RESEARCH ARTICLE

How is Flow Experienced and by Whom? Testing Flow among Occupations

Susana Llorens*†, Marisa Salanova & Alma Mª Rodríguez

WONT Research Team, Universitat Jaume I, Spain

Abstract

The aims of this paper are to test (1) the factorial structure of the frequency of flow experience at work; (2) the flow analysis model in work settings by differentiating the frequency of flow and the frequency of its prerequisites; and (3) whether there are significant differences in the frequency of flow experience depending on the occupation. A retrospective study among 957 employees (474 tile workers and 483 secondary school teachers) using multigroup confirmatory factorial analyses and multiple analyses of variance suggested that on the basis of the flow analysis model in work settings, (1) the frequency of flow experience has a two-factor structure (enjoyment and absorption); (2) the frequency of flow experience at work is produced when both challenge and skills are high and balanced; and (3) secondary school teachers experience flow more frequently than tile workers. Copyright © 2012 John Wiley & Sons, Ltd.

*Correspondence

Susana Llorens, Department of Social Psychology, Universitat Jaume I, Avenida Sos Baynat, s/n. 12071, Castellón, Spain.
†Email: llorgum@uji.es

The study of human strengths and optimal functioning has drawn a growing amount of attention in modern organizations, and following the premises of Positive Psychology, they have become increasingly more interested in optimizing positive psychosocial emotions and experiences. One of the positive phenomena that is receiving attention is *flow*, which is an optimal experience that is common to a wide range of activities. Different scholars have described the experience of flow not only in daily and entertainment activities (e.g. Csikszentmihalyi, 2003; Delle Fave & Massimini, 2005) but also in work settings (e.g. Bakker, 2005; Salanova, Bakker, & Llorens, 2006).

Despite the advances in the study of flow at work, more empirical research is needed in order to (1) identify the dimensionality of the flow experience at work; (2) differentiate the frequency of flow experience at work from its prerequisites; and (3) test for significant differences in the frequency of flow experience among different occupations. In the present study, we contribute to previous research questions by testing (1) the factorial structure of the frequency of flow experience (i.e. enjoyment, absorption and intrinsic interest) at work in two samples (tile workers and secondary school teachers); (2) the flow analysis model in work settings by differentiating the frequency of flow experience at work and the

frequency of its prerequisites (i.e. challenge and skills); and (3) whether there are significant differences in the frequency of flow experiences depending on the occupation (tile workers and secondary school teachers) on the basis of the flow analysis model in work settings.

Flow experiences at work: The concept and its measurement

The study of flow constitutes one of the new trends that have emerged in Positive Psychology. Originally, this concept was studied by means of interviews with artists, athletes, composers, dancers, scientists and so on (see Csikszentmihalyi, 1975, 1990, 1997, 2003). These particular samples described flow as an experience in their activities that made them feel good and motivated because they were doing something worthwhile for its own sake. The study of the experience of flow has been extended to different contexts such as daily activities (Delle Fave & Massimini, 2005), leisure (Csikszentmihalyi & LeFevre, 1989), study (Delle Fave & Bassi, 2000) and work settings (Salanova et al., 2006).

On the basis of the concept of flow, and according to Csikszentmihalyi (1997; p. 30), the flow experience 'tends to occur when a person's skills are fully involved

