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Flow at Work and Basic Psychological Needs: Effects on Well-Being

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Recent conceptual work draws meaningful distinctions between experiential and declarative well-being (Shmotkin, 2005), but little has been done to apply such distinctions in organisational psychology. We use this framework to integrate self-determination theory (Deci & Ryan, 1985) and flow theory (Csikszentmihalyi, 1975), leading to hypotheses proposing that flow experiences at work (experiential well-being) lead to declarative well-being outcomes through their influence on the satisfaction of basic psychological needs for competence and autonomy. Findings from a two-week experience sampling study of full-time employees offer support for our hypotheses. This study also shows support for the moderating effect of individual differences in personality on the relationships among flow experiences, need fulfillment, and declarative well-being.

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INTRODUCTION

Well-being refers to "optimal psychological functioning and experience", and well-being research has included facets such as pleasure, health, and satisfaction (Ryan & Deci, 2001, p. 142). Although affect is typically considered a facet of well-being, Deci and Ryan (2000) have suggested that well-being is not merely the enjoyment of positive affect, but also includes a deep sense of wellness. Historically, this research has tried to identify "what constitutes the 'good life'" (Ryan & Deci, 2001, p. 142) at a general level, but recent studies have connected life in general with the work domain (e.g. Heller, Watson, & Ilies, 2006; Sonnentag & Bayer, 2005), and well-being has been related to a number of important work outcomes (e.g. job performance, retention, profitability, etc.; Wright & Huang, 2012).

In addition to examining between-person differences in well-being, our understanding of employee well-being increasingly relies on dynamic examinations of within-individual variability as it unfolds naturally across time. This is evidenced by a number of studies adopting longitudinal designs and experiencing sampling methodologies (e.g. Ilies, Aw, & Pluut, 2015; Sonnentag & Ilies, 2011; Xanthopoulou, Bakker, & Ilies, 2012). Research on within-person variability in employee well-being offers a series of important insights. First, it takes into consideration temporality—the day-to-day variation in employee well-being over time. Second, it gives a more fine-grained understanding of how employee well-being changes and evolves over time, and how it relates to person and situation factors. Third, it considers the immediate assessment of well-being derived from the work experience itself, and does not rely on post-hoc evaluations of the experience.

Shmotkin's (2005) systematic framework for interpreting well-being and related phenomena integrates the between-person and within-person approaches to well-being. He argues that *subjective well-being* represents "a dynamic system whose role is to constitute a favorable psychological environment" (p. 295) to help individuals face the challenges of life, and divides the domain of subjective well-being into *experiential well-being* and *declarative well-being*. Experiential well-being is derived through introspection and awareness of oneself at the moment in which one is engaged in an activity. Experiential well-being is not an evaluative response, but rather, well-being embedded within the experience itself; it provides the individual with resources to deal with challenges in the external environment. Declarative well-being, on the other hand, operates in the public context through social interaction, and is defined as "*any report of [subjective well-being] to an audience*" (Shmotkin, 2005, p. 303, italics in original); that is, declarative well-being refers to reports of well-being to someone else or to oneself, including typical subjective well-being reports. We, like Shmotkin, argue that differences between declarative and experiential well-being are not trivial, and that by considering employees'

experiential well-being at work, we can better understand how work life influences employees' declarative well-being.

We draw from self-determination theory (Deci & Ryan, 1985) and flow theory (Csikszentmihalyi, 1975) to understand the relationship between experiential well-being and declarative well-being. Self-determination theory suggests that individuals have basic psychological needs to act competently and autonomously and when these needs are fulfilled, individuals experience heightened declarative well-being. Flow theory suggests that a source or antecedent of declarative well-being is the experience of flow: an event or activity that is so demanding that it requires, but does not exceed, all of the individual's attention and skill, and that it is "worth doing for its own sake" even if there is no external reward (Csikszentmihalyi, 1999, p. 824). This description of flow is consistent with what Shmotkin (2005) calls *experiential well-being*. Self-determination theory and flow theory are similar in that they both describe how individuals obtain declarative well-being outcomes. However, the two theories differ in that self-determination theory deals with evaluations of individual action (e.g. acting autonomously or competently), whereas flow theory focuses on the experience itself, including individual and contextual factors such as individual skill and task difficulty.

This study examines the relationships between flow at work, need fulfillment, and declarative well-being outcomes, and also attempts to identify individual dispositions that moderate the relationships between experiential and declarative well-being. This study has three major objectives. First, we propose that it is the fulfillment of basic psychological needs associated with flow at work that explains why and how flow and well-being are related. Although self-determination theory and flow theory share common elements (Deci & Ryan, 2000), no research to date has examined predictions from the two theories in an integrated study of employees at work. Such an integrated examination constitutes our second objective. Finally, our third objective is to empirically examine how broad personality factors influence the relationships among flow experiences, need fulfillment, and declarative well-being.

