p \leqslant 0.05$; **$p \leqslant 0.01$; ***$p \leqslant 0.001$

(Baard *et al.*, 2004). These attributes exist as both individual perceptions of the workplace and the shared perceptions of individuals in a given workplace and can therefore be assessed at two levels, as psychological or organizational climate.

A test of the model with integrated regulation was offered in line with SDT in order to validate the corresponding WPDQ. The WPDQ has was found to have good internal consistency and stability at both the single and multilevel configurations over four time points (covering a total of ten months). Tested using data collected at different times, analysis of measurement invariance showed that the same items resulted in the same configurations and revealed comparable relationships between items and latent constructs. The only exception was flexibility at the individual level for the second of the four data collection waves. This may indicate that role flexibility at the individual level is experienced differently in different workplaces, but it is difficult to assert what this exception may imply without further investigation. As expected, the measure is an excellent predictor of motivation over time.

This model has potential implications for theory and research. It offers a way forward for understanding the meaning of context for organizational behavior and job design (Grant *et al.*, 2010; Johns, 2010; Morgeson *et al.*, 2010). Observing a decline in the volume of job design research, Grant *et al.* (2010) argued that job design theory does no longer reflect the impact of contextual changes in the work environment, whereas Johns (2010) suggested that "job design has too often been treated as a phenomenon rather isolated from its surroundings" (p. 367). An understanding of the job and workplace characteristics that can together impact on motivation could help to realize how "design is embedded in a large work context" (Johns, 2010). Viewing job design and workplace design as allies in supporting organizational behavior could highlight new challenges in job design and organizational behavior research and therefore help to place "job design in context" (Grant *et al.*, 2010).

The model also offers a contribution to the climate literature by building on the observation that individuals are nested within workgroups (Kozlowski and Klein, 2000) and identifying a configuration of the perceived and shared workplace attributes that can support motivation. Despite their common foundations, the psychological and organizational climate traditions have evolved in different ways, but could be integrated again, conceptually and methodologically. The conceptualization of workplace attributes for motivation as two climate levels provides an alternative to the psychological vs organizational climate debate by demonstrating that it is possible to have a tool that measures both.

Methodologically, this work offers a domain-specific climate measure of workplace characteristics that partitions the between and within variation components. A measure that is validated simultaneously at both levels is an improvement for the measurement of domain-specific climates, which has tended to focus on either psychological or organizational climate, depending primarily on the level at which the outcome variable is measured. Neither aggregated measures of psychological climate at the organizational level nor disaggregated measures of organizational climate at the individual level are appropriate as they can lead to analytical and conceptual problems. However, with advancement of multilevel techniques (Muthén and Muthén, 1988-2010) it is possible to develop measures that incorporate both levels. The WPDQ addresses the tendency to use aggregated individual-level measures to assess group-level constructs when they have not been validated at the group level and at the cost of ignoring individual variation. It also circumvents analytical and conceptual problems of aggregating or disaggregating measures developed at different levels. The approach undertaken here resulted in a unique tool that is relevant and appropriate for assessing phenomena at the group level (Klein and Kozlowski, 2000a, b) and for understanding workplace characteristics for motivation.

The measure is practical, versatile, and can inform actionable solutions. It could be used, for example, to diagnose the impact of specific workplace characteristics on employee motivation and, by extension, on related affective and behavioral outcomes. Optimal configurations of workplace characteristics could then be examined and interventions could designed to foster motivation in specific workgroups. Additionally, optimal configurations of workplace characteristics that support or complement good job design could also be identified. Moreover, perceptions of organizational climate could be examined separately from perceptions of psychological climate, depending on the target organizational behavior. This would allow to develop specific resources to develop individual-focussed or workplace-wide solutions to support motivation. Furthermore, the measure could be used to examine individuals' deviations from the shared experiences of the work group. These may reflect not just subjective experiences but also objective differences in the work environment such as differential treatment by the manager (Van Yperen and Snijders, 2000) or job design configurations. Finally, although further research will be necessary to examine potential links between workplace attributes and needs fulfillment, thus further elaborating on the model, the three climate dimensions have been shown to be good indicators of the extent to which the workplace can support motivation.

