

The influence of task challenge on skill utilization, affective wellbeing and intrapreneurial behaviour

Paul TY Preenen

Research Department, Dutch Tax and Customs Administration, the Netherlands

Luc Dorenbosch

De baaningenieurs, the Netherlands

Edo Plantinga

Deell.eu, the Netherlands

Steven Dhondt

KU Leuven, Belgium; TNO, Netherlands Organization for Applied Scientific Research, the Netherlands

Abstract

This study examines and theorizes the effects of task challenge on skill utilization, affective wellbeing and intrapreneurial behaviour among civil servants through a real-life challenging assignment, which was part of a unique Dutch and Flemish bottom-up organized event called 'Train Your Colleague'. Results of a short-term longitudinal study indicate that, as expected, task challenge is positively related to skill utilization and intrapreneurial behaviour but, unexpectedly, not to affective wellbeing. These results suggest that challenging assignments may be important tools to enhance employees' skill utilization and intrapreneurial behaviour at the workplace. Implications for theory and practice are discussed.

Keywords

Challenging assignments, intrapreneurial behaviour, job challenge, skill utilization, task challenge

To date, an increasing number of studies have showed positive outcomes of challenging work tasks and challenging job assignments, which are assignments that are demanding,

Corresponding author:

Paul TY Preenen, Research Department, Dutch Tax and Customs Administration, PO Box 18200, 3501 Utrecht, the Netherlands.

Email: typ.preenen@belastingdienst.nl

stimulating and new, and call on one's competence and perseverance (e.g. De Pater et al., 2009a). Challenging tasks have been found to be positively related to skill development and informal learning (e.g. Preenen et al., 2011a), management development (e.g. DeRue and Wellman, 2009; McCauley et al., 1994), job performance behaviours (e.g. Carette et al., 2013; DeRue et al., 2012), as well as potential for career promotion (e.g. De Pater et al., 2009b). Additionally, challenging tasks are found to increase pleasant and positive mood states and feelings (e.g. Preenen et al., 2011b, 2014a; Van Vianen et al., 2008). In light of these findings challenging work tasks can generally be perceived as useful tools to enhance employees' positive job experiences and quality of working life.

However, in many studies the foremost positive effects of challenging work tasks were scrutinized in psychological laboratory settings, generally with students as participants (e.g. De Pater et al., 2010; Preenen et al., 2014a; Steele-Johnson et al., 2000). The question thus remains whether beneficial results can be found in practical work settings among different target groups. Moreover, as recently mentioned in the literature (Aryee and Chu, 2012), in the existing field studies the outcomes of task challenge were predominantly investigated among managers, management trainees, or employees working in corporate settings (e.g. De Pater et al., 2009a; DeRue and Wellman, 2009; McCauley et al., 1994) and in many times through cross-sectional research designs (e.g. Preenen et al., 2011b). The longer term effects of task challenge for other employees, such as civil servants, have been mostly ignored.

Moreover, in most studies task challenge is operationalized through general work or task aspects of employees' jobs or by the amount of challenging assignments that people have in their work and jobs (e.g. De Pater et al., 2009a; Preenen et al., 2014b). The effects of actual perceived task challenge through specific real-life challenging assignments over time are still underexplored for employees. Furthermore, the impact of challenging assignments on important employee behaviours for organizations, such as future innovative and proactivity behaviours, has been theorized (Van Vianen et al., 2008), but still lacks empirical investigation. In general, the effects of challenging tasks on employee behaviour have largely been neglected and mostly focused on attitudinal or career-related outcomes. In sum, the positive effects of task challenge are promising but need further empirical replication and exploration of relevant behavioural outcomes in practice.

In this article, we hypothesize and investigate the longer term effect of task challenge through a real-life assignment with civil servants on a balanced set of outcomes, namely, skill utilization (cognitive learning component) and affective wellbeing (affective component). Additionally, the effect of task challenge on a behavioural employee outcome which is becoming increasingly popular in the research (Stam et al., 2012), namely, intrapreneurial behaviour (behavioural component), is theorized and investigated. Our central research question is:

What are the short-term longitudinal effects of real-life task challenge on skill utilization, affective wellbeing and intrapreneurial behaviour among civil servants?

By investigating this question, we aim to 'replicate' and extend positive task challenge effects and studies in a real-life setting on both a learning and an affective outcome.

In addition, we include the effect of task challenge on an important behavioural outcome of employees. To date, no research has brought together the job challenge and intrapreneurship research literatures. Gaining knowledge about how to challenge civil servants to best utilize their skills, and increase their affective wellbeing and intrapreneurial behaviours, is not only interesting from a scientific perspective, but also from a practical one. Civil servants may work in the same position for a long time, and might well be susceptible to boredom, negative wellbeing, experience skill obsolescence and even become less creative and less innovative. This is potentially harmful for both individuals and organizations and for the wider society. Hence, it is essential to understand how civil servants can be empowered, motivated and stimulated to become more innovative and stay engaged in innovative but effective ways. Therefore, we will investigate our ideas via a unique pre-existing event for civil servants called ‘Train Your Colleague’ (TYC). TYC is a ‘bottom-up’ organized Dutch and Flemish national event in which hundreds of civil servants voluntarily prepared and provided training courses for colleagues in a work-related subject. They were given the momentum, marketing and infrastructure to organize a training event to which they could invite colleagues from inside or outside their organization. Such training could be generally perceived as a real-life, positively challenging assignment for many people, and is a practical and novel way to examine the short-term longitudinal effects of task challenge among civil servants.

Below, we first provide a short overview of the concept of challenging work assignments (i.e. job/task challenge) and experienced task challenge. Subsequently, we theoretically and empirically develop our hypotheses about the effects of task challenge on skill utilization, affective wellbeing and intrapreneurial behaviour to empirically approach our research question. After this, we describe our methods and results. We will close with a general discussion of the findings and discuss implications for both theory and work practice.

Theory and hypotheses

Task challenge

Challenging work assignments are usually described in quite specific task characteristics as tasks and assignments that (a) are novel and include non-routine skills and behaviours, (b) test abilities or resources, (c) provide autonomy to determine how to accomplish the task, and (d) have high levels of responsibility and visibility (Preenen et al., 2011b; Van Vianen et al., 2008: 287). These features are generally perceived as challenging by many workers and employees. Yet, still, how employees respond to certain job characteristics depends on how they subjectively experience these characteristics themselves (e.g. Hackman and Lawler, 1971). Hence, *experienced* task challenge is of importance in understanding the consequences of challenging assignments. The experience of job challenge can be defined as the cognitive appraisal that work demands are potentially valuable and helpful, because they provide opportunities and possibilities for gain, mastery, or personal growth (Folkman and Lazarus, 1985). Experienced task challenge can also be defined as ‘the excitement and stimulation associated with a particular task set’ (Dixon et al., 2005: 174). In our study, we focus on assessing the perception of how positively challenging participants find the TYC

assignment. This task can be expected to consist of several of the above mentioned challenging task components.

Below, we develop the hypotheses about the effects of task challenge on skill utilization, affective wellbeing and intrapreneurial behaviour by drawing on job challenge, management development and entrepreneurship literature.

Task challenge and skill utilization

By the term skill utilization, we mean the level of match between an individual's skills and the opportunity to use these skills in that person's work role (O'Brien, 1980). Research and literature thus far suggest that the opportunity to use important skills is an important determinant and source of positive employee attitudes (Bolino and Feldman, 2000; Humphreys and O'Brien, 1986). In contrast, poor skill utilization is strongly associated with negative attitudes towards work and internships (Feldman and Bolino, 2000). Hence, understanding how to influence skill utilization at work is important for employees and organizations.

