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Abstract
We take a first step to explore how organizational factors influence individual entrepreneurial behavior at work, by investigating the role of job design variables. Drawing on multiple-source survey data of 179 workers in a Dutch research and consultancy organization we find that entrepreneurial behavior, indicated by innovation, proactivity and risk-taking items, is a higher-order construct. Job autonomy is positively related with entrepreneurial behavior, as well as its innovation and proactivity sub-dimensions, while job variety is not. This suggests that interventions related to the vertical scope of jobs will promote entrepreneurial behaviors more than horizontal job expansion.

INTRODUCTION

Recent findings from the Global Entrepreneurship Monitor show that entrepreneurial behavior by employees in organizations is more important than previously thought. Survey output in 52 countries reveals that while business founding and self-employment are more often found in developing economies, entrepreneurial employee activity is particularly prevalent in advanced economies, and represents an alternative type of entrepreneurship that has been overlooked in official statistics (Bosma, Wennekers and Amorós, 2012). Ten years ago, Shane (2003) already concluded that operational definitions of entrepreneurship mainly revolve around new firm formation, while individual entrepreneurial behavior in organizations is under-researched. Although studies of employee entrepreneurship are emerging, there are still gaps in the literature when it comes to entrepreneurial behaviors in organizations. Ireland, Covin and Kuratko (2009) identified that behaviors and processes at the organizational members (i.e. individual employees) level are key to any corporate entrepreneurship strategy, and that studies of the antecedents and consequences at this level are merited.

The contribution of this paper is twofold. First and foremost, we take an initial step to investigate what constitutes a favorable environment for entrepreneurial behavior in organizations. For business founders it has been well demonstrated that entrepreneurial behavior is influenced by individual attributes (e.g., age, education, self-efficacy) and environmental forces (e.g., R&D intensity, market growth, industry concentration) (Shane, 2003). Rather than the broader industrial context, however, entrepreneurial employees are influenced by organizational factors - and what these look like is still uncertain. Our focus is on job design variables, or the structure, content and configuration of employees' tasks and roles (Parker and Ohly, 2008). We investigate the potential influence of job autonomy and job variety, two job design variables which strongly influence employees' general work satisfaction and performance. Job autonomy and variety correspond with important potential interventions to expand jobs vertically (increase responsibility for decision-making) or horizontally (breadth of activities people are involved in), respectively (Parker, 1998). As investigations of their consequences beyond direct task performance are still rare (Parker and Ohly, 2008), we investigate if job autonomy and job variety matter for employees' entrepreneurial behaviors. Secondly, to thoroughly investigate the influence of job autonomy and variety, we control for a range of variables that have been previously identified as determinants of business founding (including gender, age, work experience, education, and more). By doing so, we explore if these variables are also applicable to identify entrepreneurial workers. Given that in some countries entrepreneurial employee behavior appears to substitute for a lack of business founding and self-employment (Bosma *et al.,* 2012), it becomes interesting to see if similar rules-of-thumb can be used for entrepreneurial workers.

We suggest that dichotomous indicators like engagement in new firm formation and/or self-employment are not suitable to explore employees' entrepreneurial behavior. Beyond the creation of new ventures on behalf of their employer, entrepreneurial behavior can be broader and also include new product development, process and administrative improvements, or work role innovations, to mention only a few. We define entrepreneurial behavior as the extent to which individual workers proactively engage in the creation, introduction and application of opportunities at work, marked by taking business-related risks. Behavior-based perspectives of entrepreneurship generally revolve around similar definitions: associated with the discovery, evaluation and exploitation of opportunities (Shane, 2003).

THEORY AND HYPOTHESES

Given our broad, behavior-based definition we identified three features of entrepreneurial behavior for investigation: innovation, proactivity and risk-taking. These are a common denominator in three usually unconnected literatures which describe or touch upon the entrepreneurial process, including traditional entrepreneurship or business founding, firm-level entrepreneurial orientation, and organizational behavior. The focus on innovation, proactivity and risk-taking behaviors implies that we expand corporate entrepreneurship studies which generally revolves around the firm level of analysis. Although not without debate, examining the content of corporate entrepreneurship at other levels has been called for (Miller, 2011), and this also includes the individual level of inquiry (e.g., Krauss, Frese, Friedrich and Unger, 2005; Ireland *et al.*, 2009). Hereafter

we elaborate on employees' entrepreneurial behaviors and present our hypotheses regarding job autonomy and job variety.

