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When innovation requirements empower individual innovation: the role of job complexity

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Abstract

Purpose – The purpose of this paper is to contribute to the field's understanding of how to raise individual innovation. Specifically, the authors aim to contribute to an understanding of the interplay of job characteristics and intrinsic motivation for individual innovation.

Design/methodology/approach – The study uses time-lagged survey data of a public service organization in Belgium. The analyses are based on more than 80 jobs and more than 1,000 employees. Hierarchical linear modeling was adopted to test cross-level hypotheses.

Findings – Innovation requirements influence individual innovation efforts by psychologically empowering employees, but the extent to which psychological empowerment translates into individual innovation depends on job complexity.

Originality/value – A more nuanced understanding is developed of when innovation requirements empower individual innovation, by acknowledging the role of job complexity in this relationship. The current findings contribute to a multilevel integrative understanding of the interplay of the job context and intrinsic motivation.

Keywords Quantitative, Psychological empowerment, Individual innovation, Innovation requirements, Job complexity

Paper type Research paper

Introduction

In the current knowledge era, individual innovation is crucial in most if not all jobs (Dorenbosch *et al.*, 2005; Farr and Tran, 2008) to gain organizational success (Lopez-Cabrales *et al.*, 2009; Parker and Collins, 2010). In practice, it is often assumed that personality is a key predictor of individual innovation. This is wrong: it is the innovation requirements and job complexity that specifically explain individual innovation at work (Hammond *et al.*, 2011). Moreover, the interplay of job characteristics and intrinsic motivation would affect individual innovation (Anderson *et al.*, 2014; Hammond *et al.*, 2011; Unsworth and Parker, 2003). This study examines this interplay by studying innovation requirements, job complexity, and psychological empowerment. Specifically, we look at when innovation requirements empower individual innovation by studying job complexity as a moderator. Innovation requirements of a job refers to the extent to which a job entails broad expectations about taking initiatives, implementing new ideas, and making continuous improvements (Tsui *et al.*, 1997; Wang *et al.*, 2003). Job complexity is a knowledge characteristic of a job that “refers to the extent to which the tasks on a job are complex and difficult to perform” (Morgeson and Humphrey, 2006, p. 1323).

Repeatedly, it has been shown that innovation requirements affect individual innovation (Farr and Tran, 2008; Shalley *et al.*, 2004; Hammond *et al.*, 2011). High-innovation requirements imply a broad orientation on multiple aspects of work (Scott and Bruce, 1994;



Yuan and Woodman, 2010). This broad orientation is a satisfying aspect of job design and generates beneficial employee outcomes (Hackman and Oldham, 1980) such as proactive and persistent innovation efforts. Following job characteristics theory (Hackman and Oldham, 1980), broad job requirements would foster a motivational mechanism which explains the effect on work outcomes. There is some empirical support for this motivational mechanism for creativity (Anderson *et al.*, 2014), but there is a lack of research about psychological mechanisms that explain effects of the work environment on individual innovation (Hammond *et al.*, 2011; Unsworth and Parker, 2003; Anderson *et al.*, 2014). In this study, we address this lack by using psychological empowerment (Seibert *et al.*, 2011; Spreitzer, 2007; Thomas and Velthouse, 1990) to explain the relationship between broad job requirements and individual innovation. Such a study would allow us to better understand how the value chain of innovation requirements and individual innovation operates, which is of practical value to organizations that pursue this value chain.

Broad job requirements may be more relevant for some jobs than for others (Tsui *et al.*, 1997). Unfortunately, much research on individual innovation has used simplified models that do not take moderators into account to deepen our understanding of individual innovation (Anderson *et al.*, 2014). There is a void in our understanding of when broad innovation requirements are related to individual innovation via psychological empowerment. It is our aim to address this void by proposing job complexity as a moderator in this mediated relationship. This choice is inspired by literature on employment relationships, psychological empowerment and individual innovation. Employment relationship scholars assume that providing broad job requirements such as innovation requirements would be more relevant to jobs with “informational and technical complexity” than to simple jobs in which “performance contributions can be clearly defined and measured” (Tsui *et al.*, 1997, p. 1092). Therefore employment relationship scholars typically focus on management jobs in their studies (Zhang *et al.*, 2008; Jiwen Song *et al.*, 2009). Empowerment scholars argue that the benefits of psychological empowerment are not always realized (Ahearne *et al.*, 2005). “When subordinates perform complex tasks [...] they have the opportunity to test their efficacy” (Conger and Kanungo, 1988, p. 479). Innovation scholars (Hammond *et al.*, 2011; Unsworth and Parker, 2003; Anderson *et al.*, 2014; Woodman *et al.*, 1993) call for models that study how the job context and motivation are working in concert to enable individual innovation. In essence, we extend the model of innovation requirements, psychological empowerment and individual innovation by identifying a key boundary condition of this presumed causal sequence; namely, we test that psychological empowerment specifically drives individual innovation in complex jobs. When job complexity would be recognized as a key boundary condition, this may be an eye-opener for managers who do not fully understand why the empowering benefits of increased innovation requirements are not always realized.