Research findings so far consistently suggest and show that job challenge leads to informal and on-the-job learning, management development and stretching of personal skills (e.g. DeRue and Wellman, 2009; Dragoni et al., 2009; Lyness and Thompson, 2000; McCauley et al., 1994; Preenen et al., 2011a, 2015a).

Challenging tasks increase learning, skill development and skill testing of employees because these tasks usually concern novel situations in which regular routines and work tactics are insufficient, and new strategies and competencies need to be learned and trained (Davies and Easterby-Smith, 1984; McCall et al., 1988) while existing ones need to be stretched. Challenging work experiences 'create disequilibrium, causing people to question the adequacy of their skills, frameworks, and approaches' (McCauley et al., 2010: 9). This drives people to develop and learn new competencies, abilities, insights and knowledge that enable them to perform in an effective way (McCall et al., 1988; McCauley et al., 1994). Challenging assignments also generate good opportunities for on-the-job skill development, and thus perhaps also skill utilization, as they provide 'a platform for trying new behaviour or reframing old ways of thinking or acting' (McCauley et al., 1994: 544).

In addition, mastering a challenging assignment as a whole with its variety of challenging features involves using several capacities and skills simultaneously and demands the use of 'meta-skills' which are not always used. Indeed, challenging assignments improve cognitive and strategic skills as employees have to think critically about the assignment, identify the underlying causes and consequences of problems, and process new and ambiguous information (Cox and Cooper, 1988; DeRue and Wellman, 2009; Gillen and Carroll, 1985).

Based on this theoretical reasoning and the latter empirical findings, we propose that challenging assignments will also enhance employees' skill utilization. We hypothesize:

Hypothesis 1: Task challenge is positively related to skill utilization.

Task challenge and affective wellbeing

Affective wellbeing is often operationalized as positive mood. The mood literature distinguishes two underlying dimensions of mood. First, hedonic tone (positive vs negative), and second, activation (activating vs deactivating) (e.g. De Dreu et al., 2008). Negative activating mood states refer to states such as being nervous, stressed and jittery. Positive activating mood includes states such as feeling enthusiastic, inspired and active. Examples of negative deactivating mood states are feeling sad or depressed. Some examples of positive deactivating mood states are feeling relaxed or calm. In our study, we focus on positive activating mood states. We do so because we expect that such mood states are most likely to be triggered when people perform voluntary challenging assignments, which indeed can generally be considered as positively stimulating (e.g. De Pater et al., 2009b; Meyer and Allen, 1988; Preenen et al., 2014a).

We reason that perceived challenging work assignments will enhance individuals' affective wellbeing for several reasons. First, and rather straightforwardly, challenging assignments contain elements and content of personal interest (e.g. personal rewards and goals) that are pleasant, meaningful, interesting and attractive for people. Performing such assignments will therefore ignite enjoyable feelings such as fun and excitement. Both stress and management development research indeed indicate that job challenge does evoke pleasant feelings of excitement and enjoyment because of the interesting nature of the tasks (Dong et al., 2014; Lazarus and Folkman, 1984). Besides that, the extant research shows that job challenge is positively associated with experienced meaningfulness of people's work (e.g. Brown and Leigh, 1996; Kahn, 1990).

Second, enhancing skills and learning through the performance of challenging assignments is not only pleasant in and of itself, but encourages people to feel as if they are developing themselves, are progressing and being positively tested. These perceptions can all be expected to activate active pleasant feelings, both in the short and long term. Challenging job assignments are indeed theorized and found to positively increase pleasant active mood states and feelings (Preenen et al., 2014a; Van Vianen et al., 2008).

Finally, the new and difficult nature of challenging assignments (Taylor, 1981) also induces 'employees to invest greater amounts of their physical, cognitive, and emotional resources in their work' (Brown and Leigh, 1996: 361) to successfully cope with the job demands. These types of high investments have been found to positively relate with high psychological meaningfulness of work experiences (Brown and Leigh, 1996; Kahn, 1990). Psychological meaningfulness can be described as 'a feeling that one is receiving a return on investment of one's self in a currency of physical, cognitive, or emotional energy' (Kahn, 1990: 703–704) and is important for positive feelings at work. In fact, Kahn (1990) views psychological meaningfulness as an important predictor of work engagement, a persistent and pervasive (Schaufeli et al., 2006) positive affective-cognitive state of work-related wellbeing (Schaufeli and Bakker, 2004), which is closely related to affective wellbeing and has been positively related to job challenge (Kahn, 1990; Van den Broeck et al., 2010).

Some additional empirical support for the idea that job challenge is beneficial for employees' positive affective wellbeing stems from research showing that job challenge is positively related to intrinsic work motivation (Gagne et al., 1997; Hackman and

Oldham, 1980), job and work satisfaction (e.g. Judge et al., 2000; Podsakoff et al., 2007) and commitment (e.g. Buchanan, 1974; Dixon et al., 2005). In summary, both theoretical reasoning and empirical research findings support our expectation that task challenge enhances employees' affective wellbeing. We hypothesize that:

Hypothesis 2: Task challenge is positively related to affective wellbeing.

Task challenge and intrapreneurial behaviour

Intrapreneurial behaviour, or intrapreneurship, is defined in the entrepreneurship and organizational literature as the identification and exploitation of opportunities by individual workers to (also) advance their organization, which is characterized by employees' innovative, proactive and risk-taking behaviours (De Jong et al., 2011; Stam et al., 2012), within an established organization. It resembles *entrepreneurial behaviour*, but explicitly takes the perspective of individuals operating in established organizations (Stam et al., 2012), hence the name *intrapreneurship*.

Already some decades ago researchers and practitioners showed interest in intrapreneurship, due to its expected beneficial impacts on the innovative capabilities and performance of organizations (e.g. Burgelman, 1983, 1985; Kanter, 1984; McKinney and McKinney, 1989; Zahra, 1991). Recently, the concept has been gaining popularity again among organizations, and in the (Dutch) practical and scientific literature (e.g. Liebregts et al., 2015; Preenen et al., 2014c, 2015c; Stam et al., 2012). Intrapreneurship refers to individual behaviour rather than organizations or high level decision-makers (e.g. Antoncic and Hisrich, 2003; Pinchot, 1987; Stam et al., 2012; Stevenson and Jarillo, 1990). Although the outcomes of employees' intrapreneurial behaviours still need further investigation, the intrapreneurship and innovative behaviour literature (e.g. Hornsby et al., 2002; Janssen and Van Yperen, 2004; Scott and Bruce, 1994) suggests that intrapreneurs perform better than other employees in respect of innovative output and job performance (Bosma et al., 2010), with their organizations ultimately benefiting from this by performing better as well (Stam et al., 2012). Hence, understanding how intrapreneurial behaviour can be influenced for and by employees is focal. Interestingly, intrapreneurship has hardly been investigated in relation to task challenge, even though it can be theorized that challenge stimulates future intrapreneurial behaviour, as we will do below.