Entrepreneurial behaviors

Innovation is widely regarded as central in the entrepreneurial process. Shane (2003) for example, in his review of the entrepreneurship literature of self-employment and business founding, stressed that any entrepreneurial activity is characterized by some sort of innovation. Likewise, entrepreneurial orientation studies generally regard innovativeness as a central characteristic of an entrepreneurial organization. Innovativeness is then defined as 'a predisposition to engage in creativity and experimentation through the introduction of new products' (Rauch, Wiklund, Lumpkin and Frese, 2009: p.763). Finally, organizational behavior researchers have investigated the construct of innovative work behavior, defined as the initiation and intentional introduction (within a work role, group or organization) of new and useful ideas, processes, products or procedures (de Jong and den Hartog, 2010). Such individuals start with recognizing problems and generating ideas for fixes, then champion their idea to managers and colleagues, and build or organize prototypes or models for further assessment and adoption.

As for proactivity, traditional entrepreneurship studies have identified that entrepreneurship revolves around individuals who are self-starting and engage in new organizing efforts (Shane, 2003). The entrepreneurial orientation literature explicitly identifies firm-level 'proactiveness', representing an opportunity-seeking, forward-looking perspective characterized by high awareness of external trends and events, and acting in anticipation thereof (Rauch *et al.*, 2009). Proactivity is associated with

pioneering behavior, initiative taking to pursue new opportunities, and attempts to lead rather than follow (Lumpkin and Dess, 1996). These elements are also present in the organizational behavior literature in which proactive behaviors are defined as 'self-initiated and future-oriented action that aims to change and improve the situation or oneself' (Parker and Collins, 2010: p.635). These may be aimed at improving the internal organizational environment or the fit between the organization and its broader environment (e.g., by identifying organizational threats, or by selling strategic issues to the top management).

Risk-taking is another feature of the entrepreneurial process. In general, risk refers to the possibility that something unpleasant will happen. For independent entrepreneurs, despite their inclination to minimize risks, opportunity pursuit is marked by uncertainty ´as time, effort and resources must be invested before the distribution of their returns is known´ (Shane, 2003: p.7). The entrepreneurial orientation literature defines risk-taking as taking bold actions by venturing into the unknown, borrowing heavily, and/or committing significant resources to ventures in unknown environments (Rauch *et al*., 2009). Thus, entrepreneurial risk-taking is associated with potential losses of assets. For entrepreneurial workers, however, we suggest that risk-taking has a slightly different meaning. While material losses would be partly or fully passed on to their employers, entrepreneurial workers may face reputation damage, resistance from peers, and even losing their job. In this respect, Gasse (1982) identified that beyond material assets entrepreneurial risk also involves psychological, social and/or personal matters. Moreover, the organizational behavior literature repeatedly stressed that innovative and/or proactive individuals take deliberate risks in their work environment by

challenging the status quo (Parker and Collins, 2010). Entrepreneurial workers often even act without their higher management's permission which may be at the expense of internal conflict and less satisfactory work relations (Janssen, 2003). In all, we associate risk-taking with facing potential losses in a broader sense, and with an inclination to move forward without a priori permission or consensus.

In sum, innovation, proactivity and risk-taking are defining features of the individual entrepreneurial process, representing a range of behaviors that entrepreneurial workers may engage in - including identifying opportunities and threats, generating and searching out ideas, championing ideas and selling those to peers in the company, putting effort in making it happen, and boldly moving forward in the pursuit of opportunities while accepting the risk of potential losses.

Job design

The design of a job includes a variety of task, knowledge, social and contextual characteristics (Morgeson and Humphrey, 2006). We here theorize and empirically examine the role of job autonomy and job variety in shaping entrepreneurial behaviors. Although not elaborative, these are major constructs in the job design literature. Autonomy and variety correspond with two major job design interventions to improve employees' satisfaction and effectiveness, that is, by increasing the vertical scope of a job (enhanced autonomy implying decision-making latitude) and its horizontal breadth (increased task variety) (Parker, 1998). Moreover, drawing a parallel with the nature of business founding/self-employment, they are most relevant as founders are highly autonomous and face a huge variety of tasks especially in the early days of their ventures.