A further void in research on job characteristics such as innovation requirements and job complexity pertains to methodological issues; i.e., the level at which they are analyzed. Studies that test the job characteristics model (Hackman and Oldham, 1980) have been valuable for their contribution to our understanding of the motivational effect of job characteristics (Humphrey *et al.*, 2007; Morgeson and Humphrey, 2006). However, “although the theories of work design reside at the job level, the studies of work design have been conducted at the individual level” (Humphrey *et al.*, 2007, p. 1347). That is the case both for innovation requirements (Farr and Tran, 2008) and job complexity (Morgeson and Humphrey, 2006). This shortcoming in the existing literature increases the possibility of type 1 errors (Hox, 2010; Humphrey *et al.*, 2007). In order to address this shortcoming, we draw on the established difference between organizational intentions and employee perceptions of HR practices in HRM literature (Nishii and Wright, 2008; Kehoe and Wright, 2013). At the job level, a difference can be made between intended job characteristics and

perceived job characteristics within the collective of the job group. It is specifically relevant to study the latter because these collective subjective experiences with job characteristics are closer to employee reactions than managerial intentions (Kehoe and Wright, 2013). We thus study employees' perceptions of job characteristics in the aggregate (at the job group level). Beyond addressing a need in research on job characteristics, this also responds to calls for multilevel approaches to examine the interplay of job context and intrinsic motivation in predicting individual innovation (Anderson *et al.*, 2014).

As depicted in Figure 1, we study when broad innovation requirements empower individual innovation by addressing the role of job complexity. As explained, in accordance with the need to study job characteristics at the job level and recent developments in HRM-performance literature, we specifically look at perceptions of innovation requirement and job complexity within the collective of the job group.

Theory and hypotheses

We first propose a mediation model of innovation requirements, psychological empowerment and individual innovation. Subsequently, job complexity is proposed as a moderator in this model.

Innovation requirements and individual innovation

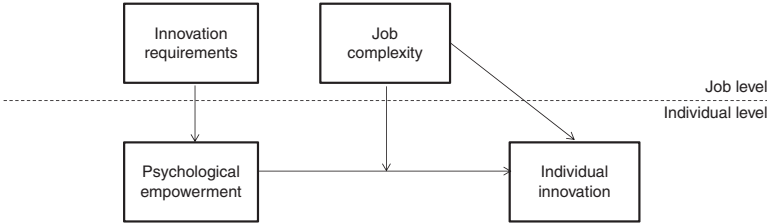
Individual innovation encompasses generating and promoting creative ideas, and implementing innovations within the work setting (Janssen, 2005; Scott and Bruce, 1994; Unsworth and Parker, 2003; Yuan and Woodman, 2010). The extent to which this individual innovation is required depends on the job (Farr and Tran, 2008; Shalley *et al.*, 2004). Innovation requirements express the expected degree of individual innovation (Tsui *et al.*, 1997; Wang *et al.*, 2003). It promotes individual innovation by entailing a broad focus on multiple aspects of work (Scott and Bruce, 1994; Yuan and Woodman, 2010). This reasoning draws on job characteristics theory (Hackman and Oldham, 1980; Morgeson and Humphrey, 2006). Broadly designed jobs foster beneficial behavioral outcomes because broad requirements are satisfying to employees. Accordingly, innovation requirements will make employees display more individual innovation. Jobs with innovation requirements foster more individual innovation than simple routine jobs because the latter lack a satisfying nature. In support of this argument, research on creativity, which is one of the aspects of individual innovation, has found that when creativity is required within a job, employees will be more likely to submit creative ideas to fulfill minimum requirements (Xie and Johns, 1995). We hypothesize:

H1a. Innovation requirements are positively related to individual innovation.

Psychological empowerment as a mediator

Job characteristics theory (Hackman and Oldham, 1980; Morgeson and Humphrey, 2006) postulates that motivational work characteristics impact employee behavior through their

Figure 1.
Multilevel model of the linkage between innovation requirements, psychological empowerment, job complexity and individual innovation



influence on psychological states of experienced meaningfulness, knowledge of results, and experienced responsibility. In job characteristics theory the emphasis is on the motivational task characteristics. In theory about psychological empowerment (Spreitzer, 1995; Thomas and Velthouse, 1990) the emphasis is on the psychological states. Psychological empowerment reflects these states by entailing cognitions about the meaning, autonomy, competence, and impact of the job. Meaning captures the value that is attached to the work goal. Autonomy concerns the sense of having choice in initiating and regulating actions. Competence refers to employees' belief that they have reached proficiency in their work. Impact captures their perceived ability to make significant contributions on strategic, operating and administrative issues in the department. Taken together, psychological empowerment captures intrinsic motivation based on cognitions about the work role.

