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What contributes to individual innovativeness? A multilevel perspective

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ABSTRACT

It is well-established that individual innovativeness is an indispensable quality for employees working in a variety of workplace environments. However, the interaction between the psychological and organizational factors influencing innovativeness remains unclear. This study seeks to address that research gap by examining a model comprising a mix of psychological factors (implicit theory and goal orientation) and organizational culture. Data were collected from 315 staff members working in 34 different departments/schools at Tampere University, Finland. The study employed a Bayesian multilevel path analysis that matched the hierarchical structure of the data to test the hypotheses. The results suggest that psychological factors reflecting goal orientation are the most important for interpreting individual innovativeness. Specifically, mastery goal orientation was shown to be a positive predictor and performance-approach goal orientation a negative predictor of innovativeness. Unexpectedly, departmental culture had neither a direct effect on innovativeness nor a moderation effect on the relationships between the psychological variables and innovativeness. Plausible explanations for these results and implications for future research are discussed.

1. Introduction

Prosperity and advancement rely on the capacity of societies, organizations, and individuals to innovate, and research has consistently shown that individual innovativeness is a key factor in initiative success (Gökçearslan, Karademir, & Korucu, 2017; Hong, Hwang, Ting, Tai, & Lee, 2013; Jin, 2013; Park & Kim, 2010; Si & Wei, 2012). Rogers (2003) describes innovators as change agents, while Kirton (1976) argues that innovators are pioneers of radical change. Innovativeness is of the utmost importance for knowledge workers (Benson & Brown, 2007) because they are expected to expand their expertise, deal with ambiguity, take risks, embrace novel ideas, and respond quickly to knowledge changes (Aldahdouh, Korhonen, & Nokelainen, 2017). In other words, knowledge workers are asked to be innovators (Drucker, 1999).

Many studies show remarkably consistent findings regarding the relevance of innovativeness in predicting adaptive outcomes. For instance, the empirical evidence shows that innovativeness predicts technology usage (Gökçearslan et al., 2017; Hong et al., 2013; Jin, 2013; Park & Kim, 2010), influences the implementation of information and communication

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technology (ICT; Drent & Meelissen, 2008), and is related to perceived competencies in e-learning (Loogma, Kruusvall, & Ümarik, 2012) and techno-pedagogical skills (Çuhadar, Bülbül, & Ilgaz, 2013).

Although several studies have sought to identify the antecedents of innovativeness, the results may be described as scattered. Some studies, for instance, have focused on organizational factors (Naranjo-Valencia, Jiménez-Jiménez, & Sanz-Valle, 2016; Shanker, Bhanugopan, van der Heijden, & Farrell, 2017; Si & Wei, 2012), while others have focused on psychological factors (Aldahdouh, Nokelainen, & Korhonen, 2018; Batra & Vohra, 2016; Lu, Lin, & Leung, 2012; Vinarski-Peretz, Binyamin, & Carmeli, 2011). In a review study summarizing the antecedents of innovativeness, Parzefall, Seeck, and Leppänen (2008) pointed out that "most studies have focused on isolated factors, and a holistic perspective is lacking" (p. 166). Among the few studies that have investigated psychological and organizational factors together, Scott and Bruce (1994) found that both psychological and organizational factors interacted and cooperated in shaping innovative behavior. Beyond those few studies (Miron, Erez, & Naveh, 2004; Montani, Odoardi, & Battistelli, 2014; Scott & Bruce, 1994), however, evidence of an interactive effect remains inconclusive.

Cai (2017) argued that the study of innovation in higher educational institutions (HEIs) does not enjoy the same momentum as studies in the management field. This conclusion adds more uncertainty about whether models identified in prior studies are applicable to the context of HEIs and calls for research to fill this void. This study responds to this need by exploring some of the most often-cited psychological and organizational factors influencing individual innovativeness in HEIs. We are fundamentally motivated by a curiosity about whether individual innovativeness results from employees' psychological attributes or is shaped by their workplace environment. Alternatively, it may be a function of both psychological and organizational aspects. This study addresses two of the most salient psychological factors—implicit theories (Dweck, Chiu, & Hong, 1995) and goal orientations (Midgley et al., 1998)—while the organizational aspect is represented by the organizational culture (Cameron & Quinn, 2006).

In what follows, we review the literature on innovativeness along with its antecedents and develop the study's hypotheses. Next, we describe the study's methodology, including the sample, the measures, and the analysis. Next, the study's most important findings are outlined. Finally, we discuss the study's results, establish connections to the literature, and draw conclusions and implications for researchers and practitioners.

2. Innovativeness

Below, we delineate several relevant concepts in the literature and try to demarcate each one. However, the boundaries are by no means clear. The more confusing concepts in the literature include "creativity"' (Amabile, 1988), "innovation" (West & Farr, 1990), "innovative behavior" (Scott & Bruce, 1994) and "innovativeness" (Goldsmith & Foxall, 2003). Thus, we will begin by locating this study's concept of innovativeness within a sea of foggy conceptualizations.

Some scholars have advocated a conceptual differentiation between creativity and innovation (Miron et al., 2004; Rank, Pace, & Frese, 2004), while others argue that innovation implicitly or explicitly encompasses creativity (West & Farr, 1990). The first approach considers creativity as idea generation while conceiving innovation as idea implementation (Rank et al., 2004). The second approach combines the two concepts and considers creativity to be the first phase of the innovation process, thus viewing creativity as "the ideation component of innovation and innovation as encompassing both the proposal and applications of the new ideas" (West & Farr, 1990, p. 10). This study employs the latter approach because our concern is not just about whether employees will implement the ideas generated by others; we also examine their tendency to generate innovative ideas.

Regarding measurement, individual innovation has been operationalized through two main methods. The first measurement level relies on Rogers (2003), who defines innovativeness as "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system" (Rogers, 2003, p. 242). This definition corresponds to a low level of abstraction because it concerns the tracking of individual differences in *observed behavior*. The literature also uses various terms to describe innovativeness from a behavioral perspective, including *actualized innovativeness* (Midgley & Dowling, 1978), *innovative work behavior*, or *innovative job performance* (Janssen & Van Yperen, 2004; Jong & Hartog, 2007). A second and more abstract measurement level for innovativeness conceptualizes it as a persistent individual characteristic (Yi, Fiedler, & Park, 2006), a latent construct (Goldsmith & Foxall, 2003; Midgley & Dowling, 1978), or an underlying personality trait (Hurt, Joseph, & Cook, 1977) that determines the tendency to generate and accept changes and novel ideas. Innovativeness as a personality trait has been referred to as *general innovativeness* (Marcati, Guido, & Peluso, 2008), *life innovativeness* (Roehrich, 2004), *innate innovativeness* (Midgley & Dowling, 1978), and *global trait innovativeness* (Goldsmith & Foxall, 2003). The measurement of innovativeness as a personality trait has outweighed the use of behavioral measurement because the latter has been identified as a post-facto technique lacking the predictive power of innovations in other domains (Goldsmith & Foxall, 2003). Accordingly, this study adopts the personality trait approach.

2.1. Factors predicting innovativeness

Researchers have made several theoretical attempts to identify the factors predicting individual innovativeness (Anderson, Potočnik, & Zhou, 2014; Frambach & Schillewaert, 2002; Parzefall et al., 2008; Patterson, Kerrin, & Gatto-Roissard, 2009; Wisdom, Chor, Hoagwood, & Horwitz, 2014). These efforts have revealed the key determinants which can be

categorized into psychological and organizational types. The sections below review these factors, along with the relationships between them.

2.1.1. Psychological factors

Several psychological factors have been identified as contributors to individual innovativeness. The long list includes Big Five personality dimensions, self-efficacy, thinking styles, intrinsic motivation, and attitudes (Anderson et al., 2014; Parzefall et al., 2008; Patterson et al., 2009; Wisdom et al., 2014). Among those factors, the implicit theory (Dweck, 2006) and achievement goal orientation (Midgley et al., 1998) represent the most promising models.

Implicit theory (Dweck & Leggett, 1988) concerns an individual's beliefs about the nature of human attributes, including ability, personality, and morality (Dweck et al., 1995). A person may believe in one of two theories about human attributes (Dweck, 2006). For entity theorists, human attributes are fixed, innate, and physical; one cannot surpass these physical limitations. For incremental theorists, human attributes are elastic, stretchable, and malleable; there are no limitations on how far one can go through practice and effort. Scholars have examined implicit theories extensively, with a focus on human abilities such as intelligence (Blackwell, Trzesniewski, & Dweck, 2007). The results of research conducted in several contexts have consistently shown that entity theories are associated with maladaptive outcomes, while incremental theories are related to adaptive outcomes (De Castella & Byrne, 2015; Dweck, 2006; Murphy & Dweck, 2010).

Achievement goal orientations is the other psychological factor important to this study. Goal orientations are often described as the reasons why one is striving to achieve a task (Dweck & Leggett, 1988; Midgley et al., 1998). Three main goal orientations have been identified: (1) mastery, (2) performance-approach, and (3) performance-avoidance (Linnenbrink & Pintrich, 2002; Midgley et al., 1998). Individuals adopting mastery goal orientation tend to engage in tasks in order to improve their capacities and sharpen their skills. By contrast, individuals adopting performance-approach goal orientation tend to engage in a task in order to show others how well they can do or to surpass their peers (Linnenbrink & Pintrich, 2002). Finally, individuals adopting performance-avoidance goal orientation tend to engage in a task in order to avoid appearing incompetent (Elliot & Church, 1997). Mastery goal orientation is often reported to be associated with adaptive behaviors (De Castella & Byrne, 2015; Dweck & Leggett, 1988), whereas performance-avoidance goal orientation is related to maladaptive behaviors (Elliot & Church, 1997). The research findings on performance-approach goal orientation have been inconsistent and contradictory (Elliot & Moller, 2003); while some findings indicate positive effects (De Castella & Byrne, 2015; Elliot & Church, 1997), others indicate negative consequences (Ames, 1992; Dweck & Leggett, 1988).