Job autonomy is 'the degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out' (Hackman and Oldham, 1976: p.258). We anticipate that job autonomy increases employees' perceived capability and willingness to engage in entrepreneurial behaviors. Job autonomy enhances workers' situational control beliefs: enabling them determine independently how to do their job or tasks, which is associated with increased mastery experiences and more self-efficacy at work (Parker, 1998). In line with this, job autonomy has been associated with entrepreneurial behaviors like innovation, personal initiative and idea implementation (Bindl and Parker, 2010). This perceived capability mechanism is also central in some well-known theories of self-employment, including planned behavior theory (e.g., Kolvereid, 1996) and the entrepreneurial event model (Shapero, 1982) such that higher self-efficacy will influence individuals' opportunity and threat perceptions and thus lead to a positive decision to pursue opportunities.

Moreover, job autonomy enhances felt responsibility and flexible role orientations which encourages employees to devote more effort to bring change to the workplace (Salanova and Schaufeli, 2008). The same motivational mechanism is also found in planned behavior and entrepreneurial event models, such that individual positive attitudes towards entrepreneurial behavior increase the odds of subsequent engagement (Shapero, 1982; Kolvereid, 1996). In line with these considerations, job autonomy has been empirically associated with personal initiative (Frese, Garst and Fay, 2007) and idea suggestion and implementation (Axtell, Holman, Unsworth, Wall, Waterson and

Harrington, 2000). We hypothesize (H1): Job autonomy is positively related to entrepreneurial behaviors (innovation, proactivity, risk-taking) in organizations.

Job variety is 'the degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the person' (Hackman and Oldham, 1976: p.257). Job variety corresponds with the breadth of activities people are involved in. It is expected to facilitate entrepreneurial behavior for two reasons. First, workers with more varied tasks are more likely to discover opportunities, i.e. this usually happens at the intersection of diverse thought worlds, so that information asymmetries can be solved. Job variety helps employees to interpret and position their work in the broader work context, and as such, stimulates them to develop ideas about how to change work-related products or processes (Frese, Kring, Soose and Zempel, 1996). Second, job variety enables individuals to develop a broader range of capabilities and social ties which can be helpful to implement opportunities. Varied tasks have for example been associated with enactive mastery experiences (Parker, 1998) which increases employees' perceived capability to engage in entrepreneurial behaviors. It provides better opportunities for employees to develop their skills, which also facilitates them to overcome barriers during entrepreneurial actions. In line with this reasoning, job variety has been empirically associated with employees' personal initiative (Salanova and Schaufeli, 2008). We hypothesize (H2): Job variety is positively related to entrepreneurial behaviors (innovation, proactivity, risk-taking) in organizations.

DATA

The data were collected in the spring of 2010 at a Dutch research and consultancy company. At the time, the company employed 271 people divided over six business units. Work was organized in temporary project teams. Although employees could work with anyone in the company, most collaborated with a limited group of other workers.

Data were collected from four sources. First, in a pen-and-paper survey we collected data on workers' perceived job autonomy, job variety, and various control variables including education, work experience and proactive personality (discussed later). Respondents also identified three colleagues with whom they had most intensively collaborated in the past three years. Eventually 189 employees participated.

Second, a web survey was sent to those identified as a 'close collaborator'. For each colleague who had mentioned their name, the respondent completed items on their entrepreneurial behaviors. Moreover, respondents assessed their colleagues' overall job performance to analyze the divergent validity of our entrepreneurial behavior measure. The number of provided ratings varied from 1 to 9 with an average of 2.625. Eventually, two out of three identified collaborators completed this second survey. After matching both datasets, we had obtained at least one peer-rating for 179 employees (66% of all staff members). Twenty-eight employees were rated once, sixty-two were rated twice, and eighty-nine persons had obtained all three ratings.