We expect that employees that are expected to display innovative behaviors will feel psychologically empowered. Innovation requirements make part of broad job requirements (Tsui and Wang, 2002). Employers signal their confidence to employees by providing broad job requirements. This encourages employees to experience self-efficacy, and to perceive themselves positively (Zhang *et al.*, 2014). Employees are likely to perceive that their inputs create value to the organization (Liangding *et al.*, 2014). This signals that they have a meaningful job. Employees perceive that they are expected to adopt meaningful new ideas and to take initiatives to improve work procedures. This implies that their competencies and their contributions are important to the organization. It also implies that employees will have an impact on work outcomes or work procedures in the future. Their impact is required because deploying their competencies is important to the organization. Employees feel a sense of self-determination to act in their work role. As a consequence, they interiorize the broad job requirements (Spreitzer, 1995). Employees feel intrinsically motivated to fulfill these job requirements (Liangding *et al.*, 2014; Zhang *et al.*, 2008). They feel psychologically empowered to act proactively and persistently (Thomas and Velthouse, 1990).

In support of our argument to link innovation requirements and psychological empowerment, a recent study shows that broad job requirements affect employees to meet the requirements through psychologically empowering them (Zhang *et al.*, 2014). We hypothesize:

H1b. Innovation requirements are positively related to psychological empowerment.

Building further on theorizing of psychological empowerment as a motivational mechanism (Thomas and Velthouse, 1990; Seibert *et al.*, 2011), the intrinsically motivating mechanism of psychological empowerment is proposed to function as a mediator in the linkage of innovation requirements and individual innovation. Not only is psychological empowerment helpful to understand why employees engage in the idea generation part of individual innovation, it is also functional to help us understand why employees persevere in implementing creative ideas. There is specifically a lack of our understanding of mechanisms that explain perseverance to innovate (Anderson *et al.*, 2014).

By being intrinsically motivated for their job, employees are focused on their work. This focus drives idea generation. Focus makes employees consider different alternatives and develop creative ideas while conducting their job (Shalley *et al.*, 2004). This focus is also important for perseverance in the implementation of creative ideas. Their focus on their work makes them more proactive to implement their creative ideas. This proactive motivation is particularly relevant for persisting in individual innovation (Parker, 2000). Empowered individuals proactively engage in a persistent and change-oriented approach to shape their work environment. This makes individual innovation a key outcome of psychological empowerment (Seibert *et al.*, 2011; Spreitzer, 2007).

Research supports the function of psychological empowerment as a motivational mechanism (Seibert *et al.*, 2011). Research also supports the theorizing that favorable

behavioral outcomes follow from broad job requirements through psychological empowerment (Zhang *et al.*, 2014). We hypothesize:

H1c. Psychological empowerment mediates the relationship between innovation requirements and individual innovation.

612

Job complexity as a moderator

It is our aim to expand our understanding of the interplay of job characteristics and intrinsic motivation. We study when innovation requirements are related to individual innovation via psychological empowerment by identifying a key boundary condition. Specifically, we propose that the extent to which psychological empowerment is associated with individual innovation depends on job complexity. Below, we first treat the linkage between job complexity and individual innovation, and subsequently the moderating role of job complexity between psychological empowerment and individual innovation.

Across organizations, the same job can be designed more or less complex depending on choices in the job design (Morgeson and Humphrey, 2006). Job complexity “refers to the extent to which tasks on a job are complex and difficult to perform” which requires high-level competencies (Morgeson and Humphrey, 2006, p. 1323). It entails path-goal multiplicity, unknown means-ends connections, interdependent subtasks, conflicting goals and high-cognitive demands (Campbell, 1988). By entailing high-cognitive demands, complex jobs are mentally challenging (Humphrey *et al.*, 2007). Typical examples of complex jobs are managers (Quinn *et al.*, 2011) and professionals (Kinnie *et al.*, 2005).

A recent extension of the job characteristics theory (Hackman and Oldham, 1980) proposes that job complexity as a knowledge characteristic is satisfying and, therefore, fosters positive outcomes from employees. Because it requires high-level skills, and because it is mentally challenging, it is likely to drive employees’ efforts. It stimulates creative thinking and idea generation (Scott and Bruce, 1994; Yuan and Woodman, 2010) to solve complex problems (Oldham and Cummings, 1996). Meta-analysis shows that job complexity generates individual innovation (Hammond *et al.*, 2011). Research shows that employees that perceive job complexity see it as their job to implement new ideas (Ohly *et al.*, 2006) and to engage in individual innovation (Hammond *et al.*, 2011; Scott and Bruce, 1994). We thus expect:

H2. Job complexity is positively related to individual innovation.