What we know about the relationship between implicit theories and goal orientations relies largely upon empirical studies that repeatedly confirm that incremental theory predicts mastery goal orientation. Meanwhile, the entity theory predicts performance-approach and performance-avoidance goal orientations (Chen & Pajares, 2010; De Castella & Byrne, 2015; Dweck & Leggett, 1988; Robins & Pals, 2002).

In 1988, Dweck and Leggett proposed a theoretical framework for future research wherein they identified implicit theories as predictors of goal orientations and goal orientations as predictors of social behaviors. While several theoretical studies have mentioned that implicit theory and goal orientations can be strong predictors of innovativeness (Anderson et al., 2014; Parzefall et al., 2008; Patterson et al., 2009), empirical findings have partially supported this theoretical framework (Keong & Hirst, 2010; Lu et al., 2012). For instance, Lu et al. (2012) found that mastery goal orientation was an indirect positive predictor of innovative performance. On the other hand, Aldahdouh et al. (2018) found that the entity theory of ability predicted the mastery goal orientation but failed to predict the performance-avoidance goal orientation. Even though performance-avoidance goal orientation appeared to be a negative predictor of innovativeness, mastery goal orientation seemed to be a positive predictor.

2.1.2. Organizational factors

Previous studies have listed a number of organizational factors that help hinder or foster innovativeness, such as organizational leadership, structure, strategy, resources, size, and climate (Anderson et al., 2014; Parzefall et al., 2008; Patterson et al., 2009; Wisdom et al., 2014). This study examines the role of organizational culture, the most often-mentioned factor amongst those listed. An organizational culture comprises employees' hidden and collective beliefs, assumptions, and thoughts about their institution, all of which implicitly guide their behavior (Cai, 2008). The term “culture” here refers to the shared identity that distinguishes one working unit from all others.

The competing values framework (CVF) is one of the most widely used typological frameworks for organizational culture (Cai, 2008; Cameron & Quinn, 2006). The CVF comprises two crossing dimensions with two opposite poles: (1) internal *vs.* external; and (2) stability *vs.* flexibility. The crossing dimensions produce four quadrants representing four organizational culture types (Cameron & Quinn, 2006): Clan (focuses on internal flexibility), Hierarchy (focuses on internal stability), Market (focuses on external stability), and Adhocracy (focuses on external flexibility).

Several review studies have made a strong case for the role of organizational culture in influencing innovativeness (Ahmed, 1998; Anderson et al., 2014; Frambach & Schillewaert, 2002; Parzefall et al., 2008; Patterson et al., 2009; Wisdom et al., 2014). For example, Patterson et al. (2009) noted that an organizational culture that supports innovation is one that “encourages risk taking and the exchange of ideas, promotes participation in decision making and management, has goals and rewards for innovation, and provides psychological safety in relation to making suggestions” (p. 25). In support of these claims, Raj and Srivastava (2013) revealed that the Clan, Adhocracy, and Market cultures contribute positively to predicting organizational innovativeness through organizational learning. In another study reported by Amabile (1988), interviews with

R&D scientists identified nine work environment characteristics that foster the generation of novel ideas: giving employees a sense of control over their work (freedom); offering supportive managerial practices, such as showing enthusiasm for new ideas and paying attention to employees' needs and expectations (encouragement); and providing constructive feedback and rewards for employees' professional skills and knowledge (recognition).

2.1.3. Psychological and organizational factors

Implicit theory and goal orientations were originally studied in academic contexts, where researchers focused on identifying their antecedents and consequences (Dweck & Leggett, 1988; Midgley et al., 1998). Their efforts have pointed to the importance of identifying the school's or classroom's goal structure as a strong predictor of students' goal orientations (Ames, 1992; Midgley et al., 1998). Students who tend to endorse a statement like "in this classroom, only talented students are rewarded" also tend to endorse statements like "my talent is what it is, and there is not much I can do to improve it." Therefore, they also tend to endorse statements like "One of my goals is to avoid looking not smart in this class."

Like those of their students, teachers' implicit-theories and goal orientations are shaped by their working environments, as several studies have emphasized (Hamstra, Van Yperen, Wisse, & Sassenberg, 2014; Kunst, van Woerkom, van Kollenburg, & Poell, 2018). Murphy and Dweck (2010), for example, showed that two cultural mindsets contribute to employees' cognition, affection, and behavior: a culture of genius and a culture of growth. In a culture of genius, organizations tend to recruit only "intelligent" people and praise employees on their "innate" attributes. They invest little in employee training, which talented people do not need. Contrariwise, in a culture of growth, organizations tend to recruit growth-minded people, praise employees on their efforts, and invest a great deal in employee training. Keating and Heslin (2015) proposed a model in which they identified organizational culture and its climate as antecedents of employees' implicit theories and their job commitment and satisfaction.

Several studies have examined organizational culture as a moderator of the relationship among the psychological variables. For instance, Hon and Leung (2011) found that organizational culture moderated the effect of employees' intrinsic motivations on their creative performance. Miron et al. (2004) examined whether cultures serve as moderators between individual creativity and innovation performance, finding that, in a high-innovative culture, individuals' creative ideas are often transformed into innovation, while individuals' creative ideas remain stagnant in a low-innovative culture.

3. Study variables and hypotheses

Table 1 summarizes the study variables, along with the corresponding abbreviations and definitions.

We posited that the psychological variables (entity theory of ability and goal orientations) and organizational variables (cultures) predict innovativeness while the organizational variables serve as moderators of the relationships among the psychological variables. Specifically, we propose the following:

Hypothesis 1. The entity theory of ability and performance-avoidance goal orientation contribute negatively in predicting innovativeness, while mastery goal orientation contributes positively in predicting innovativeness.

Hypothesis 2. The entity theory of ability is negatively associated with mastery goal orientation and positively associated with performance-avoidance goal orientation.

Hypothesis 3. The Clan and Adhocracy cultures contribute positively in predicting innovativeness, while the Hierarchy culture contribute negatively in predicting innovativeness.

Hypothesis 4. Culture moderates the relationship among the implicit theory of ability, goal orientation, and innovativeness such that:

Table 1
Study variables, abbreviations, and definitions.

Variable	Abbreviation	Definition
Innovativeness	INNOV	refers to an individual's willingness to change
Entity theory of ability	ETA	refers to an individual's beliefs that the human attributes are fixed, innate and stable
Mastery goal orientation	MAS	refers to an individuals' tendency to engage in a task in order to improve their own capacities and to sharpen skills
Performance-approach goal orientation	PAP	refers to an individuals' tendency to engage in a task in order to show others how well they can do or to overtake their peers
Performance-avoidance goal orientation	PAV	refers to an individuals' tendency to engage in a task in order to avoid appearing incompetent in comparison to their peers
Clan culture	CLN	refers to a culture that focuses on internal flexibility
Hierarchy culture	HRC	refers to a culture that focuses on internal stability
Market culture	MRK	refers to a culture that focuses on external stability
Adhocracy culture	ADH	refers to a culture that focuses on external flexibility

Hypothesis 4.1. Cultures supporting flexibility and discretion (Clan and Adhocracy) mitigate the negative effect of the implicit theory of ability and performance-avoidance goal orientation on innovativeness, but they strengthen the positive effect of mastery goal orientation on innovativeness.

Hypothesis 4.2. Cultures emphasizing control and stability (Hierarchy) worsen the negative effect of the entity theory of ability and performance-avoidance goal orientation on innovativeness, but they reduce the positive effect of mastery goal orientation on innovativeness.

Hypothesis 4.3. Cultures that support flexibility and discretion (Clan and Adhocracy) mitigate the negative effect of implicit theory of ability on mastery goal orientation, but they weaken the positive effect of the implicit theory of ability on performance-avoidance goal orientation.

Hypothesis 4.4. Cultures emphasizing control and stability (Hierarchy) reduce the positive effect of the entity theory of ability on mastery goal orientation, but they worsen the negative effect of the entity theory of ability on performance-avoidance goal orientation.

The literature has not presented clear evidence about the relationship between the Market culture and innovativeness (Naranjo-Valencia et al., 2016; Raj & Srivastava, 2013). On one hand, the Market culture is defined by stability and control, which may contribute negatively to mastery goal orientation while contributing positively to performance-avoidance goal orientation. On the other hand, it has an external orientation that supports openness and competitiveness, so it may contribute positively to innovativeness. Therefore, we do not hypothesize regarding the effect of the Market culture on innovativeness and its moderation role. Driven by the data, we allowed the Market variable to be associated with innovativeness and to moderate the relationship among the psychological variables and innovativeness.

Similar to findings on the Market culture, findings on the effect (adaptive or maladaptive) of performance-approach goal orientation have been inconsistent (Elliot & Moller, 2003). Thus, we allowed performance-approach goal orientation to be associated with innovativeness while remaining neutral regarding its effect.

4. Method

4.1. Participants

All the staff members working in 34 different schools/departments at Tampere University, Finland, were invited to participate in the study. Of these, 315 (167 female and 148 male) respondents left valid responses to an online questionnaire. Therefore, the sample was selected using a non-probability sampling method. The age of the participants varied from 20 to 67, with a mean of 46 years ($SD = 11.187$). Seventy percent ($n = 221$) of the participants were academic staff, while the rest ($n = 94$) were administrative workers. Participants had job experience of an average of 177 months in higher education (about 14.75 years; $SD = 116.475$). In terms of educational qualifications, 8% ($n = 25$) had completed a bachelor's degree, 40% ($n = 128$) had completed a master's degree, 15% ($n = 46$) had completed a doctoral or post-doctoral degree, 17% ($n = 54$) were professors or docents, and 20% ($n = 62$) were "others."

4.2. Measures and procedures

We distributed an online questionnaire to all staff members from August 2016 to November 2016, using email invitations and the university's intranet. Unless otherwise indicated, a 5-point Likert scale was used, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Cronbach's α provided an estimate of the internal consistency of the scales. We translated the questionnaire into Finnish and piloted it before use. The questionnaire consisted of demographic questions (seven items) and the following measures: innovativeness, organizational culture, goal orientations, and implicit theories of ability.

4.2.1. Innovativeness

A shortened version (13 items) of Hurt et al. (1977) Innovativeness Scale was adopted to measure the staff members' orientations towards change (e.g., "I enjoy trying new ideas"). The scale has shown strong psychometric characteristics and has repeatedly demonstrated its usefulness as a valid measure of general innovativeness (Goldsmith, 1990; Pallister & Foxall, 1998). Cronbach's α was 0.848.