Challenging tasks are difficult and new and are outside people's standard work domain. Therefore these tasks stimulate employees to rise above their day-to-day and routine work tasks. Challenging tasks stimulate creativity and innovative behaviour as employees need to think of new manners and strategies to master such tasks. Additionally, challenging tasks provide room for employees to experiment with novel behaviours and to test new ideas and extend their knowledge. Moreover, as we explained above, task challenge highly encourages personal learning and the development of new skills by employees (Preenen et al., 2011a), which are all important and useful for intrapreneurial behaviour. Task challenge also stimulates and develops perseverance and the ability to start new challenges. In other words, task challenge strengthens people mentally (Van Vianen et al., 2008), which is also a crucial element for intrapreneurial behaviour. Intrapreneurship involves promoting, developing and implementing innovative ideas that can often take a lot of energy and willpower in order to succeed. Intrapreneurship

involves a long process requiring stamina and perseverance. For example, intrapreneurs sometimes (have to) act without the approval of senior management (Vesper, 1984) and they need the courage to deviate from the status quo (Antoncic and Hisrich, 2003). Developing perseverance is also important for intrapreneurial behaviour as it appears that many creative ideas are generated by individual persistence (Baas et al., 2008; De Dreu et al., 2008).

Oftentimes challenging work assignments are visible to others (e.g. colleagues, clients, bosses) and often involve working with new people as well as dealing with diversity (McCauley et al., 1994). Challenging assignments can therefore stimulate knowledge sharing, synergy and future cooperation between colleagues. Sharing knowledge is crucial for innovation. In fact, innovation has been widely mentioned as the outcome of successful collaboration (e.g. Fagerberg, 2004). Also, research has shown that the use of challenging, functional flexibility practices like multi-skilled teams and job rotation may contribute to a wider dispersion of knowledge and improvement in innovative behaviours and employee-driven innovation (for an overview, see DeSpiegelaere et al., 2014) that lead to the better innovation performance of companies (Arvanitis, 2005; Martínez and Pérez, 2003; Martínez-Sánchez et al., 2008; Preenen et al., 2015b).

In the extant empirical literature, several studies show that challenging task characteristics, such as having variety at work, are positively related to behavioural characteristics of intrapreneurial behaviour, such as innovative work behaviour (De Jong and Den Hartog, 2005; Dorenbosch et al., 2005), problem solving and risk taking (Salanova and Schaufeli, 2008), and taking personal initiative (Frese et al., 1996; Salanova and Schaufeli, 2008). Another important challenging task characteristic is job autonomy (e.g. Van Vianen et al., 2008), that is, the degree of freedom and independence that an individual has in performing his or her work (Hackman and Oldham, 1975). Job autonomy has been positively associated with innovative behaviour (Axtell et al., 2000; De Jong and Den Hartog, 2005; Spreitzer, 1995), personal initiative taking, as well as the implementation of new ideas and solving of problems (Bindl and Parker, 2010). A meta-analysis (Hammond et al., 2011) has even identified, among many job-related variables, that job complexity and job autonomy were the job characteristics that most strongly related to innovation of employees. Finally, the accomplishment of the challenging tasks themselves is expected to increase crucial assets for intrapreneurial behaviour, such as employees' self-esteem (Davies and Easterby-Smith, 1984), ambition for higher management positions (Van Vianen, 1999) and self-efficacy regarding their potential (Maurer and Tarulli, 1994).

All in all, based on the above, we propose the following:

Hypothesis 3: Task challenge is positively related to intrapreneurial behaviour.

Method

Study design and sample

To test our hypotheses, we monitored a unique Dutch and Flemish national one-week event in which hundreds of civil servants prepared and provided training for colleagues in a relevant work-related subject. This so-called 'Train Your Colleague' (TYC) initiative

was a bottom-up voluntary programme in which civil servants were given the time, marketing and means to organize a training session or workshop to which they could invite colleagues from inside or outside their own organization. There was a central supporting website (now at www.deell.eu) where trainers could submit their own workshop and communicate with the participants. Participants were ‘recruited’ through the organizers, word of mouth, social media and so-called ‘Boosters’, the people that organized the event within their own organization. They played an active role in convincing colleagues to participate. Each organization was supported with promotional materials such as posters and email templates for promoting the event. The workshops were hosted in the meeting rooms of the participating organizations. Civil servants of all skill levels and professions could join and share their knowledge with their peers. The trainers were free to choose the subject of their workshop, as long as it was related to their work. The range of subjects of the workshops was very broad, ranging from practical workshops (e.g. tips and tricks in Excel) to soft skills (e.g. conflict mediation) to workshops in which experiences about innovations were shared.

For many people this could be considered a positive, challenging assignment. We investigated the people who gave the training. Following the criteria for a challenging assignment (Preenen et al., 2011a; Van Vianen et al., 2008), the TYC-task could be more or less positively challenging to many participants on several counts. The TYC-task is new and non-routine, as the assignment is not in participants’ standard work tasks and it was the first time for everybody to partake in the TYC event or even present a training event. The TYC-task tests the trainers’ abilities and resources to the extent of the experience, or lack thereof, they had in giving a training session, as well as the extent to which the training content was new to the trainer. The TYC-task is not pre-structured and is highly autonomous, as participants could determine for themselves how they would put across their self-chosen (but work-related) training subject. It was not formally required to develop a training session, everyone could sign up as a TYC-trainer. The TYC-task also demanded responsibility, as the TYC-trainers were in charge of the organization of their own training. Lastly, the performance on the TYC-task logically is highly visible for the participants and possibly the trainer’s colleagues, who can readily judge the training quality. Yet, because challenge is subjective to a large degree (Preenen et al., 2011b), we assessed participants’ perceived task challenge a week before the assignment.

This event took place within one week in November 2013 and allowed us to develop a study design with a pre-test and post-test. We measured task challenge indicators, control and outcome variables (skill utilization, affective wellbeing, intrapreneurial behaviour) one week (T1) prior to the TYC-initiative by means of an online survey sent by email. The post-test questionnaire (T2) (challenge indicators, outcomes) was administered six weeks after T1 and five weeks after the event-week, also through an online survey sent by email. We measured task challenge one week prior to the actual event because at that time the trainers could make a clear assessment of the task that they had been preparing for a couple of weeks, without interfering with the preparation of the assignment too much. We did not want to do our post-test directly after the assignment, as in experimental lab studies is often the case, but also did not want to assess too long after the event, as the ‘intervention’ effect of a single challenging task may not last forever. So, we chose a time interval of six weeks between T1 and T2.

The pre-test questionnaire was sent to 362 participants at T1. A total of 213 registered TYC-trainers returned the pre-test questionnaire (59%). The post-test was returned by 136 participants (64%). Descriptive statistics (means and standard deviations) of respondents' age, gender, education level and job tenure are presented in Table 1. Although we believe the attrition rates are quite acceptable, this may bias our results. Therefore, we checked with ANOVAs whether the T1 participants that did not take part in T2 ($N = 77$) differed from T1 and T2 participants ($N = 136$) in *age* (T1 = 44.20, T1 and T2 = 45.40 years), *gender* (T1 = .58, T1 and T2 = .55 proportion males), *education level* (T1 = 6.43, T1 and T2 = 6.44, see Table 1 for categories) and *tenure* (T1 = 10.38, T1 and T2 = 11.04 years). They did not differ significantly with *p*-values varying from .38 to .94. Therefore, we feel confident that attrition did not bias the results of the present study.

Measures

Task challenge. Perceived task challenge of the training task was measured with six items from the experienced job challenge scale (positive stimulation dimension, Preenen et al., 2011b). Participants indicated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*) to what extent they expected the TYC-task to be (1) attractive, (2) interesting, (3) challenging, (4) stimulating, (5) useful and (6) fascinating. Cronbach's alpha was .86.

