

Predicting innovative performance through proactive personality: Examining its criterion validity and incremental validity over the five-factor model

Nuno Rodrigues¹  | Teresa Rebelo² 

¹Faculty of Arts and Humanities,
Department of Psychology, University of
Madeira, Funchal, Portugal

²Faculty of Psychology and Educational
Sciences, University of Coimbra, Coimbra,
Portugal

Correspondence

Nuno Rodrigues, Faculdade de Artes e
Humanidades, Departamento de Psicologia,
Universidade da Madeira, Campus
Universitário da Penteada, 9020-105,
Funchal.
Email: nuno.rodrigues002@gmail.com

Funding information

The research reported in this paper was
supported by a PhD Grant (SFRH/47004)
to the first author from the Portuguese
Foundation for Science and Technology
(FCT)

Abstract

Innovation has emerged as a key work outcome for modern organizations. The present paper answers recent calls from several researchers for further empirical research on the validity of personality variables for predicting individual innovative performance. More specifically, it is focused on the validity of proactive personality. Using a sample of 170 software engineers and their direct supervisors from a multinational information technology firm, we found that this individual disposition represents a valid and meaningful predictor of individual innovative performance, when assessed through supervisor ratings. Further analyses have also shown that proactive personality remains a significant predictor of this criterion, when the big five factors of personality are taken into account. Theoretical and practical implications of these findings are presented and discussed.

KEYWORDS

five-factor model (FFM), incremental validity, individual innovation, innovative performance, proactive personality

1 | INTRODUCTION

Research about innovation in the workplace is gaining momentum in the literature. This increased emphasis placed upon innovation and interrelated constructs, such as creativity and proactivity, has been fueled by the recognition of its critical impact on organizational success and growth (Anderson, Potočnik, & Zhou, 2014; Zhou & Hoever, 2014).

Indeed, an organization's promptness to attract and develop an effective and, concomitantly, innovative workforce is clearly acknowledged as a source of competitive advantage across the current organizational environment (Anderson, De Dreu, & Nijstad, 2004; Yuan & Woodman, 2010). Such a workforce is crucial to warrant the levels of overall performance required to accomplish organizational goals, but also to drive innovative endeavors aimed at generating, promoting, and implementing new and useful ideas to improve the organization's products, practices, and work methods (Janssen, 2000; Potočnik, Anderson, & Latorre 2015).

Due to this relevance of innovation for organizational effectiveness, the questions concerning its behavioral nature and the process through which it unfolds at the individual, team, and organizational levels have remained on top of the research agenda on workplace innovation during the last two decades (Anderson et al., 2014; Hammond, Neff, Farr, Schwall, & Zhao, 2011; Hülsheger, Anderson, & Salgado, 2009).

In particular, at the individual level of analysis, innovative employee behaviors have started to occupy a central role in the models of job performance, as a core and empirically distinct dimension of individual performance at work (Harari, Reaves, & Viswesvaran, 2016; Potočnik et al., 2015). Concomitantly, there have been important theoretical developments, which have brought higher clarity on the behavioral breadth of individual innovation criteria (Anderson et al., 2014; Potočnik & Anderson, 2016).

Altogether, these research developments have contributed to a more comprehensive integration of the scattered and somewhat confusing literature about innovative performance and its related

constructs, as well as advancing the study of its multiple individual and contextual determinants (Anderson et al., 2014; Woodman, Sawyer, & Griffin, 1993). In this regard, several authors have called for further research on the individual antecedents of innovation, including those related with personality characteristics, since the dispositional bases of innovative behaviors are still far from established in the literature (Hammond et al., 2011; Potočník & Anderson, 2016).

The present paper addresses these calls and aims to contribute to building a better understanding of the role of proactive personality for predicting innovative performance. This individual disposition, which encompasses a propensity to enact change and influence the environment, is posited as key dispositional antecedent of innovation and change-related behaviors at work (Crant, 2000; Parker, Williams, & Turner, 2006). Previous primary research, albeit limited, consistently suggests that proactive personality is positively linked to innovative behaviors at work, (Fuller & Marler, 2009; Potočník et al., 2015). Although, most criteria-related validity studies of proactive personality are focused on creativity (e.g., Fuller & Marler, 2009; Gong, Cheung, Wang, & Huang, 2012; Li, Liu, Liu, & Wang, 2017). Therefore, most of the empirical research available in the literature is only informative toward a portion of the behavioral breadth of innovative performance, which mainly covers the behaviors implicated in the creation of ideas. In order to overcome these limitations, we have adopted a more integrative approach which further includes the individual actions implied in the promotion and implementation of ideas (Janssen, 2000; Kanter, 1988).