HYPOTHESIS DEVELOPMENT

Flow and Declarative Well-Being

Csikszentmihalyi found that flow occurs when individuals are "so intensely involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it" (Csikszentmihalyi, 1990, p. 4). Almost counterintuitive is the finding that these experiences occur more frequently when individuals are engaged in work or other demanding activities, rather than during leisure time (Csikszentmihalyi & LeFevre, 1989). Consistent with this perspective, Shmotkin (2005) has

argued that one of the ways in which individuals attain experiential well-being is through engaging in challenging tasks or activities, when possessing high task-specific ability.

Flow experiences are associated with high levels of focus, concentration, action, and progress, and are not typically studied under the rubric of well-being. However, once individuals have completed a flow experience, they "report having been in as positive a state as it is possible to feel" (Csikszentmihalyi, 1999, p. 825). In addition to the experiential well-being which flow provides, we expect these experiences to influence subsequent employee evaluations of their well-being (declarative well-being). This is because individuals are able to recognise the high level of focus and goal attainment, as well as the high level of energy and progress that they enjoyed while in flow.

Prior research suggests that this is the case. For example, Csikszentmihalyi and LeFevre (1989) found that employees who more frequently experienced flow reported being happier, more cheerful, friendlier, and more sociable than those who experienced flow less frequently. Eisenberger, Jones, Stinglhamber, Shanock, and Randall (2005) also found a connection between flow and positive mood, with this connection being particularly strong among individuals high in achievement orientation. At the daily level of analysis, Fullagar and Kelloway (2009) found that employees who experienced higher levels of flow also reported being more alert, happy, involved, excited, and so forth. Ceja and Navarro (2011) showed that those employees experiencing higher levels of flow also experienced high levels of enjoyment at work. In sum, it seems that there is enough conceptual and empirical support to suggest a positive association between the experience of flow and positive affect at work.

In addition to experiencing favorable affective outcomes at work, research has shown that individuals are more likely to declare higher job satisfaction after experiencing flow at work, compared to occasions when they do not experience flow (Csikszentmihalyi & LeFevre, 1989). One explanation is that employees will perceive their jobs as the mechanism allowing them to obtain flow. Flow experiences are characterised by absorption and intrinsic motivation (Bakker, 2005; Csikszentmihalyi, 1990). As employees engage in flow while performing their job, they realise that the challenge associated with their work gives them opportunities to stretch their abilities and skills, thereby facilitating flow. Retrospective reflection upon these experiences will lead to employees' positive evaluation towards the jobs (i.e. higher job satisfaction).

Basic mood theory and research as well as conceptual arguments and research on mood at work supporting "the generalization of moods earlier in the day to moods later in the day" (Judge & Ilies, 2004, p. 664) suggest that flow may also impact end-of-day affect. For instance, Demerouti, Bakker, Sonnentag, and Fullagar (2012) found that work-related flow not only influences positive affect right after the flow experience but also spills over to the non-work domain by positively influencing the affective experience of workers

during off-job time. Therefore, similar to our prediction with respect to job satisfaction, we expect employees to report higher levels of positive affect at the end of days when they engaged in more activities that facilitate flow compared to workdays when they did not engage in as many such activities.

Effects of Flow on Declarative Well-Being through Need Satisfaction

Flow and Need Satisfaction. Early conceptualisations of self-determination theory (Deci, 1975) and flow theory (Csikszentmihalyi, 1975) show conceptual overlap as they both include an emphasis on intrinsic motivation (Deci & Ryan, 2000). Flow experiences typically occur when an individual is engaged in a task or activity that is intrinsically rewarding. Similarly, self-determination theory proposes that individuals are intrinsically motivated to seek out specific tasks or activities because these tasks and activities allow them to fulfill their basic psychological needs (e.g. competence, autonomy). A comparison of flow and self-determination theories suggested that an integration of the two would "allow a fuller account of flow" (Deci & Ryan, 2000, p. 261) and would enable a more in-depth investigation of motivational phenomena.

Csikszentmihalyi (1997) suggested that during a flow experience people know how well they are doing because flow experiences provide instant feedback—feedback not contingent upon any external party but rather derived from the task itself. Individuals experiencing flow receive confirmation that their actions are resulting in progress, leading to a sense of competence in the task at hand. This addresses one of the basic psychological needs innate in humans (Deci & Ryan, 1985; Ryan & Deci, 2001). We therefore expect that when individuals experience flow, their basic psychological need for competence will be fulfilled.

In addition to meeting individuals' needs to demonstrate competence, the experience of flow is intrinsically satisfying and should therefore lead individuals to be pleased with their decision to pursue these activities (Csikszentmihalyi & LeFevre, 1989). We suggest that one reason why flow leads to positive employee outcomes at work is that when an activity provides opportunity for the employee's skills to be used and refined to the utmost, the activity becomes more interesting and enjoyable, and the worker also becomes more productive. Thus, individuals evaluate their decision to work on the task as consistent with their desires, thereby resulting in the satisfaction of their need to act autonomously. Moreover, individuals are able to turn mundane or monotonous tasks into something that induces flow. For instance, in a study of daily job crafting, Petrou, Demerouti, Peeters, Schaufeli, and Hetland (2012) found that active employees fulfill their psychological need to act autonomously at work by

seeking new challenges in their jobs. Thus, flow experiences are related to the satisfaction of an employee's basic psychological need to act autonomously.