The third source was administrative data provided by the organization, including age, gender, business unit, job size, and job types (sales workers, managers). These were used as control variables, and to correct for the selectivity of responses (see later). Finally, three years after the initial data collection we did a follow-up survey to obtain employees' self-ratings of their entrepreneurial output and self-employment intentions. These

measures were used to further validate our entrepreneurial behavior measures. In March 2013, out of the 179 employees with peer-ratings, 117 were still at the company. Ninety-three employees participated (response rate 79%).

Measures

All measures are available on request. The web survey included nine entrepreneurial behavior items. Innovation was measured with three items from Scott and Bruce (1994), including '*This employee generates creative ideas'*, '*…searches out new techniques, technologies and/or product ideas'* and '*…promotes and champions ideas to others'*. For proactivity we used two items from Parker and Collins' (2010) proactive strategic behavior measures, including '*This employee identifies long term opportunities and threats for the company'* and *'...is known as a successful issue seller*'. We added a third item *'...puts effort in pursuing new business opportunities'* as the entrepreneurial process is generally associated with such activities, but existing measures did not capture this element. Finally, risk-taking was indicated by two items based on Zhao, Seibert and Hills (2005) ('*This employee takes risks in his/her job'* and *'...when large interests are at stake, goes for the big win even when things could go seriously wrong*') and a new item ('*...first acts and then asks for approval, even if he/she knows that would annoy other people*') to explicitly include individuals' boldness. All items were rated 1 ('not at all') to 5 ('very often'). To check if the peer-ratings were homogenous we computed the intra-class correlation coefficients ICC(c,1) using a two-way random model with consistency agreement (McGraw and Wong, 1996). Their values ranged from .20 to .50 ($p<.001$) indicating that aggregation was appropriate. So, for each item responses from multiple

peers were averaged. Cronbach's α was .89 for innovation, .85 for proactivity, and .84 for risk-taking.

To evaluate the divergent validity of the entrepreneurial behavior measures, we asked respondents to also rate their collaborators' general job performance - which should be related-but-distinct from entrepreneurial behaviors (Bindl and Parker, 2010). Drawing on three items from Ashford and Black (1996), job performance was rated from 1 (lowest) to 9 (highest). ICC(c,1)-values ranged from .27 to .35 (with p-values < .001) indicating consistency, so we aggregated their scores. Cronbach's α was .88.

In the initial pen-and-paper survey, self-ratings of job autonomy and job variety were collected with Morgeson and Humphrey's (2006) decision-making autonomy and task variety measures. These measures contained three items each and were rated 1 ('strongly disagree') to 7 ('strongly agree'). Cronbach's α was .89 for both measures.

Finally, in the follow-up survey respondents rated their entrepreneurial output in the past three years, and their self-employment intentions. Drawing on Axtell *et al*. (2000) and de Jong and den Hartog (2010), entrepreneurial output was assessed with seven items indicating whether employees in the past three years had: improved current products/services, introduced entirely new products/services, improved current work practices, introduced entirely new work practices, realized organizational change, proactively acquired new customers, and realized new business for the company (rated 1 'not at all' to 5 'very often'). Cronbach's α was .82. Self-employment intentions were measured with Thompson's (2009) ten item-measure, of which six items indicate entrepreneurial intent (e.g., '*How true or untrue is it that you intend to set up a company*

in the future?') while the others are distractor items. These items were rated 1 ('very untrue') to 6 ('very true'). Cronbach's α was .97 for the entrepreneurial intent items.

Control variables

We controlled for common antecedents of business founding, which generally include demographic, cognitive and personality factors (Shane, 2003). Beyond a conservative assessment of the impact of job autonomy and variety, this enabled us to explore if some of business founding's common antecedents are helpful to identify entrepreneurial workers.

We included in our models: education (best educational attainment, coded 1=no degree, 2=bachelor degree, 3=master degree), work experience (in years, including relevant experience with previous employers) and gender (dummy variable for males). These variables should be positively related with entrepreneurial behaviors (Shane, 2003). We also entered the age of the employee and its squared-term, anticipating an inverted-U relationship with entrepreneurial behavior. Age supposedly incorporates growing experience and declining uncertainty tolerance and desire to become an entrepreneur (Shane, 2003).