Skill utilization. Skill utilization was assessed with the following three items based on extant theory (O'Brien, 1980): (1) I use all my knowledge and skills in my work; (2) My work requires a diversity of knowledge and skills; (3) In my work I get the chance to do what I'm good at. Respondents indicated their agreement with the items on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's alphas were .86 at T1 and .86 at T2.

Affective wellbeing. To measure affective wellbeing, we derived five items from the PANAS (Watson et al., 1988). These items have been used previously for assessing positive activating mood states (e.g. De Dreu et al., 2008; Preenen et al., 2014a). Subjects reported on a scale from 1 (*very slightly/not at all*) to 7 (*extremely*) the extent to which they experienced the mood states: (1) determined, (2) strong, (3) enthusiastic, (4) active and (5) inspired. Cronbach's alphas were .83 (T1) and .83 (T2).

Intrapreneurial behaviour. Intrapreneurial behaviour was measured with eight items derived from extant intrapreneurial behaviour measures (Kropp et al., 2006; Taatila and Down, 2012) and are in line with recent theory (Rigtering, 2013; Stam et al., 2012). The items were: (1) I think of solutions to problems in my work; (2) I try to convince my managers to support my ideas; (3) In my work, I translate new ideas into workable applications; (4) In my work I always try to learn new things; (5) I am always thinking about how I can do my job as well as possible in the future; (6) In my work, I search for people that I can learn from; (7) I dare to take risks in my work; and (8) I take initiative, even if the outcome is uncertain. Respondents indicated their agreement with the items on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's alphas were .82 at T1 and .82 at T2.

Table I. Means, standard deviations and correlations among study variables.^a

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Age	44.97	9.65	—										
2. Gender ^b	.56	.50	-.15*	—									
3. Education ^c	6.44	.81	-.19**	.01	—								
4. Tenure	10.82	8.90	.56**	-.06	-.22**	—							
5. Skill utilization T1	4.95	.94	.08	-.06	-.14*	.08	—						
6. Affective wellbeing T1	4.97	.76	.02	-.02	-.01	.01	.51**	—					
7. Intrapreneurial behaviour T1	5.63	.66	.01	.04	.15*	-.09	.25**	.49**	—				
8. Task challenge T1	5.91	.65	.03	-.01	-.07	.09	.16*	.24**	.23**	—			
9. Skill utilization T2	4.96	.82	.16	-.13	-.11	.10	.77**	.51**	.18*	.21*	—		
10. Affective wellbeing T2	4.95	.68	.17*	-.11	.03	.04	.41**	.65**	.30**	.46**	—		
11. Intrapreneurial behaviour T2	5.65	.56	-.10	.02	.09	-.28**	.15	.38**	.68**	.39**	.28**	.40**	—

Notes: ^a N = 136. ^b 0 = female, 1 = male. ^c 1 = no education, 2 = elementary school, 3 = lower high school (VMBO/LBO), 4 = lower professional education (MBO 1), 4 = professional education or higher (MBO 2), 5 = higher high school (HAVO/VWO/Gymnasium), 6 = bachelor's degree (HBO), 7 = master's degree or higher.
* $p < .05$, ** $p < .01$.

Control variables. Participants' age (years), gender (0 = female, 1 = male), education level (1 = no education, 2 = elementary school, 3 = lower high school [VMBO/LBO], 4 = lower professional education [MBO 1], 4 = professional education or higher [MBO 2], 5 = higher high school [HAVO/VWO/Gymnasium], 6 = bachelor's degree [HBO], 7 = master's degree or higher) and job tenure (years) were included as control variables in the analyses. Additionally, we controlled for T1 skill utilization, affective wellbeing and intrapreneurial behaviour in the related analyses to correct for baseline effects. That is, we allow the level of skill utilization, affective wellbeing and intrapreneurial behaviour in T1 to affect skill utilization, affective wellbeing and intrapreneurial behaviour in T2. Other studies estimating similar models (e.g. Preenen et al., 2011a) lack such a correction.

Results

Descriptives and correlations

In Table 1, we provide the descriptive statistics (means and standard deviations) and correlation coefficients of the main study variables.

Hypotheses testing

We test our hypotheses via multiple regression analyses in which we put the control variables age, gender, education level, tenure and T1 outcomes (skill utilization, affective wellbeing, intrapreneurial behaviour) in step 1, and task challenge in step 2 of the regression model. Table 2 summarizes the results of our regression analyses.

Skill utilization. Altogether the control variables and task challenge explained 62% of the variance in skill utilization (step 2, $R^2 = .62$, $F(6, 119) = 31.69$, $p < .001$). The R^2 change for the addition of task challenge in the regression model was 1.6% for skill utilization (R^2 change = .016, $F(1, 119) = 4.79$, $p = .031$). As we expected, it was found that task challenge positively related to T2 skill utilization ($\beta = .13$, $p = .031$), and thereby supports Hypothesis 1. Hence, challenging tasks indeed seem to enhance skill utilization as argued earlier.

Affective wellbeing. The control variables and task challenge explained 45% of the variance in affective wellbeing (step 2, $R^2 = .45$, $F(6, 128) = 4.74$, $p < .001$). The R^2 change for the addition of task challenge in the regression model was .1% for affective wellbeing but non-significant (R^2 change = .01, $F(1, 128) = 2.49$, $p = .12$). Although the effect went in the proposed direction, task challenge was unrelated to T2 affective wellbeing ($\beta = .06$, $p = .12$). Hence, Hypothesis 2 is unexpectedly not supported; there was no empirical proof for the idea that performing the perceived challenging task improved affective wellbeing in the long run.

Intrapreneurial behaviour. The control variables and task challenge explained 72% of the variance in intrapreneurial behaviour (step 2, $R^2 = .52$, $F(6, 119) = 21.84$, $p < .001$).

Table 2. Regression analyses predicting skill utilization, affective wellbeing and intrapreneurial behaviour.^a

Step and variable	Skill utilization T2		Affective wellbeing T2		Intrapreneurial behaviour T2	
	1	2	1	2	1	2
<i>Step 1</i>						
Age	.07	.07	.15	.15	.03	.03
Gender ^b	.03	.03	−.02	−.02	−.03	−.02
Education	.02	.03	.05	.06	−.09	−.06
Tenure	.03	.04	−.02	−.02	−.17*	−.17*
Skill utilization T1	.77***	.76***				
Affective wellbeing T1			.64***	.61***		
Intrapreneurial behaviour T1					.67***	.60***
<i>Step 2</i>						
Task challenge T1		.13*		.11		.20***
ΔR ²		.02*		.01		.04**
R ²	.60***	.62***	.44***	.45	.49***	.52**

Notes: ^a Standardized regression coefficients (β s) are reported, $N = 136$. ^b Female = 0, male = 1.

* $p < .05$, ** $p < .01$, *** $p < .001$.

The R^2 change for the addition of task challenge in the model was 4% for intrapreneurial behaviour (R^2 change = .04, $F(1, 119) = 9.126$, $p = .003$). As we hypothesized, task challenge was positively related to T2 intrapreneurial behaviour ($\beta = .20$, $p = .003$). Hypothesis 3 is supported, and herewith provides empirical support for our reasoning that task challenge leads to more intrapreneurial behaviours of employees.