in overcoming a challenge that is just about manageable. Optimal experiences usually involve a fine balance between one's ability to act and the available opportunities for action'. Different authors (e.g. Bakker, 2005; Salanova et al., 2006) have developed the concept of flow specifically for work activities. Three of the advances in the study of the flow experience at work are the following: (1) flow at work is considered a short-term peak experience; (2) it is assessed by single administration retrospective instruments; and (3) flow experience (and its prerequisites) is tested by frequency and not by intensity (see Bakker, 2001, 2008). Thus, considering the nature of work context, flow at work refers to a short period, i.e. the preceding days of weeks while working (Bakker, 2001, 2005, 2008). Consequently, the most useful procedure to capture the essence of flow at work is through a single retrospective instrument administration (e.g. Bakker, 2008; Salanova et al., 2006; Mäkikangas, Bakker, Aunola, & Demerouti, 2010). Moreover, the flow at work concept (as well as its prerequisites) is usually tested not by intensity but by frequency. Specifically, different scholars test flow experience at work in terms of frequency as the way to assess how often employees experience flow at work (e.g. Bakker, 2005 and 2008; Demerouti, 2006; Jackson & Eklund, 2002, 2004; Mäkikangas et al., 2010; Salanova et al., 2006). Indeed, and according to Bakker (2008; pp. 400, 401, 409, 411), flow is tested by frequency and not by intensity for different reasons: (1) the dimensions of flow experience at work are enjoyment, absorption and intrinsic interest, which have been traditionally tested by frequency; (2) this method of research (frequency) is applied on several studies related to different forms of subjective well-being, including work engagement, burnout, depression and psychosomatic health; and finally, (3) testing flow experience (and prerequisites) by frequency (instead of intensity) is not a casualty but instead a practical approach implemented by Human Resources Development Company for promoting context variables that can increase flow experiences at work.

Taking into consideration all of these features, Bakker (2001) developed the WOrk-reLated Flow scale (WOLF; Bakker, 2001, 2008). This is one of the most popular single administration instruments for testing flow experience at work. Despite being a single administration retrospective instrument, it is a scientific, reliable and valid scale to test flow at work (Bakker, 2001, 2008). Items referred to flow at work as a momentary experience related with a specific activity rather than a general behaviour during work. Basically, they defined flow at work as an optimal experience that is characterized by high frequency in enjoyment (i.e. the emotional component), high frequency in absorption (i.e. the cognitive component) and high frequency in intrinsic interest (i.e. the motivation component) at work. Enjoyment refers to a particular feeling of happiness that is the outcome of cognitive and affective evaluations of the flow experience (cf. Diener, 2000; Diener & Diener,

1999). The state of being fully concentrated and engrossed in one's work, whereby time passes quickly and one has difficulties detaching oneself from work, characterizes absorption (Ghani & Deshpande, 1994; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi, 1996; Novak & Hoffman, 1997). Intrinsic interest refers to the need to perform a certain work-related activity with the aim of experiencing inherent pleasure and satisfaction in the activity (cf. Deci & Ryan, 1985; Moneta & Csikszentmihalyi, 1996; Novak & Hoffman, 1997; Trevino & Webster, 1992). Intrinsically motivated employees are continuously interested in the work they are involved in (Harackiewicz & Elliot, 1998), and they want to continue their work and are fascinated by the tasks they perform (Csikszentmihalyi, 1997).

The elements that make up this three-dimensional structure (i.e. enjoyment, absorption and intrinsic interest) have been proposed as the main components of the frequency of flow experience at work in a vast amount of research. For example, high correlations have been obtained in music teachers and students (Bakker, 2005), in secondary school teachers (Salanova et al., 2006), in workers from small and medium-sized companies (Demerouti, 2006) and in line managers (Nielsen & Cleal, 2010). On the basis of Information and Communication Technology users (students and workers), Rodríguez, Schaufeli, Salanova, and Cifre (2008) used confirmatory factor analyses (CFA) to show that the flow experience is composed of the expected three independent but related dimensions, i.e. enjoyment, absorption and intrinsic interest. Yet, the bidimensionality of flow (enjoyment and absorption) has also been noted in other studies (Ghani & Deshpande, 1994; Skadberg & Kimmel, 2004). Recently, Rodríguez, Cifre, Salanova and Åborg (2008) used CFA to provide evidence of the genuine core dimensions of frequency of flow experience: enjoyment and absorption in Spanish and Swedish university students. Thus, it seems that the role played by intrinsic interest is that of an antecedent of the frequency of flow experience rather than one of its components. This basic confusion regarding the structure of the flow experience needs further studies in order to clarify the structure of the frequency of flow experience, specifically in work contexts. Consequently, one of the aims of the current study is to use multigroup CFA to investigate the factorial structure of frequency of flow at work in order to test the invariance of the frequency of flow structure in work settings (tile workers and secondary school teachers). More particularly, we expect that:

Hypothesis 1 A traditional three-factor model including enjoyment, absorption and intrinsic interest (tested by frequency) will fit the data better than a two-factor model (in which items are assumed to be loaded in enjoyment and absorption) or a one-dimensional model (all items are assumed to be loaded on one underlying undifferentiated flow dimension).