4.2.2. Organizational culture

We adopted the Organizational Culture Assessment Instrument (OCAI) to assess staff's perceptions of their departments' culture. The OCAI was devised by Cameron and Quinn (2006) and is based on the CVF, the framework most often used to assess culture in the higher education context (Cai, 2008; Kleijnen, Dolmans, Muijtjens, Willems, & Van Hout, 2009). Previous studies have validated the OCAI's validity and reliability in measuring an organization's culture (Cameron & Quinn, 2006; Heritage, Pollock, & Roberts, 2014). The OCAI consists of 24 questions: six for each of the four cultures. Cronbach's α coefficients were as follows: Clan = 0.805, Hierarchy = 0.624, Market = 0.868, and Adhocracy = 0.822. The reliability of the

Hierarchy culture is under the acceptable level of 0.70 and is consistent with prior findings that revealed that the Hierarchy factor should be adjusted (Heritage et al., 2014).

4.2.3. Goal orientations

We adapted a shortened version (10 items) of Midgley and colleagues' (2000) Achievement Goal Orientation (AGO) Scale to measure staff members' goal orientations. The adaptations included replacing "school" with "work." The resulting AGO Scale consisted of three subscales: MAS (three items; e.g., "One of my goals in work is to learn as much as I can"), PAP (three items; e.g., "One of my goals is to show others that work is easy for me"), and PAV (four items; e.g., "It's important to me that I don't look incapable of doing my work"). Cronbach's α values for MAS, PAP, and PAV were 0.759, 0.787, and 0.815, respectively.

4.2.4. Implicit theories of ability

The eight-item person measure developed by Levy, Stroessner, and Dweck (1998) was adapted to capture the implicit theory of ability. The items were re-worded to reflect first-person beliefs about the nature of participants' personal attributes rather than human attributes in general (e.g., for incremental beliefs, "I can significantly change my basic level of talent"; for entity beliefs, "My talent is something very basic about me that I can't change very much"). The items were measured on a 6-point Likert scale, ranging from 1 ("strongly disagree") to 6 ("strongly agree"). The incremental items were reverse-scored such that larger scores reflected a relatively strong entity theory. The eight items were added up and averaged to create the Entity Theory of Ability scale ($\alpha = 0.870$).

4.3. Analysis

4.3.1. Approach

We conducted Bayesian multilevel path analysis using Mplus version 8.0 (Muthén & Muthén, 2017) to test the hypotheses. A multilevel approach was warranted since our data had a nested structure, whereby we collected 315 responses of individuals working in 34 schools/departments. We opted to use path analysis because the study variables were assumed to have structural dependencies among the predictor variables beside their effects on the outcome variable. We followed the within-and-between approach to multilevel path analysis, wherein estimates for the within-covariance matrix (individual-level) and between-covariance matrix (group-level) are determined separately (Hox, 2010). This makes it possible to partial out the group-level variance from individual-level variables. Multilevel path analyses of both levels were conducted separately but simultaneously. Due to the small number of groups in this study, it was not feasible to conduct the analysis on latent variables. Thus, summary scores of the variables were used in the analysis. The Bayesian approach was chosen because of its superior performance for small samples (Stegmueller, 2013). Unlike inferential techniques, the Bayesian approach does not rely on any distributional assumptions about the data, such as normality (Finch & Bolin, 2017, p. 286).

4.3.2. Settings

The Markov Chain Monte Carlo (MCMC) methodology was used to obtain the parameter estimates in Bayesian analysis. The convergence of parameter estimates was assessed by the Potential Scale Reduction (PSR) convergence criterion. A PSR <1.05 for each parameter indicates that convergence of the MCMC sequence has been reached (Finch & Bolin, 2017). The convergence was also monitored using the trace plots. Quick oscillations in the trace plot indicate convergence. Autocorrelation plots were used to check for the correlation between two adjacent MCMC draws and to set the thinning value. Data was thinned every fourth MCMC draw to minimize the correlation to near zero.

Model fit was assessed using the Posterior Predictive P-value (PPP) and Credibility Interval (CI). A PPP value close to 0.50 indicates optimal fit (Finch & Bolin, 2017). A 95% CI that contains zero indicates good fit to the data. In addition, we used the Deviance Information Criterion (DIC) to compare between models, where the model with the lowest DIC value is preferable. The analysis was conducted using non-informative or diffuse priors. Two MCMC chains of a minimum of 45,000 iterations were used (Muthén & Muthén, 2017).

4.3.3. Statistical procedures

We tested three models while analyzing the data: random intercept, random slopes, and cross-level interaction models. First, we tested the random intercept model (Fig. 1) and assessed the fitness of the model by computing the PPP. Then, we tested the random slopes model (Fig. 2) by allowing the slopes to vary across departments. Finally, we tested the cross-level interaction model (Fig. 3), in which the cultures served as moderators of the relationships between the psychological variables and the outcome (innovativeness).

The logic behind this process had two objectives. One was to ensure simplicity by testing the models from simple to more complex structures. The other was to check the PPP model fit value, which was not available except for the random intercept model. We then compared the DIC value of the random intercept model with the DIC values of both the random slopes and the cross-level interaction models. Lower DIC values would indicate a better model fit.

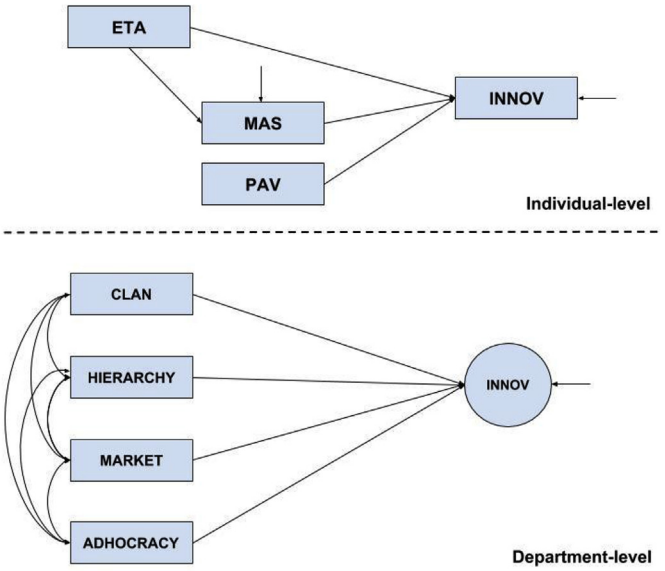

Fig. 1. Random intercept model. INNOV = Innovativeness; ETA = Entity Theory of Ability; MAS = Mastery goal orientation; PAV = Performance-Avoidance goal orientation. Performance-Approach goal orientation as well as the path from ETA to PAV were omitted based on the correlation findings.

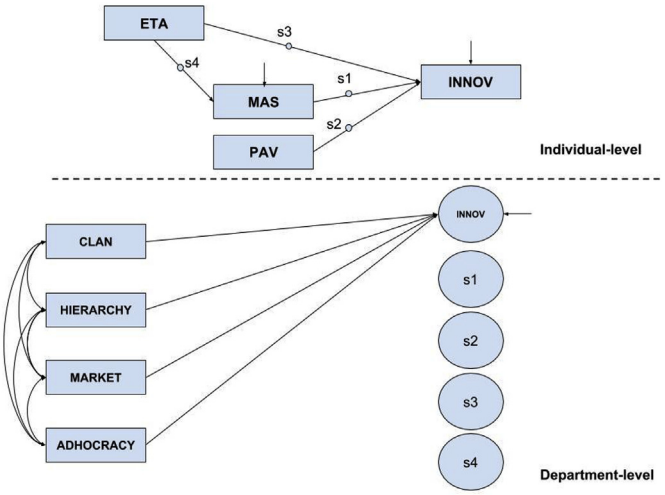

Fig. 2. Random slopes model. INNOV = Innovativeness; ETA = Entity Theory of Ability; MAS = Mastery goal orientation; PAV = Performance-Avoidance goal orientation. Performance-Approach goal orientation as well as the path from ETA to PAV were omitted based on the correlation findings.

4.3.4. Preliminary analyses

4.3.4.1. Missing data analysis. First, we conducted a missing values analysis. A case screening of 342 collected responses resulted in the removal of 27 cases. The missing values per variable were analyzed using the data imputation technique; they were replaced by the mean (for continuous variables) and the median (for the categorical variables).

4.3.4.2. Sample homogeneity. We conducted a series of differences tests to ensure sample homogeneity with respect to the outcome variable, innovativeness. An independent sample *t*-test showed that there was no significant difference in innovativeness based on gender (male or female) or job type (academic or administrative). The results of a one-way ANOVA also revealed no significant difference in innovativeness related to staff educational levels ($p > 0.05$).

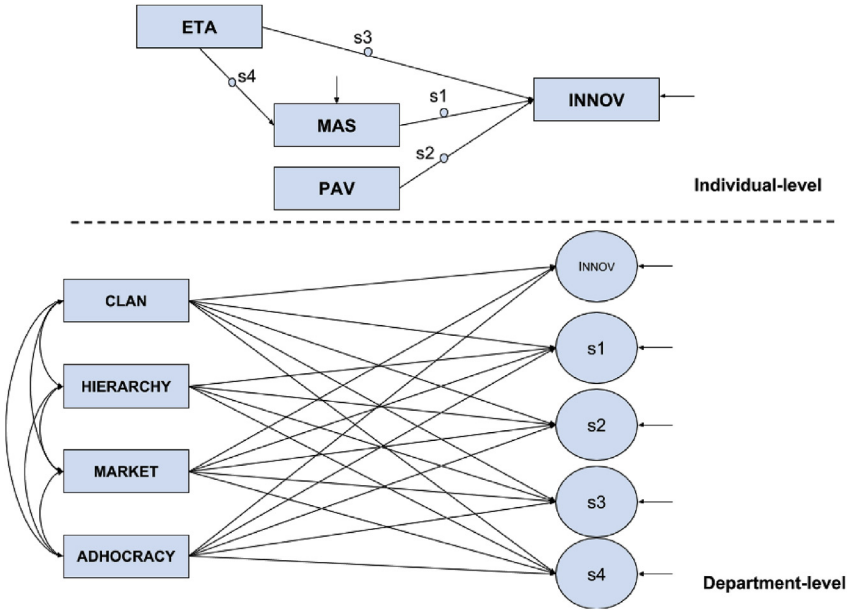

Fig. 3. Cross-level interaction model. INNOV = Innovativeness; ETA = Entity Theory of Ability; MAS = Mastery goal orientation; PAV = Performance-Avoidance goal orientation. Performance-Approach goal orientation as well as the path from ETA to PAV were omitted based on the correlation findings.