Discussion

Our central research question was: What are the short-term longitudinal effects of real-life task challenge on skill utilization, affective wellbeing and intrapreneurial behaviour among civil servants? We explored this question by investigating the effects of a bottom-up organized real-life assignment for civil servants after five weeks, in which participants developed and provided training for colleagues in a work-related subject. We proposed and developed the idea that the performance of a challenging perceived assignment would positively impact skill utilization (Hypothesis 1), affective wellbeing (Hypothesis 2) and intrapreneurial behaviour (Hypothesis 3). As expected, we found that task challenge, assessed a week (T1) before the event took place, was positively related to skill utilization and intrapreneurial behaviour measured five weeks later (T2), even when controlled for baseline effects of skill utilization and intrapreneurial behaviour.

Theoretical and empirical contributions

Apparently, civil servants who found the task challenging in a positive way had a better match between their skills and the opportunity to use these skills in their work

five weeks after the task. The challenging task involved and stretched the specific focal skills that participants enjoy using or want to develop, as they volunteered for this task and could design the training they personally like. In general, preparing and mastering a complex, challenging assignment as a whole involves using several capacities and skills simultaneously and includes the use of strategic and cognitive meta-skills, which maximizes skill utilization. This supports research and theory that shows and argues that challenging assignments improve cognitive and strategic skills as employees have to think critically about the assignment, identify the underlying causes and consequences of problems, and process new and ambiguous information (Cox and Cooper, 1988; DeRue and Wellman, 2009; Gillen and Carroll, 1985). Our finding and reasoning also support and extend extant job challenge theory and research that hypothesized and found positive relationships between job challenge and related concepts to skill utilization, such as (on-the-job, informal) learning and skill development, among trainees, employees and managers (e.g. DeRue and Wellman, 2009; Dragoni et al., 2009; Lyness and Thompson, 2000; McCauley et al., 1994; Preenen et al., 2011a, 2015a). To date, it appears that job challenge is a focal antecedent of employee learning and development.

Task challenge was positively related to the intrapreneurial behaviour of participants. Apparently, performing the challenging perceived task enhanced people's self-confidence, persistence, creativity and enjoyment of intrapreneurial activities as we extensively theorized. This corroborates and extends literature that suggests that the accomplishment of challenging tasks increases crucial assets for intrapreneurial behaviour, such as employees' self-esteem (Davies and Easterby-Smith, 1984), perseverance and ambition for higher level job positions (Van Vianen, 1999), and self-efficacy regarding their potential (Maurer and Tarulli, 1994). Participants also developed new skills, gathered new information and met new people, which are all useful for (future) employee-driven innovation, intrapreneurial activities and collaborations. Our study and theory development adds new knowledge to the intrapreneurship literature about manageable factors that impact intrapreneurial behaviour of employees. Although the positive effects of challenging assignments for future innovative and proactive behaviours have been argued (Van Vianen et al., 2008), and intrapreneurial behaviour is gaining popularity again among practitioners and (applied) researchers (e.g. Bosma et al., 2010; Preenen et al., 2014c; Rigtering, 2013; Stam et al., 2012), research and theory on the antecedents of intrapreneurial behaviours are still scarce. In fact, to our knowledge, specific research on how task challenge is related to intrapreneurial behaviour has not been executed so far. We combined two research streams by showing that performing challenging assignments is important for stimulating intrapreneurial behaviours.

Unexpectedly, and against extant research findings (e.g. Preenen et al., 2014a) showing positive effects of task challenge for related outcomes (e.g. job satisfaction, intrinsic motivation, work engagement), we did not find a positive effect of task challenge on affective wellbeing as hypothesized. However, findings were in the right direction and close to significant. Hence, perhaps with a larger sample we would find the expected effects. An alternative explanation might be that we assessed affective wellbeing through positive activated mood states assessed a couple of weeks later. Activated mood state effects may not last that long. Besides that, it might in general be difficult to find (strong) effects for wellbeing mood states as they are to some extent stable mood states and

perhaps only influenced by long-term high impact challenging situations. Researchers could take a further look at these issues.

Our study contributes to the job challenge literature and practice in two more ways. First, previous studies on the effects of challenging job assignments were often investigated with college students (e.g. De Pater et al., 2010; Preenen et al., 2011b, 2014a), and foremost with managers, management trainees or recent MBA graduates in corporate environments (e.g. De Pater et al., 2009a; DeRue and Wellman, 2009; Dong et al., 2014; McCauley et al., 1994; Preenen et al., 2014b). We showed that task challenge matters for civil servants' skill utilization and intrapreneurial behaviours. It is generally known that civil servants often work for a long time for the government in the same positions and might be susceptible to boredom, skill obsolescence and loss of creativity and proactivity. Our findings contribute to existing knowledge and interventions about how civil servants can be challenged and challenge themselves to become more intrapreneurial by using an innovative, bottom-up intervention. To date, such research is quite scarce.

Second, a lot of research on the outcomes of challenging work assignments has been done with cross-sectional research designs, and was done in artificial lab-settings with students investigating short-term effects of artificial challenging tasks (e.g. De Pater et al., 2010; Preenen et al., 2014a). Our design enabled us to monitor a real-life task containing many challenging elements, and to test for some causalities due to our (short-term) longitudinal design. Additionally, task challenge has been mostly and narrowly defined in terms of challenging job characteristics or by the extent to which employees have challenging assignments in their jobs (e.g. Preenen et al., 2011a, 2014b). By investigating the outcomes of actual perceived task challenge through a real-life challenging perceived assignment among civil servants, our research makes a new contribution to the job challenge literature.

Future research and limitations

As expected we found positive effects of task challenge on skill utilization and intrapreneurial behaviour. Although our proposed explanatory theoretical mechanisms are in line with earlier reasoning and research, we did not actually test these specific mechanisms and explanations. In addition, and as we described earlier, a challenging assignment is a multifaceted concept with several features that combine to make a task challenging. However, certain features may have stronger effects for different outcomes than others, which was out of our research scope. Hence, future research could focus on investigating our proposed explanations and scrutinize the possible divergent effects of challenging aspects for different outcomes.

Our findings and reasoning support the fast growing evidence that challenging assignments generally benefit both employees and organizations. Logically, research should further examine and disentangle the specific effects of challenging assignments as stated before. Yet, given the beneficial effects of job challenge, research should also further investigate factors and components that impact the performance and allocation of challenging tasks that workers have in their jobs (Preenen et al., 2014a). Although we investigated a challenging bottom-up initiative that was not imposed by a higher hand, managers do usually play a crucial role, both formally and informally, in enhancing

employees' experienced job challenge (Aryee and Chu, 2012; Preenen et al., 2014b) by assigning challenging tasks and stimulating employees to perform, seek and develop challenging tasks. Yet, still little is known about the allocation process of challenging tasks by managers and supervisors and how they are influenced (Preenen et al., 2014a, 2014b). Aryee and Chu (2012) found a positive relation between transformational leadership and challenging job experiences. The role of leadership style in challenging employees seems interesting to further explore. Future research could also study how employees' self-profiling and self-promoting activities influence supervisors' task allocation. It could be that people who actively promote their qualities and skills are assigned more challenging tasks and assignments by their managers (Preenen et al., 2015a).

We would like to discuss some possible methodological limitations of our study. First, our study did not have a pure experimental setting with a control group and thus cannot provide full experimental evidence for our findings. Even though our results are supported by theoretical reasoning and research findings, and were based on a (short-term) longitudinal design, additional field experiments and randomized control trials (RCTs) are recommended to provide conclusive evidence.