What makes a job allow to experience flow more frequently?

The frequency of flow experience is a complex concept not only because of the difficulty involved in operationalizing it but also because the experience itself is often confounded with its prerequisites. This confusion has been common in research even as far back as the original description by Csikszentmihalyi (1975, 1990, 1997). This author defined the flow experience by means of nine characteristics: (1) clear goals; (2) immediate and unambiguous feedback; (3) personal skills well suited to given challenges; (4) merger of action and awareness; (5) concentration on the tasks at hand; (6) a sense of potential control; (7) a loss of self-consciousness; (8) an altered sense of time; and (9) experience that becomes autotelic. Consequently, the flow experience itself and it prerequisites are mixed up in his definition. However, it is generally accepted that flow prerequisites, the flow experience itself and flow consequences are aspects of flow that are closely related but should nevertheless be distinguished (Chen, Wigand, & Nilan, 1999; Ghani & Deshpande, 1994; Trevino & Webster, 1992). Recent research attends to the differentiation among flow prerequisites and the flow experience itself in different contexts such as public and private schools, web users, online shopping and physical activity (i.e. Bassi & Delle Fave, 2011; Chen et al., 1999; Guo & Poole 2009; Kawabata & Mallett, 2011; Keller & Bless 2008; Keller & Blomann 2008; Mesurado 2009; Pearce, Ainley, & Howard, 2005). Despite this advance, it seems that more research is needed to clarify this distinction in work settings where the confusion still remains. For example, in Nielsen and Cleal (2010), flow experience consists of nine items measuring (1) control of the situation; (2) enjoyment; (3) activity; (4) clarity; (5) skills; (6) challenge; (7) performance; (8) absorption; and (9) involvement. Again, the flow experience and its prerequisites are mixed together.

In order to determine what makes a job allow to experience flow and to differentiate it from the experience of flow itself, Csikszentmihalyi (1975) developed the Channel Model. Originally, he considered the flow experience as a situation in which challenges match people's skills. Subsequently, the Experience Fluctuation Model (EFM; Massimini & Carli, 1988) proposed that flow would occur when there is a balance between high levels of both challenges and skills. Specifically, 'when both challenge and skills are high, the person is not only enjoying the moment, but is also stretching his or her capabilities with the likelihood of learning new skills and of increasing self-esteem and personal complexity' (Csikszentmihalyi & LeFevre, 1989; p. 816). Despite of the empirical evidence of the EFM in different contexts, i.e. educational, technological, and competitive and recreational sports (e.g. Catley & Duda, 1997; Chen et al., 1999; Csikszentmihalyi & Rathunde, 1993; Moneta & Csikszentmihalyi, 1996), any study has tested this model

in work settings using questionnaires. Actually, EFM was designed to tackle the experience fluctuation in terms of intensity (instead of frequency) and based on a repeated data collection (instead of single administration questionnaire) (e.g. Csikszentmihalyi, Larson, & Prescott, 1977; Hektner, Schmidt, & Csikszentmihalyi, 2007). Consequently, this model is inadequate to test flow at work since this experience has been traditionally tested in terms of frequency and on a single administration questionnaire (e.g. Bakker, 2005, 2008; Salanova et al., 2006; Mäkikangas et al., 2010). Concretely, Bakker (2008; p. 411) posted that, considering the nature of work, 'it is technically not possible (yet) to measure real-time flow (while it happens), and this makes it difficult to map the precise prevalence of peak experiences at work'.

Notwithstanding the relevance of previous models, it is necessary to develop a specific model of analyses of flow in work settings. On the basis of the premises of previous models of flow, this model of flow at work should take into account the following: (1) previous research on flow experience; (2) the distinction between flow experience and its prerequisites; and (3) the characteristics of the measure of flow experience at work, which is tested by frequency (instead of intensity) and using single administration questionnaires. More specifically, and on the basis of previous research (e.g. Delespaul, Reis & de Vries, 2004; Eisenberger et al., 2005), our flow analysis model in work settings assumes that employees would experience flow more frequently when their job demands are perceived as highly challenging but they also believe that they have the skills to cope with the demands.