Complex jobs imply building new competencies that are not yet available in the organization while conducting the job. Feeling empowered will be important to pursue challenges in complex jobs because competencies are developed on the job while facing complex and new challenges (Lindgren *et al.*, 2004). This requires cognitions of psychological empowerment to self-determinately engage in exploring new work ideas, and to persevere while implementing these new ideas. When employees experience to have low competences to deal with the complex job demands, they will prevent situations that require building competencies (Thomas and Velthouse, 1990). Moreover, in complex jobs, the difficulty in the encountered problems and their unknown cause-effect relationships ask for creative thinking. Employees in these jobs face ambiguous cause-effect relationships which makes it less possible to prescribe and evaluate performance processes. This ambiguity makes it difficult for supervisors to control the work. As a knowledge characteristic of the job (Humphrey *et al.*, 2007), job complexity implies work that cannot be structured. This requires employees to internalize control by being empowered for their work. This psychological empowerment is crucial for employees in complex jobs to engage and persist in individual innovations. Employees in complex jobs

have more discretion to act and they feel less constrained by their contextual environment (Amabile, 1983; Pan *et al.*, 2012). For employees to use this discretion by engaging in individual innovations, they need to be psychologically empowered.

In simple jobs, employees' psychological empowerment may be of lesser circumstance for fostering individual innovation. Even though psychologically empowered employees may be more motivated to engage in individual innovation, the opportunity to pursue innovation depends on their job's complexity. Employees in simple jobs have lesser opportunities to rock the boat, and to make the difference with their ideas. Their motivation is thus less likely to foster individual innovation. Creativity to deal with work problems is less saliently needed in simpler tasks. Employee motivation to solve problems may result in using established knowledge and routines rather than generating new ideas (Shalley *et al.*, 2004). Individual innovation is thus a less potential outcome from psychological empowerment for employees in simple jobs.

The above reasoning is in accordance with the interactionist perspective on individual innovation (Hammond *et al.*, 2011; Unsworth and Parker, 2003) which proposes that individual differences and contextual differences interactively combine in promoting individual innovation. We hypothesize:

H3. Job complexity enhances the positive relationship between psychological empowerment and individual innovation.

Method

Sample and procedures

This study makes part of a broader research project. A large government agency in Belgium with a broad range of jobs related to services to citizens initiated the sample. In Belgium, the New Public Management movement has championed the need for innovation (Pollitt and Bouckaert, 2011). Nevertheless, the extent to which public sector organizations have developed innovative capacity differs greatly between organizations (Damanpour *et al.*, 2009). The studied organization faces budget constraints and quality improvement goals at the same time. The services that are delivered to the citizens should be made more efficient and more effective which requires individual innovation. Therefore innovative behavior and employee entrepreneurship are included as part of the organizational objectives.

This organization has more than 100 different jobs of which 89 employ at least four employees, which was important for the multilevel design of the study. In the job classification of the organization, the jobs are categorized in ten levels that reflect the complexity of the job besides other job evaluation criteria. Jobs from the second level until the ninth level made part of the sample. This implies that jobs with very low absolute complexity were not included in the sample. Our stratified sampling strategy aimed at a large sample at the job level to anticipate on possible power issues that are common in multilevel research (Bliese, 2000). Individual innovation was collected three months after the first survey, which encompassed the other measures. Such "temporal separation" is recommended to prevent common method bias (Podsakoff *et al.*, 2012). From the 1,800 employees that were invited to participate, 1,178 employees (65 percent) in 82 jobs filled out both surveys. Even if compared with web-based surveys that do not apply a time lag, the response rates were high (Cook *et al.*, 2000).

The first survey was subdivided in two parts to emphasize that the questions on the job-level variables dealt with the job referent, and the questions on empowerment dealt with the individual referent. This procedure creates a psychological separation to prevent common method bias (Podsakoff *et al.*, 2012).

Measures

All data on the continuous variables was collected on a five-point Likert scale.

Innovation requirements. We used the scale for extra-role job requirements by Liangding *et al.* (2014) that exists of four items pertaining to innovation requirements of a job. This scale has the benefit that it can be used across different jobs. An example item is “< Job referent > are expected to adopt new ideas and methods actively to improve work.” The respondents’ job title was automatically entered in the items which was important for operationalizing the innovation requirements (Patterson *et al.*, 2005). Cronbach’s α was 0.94. In order to test whether aggregation was warranted, we did several tests. The ANOVA-test shows significant between job variance ($F(81,850)=1,997$, $p < 0.01$). ICCs are acceptable for aggregation (ICC1 = 0.08; ICC2 = 0.50). The ICC1 value fulfilled the suggested cutoff value of 0.05, and the ICC2 value can be seen as marginally acceptable since it lies in the range from 0.50 to 0.70 (Bliese, 2000; Klein and Kozlowski, 2000). Aggregation is further warranted because there is high inter-rater agreement within-the-jobs ($rwg = 0.86$). Taken together these tests provide support for aggregation of employee perceptions to the job-level mean.