As a personality trait we included proactive personality, which Bateman and Crant (1993) defined as a dispositional trait to take action in order to influence one's environment and bring about change. Proactive personality was previously found to be positively related with new venture success (Rauch and Frese, 2007) and proactivity and innovation (Parker and Collins, 2010). We measured proactive personality with four items (α=.80) from Bateman and Crant (1993).

Next, to conservatively test our hypotheses we added three more variables related to the nature of the job: being a sales worker, being a manager (two dummy variables) and job size (in full-time equivalents). Sales workers were so far ignored in corporate entrepreneurship studies, but they may well be in-house entrepreneurs. Sales workers maintain external work contacts and have diverse networks, which have been associated with the discovery of opportunities (Shane, 2003) and innovation behavior (de Jong and den Hartog, 2010). They are also known for their strong need to conquer and risk-acceptance to reach their targets (Mayer and Greenberg, 2006).

Managers generally have better opportunities to identify and implement opportunities due to their deviant roles and responsibilities, including the ability to influence decision-making and to access resources (Hornsby, Kuratko, Shepherd and Bott, 2009) and better internal ties due to high interdependence (Morgeson and Humphrey, 2006). For job size, we anticipated that those with longer workweeks are more entrepreneurial. By working more hours such workers accumulate knowledge and experience, which is associated with for entrepreneurial behaviors in new businesses (Shane, 2003) and existing organizations (Bindl and Parker, 2010).

Finally, we included dummy variables for five of the organization's business units, the sixth unit being the reference group.

RESULTS

The innovation, proactivity and risk-taking items were significantly related. In an exploratory factor analysis with oblique rotation, the scree criterion suggested three factors, with each item loading on its presupposed dimension, and correlations between

the three factors exceeding .56 (all p's < .001). This suggests that entrepreneurial behavior may be a higher-order reflective construct. To explore this we estimated a range of confirmatory factor (CFA) models, all with maximum likelihood estimation and unrelated error terms.

In the first CFA model, each factor was indicated by its three items, without correlations between the factors. Model fit was insufficient (GFI=.753, RMSEA=.228, TLI=.683, NFI=.745, χ^2/df = 10.24). In the second model entrepreneurial behavior was specified as a higher-order factor. Model fit was good (GFI=.940, RMSEA=.078, TLI=.963, NFI=.954, χ^2/df = 2.07) while all standardized item loadings exceeded .60 (with p-values < .001). In the third model we loaded all nine entrepreneurial behavior items on a single factor. Model fit deteriorated (GFI=.765, RMSEA=.202, TLI=.750, NFI=.794, χ^2/df = 8.29) implying that the items are not one-dimensional. These results indicate that innovation, proactivity and risk-taking are reflections of a higher-order construct.

To assess the discriminant validity of the higher-order construct we correlated it with job performance, which was collected from the same source (peer-ratings). The fourth model extended the second model by adding job performance as a first-order factor indicated by three items. Model fit was still good (GFI=.912, RMSEA=.079, TLI=.952, NFI=.934, χ^2/df = 2.11) while the correlation coefficient between entrepreneurial behavior and job performance was .44 (p<.001). Next, in the fifth model we fixed this correlation on unity. Model fit broke down (GFI=..788, RMSEA=.163, TLI=.797, NFI=.818, χ^2/df = 5.74) showing that peer-rated entrepreneurial behavior is distinct from peer-rated job performance.

To further explore the validity of our entrepreneurial behavior measure we correlated it with employees' entrepreneurial output recorded three years later. Higher-order entrepreneurial behavior as rated by peers was significantly related with self-rated entrepreneurial output ($r=.54$, $p<.001$). For the innovation, proactivity and risk-taking dimensions these correlations were .45, .55 and .42, respectively (all p's$<.001$). Thus, entrepreneurial behaviors are predictive of output indicators which suggests that entrepreneurial workers create value for the organization in the longer run. Entrepreneurial behavior was also significantly related with employees' self-employment intentions after three years ($r=.34$, $p<.001$). Similar results were found for innovation ($r=.32$, $p<.001$) and proactivity ($r=.40$, $p<.001$) while the risk-taking coefficient was marginally significant ($r=.18$, $p<.10$). Peer-rated entrepreneurial behaviors are associated with seemingly persistent intentions of employees to be entrepreneurial.