Furthermore, we also intend to contribute for the study of the applied value of proactive personality for personnel selection purposes, by focusing on its incremental validity over and beyond the FFM. As Potočník et al. (2015) have emphasized, "unless these variables show incremental validity beyond that of the big five traits, it is pointless to include them as part of the personality assessment for selection purposes" (p. 20). To our knowledge, this study comprises the first empirical attempt to examine whether and to what extent proactive personality contributes to incrementing the prediction of innovative performance over the big five.

2 | THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 | Individual innovation as a key performance criterion

Over recent decades, a number of remarkable theoretical and empirical developments on the literature of work and organizational psychology have posited innovation as a critical work outcome for modern organizations (Anderson et al., 2004, 2014).

In parallel, innovative performance has emerged as an important criterion for human resource management decision-making, particularly concerning the selection and development of innovative potential (Hülshager et al., 2009; Potočník et al., 2015). In fact, recent meta-analytical evidence has showed that, despite being linked with previous well-established job performance dimensions of task,

citizenship performance, and counterproductive behaviors (see Campbell & Wiernik, 2015; Rotundo & Sackett, 2002, for reviews), innovative performance is still empirically unique and distinct from them (Harari et al., 2016). Further research efforts focused on the nomological network of innovation-related have also contributed to clarify its behavioral scope as a performance criterion (Anderson et al., 2014; Potočník & Anderson, 2016).

Drawing upon these developments, we conceptualize innovative performance as a multiphase behavioral process, including a set of intentional actions implied in the generation and implementation of new and useful ideas intended to improve the procedures, practices, or the products of the organization (Anderson et al., 2014). Hence, besides capturing the first phase of the innovation consisting of the development of new and beneficial ideas for the organization, which is commonly known as creativity, this criterion also encompasses the second phase of this process, which comprises the behaviors aimed at implementing these ideas into the workplace (Potočník & Anderson, 2016; West & Farr, 1990). Notwithstanding, we further separate the second phase of the innovation process into idea promotion and idea implementation, following the approach of Kanter (1988), also adopted by Janssen (2000). This more fine-grained and integrative approach includes the individual actions intended to find and secure support from key organizational members toward suggested ideas, highlighting its importance as a required condition to enable later implementation of the idea.

2.2 | Proactive personality and innovative performance

Bateman and Crant (1993) first introduced the proactive personality construct in the literature, conceiving it as an individual tendency or disposition to show initiative and take action to influence and enact meaningful change in the environment, despite situational constraints.

Along with the great appeal of proactive personality for modern organizations due to its focus on initiating change, advances in empirical research through meta-analytic studies have, indeed, supported its applied value, by reporting positive and meaningful links between this disposition and individual job performance (Fuller & Marler, 2009; Thomas, Whitman, & Viswesvaran, 2010). Moreover, Thomas et al. (2010) also provided meta-analytical evidence supporting the incremental validity of proactive personality over the big five for predicting overall job performance. These findings were complemented by a more recent meta-analysis conducted by Spitzmuller, Sin, Howe, and Fatimah (2015), which showed that proactive personality increments the prediction of overall job performance and the specific dimensions of task performance and citizenship performance criteria, beyond general mental ability and the big five.

Still, the picture regarding the criteria-related validity of proactive personality for predicting innovative performance remains far more incomplete (Potočník & Anderson, 2016; Potočník et al., 2015). Several authors have acknowledged this literature void and called for further research with samples pertaining to work settings, in

order to establish the relevance of proactive personality for the prediction of this criterion (Hammond et al., 2011; Potočník et al., 2015). Logically, this sort of evidence is key to establishing the applied value of this personality construct, given the pervasive need of modern organizations to build a workforce able to work effectively, as well as successfully driving innovative endeavors (Potočník et al., 2015).