On the whole, this work contributes to calls to consider the broader work environment when theorizing in organizational behavior (Bliese and Jex, 2002; Johns, 2006; Rousseau and Fried, 2001). Oldham and Hackman (2010) too remarked that they "under-recognized the importance for work redesign of the broader context – that is, the organization's formal properties (e.g. centralization, formalization, technology, and control systems) and the culture within which the organization operates" (p. 472). A clearer understanding of the meaning of

the shared workplace can help to transcend the predominant modus operandi of focussing on individuals' personal experiences of their job and omitting their experiences of the workplace or the organizational context (Johns, 2010; Rousseau and Fried, 2001). Similarly, in response to calls for establishing links between the individual and organizational levels (Chen *et al.*, 2005; Kozlowski and Klein, 2000), the proposed model can explicate a missing link in the relationship between the workplace and organizational behavior.

This work has potential limitations. First, the response rates in this study were low. However, they were typical of response rates for online questionnaires (e.g. Kaplowitz *et al.*, 2004). It was possible to ascertain the representativeness of the sample in each workplace, although the safeguards taken against non-representativeness for small workplaces can still be potentially problematic for larger workplaces. Furthermore, careless respondents may be prone to response bias when survey items are positively worded. It is therefore recommended that future research using this measure should safeguard against response bias by screening for careless respondents. Finally, although some may argue that the exclusive use of self-report measures and the lack of objective measures are limitations, we do not consider these as limitations considering the specific aims of this study.

A range of avenues for future research can be identified. First, research could be broadened to focus on other organizational behavior and individual-level outcomes, such as performance, organizational citizenship behavior, affective well-being, job satisfaction, or withdrawal behaviors. While the job design and self-determination literatures posit motivation as a fundamental criterion outcome, existing research has linked each of the identified workplace attributes to a range of additional outcomes, directly and indirectly. Therefore, although motivational mechanisms have received substantial support in relation to individual and group-level outcomes, alternative pathways could also be examined (Parker *et al.*, 2003). Conversely, because the job and the workplace are not the only determinants of motivation, the joint effects of workplace and job characteristics and additional influences, such as leadership, HR policies, or psychological contract could also be examined. For example, research has emphasized manager support for employee self-determination as a strong predictor of employee attitudes (Deci *et al.*, 1989). Finally, because there is little, if any, research on how inherently healthy and motivating workplaces can be developed, organizational intervention research could also focus on the potential to design workplaces supportive of motivation.

The WPCM describes the workplace attributes, conceptualized as psychological and organizational climate, that have the potential to foster individual motivation. It views job and workplace design as allies in determining motivation. It can also help to contextualize job design and organizational behavior, suggesting a potentially fruitful line of future research.

References

Baard, P.P., Deci, E.L. and Ryan, R.M. (2004), "Intrinsic need satisfaction: a motivational basis of performance and well-being in two work settings", *Journal of Applied Social Psychology*, Vol. 34 No. 10, pp. 2045-2068.

Bakker, A.B., Hakanen, J.J., Demerouti, E. and Xanthopoulou, D. (2007), "Job resources boost work engagement, particularly when job demands are high", *Journal of Educational Psychology*, Vol. 99 No. 2, pp. 274-284.

Bamberger, P. (2008), "From the editors beyond contextualization: using context theories to narrow the micro-macro gap in management research", *Academy of Management Journal*, Vol. 51 No. 5, pp. 839-846.

Baumeister, R.F. and Leary, M.R. (1995), "The need to belong: desire for interpersonal attachments as a fundamental human motivation", *Psychological Bulletin*, Vol. 117 No. 3, pp. 497-529.

Bliese, P.D. and Jex, S.M. (2002), "Incorporating a multi-level perspective into occupational stress research: theoretical, methodological, and practical implications", *Journal of Occupational Health Psychology*, Vol. 7 No. 3, pp. 265-276.