Similar to predecessor models of flow (Csikszentmihalyi & Csikszentmihalyi, 1988; Delle Fave & Bassi, 2000; Delle Fave & Massimini, 2005; Massimini & Carli, 1988), our flow analysis model in work settings also proposes eight areas, called channels, which represent the following experiences: Channel 1 (high frequency challenge and medium frequency skills are perceived) corresponds to arousal; Channel 2 (high frequency challenge and high frequency skills) corresponds to flow; Channel 3 (medium frequency challenge and high frequency skills), control is experienced; Channel 4 (low frequency challenge and high frequency skills) characterized by relaxation; Channel 5 (low frequency challenge and medium frequency skills), boredom is experienced; Channel 6 (low frequency challenge and frequency skills), a state of disengagement and physical disorganization is produced, corresponding to apathy; Channel 7 (medium frequency challenge and low frequency skills), worry is experienced; and finally, Channel 8 (high frequency challenge and low frequency skills) corresponds to anxiety.

The second relevant point of our flow analysis model in work settings is that the balance among high frequency challenge and high frequency skills is not necessarily objective but depends on employees' perceptions or beliefs, since the flow experience at work is a subjective experience (see Massimini, Csikszentmihalyi, & Carli,

1987, for an original version of measure of flow as intensity). Different scholars have shown that flow experiences at work are enhanced by the quality of the work experiences rather than the objective complexity of the tasks. In particular, studies in work settings (Salanova et al., 2006) found that those people with high beliefs in their skills experienced flow more frequently than those with low beliefs in their skills. Thus, high perceived skills, which are well matched with high perceived challenges, are necessary prerequisites to experience flow (Salanova et al., 2006).

Despite the empirical evidence of flow experience at work, there is a lack of research in which the frequency of flow experience (i.e. enjoyment, absorption and intrinsic interest) and the frequency of its prerequisites (i.e. high balanced perceptions of challenges and skills) are tested together, but at the same time differentiated, in the same study. In order to solve these tricky questions about the distinction of the frequency of flow experience and its prerequisites, more studies need to be conducted specifically in work contexts. Hence, the second aim of the current study is to test, in the same study, the frequency of the flow experience and its prerequisites (i.e. challenge and skills) at work (tile workers and secondary school teachers) on the basis of the flow analysis model in work settings. We expect that:

Hypothesis 2 Workers, independently of occupation, who perceive balanced high frequency of challenge and skills in their jobs will experience flow more frequently than others who perceive different combinations between challenge and skills.

Looking for the jobs in which flow is most frequently experienced?

Different scholars have tested the frequency of flow experience in different work settings, e.g. music teachers (Bakker, 2005), secondary school teachers (Salanova et al., 2006), Information and Communication Technology users (Rodríguez, Schaufeli et al., 2008), line managers (Nielsen & Cleal, 2010), employment agency workers (Mäkikangas et al., 2010) and workers from different occupations (Demerouti, 2006; Salanova, Martínez, Cifre, & Schaufeli, 2005). This research provides evidence that the frequency of flow experience can be felt not only by artists or athletes but also by workers. However, none of these studies explore the differences in the frequency of the flow experience and its prerequisites across different kinds of jobs on the basis of a flow analysis model in work settings.

According to previous research on intensity of flow (Csikszentmihalyi, 1975; Delle Fave & Bassi, 2000; Massimini & Carli, 1988), and by extending this evidence to the flow analysis model in work settings, it is plausible to expect that workers in any occupation may experience flow frequently while doing the tasks their job involves. In particular, this frequency of flow experience should be produced when prerequisites of