From a theoretical point of view, it seems plausible to admit that proactive personality might represent one of the most successful predictors of innovative performance, within the scope of individual personality characteristics. As several authors have stressed, proactive personality entails a dispositional self-starting approach to enacting change at work, through both motivational and behavioral mechanisms (Chen, Farh, Campbell-Bush, Wu, & Wu, 2013; Crant, 2000; Parker et al., 2006). Therefore, individuals with higher scores on this disposition tend to set high performance standards, actively look for opportunities to influence their environment, anticipate problems and identify new ideas for improving work practices and processes (Crant, 2000).

Such dispositional attributes have been posited as promoters of both individual and team innovation (Chen, Farh, Campbell-Bush, Wu, & Wu, 2013; Crant, 2000). In accordance, Grant and Ashford (2008) presented a proactivity process perspective, arguing that proactive individuals anticipate future events and are mindful of the effects of their actions. Previous empirical research, albeit limited, points toward this direction, since some prior studies have reported positive links between proactive personality and individual and team innovative performance (Chen et al., 2013; Li et al., 2017; Parker et al., 2006). Taking into account this initial evidence along with the inherent relevance of proactive personality to enacting change and innovation related behaviors we hypothesized that:

Hypothesis 1: *Proactive personality is positively related to innovative performance.*

As previously mentioned, the second major contribution of this paper consists of the study of the incremental validity of proactive personality over the FFM. This question remains completely unexplored in the literature, yet it stands as fundamental to concluding whether proactive personality should be used along with other personality predictors, including the big five, when selecting for innovation potential (Potočník et al., 2015). Indeed, there are several reasons to anticipate that proactive personality can account for specific variance on innovative performance beyond the big five.

First, it is argued that this disposition encompasses a conceptual and empirical element not entirely covered by the FFM (Crant & Bateman, 2000). Recent meta-analytical evidence supports this aspect, by showing that more than 50% of its variance is not accounted for by the big five (Spitzmuller et al., 2015). Secondly, since proactive personality refers to a compound personality trait, entailing a tendency to “show initiative, take action and persevere until meaningful change occurs” (Crant, 2000, p. 439), it might be especially relevant to enacting innovative behaviors, due to their implicit change-related nature. In fact, previous findings have shown that

compound personality variables which are more specially tailored to the outcome might outperform the prediction yielded by primary personality traits (Hough & Schneider, 1996; Viswesvaran, Deller, & Ones, 2007). As such, on the basis of both these aspects we hypothesize that:

Hypothesis 2: *Proactive personality shows incremental validity over and above the big five for predicting innovative performance.*

3 | METHOD

3.1 | Organizational context, procedure, and participants

Our data were drawn from a broader validation study conducted in a multinational, information technology firm which specializes in the delivery of innovative and reliable software solutions customized to client's needs and specific requirements. All participants pertain to a single job of software engineering, with core responsibilities concerning software coding, testing and quality assurance, along with project management and customer communication duties.

Following a predictive design, the big five and proactive personality predictors were measured on a first data collection phase, using an online survey administered to a total of 192 software engineers during working hours. The survey also included informed consent with information regarding the goals of the study and emphasizing the confidentiality of the participants' answers.

A total of 170 completed and valid questionnaires were obtained, corresponding to a response rate of 89%. In the second phase, 6 months later, innovative performance ratings were obtained from their direct supervisors, instead of using self-report measures. Besides its inherent bias (Podsakoff, MacKenzie, & Podsakoff, 2012), the reliance on self-ratings has been considered, especially inappropriate for studying innovation at work (Potočník & Anderson, 2012; Potočník et al., 2015).

The great majority of the participants were male (95%) with an average age of 31.06 years ($SD = 4.63$) and their average organizational tenure was 3.72 years ($SD = 1.99$).

3.2 | Measures

Since the original version of the measures used was in English, a Portuguese version was drawn up prior to implementation, following translation-back translation standard procedures (Brislin, 1986).

3.2.1 | Proactive personality

This disposition was measured using a six-item subscale from Bateman and Crant's original (1993) scale. Previous studies with samples from different countries and cultural contexts have shown the appropriateness of this abbreviated scale, in terms of

its unidimensionality and internal consistency (Claes, Beheydt, & Lemmens, 2005; Li, Liang, & Crant, 2010). A sample item is "I love being a champion for my ideas, even against others' opposition." The response scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha for this scale was 0.70 in the current sample.

3.2.2 | Big five

Saucier's Mini-Markers were used to measure the five factors of personality in this sample. It consists of a 40-item abbreviated version of Goldberg's (1992) 100-item Adjective Checklist that gives unipolar markers for the Big-Five personality factor structure, but preserves similar construct validity and reliability (Saucier, 1994).