4.3.4.3. Common method variance. Our data could have suffered from a common method bias since the responses for all study variables were collected from the same individuals. We used Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). All items of our nine variables were entered into an unrotated exploratory factor analysis using SPSS and forcing a one-factor solution. The results indicated that the single factor accounted for only 12.7% of the variance. These results suggested that the common method variance was not a major concern in this study.

4.3.4.4. Data aggregation. The intra-class correlation coefficient (ICC1; Bliese, 2000) was calculated to examine whether there were department-level variances in the study variables that necessitated their inclusion in the between-level model. ICC1 represents the proportion of group-level variance in respect to the total variance of the variable. Variables showing ICC1 > 0.05 were included in the between-level model (LeBreton & Senter, 2008). Though we consider the entity theory of ability and goal orientations as individual characteristics, we computed ICC1 for their respective variables because they may differ significantly across departments due to the study's sampling method. As hypothesized, however, the ICCs for those individual variables showed almost no variance according to department membership (All ICC1s < 0.03). Thus, they were included only in the within-level model. Furthermore, we calculated ICC1 for the outcome variable (innovativeness) to see whether individual innovativeness was affected by department membership (Bliese, 2000). The results revealed that 10% of the variance in innovativeness was due to department membership.

Our intention for the cultural variables was to measure the common perceptions of culture in each department. We were interested in the mean of each department, and not individual perspectives on what the departmental culture was. However, the cultural variables were measured through the ratings given by individuals in the department. To justify the aggregation of those cultural variables to their departments' means, we used a calculator developed by Biemann, Cole, and Voelpel (2012) to compute median Rwg values using the null uniform distribution (Bliese, 2000). The Rwg value indicates the degree of agreement among staff members within a department. Values greater than 0.70 indicate generally accepted agreement among the raters (LeBreton & Senter, 2008). Using the same tool, we determined ICC1 in addition to the reliability of the group means (ICC2). The results were as follows: for Clan culture, 0.88 (Rwg), 0.08 (ICC1), and 0.44 (ICC2); for Hierarchy culture, 0.88 (Rwg), 0.08 (ICC1), and 0.45 (ICC2); for Market culture, 0.89 (Rwg), 0.16 (ICC1), and 0.64 (ICC2); for Adhocracy culture, 0.88 (Rwg), 0.09 (ICC1), and 0.47 (ICC2). The F-ratios associated with the ICC values were all statistically significant at the 0.05 level. The ICC1 and Rwg values of all cultural variables were above the cut-off values. The ICC2 values ranged between 0.44 and 0.64, classified by Fleiss (1986, p. 7) as fair to good reliability estimates (ICC2 values < 0.40 are poor, those between 0.40 and 0.75 are fair to good, and those > 0.75 are excellent). Based on the results, we decided to aggregate the cultural variables.

We followed the recommendation of Enders and Tofighi (2007), who suggested centering the individual-level variables on their group mean when the focus is on inspecting the moderation effect of the group-level variables on individual-level relationships. Department-level variables were centered on their grand mean (Hox, 2010).

4.3.4.5. Descriptive statistics. Table 2 displays the means, standard deviations, and correlations among the variables on the individual and department levels. An inspection of the correlations revealed that the relationships between innovativeness and the psychological variables were significant except for PAP. Therefore, PAP was excluded from further analysis. Similarly, ETA showed a non-significant relationship with PAV. Thus, the regression coefficient between ETA and PAV was canceled out in the examined models.

5. Results

5.1. Random intercept model

We were guided by the hypotheses and the correlation matrix in specifying the paths between the variables. At the individual level, we examined the model in which ETA, MAS, and PAV were predictors of innovativeness, while ETA was a predictor of MAS. At the department level, we examined the extent to which Clan, Hierarchy, Market, and Adhocracy cultures explain the variance in the random intercept of innovativeness. Equations (1)–(3) below represent the model:

$$INNOV_{ij} = \beta_{0j} + \beta_{10}\, MAS_{ij} + \beta_{20}\, PAV_{ij} + \beta_{30}\, ETA_{ij} + e_{ij} \quad (1)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\, CLN_j + \gamma_{02}\, HRC_j + \gamma_{03}\, MRK_j + \gamma_{04}\, ADH_j + u_{0j} \quad (2)$$

$$MAS_{ij} = \alpha_{00} + \alpha_{10}\ \ ETA_{ij} + \varepsilon_{ij} \quad (3)$$

In equation (1), the intercept β_{0j} is a random effect that varies across departments, while the slopes β_{10}, β_{20}, and β_{30} are fixed. The cultures on the department level predict the intercept of innovativeness β_{0j}. Equation (3) allows ETA to predict MAS where the intercept α_{00} and the slope α_{10} are fixed. ETA was not allowed to predict PAV because ETA had no correlation with PAV, as shown in the correlation matrix (see Table 2).

The parameter estimates all converged adequately, as the PSR values decreased smoothly over the iterations, reaching a value of 1.010, which is below the cut-off value of 1.05. The trace plot (Fig. 4) displays quick oscillations, while the autocorrelation plot (Fig. 5) displays low autocorrelation near zero, which together indicating good convergence of the MAS estimate. The posterior parameter trace and autocorrelation plots for the other parameters (not reported) were also indicative of good convergence.

The model showed a good fit to the data, as the PPP was 0.278, and the 95% CI for the difference between the observed and the replicated χ^2 values covered zero, with a lower bound of −16.494 and an upper bound of 32.025. The DIC value was 1143.358.

As shown in Table 3, ETA is negatively associated with MAS ($\alpha_{10} = -0.149$) and INNOV ($\beta_{30} = -0.083$), while MAS is positively associated with INNOV ($\beta_{10} = 0.261$). As expected, PAV is negatively associated with INNOV ($\beta_{20} = -0.097$). Although the individual-level variables maintained a significant association with INNOV, a significant value of e_{ij} may suggest that there remains a variance in INNOV that has not yet been explained.

Contrary to our expectations, none of the cultures explained the variance of the innovativeness's random intercept, even though a random effect of the intercept (δ^2_{u0j}) pointed to a significant variation in the intercept (γ_{00}) between departments. A significant overall fixed intercept γ_{00}, which is the expected value of INNOV when all predictors are on their means, suggested that the intercept was significantly different from zero.

Table 2
Means, standard deviations, and correlations among the variables on the individual and department levels.

	1	2	3	4	5	6	7	8	9
1. INNOV	1					−0.01	0.02	−0.04	−0.02
2. ETA	−0.09*	1							
3. MAS	0.13*	−0.09*	1						
4. PAP	0.00	0.05	0.04	1					
5. PAV	−0.08*	0.05	0.07	0.54*	1				
6. Clan						1	0.00	−0.10*	0.07*
7. Hierarchy							1	0.00	−0.03
8. Market								1	0.03
9. Adhocracy									1
M	3.75	3.73	3.95	2.22	2.67	3.02	2.87	2.49	2.94
SD	0.057	0.049	0.040	0.048	0.054	0.069	0.052	0.092	0.063

Notes: INNOV = Innovativeness; ETA = Entity Theory of Ability; MAS = Mastery goal orientation; PAP = Performance-Approach goal orientation; PAV = Performance-Avoidance goal orientation. Values below the diagonal are correlations at the individual level (n = 315); values above the diagonal are correlations at the department level (n = 34). *$P < 0.05$.

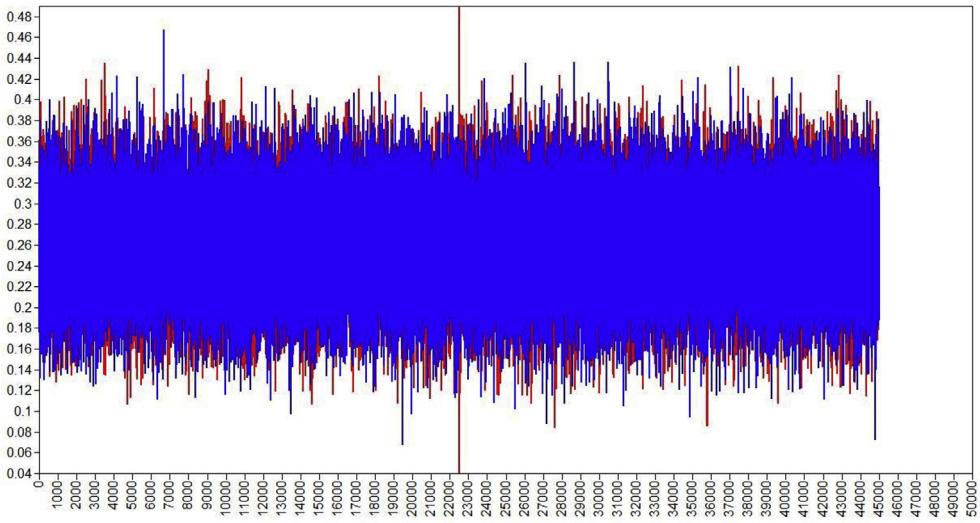

Fig. 4. Trace plot for the slope of MAS.