Job complexity. We used three items of a scale to measure job complexity that was developed by Cammann *et al.* (1983). These items were also recently used by Shaw and Gupta (2004). For measuring job complexity, the wordings were adopted to insert the respondents’ job referent in the items (Patterson *et al.*, 2005). The items are: “The job of < job referent > is very complex,” “The job of < job referent > requires a lot of skill,” and “The job of < job referent > is such that it takes a long time to learn the skills required to do the job well.” Cronbach’s α was 0.72. We did several tests that provided support for aggregation to the job-level mean. The ANOVA-test shows that there are significant between job differences ($F(81,849) = 2,549$, $p < 0.01$), the ICCs are acceptable (ICC1 = 0.13; ICC2 = 0.61) (Bliese, 2000; Klein and Kozlowski, 2000), and the rwg test demonstrates high inter-rater agreement (0.80).

Psychological empowerment. We used Spreitzer’s (1995) scale for measuring psychological empowerment. An example item is: “I am confident about my ability to do my job,” and “The work that I do is important to me.” Based on acceptable fit indices ($GFI \geq 0.90$, $CFI \geq 0.90$, $NFI \geq 0.90$; $RMSEA \leq 0.10$) (Brown, 2015), we judged that our data fits better with a second-order, four-factor model in which psychological empowerment represents the higher-order factor of the four lower-order dimensions (i.e. meaning, impact, self-determination, and competence) ($GFI = 0.93$, $CFI = 0.93$, $NFI = 0.92$; $RMSEA = 0.10$) than with a four-factor model ($GFI = 0.64$, $CFI = 0.55$, $NFI = 0.55$; $RMSEA = 0.24$). There is also support in combining the items in a single scale by high internal consistency reliability ($\alpha = 0.87$).

Individual innovation. For individual innovation, we used three items of a scale by Scott and Bruce (1994), which were also recently used by Parker and Collins (2010). The items are: (How frequently do you [...]) “[...] generate creative ideas?” “[...] search out new techniques, technologies and/or product ideas?” and “[...] promote and champion your ideas to others.” Support for combining the items into a single scale is found in the high level of internal consistency reliability ($\alpha = 0.85$).

Control variables. The participating employees reported gender (1 = female, 0 = male), age, job tenure (in number of years), and managerial level (1 = a managerial level job function, 0 = not a managerial level job function). These variables have also been used as control variables in earlier research on creativity and innovation (Scott and Bruce, 1994; Seibert *et al.*, 2011; Shalley *et al.*, 2004).

Analyses

To address the multilevel nature of our model, we used hierarchical linear modeling which considers job-level and individual-level variance, simultaneously. This allows us to analyze the hypothesized cross-level mediation and moderation (Hox, 2010). As recommended, all

variables are grand-mean centered which eases the interpretation of the moderation effect (Hox, 2010). We reported Pseudo R^2 which is comparable to R^2 in interpretation (Snijders and Bosker, 1994). Furthermore, we reported deviance as an indicator of model fit, i.e. “the smaller, the better the model” (Hox, 2010). VIF analyses were conducted in SPSS and suggest that multicollinearity is not an issue.

Results

Table I presents means, standard deviations, and correlations of the individual-level and job-level variables. Below, we first describe the results for the hypothesized mediation of psychological empowerment between the innovation requirements and individual innovation. Subsequently, we describe the results for the hypothesized moderation of job complexity between psychological empowerment and individual innovation.

Innovation requirements and psychological empowerment

A condition for mediation (Mathieu and Taylor, 2006) by psychological empowerment is that the innovation requirements are positively associated with psychological empowerment. As displayed in Table II, before estimating the models for individual innovation, psychological empowerment was tested as the dependent variable (Hox, 2010).

	Means	SD	1	2	3	4	5	6
<i>Individual level</i>								
1. Empowerment	3.89	0.49	1					
2. Individual innovation	3.55	0.70	0.36**	1				
3. Age	44.00	10.87	0.07*	0.01	1			
4. Job tenure	8.17	6.80	-0.01	-0.14**	0.33**	1		
<i>Job level</i>								
5. Job requirements	3.98	0.25					1	
6. Job complexity	3.79	0.36					0.03	1

Notes: $n = 1,178$ individuals (individual level) in 82 jobs (job level). *, **Correlation is significant at the 0.05 and 0.01 levels (two-tailed), respectively

Table I.
Descriptive statistics
and correlations

	Model 1	Model 2	Model 3	VIF
<i>Individual level</i>				
Intercept	3.90***	3.93***	3.94***	
Gender (<i>a</i>)		-0.05****	-0.05****	1.10
Age		0.00	0.00	1.24
Job tenure		0.00	0.00	1.19
<i>Job level</i>				
Managerial job level		0.24***	0.17***	1.11
Innovation requirements			0.29***	1.03
Deviance	1,570	1,527	1,512	
Pseudo R^2 level 1		0.01	0.06	
Pseudo R^2 level 2		0.28	0.27	