Example items include "Moody" and "Temperamental" for emotional stability, "Imaginative" and "Intellectual" for openness, "Talkative" and "Energetic" for extraversion, "Organized" and "Efficient" for conscientiousness, and "Kind" and "Cooperative" for agreeableness. Each employee in our sample rated how accurately each adjective described himself using a Likert-type scale anchored at 1 = extremely inaccurate and 5 = extremely accurate. Cronbach's alphas were of 0.88 for emotional stability, 0.74 for openness to experience, 0.84 for extraversion, 0.79 for conscientiousness, and 0.71 for agreeableness.

3.2.3 | Innovative job performance

Our criterion was assessed using Janssen's (2000, 2001) nine-item scale of individual innovative behaviors at work. The appropriateness of this measure for the study of innovative performance has been previously acknowledged in the literature (Anderson et al., 2014). It follows the stages of innovation asserted by Kanter (1988) and evaluates individual behaviors implied in idea generation, promotion, and implementation, using three items for each of these behavioral types. Sample items are "Creating new ideas for difficult issues" and "Introducing innovative ideas into the work environment in a systematic way." Direct supervisors rated the frequency with which each employee exhibited these behavioral forms in the last six months, using a five-point format ranging from 1 (Never) to 5 (Always).

Despite comprising specific items to assess idea generation, promotion, and implementation, prior studies with this measure have reported strong intercorrelations between these three innovative behavior subscales—over 0.79 and over 0.76 in Janssen's (2000, 2003) samples, respectively. Consequently, the author has combined and used these behavioral dimensions as a single additive scale of innovative behavior. The same approach has also been followed in further research with this scale (e.g., Aryee, Walumbwa, Zhou, & Hartnell, 2012; De Jong & Hartog, 2010; Wang, Fang, Qureshi, & Janssen, 2015). In the current sample, the magnitude of the respective intercorrelations was particularly strong as well, more specifically 0.76 between idea generation and idea implementation, 0.72 between idea generation and idea promotion and 0.82 between idea promotion and idea implementation. Hence, we followed the same

approach adopted in previous studies and used a single criterion of overall innovation in our analyses. Cronbach's alpha for the total scale in the current sample was 0.92.

3.3 | Preliminary analyses

Before testing our hypotheses, evidence concerning the construct and discriminant validity of the measures used in the present study was gathered. Due to the relatively small sample size for performing a confirmatory factor analysis with all the items from the predictors and criterion under study, a principal component analysis was conducted. Given that obtained components were interrelated, oblimin rotation was used and the expected seven-component solution was found, accounting for 51.10% of item variance. All the items showed clean and appropriate loadings on the expected component, ranging from 0.86 to 0.68 for innovative performance, from 0.84 to 0.54 for emotional stability, from 0.62 to 0.43 for openness, from 0.74 to 0.44 for extroversion, from 0.82 to 0.42 for conscientiousness, from 0.70 to 0.41 for agreeableness, and from 0.76 to 0.35 for proactive personality. The only exception occurred for the item *deep* (from the openness to experience subscale), which loaded below the required standards and was consequently dropped from the analyses.

4 | RESULTS

Table 1 summarizes descriptive statistics and correlation coefficients between all the control variables, predictors, and criterion under study.

Consistent with our first hypothesis, proactive personality has emerged as a positive and valid predictor of innovative performance in the current sample. Organizational tenure and the big five factors of openness, extraversion, emotional stability, and conscientiousness are also positively related to this criterion.

As stated above, innovative performance ratings were obtained from the software engineers' direct supervisors. As some supervisors evaluated several participants (86 supervisors rated an average of 1.98 individuals, $SD = 1.23$), the data structure was partially nested. According to the hierarchical nature of our data structure and to account for potential nonindependence of the ratings, we used hierarchical linear modeling (HLM), computed on R software (multilevel package), to test our second hypothesis. In fact, the intraclass coefficient ($ICC_{(1)} = 0.32$) indicated that supervisors account for about 32% of the variability in individuals' innovation performance ratings, which reinforced the appropriateness of multilevel modeling. We also examined the intercept variability by estimating an unconditional means model (or null model). An unconditional means model does not contain any predictors but includes a random intercept variance term for groups (Bliese, 2016), in our case, for each supervisor's evaluations. The -2 Log likelihood ($-2LL$) value (384.68) of the model with a random intercept is smaller than the $-2LL$ value (397.76) of a model without a random intercept, and the difference is statistically significant (13.08, $p < 0.001$). Therefore, a

random intercept model was required to adequately account for the nested nature of our data.