Chan, D. (1998), "Functional relations among constructs in the same content domain at different levels of analysis: a typology of composition models", *Journal of Applied Psychology*, Vol. 83 No. 2, pp. 234-246.

Chen, G., Bliese, P.D. and Mathieu, J.E. (2005), "Conceptual framework and statistical procedures for delineating and testing multilevel theories of homology", *Organizational Research Methods*, Vol. 8 No. 4, pp. 375-409.

De Jonge, J., Dormann, C., Janssen, P.P.M., Dollard, M.F., Landeweerd, J.A. and Nijhus, F.J.N. (2001), "Testing reciprocal relationships between job characteristics and psychological well-being: a cross-lagged structural equation model", *Journal of Occupational and Organizational Psychology*, Vol. 74 No. 1, pp. 29-46.

Deci, E.L. and Ryan, R.M. (1985), *Intrinsic Motivation and Self-Determination in Human Behavior*, Plenum Publishing Co., New York, NY.

Deci, E.L. and Ryan, R.M. (2000), "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being", *American Psychologist*, Vol. 55 No. 1, pp. 68-78.

Deci, E.L., Connell, J.P. and Ryan, R.M. (1989), "Self-determination in a work organization", *Journal of Applied Psychology*, Vol. 74 No. 4, pp. 580-590.

Deci, E.L., Eghrari, H., Patrick, B.C. and Leone, D.R. (1994), "Facilitating internalization: the self-determination theory perspective", *Journal of Personality*, Vol. 62 No. 1, pp. 119-142.

Diez-Roux, A.V. (1998), "Bringing context back into epidemiology: variables and fallacies in multilevel analysis", *American Journal of Public Health*, Vol. 88 No. 2, pp. 216-222.

Dunlap, W.P., Burke, M.J. and Smith-Crowe, K. (2003), "Accurate tests of statistical significance for rwg and average deviation interrater agreement indices", *Journal of Applied Psychology*, Vol. 88 No. 2, pp. 356-362.

Festinger, L. (1954), "A theory of social comparison processes", *Human Relations*, Vol. 7 No. 2, pp. 117-140.

Gagné, M., Forest, J., Gilbert, M.-H., Aubé, C., Morin, E. and Malorni, A. (2010), "The motivation at work scale: validation evidence in two languages", *Educational and Psychological Measurement*, Vol. 70 No. 4, pp. 628-646.

Gillespie, M.A., Denison, D.R., Haaland, S., Smerek, R.E. and Neale, W.S. (2008), "Linking organizational culture and customer satisfaction: results from two companies in different industries", *European Journal of Work and Organizational Psychology*, Vol. 17 No. 1, pp. 112-132.

Glick, W.H. (1985), "Conceptualizing and measuring organizational and psychological climate: pitfalls in multilevel research", *Academy of Management Review*, Vol. 10 No. 3, pp. 601-616.

Grant, A.M., Fried, Y., Parker, S.K. and Frese, M. (2010), "Putting job design in context: introduction to the special issue", *Journal of Organizational Behavior*, Vol. 31 Nos 2-3, pp. 145-157.

Gruys, M.L., Stewart, S.M., Goodstein, J., Bing, M.N. and Wicks, A.C. (2008), "Values enactment in organizations: a multi-level examination", *Journal of Management*, Vol. 34 No. 4, pp. 806-843.

Hackman, J.R. (1992), "Group influences on individuals in organizations", in Dunetter, M.D. and Hugh, L.M. (Eds), *Handbook of Industrial and Organizational Psychology*, Vol. 3, Consulting Psychologists Press, Palo Alto, CA, pp. 199-267.

Hackman, J.R. and Oldham, G.R. (1975), "Development of the job diagnostic survey", *Journal of Applied Psychology*, Vol. 60 No. 2, pp. 159-170.

Hu, L. and Bentler, P.M. (1999), "Cutoff criteria in fix indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling*, Vol. 6 No. 1, pp. 1-55.

Idaszak, J.R. and Drasgow, F. (1987), "A revision of the job diagnostic survey: elimination of a measurement artifact", *Journal of Applied Psychology*, Vol. 72 No. 1, pp. 69-74.