Notes: $n = 1,178$ individuals (level 1) in 82 jobs (level 2). Estimates are based on grand-mean centering; Pseudo R^2 indicates the amount of total variance in the dependent variable explained by the predictors; a 1 = “female”; 0 = “male.” * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.10$

Table II.
Results of HLM
analysis for the
antecedents of
psychological
empowerment

Model 1 concerns the intercept-only model in which the variance of the between job errors is significant ($p < 0.05$), which makes it appropriate to examine a multilevel model. An ICC(1) of 0.10 for psychological empowerment, suggests that 10 percent of the variance in psychological empowerment resides between jobs. In model 2 the controls are included. The results suggest that managers were significantly more empowered. The random error variance of the constant was significant. We then proceeded with model 3, which included the level 2 predictors. The innovation requirements are positively associated with psychological empowerment. This model accounted for 6 percent individual-level variance and 27 percent job-level variance in psychological empowerment. The findings provide support for *H1b*.

Innovation requirements and individual innovation

Turning now to the analyses for individual innovation, we used a similar staged approach (see Table III). The first model demonstrates that the between job variance is significant. Thus multilevel analysis is warranted. Individual innovation had an ICC of 0.12. In model 2, level 1 and level 2 control variables were entered. At level 1, these results suggest that individual innovation was lower for females and decreased with job tenure. At level 2, the results suggest that managers innovate more than non-managers. Model 2 results showed significant random variance components for the intercept; thus, we proceeded to include the level 2 innovation requirements in model 3. According to these results, there was a positive direct relationship between the innovation requirements and individual innovation. These findings provide support for *H1a*.

Moving to model 4, we added the hypothesized mediator (i.e. psychological empowerment). Subsequently, the coefficient for innovation requirements went down. Together with the earlier results on the associations between innovation requirements and psychological empowerment, these findings suggest that psychological empowerment partially mediates the relationship between the innovation requirements and individual

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	VIF
<i>Individual level</i>							
Intercept	3.55***	3.59***	3.62***	3.60***	3.61***	3.60***	
Gender (<i>a</i>)		−0.15***	−0.16***	−0.13**	−0.12***	−0.12***	1.12
Age		0.00	0.00	0.00	0.00	0.00	1.24
Job tenure		−0.01***	−0.01***	−0.01*	−0.01*	−0.01*	1.19
Psychological empowerment				0.53***	0.52***	0.54***	1.18
<i>Job level</i>							
Managerial level		0.35***	0.24**	0.15*	0.11****	0.09	1.12
Innovation requirements			0.44**	0.29**	0.29**	0.28**	1.16
Job complexity					0.16*	0.16*	1.07
<i>Cross-level interaction</i>							
Psychological empowerment × Job complexity						0.36**	1.02
Deviance	2,452	2,399	2,381	2,214	2,211	2,204	
Pseudo R^2 level 1		0.00	0.09	0.21	0.21	0.21	
Pseudo R^2 level 2		0.28	0.41	0.52	0.53	0.52	

Table III.
Results of HLM
analysis for the
antecedents of
individual innovation

Notes: $n = 1,178$ individuals (level 1) in 82 jobs (level 2). Estimates are based on grand-mean centering. In order to check for spurious cross-level interactions, *post hoc* tests have been conducted with group-mean centering; Pseudo R^2 indicates the amount of total variance in the dependent variable explained by the predictors; a 1 = “female”; 0 = “male.” * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.10$

innovation. We estimated significance of the indirect effects with the Monte Carlo method by Selig and Preacher (2008). Results show significant indirect effects (95 percent CIs between 0.08 and 0.24), which provides support for *H1c*.

Cross-level moderation of job complexity

Subsequently, we wanted to test the cross-level moderation of job complexity. First, we tested the direct cross-level effect of job complexity in model 5. The results suggest that individual innovation increases with job complexity, which provided support for *H2*.

Before proceeding to model 6, we tested whether the random error variance of the slope of psychological empowerment would be significant at the job level. Because this was the case, it was appropriate to test a cross-level moderation. In model 6, job complexity was added to the random intercept of the model and to the random slope of psychological empowerment. According to the results, there was a positive direct relationship between job complexity and individual innovation as well as a cross-level moderation of job complexity of the relationship between psychological empowerment and individual innovation.

This moderation is shown in Figure 2 in which the moderation is visualized according to the procedure of Aiken and West (1991). The *y*-axis represents individual innovation, and the *x*-axis represents psychological empowerment. There are separate lines for higher job complexity (one standard deviation above the grand mean of job complexity) and lower job complexity (one standard deviation below the grand mean of job complexity). The plot demonstrates visually that the slope of psychological empowerment is steeper for employees that function in jobs that are characterized by a high-complexity climate. This final model explained 21 percent of the individual-level variance in individual innovation, and 52 percent of the job-level variance. In sum, the results of model 6 provide support for *H3*.