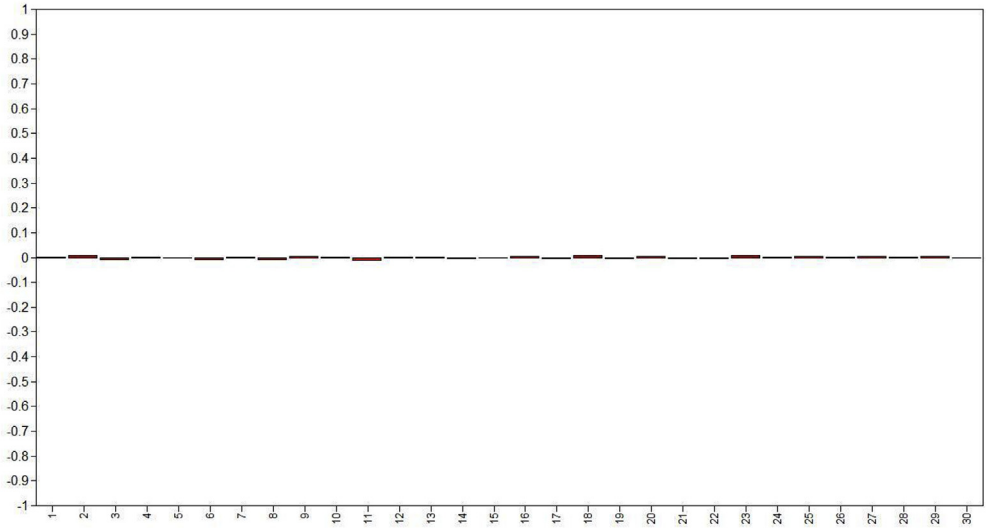

Fig. 5. Autocorrelation plot for the slope of MAS.

Table 3
Bayesian parameter estimates and credibility intervals of random intercept model.

Path	Estimate (*SD*)	95% Credibility Interval		Significance
		Lower	Upper	
Within-level				
MAS → INNOV (β_{10})	0.261 (0.044)	0.175	0.347	*
PAV → INNOV (β_{20})	−0.097 (0.032)	−0.159	−0.034	*
ETA → INNOV (β_{30})	−0.083 (0.035)	−0.153	−0.014	*
ETA → MAS (α_{10})	−0.149 (0.045)	−0.237	−0.062	*
Residual Variances				
INNOV ($\delta^2_{\varepsilon ij}$)	0.244 (0.021)	0.208	0.289	*
MAS ($\delta^2_{\varepsilon ij}$)	0.418 (0.034)	0.359	0.492	*
Between-level				
CLN → INNOV (γ_{01})	−0.380 (0.266)	−0.900	0.147	
HRC → INNOV (γ_{02})	0.308 (0.231)	−0.139	0.773	
MRK → INNOV (γ_{03})	−0.290 (0.173)	−0.625	0.056	
ADH → INNOV (γ_{04})	0.244 (0.259)	−0.263	0.759	
Intercepts				
INNOV (γ_{00})	3.758 (0.048)	3.662	3.853	*
Residual Variances				
INNOV (δ^2_{u0j})	0.040 (0.021)	0.014	0.095	*

5.2. Random slopes model

We allowed the slopes of the relationships between the psychological variables and innovativeness to vary across departments in a random slopes model. The slope of ETA on MAS was permitted to vary as well. The rest of the model remained as it was in the random intercept model to allow a comparison of the two models using DIC value.

$$INNOV_{ij} = \beta_{0j} + \beta_{1j} MAS_{ij} + \beta_{2j} PAV_{ij} + \beta_{3j} ETA_{ij} + e_{ij} \quad (4)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01} CLN_j + \gamma_{02} HRC_j + \gamma_{03} MRK_j + \gamma_{04} ADH_j + u_{0j} \quad (5)$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (6)$$

$$\beta_{2j} = \gamma_{20} + u_{2j} \quad (7)$$

$$\beta_{3j} = \gamma_{30} + u_{3j} \quad (8)$$

$$MAS_{ij} = \alpha_{00} + \alpha_{1j} ETA_{ij} + \varepsilon_{ij} \quad (9)$$

$$\alpha_{1j} = \lambda_{10} + \varepsilon_{1j} \quad (10)$$

The slopes β_{1j}, β_{2j}, and β_{3j} were random effects that vary across departments in this model (see equation (4)). The slopes β_{1j}, β_{2j}, and β_{3j} were functions of fixed intercepts (γ_{10}, γ_{20}, and γ_{30}) and random variances (u_{1j}, u_{2j}, and u_{3j}), while no variables were assigned to predict for those slopes, as shown in equations (6)–(8). Similarly, the slope α_{1j} was a function of fixed intercept λ_{10} and a random part ε_{1j}, as shown in equation (10).

Good MCMC convergence was manifested by (1) a steady decrement in the PSR values to values close to 1 for the last few tens of thousands of iterations, (2) tight horizontal bands for the parameter estimation in the trace plots, and (3) low dependence in the chain in the autocorrelation plots. The DIC value was 1122.479, which is lower than in the previous model; thus, allowing the slopes to vary across department led to a better fit to the data.

In this model, only MAS and PAV appeared to have significant positive ($\gamma_{10} = 0.266$) and negative effects ($\gamma_{20} = -0.089$) on INNOV, respectively (see Table 4). The variances of the slopes (u_{1j}, u_{2j}, u_{3j}) were significant, which indicates significant variations between departments in the relationships between the psychological variables and innovativeness, thus justifying the running of the cross-level interaction model.

5.3. Cross-level interaction model

The cross-level interaction model incorporated the previous random slopes model plus two additional constraints: (1) the cultures acted as moderators for the relationships between the psychological variables and innovativeness, as shown in

Table 4
Bayesian parameter estimates and credibility intervals of random slopes model.

Path	Estimate (*SD*)	95% Credibility Interval		Significance
		Lower	Upper	
Within-level				
Residual Variances				
INNOV (δ^2_{eij})	0.218 (0.020)	0.183	0.262	*
MAS ($\delta^2_{\varepsilon ij}$)	0.388 (0.033)	0.331	0.459	*
Between-level				
CLN → INNOV (γ_{01})	−0.375 (0.263)	−0.887	0.146	
HRC → INNOV (γ_{02})	0.314 (0.229)	−0.130	0.773	
MRK → INNOV (γ_{03})	−0.284 (0.171)	−0.615	0.056	
ADH → INNOV (γ_{04})	0.247 (0.256)	−0.263	0.746	
Intercepts				
INNOV (γ_{00})	3.772 (0.050)	3.675	3.872	*
Means				
MAS→INNOV slope (γ_{10})	0.266 (0.062)	0.143	0.390	*
PAV→INNOV slope (γ_{20})	−0.089 (0.044)	−0.177	−0.002	*
ETA→INNOV slope (γ_{30})	−0.072 (0.043)	−0.158	0.013	
ETA→MAS slope (λ_{10})	−0.124 (0.068)	−0.256	0.010	
Variances				
MAS→INNOV slope (u_{1j})	0.044 (0.035)	0.006	0.138	*
PAV→INNOV slope (u_{2j})	0.023 (0.016)	0.005	0.065	*
ETA→INNOV slope (u_{3j})	0.012 (0.014)	0.001	0.051	*
ETA→MAS slope (ε_{1j})	0.059 (0.037)	0.014	0.158	*
Residual Variances				
INNOV (δ^2_{u0j})	0.042 (0.021)	0.016	0.098	*

equations (13)–(15); and (2) the cultures were allowed to be moderators for the relationship between ETA and MAS as well (equation (17)).

$$INNOV_{ij} = \beta_{0j} + \beta_{1j}\ MAS_{ij} + \beta_{2j}\, PAV_{ij} + \beta_{3j}\, ETA_{ij} + e_{ij} \quad (11)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\, CLN_j + \gamma_{02}\, HRC_j + \gamma_{03}\, MRK_j + \gamma_{04}\, ADH_j + u_{0j} \quad (12)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}\, CLN_j + \gamma_{12}\, HRC_j + \gamma_{13}\, MRK_j + \gamma_{14}\, ADH_j + u_{1j} \quad (13)$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}\, CLN_j + \gamma_{22}\, HRC_j + \gamma_{23}\, MRK_j + \gamma_{24}\, ADH_j + u_{2j} \quad (14)$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31}\, CLN_j + \gamma_{32}\, HRC_j + \gamma_{33}\, MRK_j + \gamma_{34}\, ADH_j + u_{3j} \quad (15)$$

$$MAS_{ij} = \alpha_{00} + \alpha_{1j}\, ETA_{ij} + \varepsilon_{ij} \quad (16)$$

$$\alpha_{1j} = \lambda_{10} + \lambda_{11}\, CLN_j + \lambda_{12}\, HRC_j + \lambda_{13}\, MRK_j + \lambda_{14}\, ADH_j + \varepsilon_{1j} \quad (17)$$

The PSR value, in addition to the trace and autocorrelation plots for the parameters, indicated that the parameter estimation converged properly. The DIC value was 1015.440, which is smaller than that of the random intercept model. This means that the cross-level interaction model showed a better fit to the data.

Table 5 shows that the interaction between the psychological variables and cultures was not significant. The culture variables appeared to have neither direct effects on INNOV nor a moderation effect on the relationships between the psychological variables and innovativeness. Only the positive effect of MAS on INNOV ($\gamma_{10=}0.223$) and the negative effect of PAV on INNOV ($\gamma_{20=}-0.092$) were found to be significant. The variances of the random intercept (δ^2_{u0j}) and the random slopes (δ^2_{u1j}, δ^2_{u2j}, δ^2_{u3j}) were significant. In other words, the intercept varied significantly between departments, and so did the

Table 5
Bayesian parameter estimates and credibility intervals of cross-level interaction model.