Ilardi, B.C., Leone, D., Kasser, T. and Ryan, R.M. (1993), "Employee and supervisor ratings of motivation: main effects and discrepancies associated with job satisfaction and adjustment in a factory setting", *Journal of Applied Social Psychology*, Vol. 23 No. 21, pp. 1789-1805.

James, L.R. (1982), "Aggregation bias in estimates of perceptual agreement", *Journal of Applied Psychology*, Vol. 67 No. 2, pp. 219-229.

James, L.R., Choi, C.C., Ko, C.H.E., McNeil, P.K., Minton, M.K., Wright, M.A. and Kim, K. (2008), "Organizational and psychological climate: a review of theory and research", *European Journal of Work and Organizational Psychology*, Vol. 17 No. 1, pp. 5-32.

James, L.R., Demaree, R.G. and Wolf, G. (1984), Estimating within-group interrater reliability with and without response bias", *Journal of Applied Psychology*, Vol. 69 No. 1, pp. 85-98.

Johns, G. (2006), "The essential impact of context on organizational behavior", *Academy of Management Review*, Vol. 31 No. 2, pp. 386-408.

Johns, G. (2010), "Some unintended consequences of job design", *Journal of Organizational Behavior*, Vol. 31 Nos 2/3, pp. 361-369.

Kaplowitz, M.D., Hadlock, T.D. and Levine, R. (2004), "A comparison of web and mail survey response rates", *Public Opinion Quarterly*, Vol. 68 No. 1, pp. 94-101.

Karasek, R.A. and Theorell, T. (1990), *Healthy Work: Stress, Productivity and the Reconstruction of Working Life*, Basic Books, New York, NY.

Klein, K.J. and Kozlowski, S.W.J. (2000a), *Multilevel Theory, Research, and Methods in Organizations*, Jossey Bass, San Francisco, CA.

Klein, K.J. and Kozlowski, S.W.J. (2000b), "From micro to meso: critical steps in conceptualizing multilevel research", *Organizational Research Methods*, Vol. 3 No. 3, pp. 211-236.

Kozlowski, S.W.J. and Klein, K.J. (2000), "A multilevel approach to theory and research in organizations: contextual, temporal, and emergent processes", in Klein, K.J. and Kozlowski, S.W.J. (Eds), *Multilevel Theory, Research and Methods in Organizations: Foundations, Extensions, and New Directions*, Jossey-Bass, San Francisco, CA, pp. 3-90.

Kristensen, T.S., Hannerz, H., Hogh, A. and Borg, V. (2005), "The Copenhagen Psychosocial Questionnaire – a tool for the assessment and improvement of the psychosocial work environment", *Scandinavian Journal of Work Environment and Health*, Vol. 31 No. 6, pp. 438-449.

McMillan, D.W. and Chavis, D.M. (1986), "Sense of community: a definition and theory", *Journal of Community Psychology*, Vol. 14 No. 1, pp. 6-23.

Mayer, R.C., Davis, J.H. and Schoorman, F.D. (1995), "An integrative model of organizational trust", *Academy of Management Review*, Vol. 20 No. 3, pp. 709-734.

Meyer, J.P. and Gagné, M. (2008), "Employee engagement from a self-determination theory perspective", *Industrial and Organizational Psychology*, Vol. 1 No. 1, pp. 60-62.

Michaelides, G. and Karanika-Murray, M. (2012), "Conceptualizing organizational context in relation to health and well-being: a qualitative exploration", in Gonçalves, S.P. and Neves, J.G. (Eds), *Occupational Health Psychology: From Burnout to Well-being*, Scientific & Academic Publishing, Lisboa, ISBN: 978-0-9838996-7-9, available at: www.sapub.org/book/978-0-9838996-7-9.html

Morgeson, F.P., Dierdorff, E.C. and Hmurovic, J.L. (2010), "Work design in situ: understanding the role of occupational and organizational context", *Journal of Organizational Behavior*, Vol. 31 Nos 2/3, pp. 351-360.