Need Satisfaction and Declarative Well-Being. A growing body of research, built upon self-determination theory (Deci & Ryan, 1985), leads us to propose that flow's influence on declarative well-being is due to the mediating effect of need fulfillment. In a two-week experience sampling study of college students, Sheldon, Ryan, and Reis (1996) found that the daily fulfillment of needs for competence and autonomy was related to well-being, which included affect, vitality, and physical health. Results from another two-week, within-individual study found that daily fluctuations in the fulfillment of needs for autonomy and competence were related to fluctuations in positive mood (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000).

The fulfillment of basic psychological needs has also been shown to relate to various types of satisfaction. A field experiment testing self-determination theory found that managers' orientation toward supporting self-determination was strongly related to general satisfaction (Deci, Connell, & Ryan, 1989). Likewise, results from a field sample of employees and their supervisors indicate that supervisor and employee ratings of autonomy and competence were related to several positive outcomes, including work satisfaction (Ilardi, Leone, Kasser, & Ryan, 1993). A large-scale study of over 5,000 managers in 24 different countries found that managers who felt in control of their work exhibited higher job satisfaction than those who felt that their work was driven by external influences (Spector et al., 2002). In light of these consistent relationships between need fulfillment and declarative well-being, we hypothesise:

Hypothesis 1: The experience of flow at work will positively influence daily declarative well-being such that employees will report higher (a) positive affect and (b) job satisfaction at the end of workdays on which they engage in more activities which meet the conditions for experiencing flow (high challenge and high skill), compared to days when they engage in fewer of those activities.

Hypothesis 2: Fulfillment of needs for autonomy and competence will partially mediate the effects of flow experiences on (a) positive affect and (b) job satisfaction at the end of workdays.

The Moderating Role of Individual Differences in Personality

Csikszentmihalyi's (1990) concept of autotelic personality suggests that some people tend to position themselves in flow situations, with a greater capacity to initiate, sustain, and enjoy optimal experiences (Nakamura & Csikszentmihalyi, 2002). Where non-autotelic personalities may see difficulty, a deep sense of

interest and strong purpose aids autotelic individuals to recognise opportunities to build their skills. They are open to new information and challenges to capitalise on the opportunity to build new skills.

The autotelic personality is a conjunction of receptive (e.g. openness) and active qualities (e.g. strong sense of purpose and will). These two qualities act as meta-skills that autotelic individuals use to find flow in their daily activities (Nakamura & Csikszentmihalyi, 2002), but their roles in the flow experience have rarely been examined (Baumann & Scheffer, 2011). We therefore extend this line of reasoning by suggesting that individuals who are open to experience and have a strong purpose will have a greater appreciation for flow experiences and may derive greater benefit from these experiences than other individuals.

Openness to experience relates to an individual's affinity for "varied experience for its own sake" (Vittersø, 2003, p. 149). Open individuals seek out novel experiences, whereas their closed counterparts are less interested in new experiences (McCrae & Costa, 1985). Openness to experience also refers to the extent to which individuals are imaginative, curious, independent thinkers, and amenable to new ideas and perspectives (Costa & McCrae, 1992) . Highly open individuals need excitement and activities that engage their curious minds. Flow experiences require all of an individual's attention, skill, and effort, and with the successful completion of the challenging task, the individual's skill at the task increases (Csikszentmihalyi, 1990).

Because highly open individuals have a tendency to seek out new or novel experiences, they will be sensitive to the changing nature of the tasks that bring about flow experiences, and they will therefore respond more favorably to flow experiences, because such experiences fulfill their needs to autonomously choose new and engaging activities. Therefore, we expect:

> *Hypothesis 3*: Openness to experience will moderate the relationship between flow and fulfillment of the need for autonomy, such that the relationship will be stronger for individuals high on openness to experience, than for those low on it.

Conscientiousness refers to an individual's strong sense of purpose and will, dependability, reliability, self-control, and tendency to work hard to achieve goals (Costa & McCrae, 1992). Part of the appeal of flow experiences is the intense focus involved during these events, and one reason why such focus is possible is because goals are clear and feedback is instantaneous (Csikszentmihalyi, 1997). Therefore, individuals who derive high levels of satisfaction from pursuing and attaining goals would be expected to particularly appreciate flow experiences. For example, conscientious individuals base part of their self-image upon the successful development and utilisation of talent and skill, and the attainment of goals. Therefore, the experience of flow, which results from

matching high skill with high challenge, should meet an achievement-oriented individual's need to surpass set standards (Eisenberger et al., 2005).

Flow experiences will also appeal to a conscientious individual's desire to be organised and to have a strong sense of purpose, because during flow experiences individuals have no surplus attention and are completely engaged in the task. Moreover, when engaged in a flow experience, although the task is difficult, it is very clear to the individual what needs to be done next, further appealing to the individual's desire for order. Therefore, the conscientious individual's need to be organised and purposeful will be met, thus contributing to a sense of competence in the task at hand.