Path	Estimate (*SD*)	95% Credibility Interval		Significance
		Lower	Upper	
Within-level				
Residual Variances				
INNOV ($\delta^2_{\varepsilon ij}$)	0.208 (0.020)	0.173	0.252	*
MAS ($\delta^2_{\varepsilon ij}$)	0.388 (0.033)	0.331	0.459	*
Between-level				
CLN → INNOV (γ_{01})	−0.374 (0.262)	−0.884	0.149	
HRC → INNOV (γ_{02})	0.312 (0.229)	−0.128	0.776	
MRK → INNOV (γ_{03})	−0.280 (0.171)	−0.613	0.062	
ADH → INNOV (γ_{04})	0.243 (0.255)	−0.257	0.746	
CLN × MAS→ INNOV slope (γ_{11})	0.453 (0.383)	−0.289	1.228	
HRC × MAS→ INNOV slope (γ_{12})	−0.299 (0.316)	−0.942	0.309	
MRK × MAS→ INNOV slope (γ_{13})	−0.289 (0.247)	−0.783	0.191	
ADH × MAS→ INNOV slope (γ_{14})	−0.438 (0.354)	−1.145	0.249	
CLN × PAV→ INNOV slope (γ_{21})	−0.099 (0.269)	−0.606	0.452	
HRC × PAV → INNOV slope (γ_{22})	0.199 (0.210)	−0.211	0.622	
MRK × PAV → INNOV slope (γ_{23})	−0.084 (0.179)	−0.423	0.284	
ADH × PAV → INNOV slope (γ_{24})	0.034 (0.241)	−0.449	0.503	
CLN × ETA → INNOV slope (γ_{41})	0.214 (0.268)	−0.298	0.758	
HRC × ETA → INNOV slope (γ_{42})	−0.015 (0.237)	−0.476	0.459	
MRK × ETA → INNOV slope (γ_{43})	0.234 (0.178)	−0.108	0.596	
ADH × ETA → INNOV slope (γ_{44})	−0.344 (0.252)	−0.841	0.149	
CLN × ETA→MAS slope (λ_{11})	−0.175 (0.371)	−0.881	0.582	
HRC × ETA→MAS slope (λ_{12})	−0.300 (0.324)	−0.922	0.358	
MRK × ETA→MAS slope (λ_{13})	−0.054 (0.240)	−0.525	0.416	
ADH × ETA→MAS slope (λ_{14})	−0.382 (0.354)	−1.097	0.295	
Intercepts				
INNOV (γ_{00})	3.759 (0.048)	3.664	3.852	*
MAS→ INNOV slope (γ_{10})	0.223 (0.064)	0.099	0.355	*
PAV→ INNOV slope (γ_{20})	−0.092 (0.046)	−0.182	−0.001	*
ETA→ INNOV slope (γ_{30})	−0.083 (0.048)	−0.181	0.007	
ETA→ MAS slope (α_{1j})	−0.105 (0.067)	−0.240	0.027	
Residual Variances				
INNOV (δ^2_{u0j})	0.043 (0.021)	0.017	0.099	*
MAS→ INNOV slope (δ^2_{u1j})	0.033 (0.035)	0.002	0.133	*
PAV→ INNOV slope (δ^2_{u2j})	0.022 (0.018)	0.002	0.070	*
ETA→ INNOV slope (δ^2_{u3j})	0.016 (0.019)	0.001	0.070	*
ETA→ MAS slope ($\delta^2\varepsilon_{1j}$)	0.051 (0.038)	0.008	0.155	*

relationships between the psychological variables and innovativeness. The variance of the random slope of ETA on MAS ($\delta^2\varepsilon_{1j}$) was significant as well.

6. Discussion

This study sought to identify the factors influencing individual innovativeness and to determine how these factors interact to produce their influencing power. The literature has identified two major factor types: psychological factors, represented in this study by implicit theory and goal orientation; and organizational factors, represented by organizational culture.

This study supports the previous finding that the performance-approach goal orientation may lack the power to predict individual differences in different contexts. These results can contribute to the long-standing debate about the consequences of performance-approach goal orientation (Butler, 2007; Chen & Pajares, 2010; Mascret, Elliot, & Cury, 2015; Papaioannou & Christodoulidis, 2007).

The study used a series of models to examine the influence of the entity theory of ability, mastery goal, and performance-avoidance goal orientations on innovativeness. In the random intercept model, we assumed that the psychological factors (ETA, MAS, PAV, and INNOV) influenced each other with fixed relationships, which were not allowed to vary across departments. In this model, ETA showed a significantly negative effect on MAS and INNOV. MAS and PAV showed positive and negative effects on INNOV, respectively. In the random slopes and cross-level interaction models, when we allowed the relationships among the psychological factors to vary across departments, all relationships retained their significance, except the influence of ETA on other factors (MAS and INNOV). Thus, the results partially supported Hypothesis 1 but failed to support Hypothesis 2. Our findings challenge the results reported in many previous studies that confirmed the relationship between ETA and MAS (Aldahdouh et al., 2018; Chen & Pajares, 2010; Cho, Toste, Lee, & Ju, 2019; De Castella & Byrne, 2015). It is worth mentioning that those studies did not consider the hierarchical structure of the data and thus reported results that were similar to our results in the random intercept model. De Castella (2015), for example, reported a significant relationship between the entity theory of intelligence and MAS by sampling 680 Australian students from five different high schools while overlooking the fact that the sample had a hierarchical structure (students nested within classes, and classes nested within schools). Neglecting the hierarchal structure of data might produce misleading results (Hox, 2010). This study sheds light on the importance of accounting for the group level while analyzing the effect of the individual factors. Not all previous studies failed to take the data structure into account. However, our findings challenge the results of the few studies that controlled for group variation (Chen & Wong, 2015; Leondari & Gialamas, 2002). One interpretation of this deviation might be that our sample differs from previous studies' samples in that it was comprised of staff members in a workplace while most of the samples used by previous studies were comprised of students in schools or universities. To the best of our knowledge, we are the first to examine the relationship between ETA and MAS for staff members in the higher educational context.

Individual innovativeness is by definition an individual characteristic. We identified two clues that suggest that it is a psychological construct and can be predicted by other psychological constructs. The first clue was established by the proportion of the variation accounted for by departmental membership relative to the total variance in innovativeness (ICC1 = 0.10). In other words, 90% of the innovativeness variance can be attributed to the individual willingness to change. The second clue was the fact that MAS and PAV retained their significant influences on INNOV throughout the three models. These results indicated that the psychological factors, namely goal orientations, are most important for interpreting individual innovativeness, in line with previous studies (Aldahdouh et al., 2018; Keong & Hirst, 2010; Lu et al., 2012).

One unanticipated finding, which was contrary to hypotheses 3 and 4 (and sub-hypotheses 4.1, 4.2, 4.3, and 4.4), was that none of the cultures contributed to innovativeness, nor did they moderate the relationships among the psychological variables. Although many literature reviews have pointed to the influence of organizational culture on innovativeness (Ahmed, 1998; Anderson et al., 2014; Frambach & Schillewaert, 2002; Parzefall et al., 2008; Patterson et al., 2009; Wisdom et al., 2014), this study failed to provide any evidence of such a relationship. It may be worth mentioning that most of the empirical findings that supported the influence of organizational cultures on innovativeness in fact used the concept of *organizational* innovativeness rather than that of *individual* innovativeness (Naranjo-Valencia et al., 2016; Prakash & Gupta, 2008; Raj & Srivastava, 2013). It is also difficult to compare our results with those generated through the use of the concept of individual innovativeness (Miron et al., 2004) due to the different views among researchers on what the definition of "innovativeness" is, how it may be measured, and whether innovativeness should target behavioral, general, or domain-specific aspects (Goldsmith & Foxall, 2003).

6.1. Implications

Several patterns of theoretical and practical implications can be delineated across the findings. In line with prior research (Janssen & Van Yperen, 2004; Keong & Hirst, 2010; Lu et al., 2012), the results revealed that adopting innovation is primarily an individual decision, attributable to the individual's tendencies and goal orientations. Thus, to support staff innovativeness, one could work to enhance their awareness of the positive impacts of mastery goal orientation while decreasing the negative effects of performance-avoidance goal orientation. For example, human resource management at HEIs should introduce professional development courses for staff members based on scientific evidence. These sessions should discuss goal orientations and their consequences on performance. Such courses might have significant impacts for institutions, inducing employees towards mastery goal orientation in the same way in which interventions have altered deeper traits such as

implicit beliefs (Blackwell et al., 2007; Heslin, Latham, & VandeWalle, 2005; Keating & Heslin, 2015; Kunst et al., 2018). This study adds to both Lu et al. (2012) and Janssen and Van Yperen (2004) in finding that institutions aspiring to embrace innovative employees should find ways to orient them towards mastery goals. This could be done by, for instance, promoting "self-referenced rather than other-referenced feedback and compensation systems that focus on effort, personal improvement, skill development, experimentation and cooperation" (Janssen & Van Yperen, 2004, p. 382).

The individual decision to adopt or reject innovations does not occur in a vacuum, yet there are variations in innovativeness due to the workplace environment (department level). In seeking the source of department-level variations, one may conceive of two equally likely hypotheses. One is to assume that individuals who have certain characteristics tend to prefer working in certain schools/departments; the main source of variation in this case is at the individual level. Alternatively, one may assume that the source of the departmental variation is due to certain characteristics of each department that encourage or discourage the staff to adopt or reject innovations. We adopted the second approach and sought to explain the departmental variation by examining the effect of the departmental culture. However, the results countered our expectations, as the cultures showed no significant effect.

Another implication for researchers is that they should take the nested structure of the data into account when analyzing the individual variables. The general concept is that groups and their individuals are engaging in a bidirectional interaction: the individuals are influenced by their group, and the group is in turn influenced by its members (Hox, 2010). When the study design involves nested structure data, this implicitly means that the observations are not independent. Studies that fail to account for this assumption and violate the independency of the observations will generate results of doubtful validity. Ignoring the hierarchal structure of the data leads to an inappropriate estimation of the standard errors, producing erroneous statistical inferences (Finch & Bolin, 2017). It seems that the difference we observed between an accounting of the group level and ignoring it reflects what Hox (2010) found. Hox (2010) conducted a meta-analysis on data that had originally been analyzed without having their multilevel nature taken into account, and the analysis reached different conclusions.

6.2. Strengths, limitations, and future research

This study is one of the very few to examine group effects in explanation of the relationships among the entity theory of ability, goal orientation, and individual innovativeness. Using a multilevel path analysis enabled us to examine if environmental or contextual factors (e.g., departmental culture) moderate the relationships among the psychological variables. Thus, the development of an integrative framework examining individual, group, and cross-level effects on innovativeness would be a potential avenue for future research.