Morgeson, F.P. and Hofmann, D.A. (1999), "The structure and function of collective constructs: implications for multilevel research and theory development", *Academy of Management Review*, Vol. 24, pp. 249-265.

Morgeson, F.P. and Campion, M.A. (2003), "Work design", in Borman, W.C., Ilgen, D.R. and Klimoski, R.J. (Eds), *Handbook of Psychology, Industrial and Organizational Psychology*, Vol. 12, John Wiley & Sons, Hoboken, NJ, pp. 423-452.

Morgeson, F.P. and Humphrey, S.E. (2006), "The work design questionnaire (WDQ): developing and validating a comprehensive measure for assessing job design and the nature of work", *Journal of Applied Psychology*, Vol. 91 No. 6, pp. 1321-1339.

Mowday, R.T. and Sutton, R.I. (1993), "Organizational behavior: linking individuals and groups to organizational contexts", *Annual Review of Psychology*, Vol. 44 No. 1, pp. 195-229.

Muthén, L.K. and Muthén, B.O. (1998-2010), *Mplus User's Guide*, 6th ed., Muthén & Muthén, Los Angeles, CA.

Oldham, G.R. and Hackman, J.R. (2010), "Not what it was and not what it will be: the future of job design research", *Journal of Organizational Behavior*, Vol. 31 Nos 2/3, pp. 463-479.

Parker, C.P., Baltes, B.B., Young, S.A., Huff, J.W., Altmann, R.A., Lacost, H.A. and Roberts, J.E. (2003), "Relationships between psychological climate perceptions and work outcomes: a meta-analytic review", *Journal of Organizational Behavior*, Vol. 24 No. 4, pp. 389-416.

Patterson, M.G., West, M.A., Shackleton, , V.J., Dawson, J.F., Lawthom, R., Maitlis, S., Robinson, D.L. and Wallace, A.M. (2005), "Validating the organizational climate measure: links to managerial practices, productivity and innovation", *Journal of Organizational Behavior*, Vol. 26 No. 4, pp. 379-408.

Rafferty, A.E. and Griffin, M.A. (2004), "Dimensions of transformational leadership: conceptual and empirical extensions", *The Leadership Quarterly*, Vol. 15 No. 3, pp. 329-354.

R Core Team (2014), "R: a language and environment for statistical computing", *R Foundation for Statistical Computing*, Vienna, available at: www.R-project.org/

Rousseau, D.M. (2011), "Reinforcing the micro/macro bridge: organizational thinking and pluralistic vehicles", *Journal of Management*, Vol. 37 No. 2, pp. 429-442.

Rousseau, D.M. and Fried, Y. (2001), "Location, location, location: contextualizing organizational research", *Journal of Organizational Behavior*, Vol. 22 No. 1, pp. 1-13.

Ryan, R.M. (1982), "Control and information in the intrapersonal sphere: an extension of cognitive evaluation theory", *Journal of Personality and Social Psychology*, Vol. 43 No. 3, pp. 450-461.

Ryan, R.M. and Deci, E.L. (2000a), "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being", *American Psychologist*, Vol. 55 No. 1, pp. 68-78.

Ryan, R.M. and Deci, E.L. (2000b), "The darker and brighter sides of human existence: basic psychological needs as a unifying concept", *Psychological Inquiry*, Vol. 11 No. 4, pp. 319-338.

Ryan, R.M. and Deci, E.L. (2000c), "Intrinsic and extrinsic motivations: classic definitions and new directions", *Contemporary Educational Psychology*, Vol. 25 No. 1, pp. 54-67.

Satorra, A. and Bentler, P.M. (2001), "A scaled difference chi-square test statistic for moment structure analysis", *Psychometrika*, Vol. 66 No. 4, pp. 507-514.

Schneider, B. (Ed.) (1990), *Organizational Climate and Culture*, Jossey-Bass, San Francisco, CA.

Schneider, B., Ehrhart, M.G. and Macey, W.H. (2013), "Organizational climate and culture", *Annual Review of Psychology*, Vol. 64, pp. 361-388.