Hypothesis 4: Conscientiousness will moderate the relationship between flow and fulfillment of the need for competence such that the relationship will be stronger for individuals high in conscientiousness, than for those low on it.

METHODS

Participants and Procedure

We recruited 150 full-time professionals, administrative supervisors, and clerical-technical workers at an American university. Participation in the study was completely voluntary and employees were compensated up to US $100 for their participation. After signing up for the study using a Web-based registration page, participants selected an orientation session to attend for training on the experience sampling device (a Palm Pilot) and then completed a Web-based survey that gathered various demographic measures. Of the 150 participants who signed up for the study, 118 attended the training. During training sessions, participants first completed a short survey assessing their personality traits, and then received instruction on how to fill out the experience sampling surveys on the Palm Pilot.

The day after the last training session, the experience sampling portion of the study began in which participants completed a short survey during each of three blocks of time throughout the day (8:30 am to 10:00 am; 10:00 am to 11:30 am; 1:30 pm to 3:00 pm), for 10 consecutive workdays. These surveys assessed the *task in which the participants were engaged when signaled by the Palm Pilot* (audible signals were programmed to occur at a random time within each time window, using the using the Purdue Momentary Assessment Tool by Weiss, Beal, Lucy, and MacDermid, 2004). At the end of each workday, participants completed a short survey assessing their declarative well-being for the day (positive affect and job satisfaction). The survey was to be completed after participants had finished working for the day and was available between 4:00 pm and 6:00 pm.

Of the 118 individuals who participated in the daily portion of the study, four were dropped from the sample because they responded to fewer than three of the possible ten sets of matched surveys (i.e. Palm Pilot surveys throughout the day matched with Web surveys at the end of the day). The final sample included 114 individuals (74% female, mean age of 43.5 years, and mean job tenure of 13.2 years). Out of 3,420 potential measurements for the three daily surveys on the Palm Pilot and 1,140 potential end-of-day measurements, we obtained a total of 3,032 Palm Pilot surveys and 970 end-of-day Web surveys. We averaged the Palm Pilot measures for each individual each day to create day-level measures of flow and need fulfillment for each individual, and then matched these measures with the end-of-day declarative well-being measures. We obtained 892 matched response sets, representing a final response rate of 78.2 per cent.

Measures

Flow. Although flow theory offers promising insight for individual experience at work, the discrete and intrapsychic nature of flow experiences has presented measurement difficulties. To study the phenomenon, Csikszentmihalyi and colleagues developed the Experience Sampling Method (ESM), a technique in which participants are intermittently signaled (e.g. by a pager, wristwatch alarm, or handheld computer) and then asked to indicate the challenge and skill related to the task in which they were engaged when signaled (see Csikszentmihalyi, 1990). This assessment methodology circumvents many problems associated with retrospective measurement (see Larson & Csikszentmihalyi, 1983), and eliminates the need to ask respondents to define flow experiences by instead asking them to specify the nature of the task at hand. Because of these advantages, the assessment of flow through ESM reports of high challenge and high skill has been adopted by flow researchers and extensively used in the empirical research on the topic (Bakker, 2005; Csikszentmihalyi, 1990, 1997, 2000; Csikszentmihalyi & Hunter, 2003; Csikszentmihalyi & LeFevre, 1989; Delespaul, Reis, & DeVries, 2004; Reiss, 2000).

Although the conceptualisation of flow as high challenge/high skill does not address the internal processes comprising individual experiences, it does identify situations in which the individual is in the midst of the conditions that facilitate flow experiences. Furthermore, because this approach does not require individuals to consciously evaluate or declare their psychic state, this measure of flow will allow us to inductively assess participants' experiential well-being states (i.e. identify when they are in flow) rather than ask individuals to report how they feel, which assesses their declarative well-being (e.g. affect and satisfaction).

During each of the Palm Pilot surveys, respondents were asked to answer two items on a 1–5 agreement scale. The first item ("The task/activity was very

challenging") relates to the task, and the second ("I am highly skilled for this task/activity") relates to the individual. Closely following established procedure (Csikszentmihalyi, 1990; Csikszentmihalyi & LeFevre, 1989), we computed a mean score for each individual on each of the two items. We then coded whether each discrete score was above or below the individual's own mean of skill or challenge reports. When the individual was facing higher than average challenge and reported demonstrating higher than average skill, we coded the situation as a flow experience. The other configurations of responses (high skill/low challenge; low skill/high challenge; low skill/low challenge) were not considered flow experiences.

Autonomy. Following Reis et al. (2000), autonomy was measured during each of the Palm Pilot surveys by asking respondents to report the reason for which they were engaged in the particular task or activity at that time. Respondents indicated, on 1–5 agreement scales, the extent to which they engaged in each particular task or activity for external ("something about your external situation forced you to do it"), introjected ("you made yourself do it, to avoid anxiety or guilt"), identified ("interesting or not, you felt that it expressed your true values"), or intrinsic ("you did it purely for the interest and enjoyment in doing it") reasons. For each response, we computed a summary autonomy score by adding together the items with the following weights: intrinsic (+2), identified (+1), introjected (−1), and external (−2). This method of computing summary autonomy scores for discrete activities is identical to that used in previous research assessing state autonomy (Grolnick & Ryan, 1987; Grolnick, Ryan, & Deci, 1991; Reis et al., 2000; Sheldon & Kasser, 1995; Sheldon et al., 1996). Finally, daily autonomy scores were calculated by averaging the three responses for this scale on each day for each respondent.