This study also raises several intriguing questions the exploration of which could further our understanding of individual innovativeness. First, our cross-sectional design limits our ability to confirm causal relationships, but future research using an experimental or longitudinal design could prove our claims. A second limitation of the study is the use of a self-reporting questionnaire to measure the variables. Although Harman's one factor test found no major common method bias, collecting data from different sources would strengthen the study's design and results (Podsakoff et al., 2003). For example, departmental culture could be described *via* consensus among representatives from management, employees, and the union rather than by relying on the aggregative value of individual perceptions (Cameron & Quinn, 2006).

As our examination of departmental culture in the HEI context found no evidence of its influence on individual innovativeness, considerably more work will need to be done to examine the predictive power of other departmental factors, such as department size and structure (Frambach & Schillewaert, 2002); department learning (Senge, 1990); department innovativeness (Frambach & Schillewaert, 2002); department proactivity (Lantz Friedrich, Sjöberg, & Friedrich, 2016); and department cohesiveness (Patterson et al., 2009).

Finally, we focused on addressing the antecedents of individual innovativeness. Future research could investigate its consequences, as well as its antecedents. Needless to say, the value of innovativeness remains questionable until its consequences have been examined thoroughly. Previous studies have identified a set of consequences, including domain-specific innovativeness (Marcati et al., 2008) and technology usage (Gökçearslan et al., 2017; Jin, 2013). More efforts in this direction would be welcome.

Notwithstanding these limitations, the model presented in this study should prove useful in expanding our understanding of the factors influencing individual innovativeness. The clearest result of this study is its corroboration of previous studies' consistent finding that psychological factors are the most important factors influencing individual innovativeness (Batra & Vohra, 2016; Lu et al., 2012; Vinarski-Peretz et al., 2011). Another interesting finding is that organizational culture had neither a direct effect on innovativeness nor a moderation effect on the relationships between the psychological factors and innovativeness, which contradicted many previous findings (Miron et al., 2004; Montani et al., 2014; Scott & Bruce, 1994). Further research is needed to clarify the role of culture by considering differences among organization types in the analysis.

Conflicts of interest

The authors declare no conflict of interest.

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References

Ahmed, P. K. (1998). Culture and climate for innovation. *European Journal of Innovation Management, 1*(1), 30–43. https://doi.org/10.1108/14601069810199131.
Aldahdouh, T. Z., Korhonen, V., & Nokelainen, P. (2017). How does an organisation's culture relate to professional growth? A study of Finnish higher education institutions. *Ammattikasvatuksen Aikakauskirja, 19*(1), 9–30.
Aldahdouh, T. Z., Nokelainen, P., & Korhonen, V. (2018). Innovativeness of staff in higher education - do implicit theories and goal orientations matter? *International Journal of Higher Education, 7*(2), 43–57. https://doi.org/10.5430/ijhe.v7n2p43.
Amabile, T. (1988). A model of creativity and innovation in organizations. In B. M. Staw, & L. L. Cummings (Eds.), *Research in organizational behavior* (pp. 123–167). Greenwich, CT, USA: JAI Press Inc.
Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(3), 261–271. https://doi.org/10.1037/0022-0663.84.3.261.
Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations. *Journal of Management, 40*(5), 1297–1333. https://doi.org/10.1177/0149206314527128.
Batra, S., & Vohra, N. (2016). Exploring the linkages of cognitive style and individual innovativeness. *Management Research Review, 39*(7), 768–785. https://doi.org/10.1108/MRR-03-2014-0047.
Benson, J., & Brown, M. (2007). Knowledge workers: What keeps them committed; what turns them away. *Work, Employment & Society, 21*(1), 121–141. https://doi.org/10.1177/0950017007073623.
Biemann, T., Cole, M. S., & Voelpel, S. (2012). Within-group agreement: On the use (and misuse) of rWG and rWG(J) in leadership research and some best practice guidelines. *The Leadership Quarterly, 23*(1), 66–80. https://doi.org/10.1016/j.leaqua.2011.11.006.
Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246–263. https://doi.org/10.1111/j.1467-8624.2007.00995.x.
Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein, & S. W. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 349–381). San Francisco, CA, USA: Jossey-Bass.
Butler, R. (2007). Teachers' achievement goal orientations and associations with teachers' help seeking: Examination of a novel approach to teacher motivation. *Journal of Educational Psychology, 99*(2), 241–252. https://doi.org/10.1037/0022-0663.99.2.241.
Cai, Y. (2008). Quantitative assessment of organizational cultures in post-merger universities. In J. Välimaa, & O. Ylijoki (Eds.), *Cultural perspective on higher education* (pp. 213–226). Dordrecht, Netherlands: Springer. https://doi.org/10.1007/978-1-4020-6604-7_14.
Cai, Y. (2017). From an analytical framework for understanding the innovation process in higher education to an emerging research field of innovations in higher education. *The Review of Higher Education, 40*(4), 585–616. https://doi.org/10.1353/rhe.2017.0023.
Cameron, K. S., & Quinn, R. E. (2006). *Diagnosing and changing organizational culture based on competing values framework* (3rd ed.). San Francisco, CA, USA: Jossey-Bass.
Chen, J., & Pajares, F. (2010). Implicit theories of ability of Grade 6 science students: Relation to epistemological beliefs and academic motivation and achievement in science. *Contemporary Educational Psychology, 35*(1), 75–87. https://doi.org/10.1016/j.cedpsych.2009.10.003.
Chen, W., & Wong, Y. (2015). Chinese mindset: Theories of intelligence, goal orientation and academic achievement in Hong Kong students. *Educational Psychology, 35*(6), 714–725. https://doi.org/10.1080/01443410.2014.893559.
Cho, E., Toste, J. R., Lee, M., & Ju, U. (2019). Motivational predictors of struggling readers' reading comprehension: The effects of mindset, achievement goals, and engagement. *Reading and Writing, 32*(5), 1219–1242. https://doi.org/10.1007/s11145-018-9908-8.
Çuhadar, C., Bülbül, T., & Ilgaz, G. (2013). Exploring of the relationship between individual innovativeness and techno-pedagogical education competencies of pre-service teachers. *Elementary Education Online, 12*(3), 797–807.
De Castella, K., & Byrne, D. (2015). My intelligence may be more malleable than yours: The revised implicit theories of intelligence (self-theory) scale is a better predictor of achievement, motivation, and student disengagement. *European Journal of Psychology of Education, 30*(3), 245–267. https://doi.org/10.1007/s10212-015-0244-y.
Drent, M., & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers and Education, 51*(1), 187–199. https://doi.org/10.1016/j.compedu.2007.05.001.
Drucker, P. F. (1999). *Management challenges for the 21st century*. New York, NY, USA: HarperCollins Publishers Inc.
Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York, NY, USA: Random House Inc.
Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry, 6*(4), 267–285. https://doi.org/10.1207/s15327965pli0604_1.
Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256–273. https://doi.org/10.1037/0033-295X.95.2.256.
Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218–232. https://doi.org/10.1037//0022-3514.72.1.218.
Elliot, A. J., & Moller, A. C. (2003). Performance-approach goals: Good or bad forms of regulation? *International Journal of Educational Research, 39*(4–5), 339–356. https://doi.org/10.1016/j.ijer.2004.06.003.
Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*(2), 121–138. https://doi.org/10.1037/1082-989X.12.2.121.
Finch, H., & Bolin, J. (2017). *Multilevel modeling using Mplus* (1st ed.). New York, NY, USA: Chapman and Hall/CRC https://doi.org/10.1201/9781315165882.
Fleiss, J. (1986). *The design and analysis of clinical experiments*. New York, NY, USA: John Wiley & Sons.
Frambach, R. T., & Schillewaert, N. (2002). Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. *Journal of Business Research, 55*, 163–176. https://doi.org/10.1016/S0148-2963(00)00152-1.
Gökçearslan, Ş., Karademir, T., & Korucu, A. T. (2017). Preservice teachers' level of web pedagogical content knowledge: Assessment by individual innovativeness. *Journal of Educational Computing Research, 55*(1), 70–94. https://doi.org/10.1177/0735633116642593.
Goldsmith, R. E. (1990). The validity of a scale to measure global innovativeness. *Journal of Applied Business Research, 7*(2), 89–97. https://doi.org/10.19030/jabr.v7i2.6249.
Goldsmith, R. E., & Foxall, G. R. (2003). The measurement of innovativeness. In L. V. Shavinina (Ed.), *The international handbook on innovation* (pp. 321–330). Oxford: Elsevier Science Ltd. https://doi.org/10.1016/B978-008044198-6/50022-X.
Hamstra, M. R. W., Van Yperen, N. W., Wisse, B., & Sassenberg, K. (2014). Transformational and transactional leadership and followers' achievement goals. *Journal of Business and Psychology, 29*(3), 413–425. https://doi.org/10.1007/s10869-013-9322-9.
Heritage, B., Pollock, C., & Roberts, L. (2014). Validation of the organizational culture assessment instrument. *PLoS One, 9*(3), 1–10. https://doi.org/10.1371/journal.pone.0092879.