Spell, C.S. and Arnold, T.J. (2007), "A multi-level analysis of organizational justice climate, structure, and employee mental health", *Journal of Management*, Vol. 33 No. 5, pp. 724-751.

Van Yperen, N.W. and Snijders, T.A.B. (2000), "A multilevel analysis of the demands-control model: is stress at work determined by factors at the group level or the individual level? ", *Journal of Occupational Health Psychology*, Vol. 5 No. 1, pp. 182-190.

Vandenberg, R.J. and Lance, C.E. (2000), "A review and synthesis of the measurement invariance literature: suggestions, practices, and recommendations for organizational research", *Organizational Research Methods*, Vol. 3 No. 1, pp. 4-70.

Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K.M. and Deci, E.L. (2004), "Motivating learning, performance, and persistence: the synergistic effects of intrinsic goal contents and autonomy-supportive contexts", *Personality Processes & Individual Differences*, Vol. 87 No. 2, pp. 246-260.

Wrzesniewski, A. and Dutton, J.E. (2001), "Crafting a job: revisioning employees as active crafters of their work", *Academy of Management Review*, Vol. 26 No. 2, pp. 179-201.

Zaccaro, S.J., Ely, K. and Nelson, J. (2008), "Leadership processes and work motivation" in Kanfer, R., Chen, G. and Pritchard, R.D. (Eds), *Work Motivation: Past, Present, and Future, the Organizational Frontiers Series, Vol. 27*, Routledge/Taylor & Francis, New York, NY, pp. 319-360.

Appendix

Autonomy-supportive	Competence-supportive	Relatedness-supportive
Decision making	*Feedback*	*Social support*
We can make a lot of decisions without requiring approval	We are always aware of how well we are doing the job	There are opportunities to develop friendships[a]
We can self-manage our work	Regular feedback is provided on the quality of the work we do	We have the chance to get to know other people[a]
We have a chance to use personal initiative or judgment in carrying out the work[a]	Negative feedback is provided in a constructive way	We have opportunities to meet with others[a]
Work planning	*Appreciation*	*Trust*
We can decide on the order in which things are done[a]	We get a pat on the back when we do our job right	People are trustworthy
We can plan how we carry out the work[a]	Work effort is appreciated	People are open to sharing ideas
We can prioritize our tasks as we see fit	We feel that we are listened to	We feel comfortable asking each other for help
Role flexibility	*Supportive management*	*Sense of community*
We can adapt our roles to the needs of a new problem	The management is concerned about our welfare.	There is a good atmosphere between colleagues[c]
We can adapt our job roles according to the workplace's needs	The management shows that they have confidence in the people who work for them[b]	There is good co-operation between colleagues[c]
We have the flexibility to adapt our job responsibilities according to unexpected demands or problems	The management can be relied upon to give good guidance[b]	There is a feeling of community[c]
	The management shows an understanding toward people[b]	People are comfortable with each other

Table AI.
The Workplace Characteristics Framework and Workplace Design Questionnaire items

Sources: [a]Adapted from Morgeson and Humphrey (2006); [b]adapted from Patterson *et al.* (2005); [c]adapted from Kristensen *et al.* (2005)

About the authors

Dr Maria Karanika-Murray is a Reader in Occupational Health Psychology at Nottingham Trent University. Her current research focusses on workplace design, organizational health interventions, intervention evaluation, older workers, work addiction, and presenteeism. Her work has been funded by the European Agency for Safety & Health at Work, the Health & Safety Executive, the Economic & Social Research Council, Heart Research UK, the European Commission (DG Employment, Social Affairs, and Inclusion), and industry partners. Dr Maria Karanika-Murray is the corresponding author and can be contacted at: maria.karanika-murray@ntu.ac.uk

Dr George Michaelides is a Lecturer in Organizational Psychology at the Department of Organizational Psychology, Birkbeck, University of London. His research interests include motivation, well-being, worklife balance, and leadership. He is also interested in longitudinal research methods and dynamic models. George's research has been published in journals such as *Human Relations*, *Work and Stress*, *Journal of Occupational Health Psychology* and *Team Performance Management*.