Second, we gathered our material using self-report data from one source. This could have led to common method bias (Podsakoff et al., 2003) and may also have decreased the measurement accuracy of our study variables (Spector and Jex, 1991). However, evidence exists that perceptions do reflect the objective work environment well (Spector, 1992). Moreover, employees' work behaviours and work attitudes are particularly influenced by their perceptions of their work environment (Ferris and Judge, 1991). One could avoid common method bias by involving other people and sources to measure the study variables. Yet, the question remains whether this would be a valid method for assessing task challenge, skill utilization and affective wellbeing, as this is quite personal and subjective. Nonetheless, future studies could also include supervisors' and peers' observations of task challenge and our study outcomes. Future research studies could also include more long-term objective and specific indicators and measures for intrapreneurial and innovative behaviour, such as the number of patents, personal involvement with innovative projects and/or process or organizational innovations, new product and services development, and even the involvement in new ventures (for companies) or organizational units within the organization.

Practical implications

Despite some common limitations, we are confident about the relevance for practice of our results as we used a (short-term) longitudinal and real-life research design and the findings are backed up by research and literature. Therefore, we feel some implications for practitioners and (governmental) organizations are appropriate.

A first and straightforward piece of advice for practitioners and (governmental) organizations that want to enhance the intrapreneurial behaviour and optimal skill use of their employees is to facilitate employees in performing challenging assignments, as in our study. In fact, allowing civil servants to perform, develop and seek out challenging assignments could well be a pragmatic way to engage long tenured civil servants susceptible to boredom and skill obsolescence. As widely mentioned throughout our article, challenging

assignments reap many other relevant benefits for other employees and their organizations. Hence, challenging work tasks should be perceived as useful tools to enhance employees' individual development and quality of working life, but also a good practice to increase the performance and innovative and entrepreneurial capacities of organizations.

The question then is, how can organizations help challenge their employees? Developing and performing a bottom-up organized and self-imposed challenging training task with some support of their organizations and managers can be a good and specific example. To enhance employees' task challenge, organizations and managers could also delegate challenging activities, responsibilities and some decision latitude to their workers. They could further enrich their employees' jobs by increasing employees' competencies to self-organize and self-manage their work and jobs (e.g. Dhondt et al., 2014). Furthermore, adding other challenging elements to employees' jobs, such as enhancing some novelty, skill variety and visibility in jobs and tasks could help to increase employees' task challenge (Hackman and Oldham, 1975; McCauley et al., 1994; Van Vianen et al., 2008).

Of course, we are aware that perfectly challenging jobs and assignments are not available or can be created for all employees. Many jobs involve repetitive and monotonous work, which can be the case in lower level administrative civil servants' jobs for example. However, in these low-skill and precarious jobs, job challenge can still be enhanced by adding and initiating certain extra-role behaviours that go further than their formal role or work requirements (Bateman and Organ, 1983). For example, employees could be involved in supporting and coaching (new) co-workers, substituting team leaders, solving problems and maintaining equipment at the workplace (Preenen et al., 2015a). Yet, when thinking about challenging employees this group is often overlooked and underestimated. This is a pity, because developing challenging tasks also for these employees will provide them with new skills, unleash hidden talents, and empower them to deal with their often precarious situation. Meanwhile organizations will benefit from more skilled, mobile and intrapreneurial employees.

To conclude, certainly (government) organizations, managers and practitioners should take responsibility and should create challenging environments for all employees, and foremost in settings where employees are susceptible to boredom and skill obsolescence with the possible advantage of better performing and more social organizations. Yet, in the end, today's employees are the designers of their own working careers (King, 2004; Sullivan, 1999), and have to be self-directive in obtaining a variety of developmental and learning experiences in their work (Bird, 2002; Van Vianen et al., 2009) and perhaps also work environment. So, challenging tasks should be investigated by researchers, facilitated by organizations and managers as tools but explored by employees themselves.

Acknowledgements

The authors thank Emma Jansen and Friso Schous for their valuable comments and feedback.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The first and second authors' contributions were supported by a grant from TNO's Behaviour and Performance Enabling Technology Programme (ETP) 2014.

References

- Antoncic B and Hisrich RD (2003) Clarifying the intrapreneurship concept. *Journal of Small Business and Enterprise Development* 10(1): 7–24.
- Arvanitis S (2005) Modes of labor flexibility at firm level: Are there any implications for performance and innovation? Evidence for the Swiss economy. *Industrial and Corporate Change* 14(6): 993–1016.
- Aryee S and Chu CW (2012) Antecedents and outcomes of challenging job experiences: A social cognitive perspective. *Human Performance* 25(3): 215–234.
- Axtell CM, Holman DJ, Unsworth KL et al. (2000) Shopfloor innovation: Facilitating the suggestion and implementation of ideas. *Journal of Occupational and Organizational Psychology* 73(3): 265–285.
- Baas M, De Dreu CK and Nijstad BA (2008) A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin* 134(6): 779–806.
- Bateman TS and Organ DW (1983) Job satisfaction and the good soldier: The relationship between affect and employee 'citizenship'. *Academy of Management Journal* 26(4): 587–595.
- Bindl UK and Parker SK (2010) Proactive work behavior: Forward-thinking and change-oriented action in organizations. In: Zedeck S (ed.) *APA Handbook of Industrial and Organizational Psychology*, Vol. 2. Washington, DC: American Psychological Association, pp. 567–598.
- Bird B (2002) Learning entrepreneurship competencies: The self-directed learning approach. *International Journal of Entrepreneurship Education* 1(2): 203–227.
- Bolino MC and Feldman DC (2000) Increasing the skill utilization of expatriates. *Human Resource Management* 39(4): 367–380.
- Bosma NS, Stam E and Wennekers ARM (2010) *Intrapreneurship: An International Study*. EIM Research Report H201005. Zoetermeer: EIM.
- Brown SP and Leigh TW (1996) A new look at psychological climate and its relationship to individual job performance. *Journal of Applied Psychology* 81(4): 358–368.
- Buchanan B (1974) Building organizational commitment: The socialization of managers in work organizations. *Administrative Science Quarterly* 19(4): 533–546.
- Burgelman RA (1983) Corporate entrepreneurship and strategic management: Insights from process study. *Management Science* 29(12): 1349–1364.
- Burgelman RA (1985) Managing the new venture division: Research findings and implications for strategic management. *Strategic Management Journal* 6(1): 39–54.
- Carette B, Anseel F and Lievens F (2013) Does career timing of challenging job assignments influence the relationship with in-role job performance? *Journal of Vocational Behavior* 83(1): 61–67.
- Cox CJ and Cooper CL (1988) *High Flyers: An Anatomy of Managerial Success*. New York: Basil Blackwell.
- Davies J and Easterby-Smith M (1984) Learning and developing from managerial work experiences. *Journal of Management Studies* 21(2): 169–182.
- De Dreu CKW, Baas M and Nijstad BA (2008) Hedonic tone and activation level in the mood-creativity link: Toward a dual pathway to creativity model. *Journal of Personality and Social Psychology* 94(5): 739–756.