Competence. During the Palm Pilot surveys participants were also asked to rate their competence on the task or activity in which they were engaged at the time they were signaled. Participants responded to the items: "How successful do you feel in the task/activity in which you were involved when you received the signal?" and "How effective is your performance on the task/activity in which you were engaged when you received the signal?" on a scale from *1 = not at all effective/successful* to *5 = extremely effective/successful* (see Reis et al., 2000). Daily competence scores were calculated by averaging the three responses for this scale for each respondent on each day. The average internal consistency reliability for the measure was .85.

Positive Affect. We used the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) with momentary instructions. We presented participants with 10 adjective descriptors of activated positive affect and asked them to indicate the extent to which the listed adjective described

their feelings "right now". Sample adjectives from this scale are "interested", "excited", and "determined". Responses were given on a scale ranging from *1 = very slightly or not at all* to *5 = extremely*. The average internal consistency reliability was .92.

Job Satisfaction. Daily job satisfaction was measured at the end of each workday with the five-item Brayfield-Rothe Index (Brayfield & Rothe, 1951), slightly modified to represent daily rather than general evaluations of job satisfaction. Example items include: "Today I have felt enthusiastic about my work" and "Today I found real enjoyment in my work", and were answered on a scale from *1 = strongly disagree* to *5 = strongly agree*. The average internal consistency reliability for job satisfaction was .90.

Personality Measures. Openness to experience and conscientiousness were measured once, via a paper-based survey completed during the orientation meeting, using items from the NEO-FFI (Costa & McCrae, 1992). Participants indicated how much they agreed or disagreed with each item on a scale from *1 = strongly disagree* to *5 = strongly agree*. An example item for openness is "I have a wide range of intellectual interests." An example item for conscientiousness is "I work hard to accomplish my goals." The average internal consistency reliability for both openness to experience and conscientiousness was .79.

ANALYSES

We used Hierarchical Linear Modeling (HLM) to simultaneously model relationships at two levels of analysis. At the first level, we modeled the direct intra-individual effects of flow on need fulfillment and declarative well-being, and we also examined the mediating role of need fulfillment in the relationship between flow and declarative well-being. All of the intra-individual predictors were centered relative to each individual's mean score, eliminating the inter-individual variance in the predictor scores and ensuring that the estimated effects are exclusively due to intra-individual fluctuations in the predictor scores over time (e.g. Ilies, Dimotakis, & de Pater, 2010). The cross-level moderating effects were examined by regressing individuals' characteristic parameters estimated at the first level of analysis (e.g. each individual's characteristic intercept and slope for predicting need fulfillment) on their scores of the personality traits at the second level of analysis. To indicate effect sizes, we followed the suggestions by Hofmann, Griffin, and Gavin (2000) to compute pseudo-R^2 values to assess the amount of variance explained by our study variables.

TABLE 1
Between- and Within-Individual Correlations among Study Variables

Variable	M	*Between-person* SD	*Within-person* SD	*Within-person variance* %	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Flow at Work	.28	.15	.28	78%	–	.22**	.07	.12**	.15**	–	–
2. Need Fulfillment: Competence	3.71	.38	.46	59%	−.12	(.85)	.24**	.16**	.21**	–	–
3. Need Fulfillment: Autonomy	1.16	2.49	2.73	55%	−.03	.23*	–	.16**	.25**	–	–
4. Positive Affect	2.72	.68	.55	40%	.02	.44**	.46**	(.92)	.46**	–	–
5. Job Satisfaction	3.54	.73	.52	34%	−.02	.33**	.48**	.60**	(.90)	–	–
6. Openness to Experience	3.52	.62			.02	−.02	−.01	−.10	−.19*	(.79)	–
7. Conscientiousness	3.98	.52			−.13	.35**	.29**	.11	.18	−.12	(.79)

Notes: $N = 114$ individuals and 892–1,032 observations. The correlations below the diagonal represent between-individual associations, computed using individuals' aggregated scores and based on a sample size of 114 individuals. The standard deviations were computed at the between-individual level (using average scores where appropriate). The correlations above the diagonal represent within-individual associations (over time) and were estimated from fixed effects HLM models with single level-1 predictors and no level-2 predictors. The values on the diagonal represent internal consistencies; for the within-individual variables the internal consistency estimates are averages across measurement occasions; the coding methods for Need Fulfillment: Autonomy and Flow at Work do not allow estimating the reliability of these scores. * $p < .05$; ** $p < .01$ (two-tailed).

RESULTS

Table 1 presents the correlations among all study variables, computed both within and between individuals. Flow scores were not correlated with any other variable *between* individuals; however, *within* individuals, flow was significantly correlated with all scores, although the relationship with the fulfillment of the need for autonomy was weak ($p < .10$). This pattern of between- and within-individual correlations is not surprising, given the method for computing flow scores that uses deviations from each individual's average scores on challenge and skill.