Testing hypotheses

Table 1 offers descriptive statistics and correlations. Entrepreneurial behavior and its dimensions were significantly related with job autonomy and job variety. For the control variables job size was not significantly correlated with entrepreneurial behaviors, as was work experience (with the exception of proactivity). Gender was not related with risk-taking. All other control variables had their expected signs and significances.

- Insert Table 1 Here –

To examine potential selectiveness of our sample, we computed χ^2- and t-tests to compare respondents (n=179) with those who had not participated or obtained any peer ratings (n=92). As we found significant differences for sales workers, gender and some of the business units (output available on request), we tested our hypotheses with two-step Heckman regression models. The selection equation included dummies for sales workers and managers, job size, age, gender, and five business unit dummies. We used it to compute the inverse mills ratio shown in the bottom row of Table 1. We then estimated various OLS regression models including the inverse Mills ratio to control for selection bias. First, a model of overall entrepreneurial behavior was estimated (average score of nine items). We then proceeded with separate models of innovation, proactivity and risk-taking (Table 2).

- Insert Table 2 Here –

The entrepreneurial behavior model had good overall fit (R^2=44.4%). The innovation and proactivity models also had high explanatory power, while the risk-taking model was acceptable.

We found that job autonomy was strongly related with entrepreneurial behavior (b=.171, $p < .05$), and also with the innovation and proactivity dimensions. For risk-taking, the regression coefficient was insignificant. Accordingly, we find that H1 is partially supported. Job variety, despite significant bivariate correlations (Table 1), was not significant in any model. H2 is not supported.

For the control variables we found more significant results. The effect parameters for education and proactive personality were always positive and significant. Moreover, the relationship between age and entrepreneurial behavior was an inverted U with a negative overall trend. The maximum value of entrepreneurial behavior was reached at 35 years. Similar relationships were obtained for the innovation and proactivity dimensions, now with maximum values at 36 and 39 years. For risk-taking the squared-term was not significant leaving a marginally negative direct relationship between age and risk-taking. Work experience was only related with the proactivity dimension, while gender was never significant.

Next, we found that job types matter for peer-rated entrepreneurial behaviors. Being a sales worker was positively related with entrepreneurial behavior and its dimensions - most strongly associated with risk-taking, and still marginally significant for innovation. Being a manager was also related with overall entrepreneurial behavior, but when analyzed per dimension, only significant for proactivity. Finally, job size was not related with entrepreneurial behavior or any of its dimensions.

DISCUSSION

We took a first step exploring what constitutes a favorable context for entrepreneurial workers in organizations, by investigating the relationship between job design variables (i.e. job autonomy and job variety) and employees' entrepreneurial behaviors. Three features of entrepreneurial behavior were identified: innovation, proactivity and risk-taking. Using data collected in a research and consultancy business, these behaviors appeared to be a higher-order construct, which was related-but-not-identical to

individuals' job performance, and positively and significantly related to workers' self-rated entrepreneurial outputs and intentions to become self-employed three years after the initial data had been collected.

Our estimates were conservative as we controlled for other job-related variables, including job types (being a sales worker, being a manager) and job size. We found that job autonomy was directly related with overall entrepreneurial behavior, as well as with its innovation and proactivity dimensions. Conversely, in spite of the positive bivariate correlations between job variety and entrepreneurial behaviors, job variety lost its significance when other variables were controlled for. Autonomy is probably more distinctive because it increases perceived control over the work environment which also enhances employees' motivation or willingness to engage in such behaviors, while job variety supposedly only influences perceived capabilities for entrepreneurial behavior. The empirical patterns that we observed are in line with Parker's (1998) work on the antecedents of role-breadth self-efficacy (RBSE). Defined as the extent to which people feel confident that they are able to carry out a broader and more pro-active role, she found that changes in job autonomy directly impacted changes in RBSE, while changes in job variety only mattered if autonomy was excluded. On top of that, autonomy may imply that workers get involved in higher level decision-making tasks, which is generally a source of new mastery experiences, while job variety is usually concerned with taking on a prescribed set of extra tasks, and not necessarily marked by increased motivation or mastery experiences.