The test of hypothesis 2 using HLM is reported in Table 2. Since organizational tenure is significantly correlated with our criterion, it was included as a control variable and entered in model 2. In the model 3, all the five factors of personality entered the analysis. Proactive personality entered in the fourth model. As we can see, model 4 shows a better fit than the others, since its $-2LL$ value (i.e., the deviance) is smaller (Hox, 2010), and proactive personality has a positive significant effect on innovative performance ($\gamma = 0.32$, $p = 0.03$), when controlling for the effects of tenure and the big five.

Therefore, the results support our second hypothesis, which posited that proactive personality will show incremental validity beyond the five-factor model, when predicting for individual innovative performance.

5 | DISCUSSION

The purpose of this paper was twofold. First, building upon a more integrative conceptualization of innovative performance, we aimed to examine the criteria-related validity of proactive personality for

TABLE 1 Means, standard deviations, and zero-order correlation coefficients

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Sex ^a	1.05	0.21	-									
2. Age	31.06	4.63	-0.08	-								
3. Organizational tenure	3.72	1.99	0.05	0.27**	-							
4. Openness	3.51	0.50	-0.13	0.03	-0.07	-						
5. Extraversion	3.49	0.68	0.02	0.05	-0.09	0.33**	-					
6. Emotional stability	3.61	0.70	-0.01	0.03	-0.09	-0.09	0.11	-				
7. Conscientiousness	4.00	0.44	0.07	0.07	0.11	0.23**	0.17*	0.18*	-			
8. Agreeableness	3.83	0.45	0.00	0.01	-0.13	0.16*	0.06	0.31**	0.18*	-		
9. Proactive personality	3.88	0.43	-0.01	0.14	0.01	0.40*	0.43**	0.12	0.38**	0.16*	-	
10. Innovative performance	2.81	0.77	0.02	0.08	0.28**	0.16*	0.17*	0.17*	0.19*	-0.06	0.26**	-

Note. $N = 170$.

^aMales were coded as 1 and females were coded as 2. * $p < 0.05$; ** $p < 0.01$.

TABLE 2 HLM results for innovative performance

Variables	Model 1 (null model)	Model 2	Model 3	Model 4
Fixed effects	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
Intercept	2.83 (0.07)***	2.46 (0.12)***	1.48 (0.68)*	1.06 (0.70)
Organizational tenure		0.10 (0.03)***	0.10 (0.03)***	0.09 (0.03)**
Openness			0.15 (0.12)	0.08 (0.12)
Extraversion			0.12 (0.09)	0.08 (0.09)
Emotional stability			0.18 (0.08)*	0.19 (0.08)*
Agreeableness			-0.02 (0.13)	-0.03 (0.13)
Conscientiousness			0.18 (0.13)	0.11 (0.13)
Proactive personality				0.32 (0.15)*
Random part				
τ_{00}	0.19	0.17	0.11	0.11
σ^2	0.41	0.39	0.39	0.39
$-2LL$	384.68	377.21	377.27	374.60

Note. Individual-level sample size = 170 (nested in 86 supervisors). Unstandardized coefficients are reported with standard errors in parenthesis. τ_{00} = between-group or intercept variance; σ^2 = within-group or residual variance.

***Significant at the 0.001 value; **significant at the 0.01 level; *significant at the 0.05 level.

the prediction of this criterion. Second, we intended to contribute to evaluate whether and to what extent proactive personality contributes to explaining specific variance in innovative performance, beyond the five factors of personality.

With regard to our first research goal, results have shown that proactive personality represent a valid and meaningful predictor of innovative performance. Prior theoretical and empirical work has ascribed a prominent role to this personality disposition for explaining several outcomes with great value for both individuals and organizations. Indeed, previous research has shown that this individual tendency to adopt a self-starting approach to work and to exhibit proactive behavioral patterns positively impacts several important work outcomes, like career success, leadership, and overall performance (Crant, 2000; Spitzmuller et al., 2015). Our study contributes to extend these findings by indicating that this disposition is also relevant to enacting innovative behaviors at work. This result has practical meaning given that the validity coefficient obtained for proactive personality is above 0.20 and therefore with enough magnitude to translate into utility gains and exert a positive and meaningful impact on hiring success, when selecting for innovative performance (Ones, Dilchert, Viswesvaran, & Judge, 2007).