Hypothesis 1, which states that flow at work will predict the two declarative well-being indicators—positive affect and job satisfaction—collected at the end of employees' workdays, was supported ($\beta = .12$ and .15, respectively, $p < .01$ for both; see main effects model in Table 2). Flow at work accounted for 2 per cent of the within-person variance in positive affect and 3 per cent of that in job satisfaction. Hypothesis 2 predicted that the fulfillment of employees' needs for autonomy and competence would mediate, in part, the effects of flow on employees' declarative well-being. Flow predicted the fulfillment of

TABLE 2
Effects of Flow at Work on Daily Declarative Well-Being (Positive Affect and Job Satisfaction) and the Mediating Role of Need Fulfillment

Predictors/Criterion	*Positive Affect*	T-*Value*	*Job Satisfaction*	T-*Value*
Main Effects				
Intercept	2.73	41.27**	3.54	50.16**
Flow at Work	.12	4.03**	.15	4.73**
Mediating Role of Need Fulfillment				
Intercept	2.73	41.09**	3.54	50.13**
Flow at Work	.08	2.37**	.11	3.52**
Need Fulfillment: Competence	.10	2.22*	.15	4.31**
Need Fulfillment: Autonomy	.12	3.05**	.19	5.03**

Notes: Estimates were obtained using 892 daily data points provided by 114 individuals by conducting a series of within-individual regressions in HLM (the slope coefficients are all standardised). All predictor scores were centered at the individuals' means to eliminate between-individual variance. * $p < .05$; ** $p < .01$ (one-tailed, directional effects).

individuals' needs ($\beta = .07$, $p < .05$ for autonomy; standardised $\beta = .22$, $p < .01$ for competence; Table 3); upon introducing the two need satisfaction variables in the intra-individual regression predicting declarative well-being indicators with flow, the regression coefficients for predicting positive affect and job satisfaction with flow decreased by 33.3 per cent and 26.7 per cent, respectively (see Table 2). Third, mediation tests for multilevel models based on the z' test described by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002)

TABLE 3
Effects of Flow at Work on Need Fulfillment and the Moderating Role of Personality Traits

Model/Criterion	*Need Fulfillment: Autonomy*	T-*Value*	*Need Fulfillment: Competence*	T-*Value*
Moderated Model				
Intercept	1.17	4.74**	3.71	103.81**
Flow at Work	.07	1.88*	.22	6.71**
Openness to Experience	−.04	−.09	–	–
Conscientiousness	–	–	.27	3.71**
Openness × Flow	1.58	2.76**	–	–
Conscientiousness × Flow	–	–	.06	.59

Notes: These values were estimated in HLM models that regressed competence or autonomy on flow at work at level 1, and at level 2 predicted the level-1 intercept and beta with individuals' scores on openness to experience. The scores on flow at work were centered relative to each participant's mean, and the effects of flow at work are standardised. * $p < .05$; ** $p < .01$ (one-tailed, directional effects).

revealed that the flow-competence mediated paths were statistically significant when predicting both positive affect and job satisfaction ($p < .01$ for both), whereas the flow-autonomy mediated path was significant when predicting job satisfaction ($p < .05$) but only approached traditional significance when positive affect was the end criterion ($p < .07$). Overall, 12 per cent of within-person variance in positive affect and job satisfaction was explained by the mediation models. These results generally support Hypothesis 2.

Finally, we examined the moderating role of openness to experience (Hypothesis 3) and conscientiousness (Hypothesis 4) on the relationships between flow and the fulfillment of needs for autonomy and competence, respectively. Table 3 shows the HLM results testing the interaction between flow and the two personality variables on need fulfillment. Openness to experience had a moderating effect on the intra-individual relationship between flow and the fulfillment of employees' need for autonomy (see Table 3).[1] This finding supports Hypothesis 3, indicating that individual differences in personality affect the manner in which individuals react to flow experiences. Although conscientiousness did exert a main effect on the fulfillment of individuals' need for competence, it did not have any interactive effect with flow on need fulfillment, failing to support Hypothesis 4.

Figure 1 shows the moderated relationship from Hypothesis 3, indicating that employees who are more open to new experiences are also more sensitive to the autonomic need fulfillment effects of flow at work, by showing a stronger link between the two. These individuals have their need for autonomy more strongly fulfilled when they experience flow, compared to those low in openness to experience. Therefore, flow is particularly important for individuals high in openness to experience, whereas those low in openness show very little connection between flow and the fulfillment of their need for autonomy. Next, although such effects were not formally hypothesised, we investigated the moderating role of openness on the relationships between flow and declarative well-being outcomes (i.e. job satisfaction). Indeed, openness to experience did moderate the effect of flow on both declarative well-being outcomes. Figure 2 shows that the relationship between flow experiences and positive affect was stronger for individuals higher in openness to experience, compared to individuals low in openness to experience (the interactive effect on job satisfaction was similar).

DISCUSSION

This study found that individuals' experiential and declarative well-being are distinct, yet related, concepts. Specifically, we found that a type of experiential

[1] Twenty-four per cent of the variance in the slopes was explained by openness to experience.