Heslin, P. A., Latham, G. P., & VandeWalle, D. (2005). The effect of implicit person theory on performance appraisals. *Journal of Applied Psychology, 90*(5), 842–856. https://doi.org/10.1037/0021-9010.90.5.842.
Hong, J. C., Hwang, M. Y., Ting, T. Y., Tai, K. H., & Lee, C. C. (2013). The innovativeness and self-efficacy predict the acceptance of using iPad2 as a green behavior by the government's top administrators. *Turkish Online Journal of Educational Technology, 12*(2), 313–320.
Hon, A. H. Y., & Leung, A. S. M. (2011). Employee creativity and motivation in the Chinese context: The moderating role of organizational culture. *Cornell Hospitality Quarterly, 52*(2), 125–134. https://doi.org/10.1177/1938965511403921.
Hox, J. J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). New York, NY, USA: Routledge.
Hurt, H. T., Joseph, K., & Cook, C. D. (1977). Scales for the measurement of innovativeness. *Human Communication Research, 4*(1), 58–65. https://doi.org/10.1111/j.1468-2958.1977.tb00597.x.
Janssen, O., & Van Yperen, N. W. (2004). Employees' goal orientations, the quality of leader-member exchange, and the outcomes of job performance and job satisfaction. *Academy of Management Journal, 47*(3), 368–384. https://doi.org/10.2307/20159587.
Jin, C. H. (2013). The effects of individual innovativeness on users' adoption of Internet content filtering software and attitudes toward children's Internet use. *Computers in Human Behavior, 29*(5), 1904–1916. https://doi.org/10.1016/j.chb.2013.03.009.
Jong, J. P. J. De, & Hartog, D. N. D. (2007). How leaders influence employees' innovative behaviour. *European Journal of Innovation Management, 10*(1), 41–64. https://doi.org/10.1108/14601060710720546.
Keating, L. A., & Heslin, P. A. (2015). The potential role of mindsets in unleashing employee engagement. *Human Resource Management Review, 25*(4), 329–341. https://doi.org/10.1016/j.hrmr.2015.01.008.
Keong, Y. O., & Hirst, G. (2010). An empirical integration of goal orientation and the theory of planned behaviour Predicting innovation adoption behaviour. *The International Journal of Entrepreneurship and Innovation, 11*(1), 5–18. https://doi.org/10.5367/000000010790772430.
Kirton, M. (1976). Adaptors and innovators: A description and measure. *Journal of Applied Psychology, 61*(5), 622–629. https://doi.org/10.1037/0021-9010.61.5.622.
Kleijnen, J., Dolmans, D., Muijtjens, A., Willems, J., & Van Hout, H. (2009). Organisational values in higher education: perceptions and preferences of staff. *Quality in Higher Education, 15*(3), 233–249. https://doi.org/10.1080/13538320903343123.
Kunst, E. M., van Woerkom, M., van Kollenburg, G. H., & Poell, R. F. (2018). Stability and change in teachers' goal orientation profiles over time: Managerial coaching behavior as a predictor of profile change. *Journal of Vocational Behavior, 104*, 115–127. https://doi.org/10.1016/j.jvb.2017.10.003.
Lantz Friedrich, A., Sjöberg, A., & Friedrich, P. (2016). Leaned teamwork fattens workplace innovation: The relationship between task complexity, team learning and team proactivity. *European Journal of Work & Organizational Psychology, 25*(4), 561–569. https://doi.org/10.1080/1359432X.2016.1183649.
LeBreton, J. M., & Senter, J. L. (2008). Answers to twenty questions about interrater reliability and interrater agreement. *Organizational Research Methods, 11*, 815–852. https://doi.org/10.1177/1094428106296642.
Leondari, A., & Gialamas, V. (2002). Implicit theories, goal orientations, and perceived competence: Impact on students' achievement behavior. *Psychology in the Schools, 39*(3), 279–291. https://doi.org/10.1002/pits.10035.
Levy, S. R., Stroessner, S. J., & Dweck, C. S. (1998). Stereotype formation and endorsement: The role of implicit theories. *Journal of Personality and Social Psychology, 74*(6), 1421–1436. https://doi.org/10.1037/0022-3514.74.6.1421.
Linnenbrink, E. A., & Pintrich, P. R. (2002). Motivation as an enabler for academic success. *School Psychology Review, 31*(3), 313–327. https://psycnet.apa.org/record/2002-18945-003.
Loogma, K., Kruusvall, J., & Ümarik, M. (2012). E-learning as innovation: Exploring innovativeness of the VET teachers' community in Estonia. *Computers and Education, 58*(2), 808–817. https://doi.org/10.1016/j.compedu.2011.10.005.
Lu, L., Lin, X., & Leung, K. (2012). Goal orientation and innovative performance: The mediating roles of knowledge sharing and perceived autonomy. *Journal of Applied Social Psychology, 42*(SUPPL. 1), 180–197. https://doi.org/10.1111/j.1559-1816.2012.01018.x.
Marcati, A., Guido, G., & Peluso, A. M. (2008). The role of SME entrepreneurs' innovativeness and personality in the adoption of innovations. *Research Policy, 37*(9), 1579–1590. https://doi.org/10.1016/j.respol.2008.06.004.
Mascret, N., Elliot, A. J., & Cury, F. (2015). The 3 × 2 achievement goal questionnaire for teachers. *Educational Psychology, 37*(3), 346–361. https://doi.org/10.1080/01443410.2015.1096324.
Midgley, D., & Dowling, G. (1978). Innovativeness: The concept and its measurement. *Journal of Consumer Research, 4*(4), 229–242.
Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L. H., et al. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23*(2), 113–131. https://doi.org/10.1006/ceps.1998.0965.
Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L., et al. (2000). *Manual for the patterns of adaptive learning scales*. Ann Arbor, MI, USA: University of Michigan.
Miron, E., Erez, M., & Naveh, E. (2004). Do personal characteristics and cultural values that promote innovation, quality, and efficiency compete or complement each other? *Journal of Organizational Behavior, 25*(2), 175–199. https://doi.org/10.1002/job.237.
Montani, F., Odoardi, C., & Battistelli, A. (2014). Individual and contextual determinants of innovative work behaviour: Proactive goal generation matters. *Journal of Occupational and Organizational Psychology, 87*(4), 645–670. https://doi.org/10.1111/joop.12066.
Murphy, M. C., & Dweck, C. S. (2010). A culture of genius: How an organization's lay theory shapes people's cognition, affect, and behavior. *Personality and Social Psychology Bulletin, 36*(3), 283–296. https://doi.org/10.1177/0146167209347380.
Muthén, L. K., & Muthén, B. O. (2017). *Mplus user's guide* (8th ed.). Los Angeles: CA, USA: Muthén & Muthén https://doi.org/10.1111/j.1600-0447.2011.01711.x.
Naranjo-Valencia, J. C., Jiménez-Jiménez, D., & Sanz-Valle, R. (2016). Studying the links between organizational culture, innovation, and performance in Spanish companies. *Revista Latinoamericana de Psicologia, 48*(1), 30–41. https://doi.org/10.1016/j.rlp.2015.09.009.
Pallister, J. G., & Foxall, G. R. (1998). Psychometric properties of the Hurt-Joseph-Cook scales for the measurement of innovativeness. *Technovation, 18*(11), 663–675. https://doi.org/10.1016/S0166-4972(98)00070-4.
Papaioannou, A., & Christodoulidis, T. (2007). A measure of teachers' achievement goals. *Educational Psychology, 27*(3), 349–361. https://doi.org/10.1080/01443410601104148.
Park, J. S., & Kim, H. S. (2010). Impacts of individual innovativeness on the acceptance of IT-based innovations in health care fields. *Healthcare Informatics Research, 16*(4), 290–298. https://doi.org/10.4258/hir.2010.16.4.290.
Parzefall, M.-R., Seeck, H., & Leppänen, A. (2008). Employee innovativeness in organizations: A review of the antecedents. *The Finnish Journal of Business Economics, 2*(8), 165–182.
Patterson, F., Kerrin, M., & Gatto-Roissard, G. (2009). *Characteristics & behaviours of innovative people in organisations*. London, UK: NESTA: Literature Review prepared for the NESTA Policy & Research Unit.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879.
Prakash, Y., & Gupta, M. (2008). Exploring the relationship between organisation structure and perceived innovation in the manufacturing sector of India. *Singapore Management Review, 30*(1), 55–76. https://doi.org/10.1016/j.indmarman.2003.08.015.
Raj, R., & Srivastava, K. B. L. (2013). The mediating role of organizational learning on the relationship among organizational culture, HRM practices and innovativeness. *Management and Labour Studies, 38*(3), 201–223. https://doi.org/10.1177/0258042X13509738.
Rank, J., Pace, V. L., & Frese, M. (2004). Three avenues for future research on creativity , innovation , and initiative. *Applied Pyschology, 53*(4), 518–528. https://doi.org/10.1111/j.1464-0597.2004.00185.x.
Robins, R. W., & Pals, J. L. (2002). Implicit self-theories in the academic domain: Implications for goal orientation, attributions, affect, and self-esteem change. *Self and Identity, 1*(4), 313–336. https://doi.org/10.1080/15298860290106805.
Roehrich, G. (2004). Consumer innovativeness. *Journal of Business Research, 57*(6), 671–677. https://doi.org/10.1016/S0148-2963(02)00311-9.
Rogers, E. M. (2003). *Diffusion of innovations* (3rd ed.). New York, NY, USA: The Free Press.

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal, 37*(3), 580–607. https://doi.org/10.2307/256701.

Senge, P. M. (1990). *The fifth discipline: The art and practice of the learning organization*. New York, NY, USA: Doubleday.

Shanker, R., Bhanugopan, R., van der Heijden, B. I. J. M., & Farrell, M. (2017). Organizational climate for innovation and organizational performance: The mediating effect of innovative work behavior. *Journal of Vocational Behavior, 100*, 67–77. https://doi.org/10.1016/j.jvb.2017.02.004.

Si, S., & Wei, F. (2012). Transformational and transactional leaderships, empowerment climate, and innovation performance: A multilevel analysis in the Chinese context. *European Journal of Work & Organizational Psychology, 21*(2), 299–320. https://doi.org/10.1080/1359432X.2011.570445.

Stegmueller, D. (2013). How many countries for multilevel modeling? A comparison of frequentist and bayesian approaches. *American Journal of Political Science, 57*(3), 748–761. https://doi.org/10.1111/ajps.12001.

Vinarski-Peretz, H., Binyamin, G., & Carmeli, A. (2011). Subjective relational experiences and employee innovative behaviors in the workplace. *Journal of Vocational Behavior, 78*(2), 290–304. https://doi.org/10.1016/j.jvb.2010.09.005.

West, M. A., & Farr, J. L. (Eds.). (1990). *Innovation and creativity at work : Psychological and organizational strategies*. Chichester: Wiley.

Wisdom, J. P., Chor, K. H. B., Hoagwood, K. E., & Horwitz, S. M. (2014). Innovation adoption: A review of theories and constructs. *Administration and Policy in Mental Health, 41*(4), 480–502. https://doi.org/10.1007/s10488-013-0486-4.

Yi, M., Fiedler, K., & Park, J. (2006). Understanding the role of individual innovativeness in the acceptance of IT-based innovations: Comparative analyses of models and measures. *Decision Sciences, 37*(3), 393–426. https://doi.org/10.1111/j.1540-5414.2006.00132.x.