Discussion

Theoretical implications

This study examines individual innovation as a result of the interplay of job characteristics and intrinsic motivation. We study when innovation requirements empower individual innovation. We examine the relationship of innovation requirements, psychological empowerment and individual innovation, and we study job complexity as a moderator in this linkage. As hypothesized, we found a mediating role of psychological empowerment in the relationship between innovation requirements and individual innovation, and a

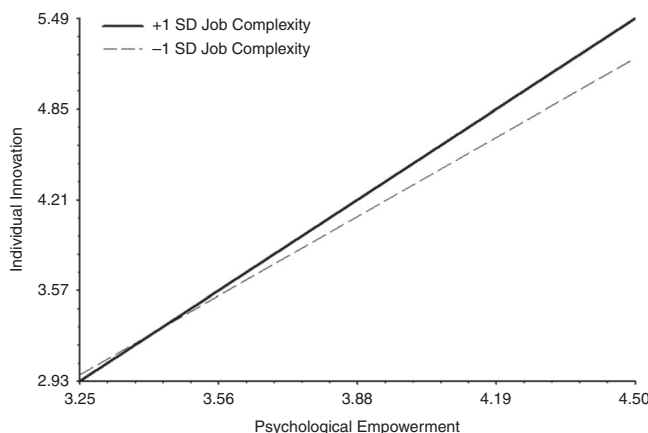


Figure 2. Multilevel moderation of the link between psychological empowerment and individual innovation

moderating role of job complexity in the relationship between psychological empowerment and individual innovation.

By examining the relationship between psychological empowerment and individual innovation, this study informs the field's understanding of how innovation requirements are likely to have an impact. The current findings show that the work environment-individual innovation linkage is driven by a psychological mechanism. This is consistent with theorizing in innovation literature (Amabile, 1983; Shalley *et al.*, 2004; Anderson *et al.*, 2014). More specifically, the relationship between innovation requirements and individual innovation can be explained by psychological empowerment. When innovation requirements are high, the job is experienced as important and meaningful. Employees experience that their job is motivating and urges autonomous and proactive behavior in dealing with the work requirements. This fosters employees' internalization of these requirements to engage in idea generation and persistence in implementing these ideas. Further, the current findings of the mediation are consistent with past research on the employment relationship. Psychological empowerment from broad job requirements is satisfying (Audenaert, Vanderstraeten and Buyens, 2016) and fosters affective commitment and job performance (Zhang *et al.*, 2014). We add to this research by focusing on innovation requirements which are a facet of such broad job requirements. Also innovation requirements provide stimuli for employees to have a proactive motivational orientation in their work. This proactive motivation drives employees to generate creative ideas and implement them.

This study also adds to the field's understanding of when innovation requirements empower individual innovation. The current findings show that the empowering effect of innovation requirements is less effective for complex jobs. This corroborates the view in innovation literature that job characteristics and individual motivation work in concert to influence individual innovation (Anderson *et al.*, 2014; Hammond *et al.*, 2011; Unsworth and Parker, 2003). Moreover, this is consistent with suggestions to acknowledge job complexity as a key boundary condition in multiple strands of the literature: employment relationship literature (Tsui *et al.*, 1997), empowerment literature (Conger and Kanungo, 1988) and creativity literature (Amabile, 1983). The current study thus adds to previous work by theoretically and empirically addressing the role of job complexity in forming a relevant context for empowering proactive behaviors from broad innovation requirements. When employees' jobs have ambiguous goals and unclear means-end connections, it becomes more relevant to foster their empowerment and individual innovation by broad innovation requirements. Employees have more discretion to act because they work in a job that is hardly controllable due to unclear means-end connections. Therefore, they need to be empowered to engage and persist in individual innovations. In contrast, when employees' jobs have clear delineated goals and clear means-end connections, it becomes less relevant to foster their empowerment and individual innovation by broadly prescribing their innovation requirements. By making part of a simple job, employees get less opportunities to rock the boat by having and implementing new ideas.

Another contribution of this study pertains to examining a multilevel model of individual innovation. By considering job characteristics at the job group level, we addressed methodological needs (Humphrey *et al.*, 2007), and we addressed the view that jobs differently affect individual innovation (Farr and Tran, 2008; Shalley *et al.*, 2004), and the need of a multilevel perspective to further the field's understanding of individual innovation (Anderson *et al.*, 2014; Unsworth and Parker, 2003). Our findings show that it is relevant to study job characteristics as collective perceptions. Previous research has found that individual perceptions of job complexity are linked with individual innovation (Hammond *et al.*, 2011). However, these individual perceptions depend on what the individual employees are capable of. Employee capabilities function as a lens through which employees judge whether their job is complex (Campbell, 1988). We thus add to previous research that not