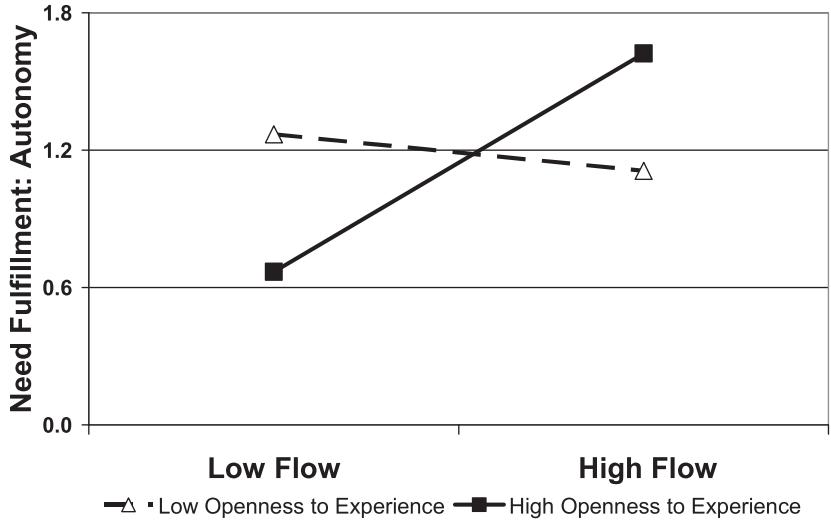

FIGURE 1. The moderating influence of openness to experience on the effect of flow on autonomy need fulfillment.

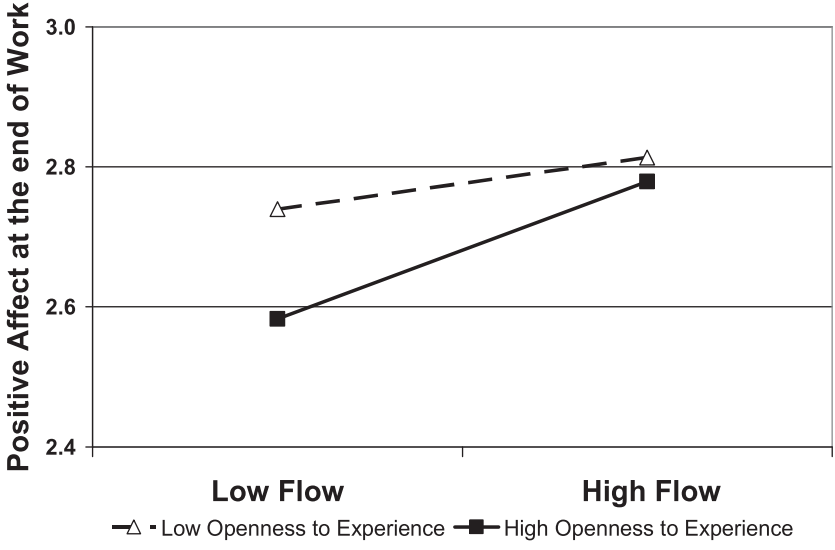

FIGURE 2. The moderating influence of openness to experience on the effect of flow on positive affect.

well-being—flow—was positively related to measures of declarative well-being (positive affect and job satisfaction). We also found that the fulfillment of individuals' needs for competence and autonomy partially mediated the influence of flow on declarative well-being outcomes. Our moderator analyses showed that individual differences in openness to experience influence the relationship between flow and the fulfillment of individuals' needs for autonomy, such that individuals higher in openness to experience show stronger positive relationships than do individuals low in openness. Finally, in post-hoc analyses, we found that the relationships between flow and declarative well-being outcomes (positive affect and job satisfaction) were also moderated by openness to experience, with highly open individuals experiencing stronger positive relationships.

We believe these findings yield a more comprehensive understanding of the nature of work experiences and their implications for employee well-being. First, we found that the fulfillment of basic psychological needs associated with flow explains how and why flow at work is associated with greater well-being. Second, the study identifies how personality traits moderate the effect of flow on need fulfillment and declarative well-being. Third, this study constructively replicates past research on need fulfillment and well-being by utilising a repeated-measures, multiple-method design. Although we found only weak support for our hypothesis that flow leads to the fulfillment of employees' need for autonomy, the moderating effect of openness to experience on this relationship was strong. This is consistent with our argument that some individuals are more likely to feel that they have acted autonomously following the experience of flow because they are able to turn tasks into flow-inducing activities. Csikszentmihalyi (1990) gives the example of a welder in a dreary assembly plant who consistently found flow in his work, despite the obligatory and seemingly monotonous nature of the task.

Strengths and Weaknesses

This study has several notable strengths. First, the conceptual integration of self-determination theory and flow theory brings together two related perspectives which, to our knowledge, have not been concurrently addressed in the organisational literature. Furthermore, we empirically tested the conceptual integration and found support for our proposed model. To this theoretical integration we add our findings on personality, indicating the value of a person–situation perspective on flow. We therefore encourage organisational researchers to consider the impact of flow and need fulfillment concepts, as well as individual differences in personality, as they investigate employee well-being in the workplace.