Focusing on the second major goal of this study, our findings suggest that proactive personality constitutes a valid predictor of innovative performance with incremental validity over and beyond the FFM, indicating that this compound trait represents a valid predictor, nonredundant with the big five, when predicting this criterion. These results are in line with previous findings supporting the assumption that this compound trait does represent a dispositional element that is not encompassed in the five-factor model (Crant, 2000; Spitzmuller et al., 2015).

Thus, from a practical point of view, the inclusion of proactive personality measures along with big five instruments can be used to improve the efficacy of personnel selection systems when assessing and selecting for innovative performance. Moreover, given the previous empirical evidence suggesting that proactive personality measures do not originate subgroup differences, the inclusion of proactive personality measures in selection systems might also contribute to mitigating potential adverse impact issues (Spitzmuller et al., 2015). Altogether, these aspects strengthen the prospects for proactive personality as one of the most successful personality predictors of individual innovation.

5.1 | Research limitations and future directions

In spite of its contributions, this study is not without limitations. Specifically, despite conceiving of innovation as a multiphase process, it was not possible to empirically differentiate this criterion into the variables of idea generation, promotion and implementation, to further examine the specific impact of the personality predictors on these more specific behavioral criteria. This differentiation of criteria was precluded by the empirical unidimensionality of Janssen's (2000) innovative behavior scale used to measure innovative performance. As previously highlighted, despite the author's initial

intention to develop a multidimensional measure of innovative work behavior by formulating items to specifically tap each of the three types of innovative behaviors, strong correlations between these three behavior scales have been found, preventing their use as independent criteria (Janssen, 2000, 2003; Wang et al., 2015).

Hence, future research should rely upon multidimensional measures of innovative performance, allowing a more fine-grained analysis of the innovation process, which is required to advance understanding of the role of the big five and of proactive personality in each phase of this process. Notwithstanding its theoretical and practical merits, this question remains greatly underdeveloped in the literature.

Another limitation stems from the reliance of our findings from a single software engineering job in an information technology firm. Despite the calls in the literature on job performance and its dimensions for more samples from this type of jobs and industry (e.g., Harari et al., 2016), the specificity of our sample inevitably restricts the generalization of our findings. Still, it has the advantage of reducing the likelihood of these contextual factors influencing our results. Notwithstanding, further research with samples from other occupations and industries is certainly needed to assess the generalizability of the present findings to other organizational settings.

A further limitation concerns the reliance on supervisor ratings alone to measure innovative performance. Despite its strength in avoiding several measurement biases associated with the use of self-ratings (see Podsakoff, MacKenzie, & Podsakoff, 2012 for a review), our research goals would benefit from collecting peer ratings as well, given that some innovative behaviors might be less visible from the supervisors, such as the employee's actions involved in the promotion of ideas targeting co-workers. On this matter of criterion measures, the further inclusion of an objective measure of innovative performance criterion, such as the number of ideas actually suggested, promoted, and implemented, could also provide important insights into the specific links of the predictors with particular innovative behavioral patterns (Potočník et al., 2015). Therefore, as previously noted, future studies should contribute in this regard using multidimensional measures of innovative innovation along with different innovation data sources. Future research should also continue to map the prominence of proactive personality against other potentially important personality constructs for innovation, such as core self-evaluations or creative personality (Potočník et al., 2015).

In conclusion, our findings support the use of proactive personality when assessing and selecting for innovative potential. Although, advancing research on the dispositional roots of innovation and their interaction with situational contingencies remains critical to enhance our knowledge about how to select for innovative potential and to intervene in work settings to unfold and translate that potential into the acknowledged benefits of innovation for organizations.

ORCID

Nuno Rodrigues  <https://orcid.org/0000-0002-3470-0887>

Teresa Rebelo  <https://orcid.org/0000-0003-3380-0840>

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How to cite this article: Rodrigues N, Rebelo T. Predicting innovative performance through proactive personality: Examining its criterion validity and incremental validity over the five-factor model. *Int J Select Assess*. 2019;27:1–8. <https://doi.org/10.1111/ijsa.12232>