only employees' individual perceptions matter to individual innovation, but also their colleagues' perceptions and experiences. Employee perceptions of job characteristics are likely to be influenced by experiences and interactions with their colleagues. Although employees form their own personal cognitions about their work role, on which they react, these cognitions are associated to job characteristics' perceptions of colleagues in their job group. Because job characteristics are typically studied at the individual level (Humphrey *et al.*, 2007), our findings represent a departure from most existing research on job characteristics. Research on HR practices has shown that employees' reactions to HR practices are influenced by experiences of their colleagues (Kehoe and Wright, 2013). Additionally, the current findings suggest that employees' reactions to job characteristics are influenced by their colleagues' perceptions and experiences. This points to a need for future studies on job characteristics to examine employees' aggregate perceptions of job characteristics throughout a job group.

Limitations and future research

Despite the abovementioned contributions, several limitations of this study should be recognized.

First, some regression coefficients in our results seem high, raising concerns for possible common method bias. However, there are several reasons that common method bias is likely not an issue in this research: the VIF values were not concerning, there were no high correlations, there was a time lag in measuring individual innovation, and the constructs were different from each other. Moreover, it has been stressed that if interaction relations are found in data, common method bias is unlikely an issue (Siemens *et al.*, 2010). Nevertheless, future research could use multisource data.

Second, the interactionist perspective on individual innovation suggests that individual differences and contextual differences interactively combine in promoting individual innovation (Unsworth and Parker, 2003; Hammond *et al.*, 2011). Therefore, we encourage researchers to consider individual perceptions of the job context in addition to the collective perceptions. These individual perceptions may function as a lens through which employees perceive and respond to the job context. Equity theory suggests that these individual perceptions are subject to social comparisons (Adams, 1965). Instead of looking at the group-level perceptions, the disagreement may be taken into account. In multilevel research, this is referred to as a "frog pond" (Klein and Kozlowski, 2000). Employees who perceive that their job is more simplified than that of the average job incumbent although the performance level is comparable may perceive inequity. These employees may restore the balance by being less innovative.

Finally, although the finding of job-level perceptions of job characteristics is a critical contribution, its relevance may depend on the organization. Multilevel communication and climate theories underline that collective perceptions are formed within a nested structure (Klein and Kozlowski, 2000). The job-level nesting may be more relevant for the formation of collective perceptions of job requirements in some organizations than in others. Employees are not only nested in jobs within organizations, but also in units, cells, and teams (Thomas *et al.*, 2005; Bliese, 2000). The salience of these different levels may depend on how work is organized. In turbulent environments work has become more dynamic. However, in many organizations, job functions still are the cornerstone for job analysis and the HRM cycle (Bernardin and Russel, 2013). When job functions are the cornerstone for job analysis and the HRM cycle, the job level may be salient. Furthermore, how the organization is structured and the proximity of employees affects social processes that are vital to the formation of collective perceptions (Klein and Kozlowski, 2000; Thomas *et al.*, 2005). It may be interesting to study other relevant levels at which collective perceptions of job requirements are formed and how this affects employees.

Managerial implications

In practice, it is often assumed that innovative behaviors require employees' creative personality. Yet, research has demonstrated that other aspects beside personality at work play a more important role (Anderson *et al.*, 2014). Specifically, two job characteristics have a large effect on individual innovation: innovation requirements and job complexity (Hammond *et al.*, 2011). Our research demonstrates the interplay of these job characteristics and psychological empowerment in relation to individual innovation. In jobs in which individual innovation is an important outcome, managers should realize that they can influence individual innovation. These jobs' job descriptions can be revised to encompass broad innovation requirements. However, managers should also be aware that the extent that these innovation requirements empower individual innovation depends on whether the job is complex. Jobs are complex when they entail unclear means-end connections. Managers should thus be careful not to simplify jobs in which they want to trigger individual innovation.

Another aspect that managers could try to steer is the emergence of collective perceptions of job characteristics in the way that they intended. It is not because HRM designs jobs to entail innovation requirements and job complexity that employees also perceive it as such. Both job requirements and job complexity need to be carefully constructed and the perceptions should be managed by HRM to foster individual innovation. HRM can pursue the formation of job-level perceptions that are in accordance with the intended job characteristics. These collective perceptions can be pursued by providing a consistent message about job characteristics across the HRM system (Audenaert, Decramer, George, Verschuere and Van Waeyenberg, 2016; Bowen and Ostroff, 2004; Tsui and Wang, 2002). Furthermore, the emergence of job-level perceptions can be followed up in existing job satisfaction surveys. These surveys may include scales to measure perceived innovation requirements and job complexity within the job. Scores of inter-rater reliability may provide information on the extent to which there are group-level perceptions of these job characteristics. When inter-rater reliability is too low, additional communications about innovation requirements and job complexity may be provided to the job incumbents and their leaders, and job characteristics may be revised to signal high-innovation requirements and high-job complexity.

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