In sum, we found that job design variables matter for entrepreneurial behavior in organizations in the sense that job autonomy makes a difference. However, a diverse

impact was found when innovation, proactivity and risk-taking were considered separately. More specifically, for risk-taking behavior both job design variables were insignificant. The explanatory power of our risk-taking model was acceptable, but relatively low, suggesting that other antecedents are at play. Here we acknowledge that we did not investigate all aspects of job design. Except for autonomy and variety, which most directly correspond with organizational interventions related to a job's vertical and horizontal scope, job design encompasses knowledge, social and physical factors (Morgeson and Humphrey, 2006). Since entrepreneurial risk-taking is associated with differential access to information (Gifford, 2003) it would be interesting to develop new research on the impact of constructs like job information processing, specialization and interdependence – these would indicate if differential access to information is present.

We also found that many individual-level determinants of business founding are helpful to identify entrepreneurial individuals in organizations. These included education and proactive personality, while the relationship between entrepreneurial behavior and age was also an inverted U. Moreover, we found that sales workers and managers are more likely to be perceived as in-house entrepreneurs. Our findings suggest that sales workers are more inclined to take risks, and not so much to innovate (although this relationship was still marginally significant), while managers distinguished themselves on the proactivity dimension. This may be in line with the nature of their tasks and roles – sales workers need to boldly move forward and engage in risky behaviors to accomplish their sales targets, while managers are more concerned with getting things done and act in the anticipation of longer-term threats and opportunities (more proactivity), while risk-taking and innovation are less central in their jobs or may even be avoided by some

managers. Finally, we could not identify significant differences between males and females. This clearly deviates from business founders, where males are much more likely to engage in entrepreneurial behaviors (Shane, 2003). Accordingly, our findings do not suggest that determinants of entrepreneurial behavior in organizations are identical to those of business founders.

Implications and future research

Our findings suggest that interventions related to work redesign can be helpful to enhance in-house entrepreneurship. More specifically, the patterns that we observed imply that a vertical expansion of jobs (enhanced autonomy) is viable to stimulate entrepreneurial behavior by incumbent staff members. This would imply to increase employees' ability to determine independently how to do their job or tasks, or to appoint them in high-autonomy positions. Given that the association with job variety was not significant, this type of intervention would generally be more beneficial than increasing the breadth of activities people are involved in. Next, we found that some well-known antecedents of business founding are useful to identify entrepreneurial workers in organizations, so that rules-of-thumb can be applied regarding who is more likely (or ought) to engage in this kind of behavior. Education and proactive personality were consistently significant and these can be accounted for when recruiting new workers. The result for education also emphasizes the importance of on-the-job training and lifelong learning. Another finding was that the relationship between age and higher-order entrepreneurial behavior is an inverted U, and ditto for the innovation and proactivity dimensions. This implies that lower expectations with regard to entrepreneurial behavior are justified for junior workers

and very senior ones. Moreover, we found that risk-taking behavior was most prominent for sales workers, while managers were most proactive. This suggests that specific responsibilities (e.g., sales targets) may make a difference for entrepreneurial behavior – although we do recognize that more elaborative research would be needed to actually demonstrate this.

This study has some limitations which bring opportunities for new research. Replication of our study in other contexts than research and consultancy should show to what extent our findings are generalizable. As we already mentioned more job design variables can be examined beyond job autonomy and variety. Next, our cross-sectional data do not necessarily imply causality, as highly entrepreneurial workers may be the ones obtaining high-autonomy positions. Although our findings would still have practical relevance (i.e. autonomy as a rule-of-thumb to identify those who are or should be more entrepreneurial), we recognize that longitudinal research designs are merited. Finally, our dependent variables were perception-based. Although our follow-up validation study showed that after three years, those with high peer-rated entrepreneurial behavior were much more likely to report entrepreneurial outputs, we recommend to directly measure such outputs (e.g., new product introductions, commercial spin-offs) in future studies.

While recognizing that expanding corporate entrepreneurship to the individual level is not without debate, our higher-order measure will enable more fine-grained analyses of entrepreneurial workers in corporate environments. A next step would be to investigate if innovation, proactivity and risk-taking capture the full domain of entrepreneurial behavior. In the related firm-level literature there is a continuing debate on content validity, e.g., if entrepreneurial orientation also includes competitive

aggressiveness and autonomy (Lumpkin and Dess, 1996). Although these are less evident at the individual level (workers are not supposed to compete aggressively with their colleagues, while autonomy is generally regarded an antecedent rather than a dimension), the content validity of our higher-order measure should nevertheless be cross-examined.