- De Jong JP and Den Hartog DN (2005) Determinanten van innovatief gedrag: een onderzoek onder kenniswerkers in het MKB. *Gedrag & Organisatie* 18(5): 235–259.
- De Jong JPJ, Parker SK, Wennekers S and Wu C (2011) *Corporate Entrepreneurship at the Individual Level: Measurement and Determinants*. EIM Research Reports. Zoetermeer: EIM.
- De Pater IE, Van Vianen AEM, Bechtoldt MN and Klehe UC (2009a) Employees' challenging job experiences and supervisors' evaluations of promotability. *Personnel Psychology* 62(2): 297–325.
- De Pater IE, Van Vianen AEM, Fischer AH and Van Ginkel WP (2009b) Challenging experiences: Gender differences in task choice. *Journal of Managerial Psychology* 24(1): 4–28.
- De Pater IE, Van Vianen AEM and Bechtoldt MN (2010) Gender differences in job challenge: A matter of task allocation. *Gender, Work and Organization* 17(4): 433–453.
- DeRue DS and Wellman N (2009) Developing leaders via experience: The role of developmental challenge, learning orientation, and feedback availability. *Journal of Applied Psychology* 94(4): 859–875.
- DeRue DS, Nahrgang JD, Hollenbeck JR and Workman K (2012) A quasi-experimental study of after-event reviews and leadership development. *Journal of Applied Psychology* 97(5): 997–1015.
- De Spiegelaere S, Van Gyes G and Van Hoetegem G (2014) Labour flexibility and innovation, complementary or concurrent strategies? A review of the literature. *Economic and Industrial Democracy* 35(4): 653–666.
- Dhondt S, Pot FD and Kraan KO (2014) The importance of organizational level decision latitude for well-being and organizational commitment. *Team Performance Management* 20(7/8): 307–327.
- Dixon MA, Cunningham GB, Sagas M et al. (2005) Challenge is key: An investigation of affective organizational commitment in undergraduate interns. *Journal of Education for Business* 80(3): 172–180.
- Dong Y, Seo MG and Bartol KM (2014) No pain, no gain: An affect-based model of developmental job experience and the buffering effects of emotional experience. *Academy of Management Journal* 57(4): 1056–1077.
- Dorenbosch L, Van Engen ML and Verhagen M (2005) On-the-job innovation: The impact of job design and human resource management through production ownership. *Creativity and Innovation Management* 14(2): 129–141.
- Dragoni L, Tesluk PE, Russell JE and Oh IS (2009) Understanding managerial development: Integrating developmental assignments, learning orientation, and access to developmental opportunities in predicting managerial competencies. *Academy of Management Journal* 52(4): 731–743.
- Fagerberg J (2004) Innovation: A guide to the literature. In: Fagerberg J, Mowery D and Nelson R (eds) *The Oxford Handbook of Innovation*. Oxford: Oxford University Press, pp. 1–26.
- Feldman DC and Bolino MC (2000) Skill utilization of overseas interns: Antecedents and consequences. *Journal of International Management* 6(1): 29–47.
- Ferris GR and Judge TA (1991) Personnel/human resources management: A political influence perspective. *Journal of Management* 17(2): 447–488.
- Folkman S and Lazarus RS (1985) If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology* 48(1): 150–170.
- Frese M, Kring W, Soose A and Zempel J (1996) Personal initiative at work: Differences between East and West Germany. *Academy of Management Journal* 39(1): 37–63.
- Gagné M, Senécal CB and Koestner R (1997) Proximal job characteristics, feelings of empowerment, and intrinsic motivation: A multidimensional model. *Journal of Applied Social Psychology* 27(14): 1222–1240.

- Gillen DJ and Carroll SJ (1985) Relationship of managerial ability to unit effectiveness in more organic versus more mechanistic departments. *Journal of Management Studies* 22(6): 668–676.
- Hackman JR and Lawler EE (1971) Employee reactions to job characteristics. *Journal of Applied Psychology* 55(3): 259–286.
- Hackman JR and Oldham GR (1975) Development of the Job Diagnostic Survey. *Journal of Applied Psychology* 60(2): 159–170.
- Hackman JR and Oldham GR (1980) *Work Redesign*. Reading, MA: Addison-Wesley.
- Hammond MM, Neff NL, Farr JL et al. (2011) Predictors of individual-level innovation at work: A meta-analysis. *Psychology of Aesthetics, Creativity, and the Arts* 5(1): 90–105.
- Hornsby JS, Kuratko DF and Zahra SA (2002) Middle managers' perception of the internal environment for corporate entrepreneurship: Assessing a measurement scale. *Journal of Business Venturing* 17(3): 253–273.
- Humphreys P and O'Brien GE (1986) The relationship between skill utilization, professional orientation and job satisfaction for pharmacists. *Journal of Occupational Psychology* 59(4): 315–326.
- Janssen O and Van Yperen NW (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.
- Judge TA, Bono JE and Locke EA (2000) Personality and job satisfaction: The mediating role of job characteristics. *Journal of Applied Psychology* 85(2): 237–249.
- Kahn WH (1990) Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal* 33(4): 692–724.
- Kanter RM (1984) *The Change Masters*. New York: Touchstone, Simon and Schuster.
- King Z (2004) Career self-management: Its nature, causes and consequences. *Journal of Vocational Behavior* 65(1): 112–133.
- Kropp F, Lindsay NJ and Shoham A (2006) Entrepreneurial, market, and learning orientations and international entrepreneurial business venture performance in South African firms. *International Marketing Review* 23(5): 504–523.
- Lazarus RS and Folkman S (1984) *Stress, Appraisal, and Coping*. New York: Springer.
- Liebrechts W, Preenen PTY and Dhondt S (2015) Niet iedere werknemer is een intrapreneur. *Economisch Statistische Berichten* 100(4706): 180–181.
- Lyness KS and Thompson DE (2000) Climbing the corporate ladder: Do female and male executives follow the same route? *Journal of Applied Psychology* 85(1): 86–101.
- McCall MW, Lombardo MM and Morrison AM (1988) *The Lessons of Experience: How Successful Executives Develop on the Job*. Lexington, MA: Lexington Books.
- McCauley CD, Ruderman MN, Ohlott PJ and Morrow JE (1994) Assessing the developmental components of managerial jobs. *Journal of Applied Psychology* 79(4): 544–560.
- McCauley CD, Van Velsor E and Ruderman MN (2010) Introduction: Our view of leadership development. In: Van Velsor E, McCauley CD and Ruderman MN (eds) *The Center for Creative Leadership Handbook of Leadership Development*, 3rd edn. San Francisco: Jossey-Bass, pp. 1–61.
- McKinney G and McKinney M (1989) Forget the corporate umbrella: Entrepreneurs shine in the rain. *Sloan Management Review* 30(4): 77–82.
- Martínez A and Pérez M (2003) Cooperation and the ability to minimize the time and cost of new product development within the Spanish automotive supplier industry. *The Journal of Product Innovation Management* 20(1): 57–69.
- Martínez-Sánchez A, Vela-Jiménez MJ, Pérez-Pérez M and de-Luis-Carnicer P (2008) Workplace flexibility and innovation: The moderator effect of inter-organizational cooperation. *Personnel Review* 37(6): 647–665.