A second strength of the study stems from the measurement design. This intra-individual study used a repeated-measures design to enable a within-

individual data analytic approach, which mitigates the concern that results might be driven by individual differences. Thus, we have illustrated how flow experiences influence employees across time, and how fluctuations in work experiences influence fluctuations in declarative well-being. Furthermore, we used three different data collection approaches (Palm Pilot, paper-based survey, Web-based surveys), taken during three distinct time periods. This reduces common-method variance concerns, and the temporal separation in the measurement of predictors, moderators, and outcomes should reduce common source bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Of course, this study also has weaknesses. First, because all data are self-report, we cannot rule out other directional interpretations for our findings. However, measures were taken in different psychological contexts; that is, the momentary measures were taken throughout the day as employees were engaged in their various tasks at work, whereas the declarative well-being measures were completed on a Web-survey after the employee had completed work for the day. Thus, the end-of-day evaluation of positive affect and job satisfaction is a declarative evaluation of the employee's well-being for the day, whereas the earlier Palm Pilot measures are *in situ* assessments of the employee's current psychological states. Also, common source bias is less of a concern in our moderator analyses (e.g. Evans, 1985).

Another concern is that, although flow conceptually occurs before the fulfillment of needs for autonomy and competence, the constructs were measured at the same point in time. However, we feel this is not a strong concern because of the way in which we measure flow. The four-channel model of flow (see Csikszentmihalyi, 1990) suggests that an individual must be highly challenged and highly skilled in order to have a flow experience. Accordingly, we asked individuals to report upon the characteristics of the task and their task-specific skill. This approach reduces the likelihood of bias that would otherwise be present with a typical continuous scale variable in which participants subjectively rate their level of flow. Moreover, when one is engaged in flow, thought and action are focused on the activity at hand, and therefore our measure evaluates the conditions that facilitate flow, rather than the actual experience of flow. By asking respondents to describe the situation rather than their reaction to the experience, we minimise the likelihood that our measure of flow is biased by unnecessary evaluations. Need fulfillment, on the other hand, entails a process in which the individual evaluates his or her reaction to an experience. These distinctions show how the measurement of flow and need fulfillment are different, despite their concurrent measurement.

Implications for Theory and Practice

Theory indicates that flow and self-determination are important in influencing employee well-being. As research on well-being garners interest from

organisational scholars, we encourage them to consider the role of both *experiential* and *declarative* well-being (Shmotkin, 2005) for employees' wellness and organisational effectiveness. Most research on job demands indicates that workload is positively related to adverse health outcomes such as strain (Karasek, 1979), yet it is likely that challenge and workload are positively correlated. This suggests that, although on average, high amounts of workload are harmful to employees, a portion of the effect might actually be beneficial. Therefore, a comprehensive integration of theoretical approaches to workload and challenge could yield a theoretical recipe for high levels of engagement at work.

Although the original research on flow addressed scientists, artists, and athletes, our study illustrates that flow is relevant to everyday work life. By employing a mean-centered approach, we are able to identify instances in which our participants were likely to be engaged in activities that facilitate experiential well-being (flow) during working hours. In fact, in our study, individuals reported being in conditions conducive to flow during 28 per cent of the occasions on which they were surveyed.[2] This figure is within the range reported by previous research (16.4% for cashiers to 57.6% for craftsmen and other professionals; Ceja & Navarro, 2012; Delle Fave, Massimini, & Bassi, 2011). It follows that a straightforward implication of our findings for managers is that they should strive to facilitate conditions for flow, perhaps by job (re)design (e.g. increasing skill variety and autonomy; Fullagar & Kelloway, 2009), to have more satisfied employees. Furthermore, such efforts would also increase performance, particularly in creative jobs, because of the links between flow (or positive affect which was influenced by flow in our study) and various dimensions of job performance (Demerouti, 2006; George & Brief, 1992).

One interesting finding from our moderator analyses is that when not engaged in flow experiences, individuals low on openness to experience reported consistently higher declarative well-being than did individuals high in openness to experience. Furthermore, more closed individuals appeared to show little if any relationship between flow experiences and declarative well-being outcomes. This suggests that, although flow is an important part of most employees' work, its importance seems to be most evident for individuals who are open to experience, as it appears that these individuals need flow experiences in order to sustain their well-being.

Another implication of our findings for the workplace is that, to the extent to which employees have sufficient decision latitude on the job, they might be able to craft their jobs (Wrzesniewski & Dutton, 2001) in a way that provides

[2] The range for the daily flow reports was 0–100% (i.e. there were days when some participants reported being in flow for each of the three assessments) although no individual reported being in flow for every assessment and eight respondents never reported being in flow.

them with more opportunities to engage in flow experiences. Modifying jobs in this manner will likely satisfy the employee's needs for competence and autonomy, resulting in greater satisfaction and positive affect on the job, in part through the experience of flow. Therefore, organisations could experience increments to employee well-being by allowing employees to craft their jobs in ways that facilitate flow.

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