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Table 1. Descriptive statistics (n=179)

		M	*SD*	*Pearson correlation coefficients*													
				(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
Dependent variables:																	
(1)	Entrepreneurial behavior	3.07	.65														
(2)	Dimension: innovation	3.43	.73	.89***													
(3)	Dimension: proactivity	3.04	.77	.88***	.72***												
(4)	Dimension: risk-taking	2.74	.73	.83***	.60***	.56***											
Independent variables:																	
(5)	Job autonomy	5.58	1.02	.47***	.41***	.49***	.32***										
(6)	Job variety	5.42	1.08	.36***	.28***	.36***	.29***	.65***									
Control variables:																	
(7)	Education	2.55	.69	.41***	.39***	.36***	.31***	.38***	.19*								
(8)	Age	42.6	11.5	.01	-.08	.11	-.01	.13	.18*	-.19*							
(9)	Work experience	14.8	10.8	.10	-.01	.21**	.05	.16*	.20**	-.14	.79***						
(10)	Male	.65	.48	.17*	.18*	.22**	.03	.22**	.14	.13	.25**	.31***					
(11)	Proactive personality	4.63	.99	.38***	.38***	.35***	.27***	.31***	.25**	.11	-.01	.01	.06				
(12)	Sales	.21	.41	.37***	.25**	.41***	.31***	.23**	.19*	.24**	.23**	.25**	.15*	.09			
(13)	Management	.13	.34	.31***	.18*	.43***	.19**	.24**	.30***	.08	.27***	.33***	.14	.11	.29***		
(14)	Job size	.90	.14	.10	.03	.14	.09	.17*	.20**	.13	.06	.11	.27***	.14	.19*	.19**	
(15)	Inverse mills ratio	.46	.29	-.08	-.03	-.12	-.06	-.13	-.08	-.08	-.01	-.16*	-.49***	-.05	-.35***	-.27***	-.28***

M = mean, SD = standard deviation. Two-tailed significance *** p<.001, ** p<.01, * p<.05. Business unit dummies excluded due to space restrictions.

Table 2. Regression models of entrepreneurial behavior with Heckman correction (n=179)

	Entrepreneurial behavior (EB)	*EB dimensions:*		
		Innovation	*Proactivity*	*Risk-taking*
Independent variables:				
Job autonomy	.171*	.142^	.227**	.071
	(.078)	(.085)	(.074)	(.098)
Job variety	.017	.017	-.038	.070
	(.074)	(.081)	(.068)	(.092)
Control variables:				
Education	.260***	.232**	.182**	.267**
	(.070)	(.076)	(.067)	(.087)
Age (centered years)	-.225^	-.213^	-.109	-.269^
	(.116)	(.127)	(.122)	(.137)
Age-squared	-.144*	-.162*	-.145*	-.067
	(.060)	(.065)	(.057)	(.074)
Work experience	.151	.083	.193*	.113
	(.092)	(.099)	(.087)	(.114)
Male	.102	.146	-.033	.160
	(.146)	(.172)	(.132)	(.179)
Proactive personality	.271***	.298***	.221***	.185**
	(.057)	(.061)	(.054)	(.071)
Sales	.253**	.152^	.193*	.315**
	(.081)	(.086)	(.082)	(.095)
Management	.152*	.076	.214**	.099
	(.074)	(.078)	(.079)	(.085)
Job size	-.086	-.120	-.120	.051
	(.076)	(.087)	(.075)	(.089)
Inverse Mill's ratio	.106	.059	-.194	.427
	(.230)	(.281)	(.249)	(.295)
Business unit dummies	Yes	Yes	Yes	Yes
Model fit:				
Adjusted R-square	44.4%	35.0%	49.4%	23.0%
F-value	9.4***	6.6***	11.2***	4.1***

Standardized effect parameters are shown. Standard errors in parentheses.
Two-tailed significance *** p<.001, ** p<.01, * p<.05, ^ p<.10.