- Maurer TJ and Tarulli BA (1994) Investigation of perceived environment, perceived outcome, and person variables in relationship to voluntary development activity by employees. *Journal of Applied Psychology* 79(1): 3–14.
- Meyer JP and Allen NJ (1988) Links between work experiences and organizational commitment during the first year of employment: A longitudinal analysis. *Journal of Occupational Psychology* 61(3): 195–209.
- O'Brien GE (1980) The centrality of skill-utilization for job design. In: Duncan K, Gruneberg M and Wallis D (eds) *Changes in Working Life*. New York: Wiley, pp. 167–187.
- Pinchot G (1987) Innovation through intrapreneuring. *Research Management* 30(2): 14–19.
- Podsakoff NP, Lepine JA and Lepine MA (2007) Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: A meta-analysis. *Journal of Applied Psychology* 92(2): 438–454.
- Podsakoff PM, MacKenzie SB, Lee JY and Podsakoff NP (2003) Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88(5): 879–903.
- Preenen PTY, De Pater IE, Van Vianen AEM and Keijzer L (2011a) Managing voluntary turnover through challenging assignments. *Group and Organization Management* 36(3): 308–344.
- Preenen PTY, Van Vianen AEM, De Pater IE and Geerling R (2011b) Ervaren uitdaging op het werk: Ontwikkeling van een meetinstrument. *Gedrag en Organisatie* 24(1): 64–83.
- Preenen PTY, Van Vianen AEM and De Pater IE (2014a) Challenging assignments and activating mood: The influence of goal orientation. *Journal of Applied Social Psychology* 44(10): 650–659.
- Preenen PTY, Van Vianen AEM and De Pater IE (2014b) Challenging tasks: The role of employees' and supervisors' goal orientations. *European Journal of Work and Organizational Psychology* 32(1): 48–61.
- Preenen PTY, Liebregts W, Dhondt S et al. (2014c) *The Intrapreneurial Behaviour Measure (IBM): Een Meetinstrument om Intrapreneurial Gedrag van Werknemers en Factoren die dit Beïnvloeden te Meten binnen Organisaties*. Leiden: TNO.
- Preenen PTY, Verbiest S, Van Vianen AEM and Van Wijk E (2015a) Informal learning of temporary agency workers in low-skill jobs: The role of self-promotion, career planning, and job challenge. *Career Development International* 20(4): 339–362.
- Preenen PTY, Vergeer RA, Kraan KO and Dhondt S (2015b) Labour productivity and innovation performance: The importance of internal labour flexibility practices. *Economic and Industrial Democracy*. Epub ahead of print 24 March 2015. doi: 10.1177/0143831X15572836
- Preenen PTY, Liebregts W and Dhondt S (2015c) Intrapreneurship stimuleren? *Tijdschrift voor Ontwikkeling in Organisaties* 5(3): 51–58.
- Rigtering C (2013) *Entrepreneurial orientation: Multilevel analysis and consequences*. Doctoral dissertation, Utrecht University School of Economics.
- Salanova M and Schaufeli WB (2008) A cross-national study of work engagement as a mediator between job resources and proactive behaviour. *The International Journal of Human Resource Management* 19(1): 116–131.
- Schaufeli WB and Bakker AB (2004) Job demands, job resources, and their relationship with burnout and engagement: A multi sample study. *Journal of Organizational Behavior* 25(3): 293–315.
- Schaufeli WB, Bakker AB and Salanova M (2006) The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement* 66(4): 701–716.
- Scott SG and Bruce RA (1994) Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal* 37(3): 580–607.

- Spector PE (1992) A consideration of the validity and meaning of self-report measures for job conditions. In: Cooper CL and Robertson IT (eds) *International Review of Industrial and Organizational Psychology*, Vol. 7. Chichester: John Wiley, pp. 123–151.
- Spector PE and Jex SM (1991) Relations of job characteristics from multiple data sources with employee affect, absence, turnover intentions, and health. *Journal of Applied Psychology* 76(1): 46–53.
- Spreitzer GM (1995) Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal* 38(5): 1442–1465.
- Stam E, Bosma N, Van Witteloostuijn A et al. (2012) *Ambitious Entrepreneurship: A Review of the Academic Literature and New Directions for Public Policy*. The Hague: Advisory Council for Science and Technology Policy (AWT).
- Steele-Johnson D, Beauregard RS, Hoover PB and Schmidt AM (2000) Goal orientation and task demand effects on motivation, affect, and performance. *Journal of Applied Psychology* 85(5): 724–738.
- Stevenson HH and Jarillo JC (1990) A paradigm of entrepreneurship: Entrepreneurial management. *Strategic Management Journal* 11(5): 17–27.
- Sullivan SE (1999) The changing nature of careers: A review and research agenda. *Journal of Management* 25(3): 457–484.
- Taatila V and Down S (2012) Measuring entrepreneurial orientation of university students. *Education and Training* 54(8/9): 744–760.
- Taylor MS (1981) The motivational effects of task challenge: A laboratory investigation. *Organizational Behavior and Human Performance* 27(2): 255–278.
- Van den Broeck A, De Cuyper N, De Witte H and Vansteenkiste M (2010) Not all job demands are equal: Differentiating job hindrances and job challenges in the job demands-resources model. *European Journal of Work and Organizational Psychology* 19(6): 735–759.
- Van Vianen AEM (1999) Managerial self-efficacy, outcome expectancies, and work-role salience as determinants of ambition for a managerial position. *Journal of Applied Social Psychology* 29(3): 639–665.
- Van Vianen AEM, De Pater IE and Preenen PTY (2008) Career management: Taking control of the quality of work experiences. In: Athanasou J and Van Esbroeck R (eds) *International Handbook of Career Guidance*. London: Springer Science and Business Media, pp. 283–301.
- Van Vianen AEM, De Pater IE and Preenen PTY (2009) Adaptable careers: Deciding less and exploring more. *The Career Development Quarterly* 57(4): 298–309.
- Vesper KH (1984) *Three Faces of Corporate Entrepreneurship: A Pilot Study*. Seattle: University of Washington, Graduate School of Business.
- Watson D, Clark LA and Tellegen A (1988) Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology* 54(6): 1063–1070.
- Zahra SA (1991) Predictors and financial outcomes of corporate entrepreneurship: An exploratory study. *Journal of Business Venturing* 6(4): 259–285.

Author biographies

Paul Preenen is researcher at the Research Department of the Dutch Tax and Customs Administration. He obtained his PhD in organizational psychology at the University of Amsterdam, the Netherlands. His research focuses on job challenge, intrapreneurship, labour flexibility and social innovation. His work has been published in a variety of academic journals, such as *Proceedings of the Royal Society B., Group and Organization Management, European Journal of Work and Organizational Psychology, Journal of Experimental Social Psychology* and *Career Development Quarterly*. His goal is to connect evidence-based research to government practice.

Luc Dorenbosch is a job engineering expert at www.debaaningenieurs.nl. He obtained his PhD in Human Resource Studies at Tilburg University, the Netherlands. He was also an applied researcher at TNO. His domain of expertise involves job crafting, job carving and multiple job holding. He assists teams with a better distribution of work tasks. He is also a fellow at the Centre for Evidence-based Management (CEBMa).

Edo Plantinga is the founder of Deell.eu, the online peer-to-peer knowledge sharing platform that is described in this article. Via this platform thousands of employees have attended workshops given by their peers. Edo is a social entrepreneur who strives to empower people on a large scale, by connecting people and allowing them to learn from each other in an informal setting.

Steven Dhondt is a senior researcher at TNO, Sustainable Productivity and Employability, and part-time professor at the KU Leuven (chair: Workplace Innovation). He coordinates major Dutch, Belgian and EU (Horizon 2020) research programmes on social innovation, corporate entrepreneurship, integrated care, workplace innovation and organizational innovation. He has published in *Behaviour and Information Technology*, *International Journal of Operations and Production Management*, *European Journal of Social Quality*, *International Journal of Social Quality*, *Team Performance Management* and *International Journal of Care Coordination*.