frequency of challenge and skills are both high and balanced. Employees (regardless of the occupation) could experience flow more frequently when the tasks in their jobs are perceived as challenging and they also perceive themselves as having high frequencies in skills that enable them to cope with those challenging tasks (e.g. Salanova et al., 2006). Despite the experience of the frequency of flow regardless of the type of occupation, previous results (Salanova et al., 2005) from a study on 770 workers in different jobs (i.e. office workers, university lecturers, technical staff, laboratory workers, sales staff, tile workers and managers) showed significant differences in the frequency of flow experience. More specifically, managers and university lecturers (i.e. both employees working with 'people') experienced flow more frequently than the other occupational workers, particularly more than office and tile workers (i.e. employees working with 'data and things'). It seems that, as expected, more challenging occupations increase the possibilities of experiencing flow at work more frequently if workers believe that they have the skills needed to cope with the challenges of their job. The authors proposed that the frequency of the flow experience does not depend on age or gender but on the type of occupation. Workers in intrinsically more motivating jobs (e.g. managers, supervisors and university lecturers) could experience flow at work more frequently than those in other intrinsically less motivating professions (e.g. production workers). Furthermore, they noted that the more creative jobs, i.e. work settings in which job resources are higher (e.g. autonomy, feedback and variety) (Warr, 1990, 2007), allowed employees to experience flow at work more frequently. In these positive contexts, workers may become engrossed in carrying out the activity and not only in the results of the task. Consequently, they could experience internally motivating activities more frequently than other workers in more routine and less creative jobs, e.g. production workers.

Although these previous results from Salanova et al. (2005) are relevant, only the differences in the frequency of flow experience itself were tested among occupations. Moreover, in this study the frequency of flow experience was tested according to a different conceptualization, i.e. absorption, intrinsic satisfaction and skills, which confounds the experience with the prerequisites. More research is needed in work settings in order to test in which jobs flow more frequently is experienced than others by taking into account the flow experience itself and its prerequisites. With this aim in mind, the third objective in this study is to explore whether there are significant differences in the frequency of the flow experience and in its prerequisites according to the occupation. Two specific types of occupations that are characterized by working with different elements/users (see Fine & Cronshaw, 1999) were tested: production workers (tile workers) and human-services employees (secondary school teachers). These specific samples were selected for two main reasons: (1) the theoretical one is

that there is evidence in favour of the idea that jobs characterized by frequent challenge, and thus more creative jobs (in our case, secondary school teachers), enhance the probability of employees experiencing flow more frequently than employees in less frequent challenging, less creative and less complex jobs (in our case, tile workers); and (2) the empirical reason is that the only study on the frequency of flow experience and different occupations that we know of, i.e. Salanova et al. (2005), provided evidence to show that flow experience was more frequent for managers and university lecturers than for office and tile workers. Hence, we expect to find that:

Hypothesis 3 There will be significant differences in the frequency of the flow experience between workers from two different occupations: tile workers (i.e. production workers) and secondary school teachers (i.e. human-services employees). More specifically, we expect secondary school teachers to experience flow more frequently than tile workers.

Method

Sample and procedure

The present study used a cross-sectional design involving a total sample of 957 Spanish employees (53% women). Self-report questionnaires were distributed among two samples: (1) Sample 1 consisted of 474 (83% response rate) employees from the tile industry (i.e. production workers; 51% of the total sample) from three private ceramic industries; and (2) Sample 2 consisted of 483 (81% response rate) secondary school teachers (i.e. human-services employees; 49% of the total sample) from 34 schools (83% of them public). The mean age of the sample as a whole was 36 years and 8 months (SD = 9 years) with ages ranging from 18 to 62 years. In Sample 1 (i.e. employees from the tile industry, $N = 474$), 52% were men, ages ranged from 18 to 62 years ($M = 33$; SD = 8 years) and 83% had permanent contracts. As regards professional category, tile workers occupied a variety of jobs: 98% were blue-collar operators who were under the direct influence of the rate of production and of the tile machinery (e.g. people working on presses or kilns and in maintenance), and 2% were sales agents. In Sample 2 (i.e. secondary school teachers, $N = 483$), 56% were women and ages ranged from 23 to 60 years ($M = 40$; SD = 8 years). As regards the professional category, 87% were graduates and 62% had permanent contracts at their school (85% were public schools).

Researchers distributed self-report questionnaires in envelopes (2004 and 2005) together with a cover letter explaining the purpose of the study. Participants were asked to fill out the questionnaires as a part of an occupational health and safety audit. This audit project was backed by different public organisms with the main aim of generating healthy organizations and raising the quality of working life. Participation was voluntary with guaranteed confidentiality. Respondents returned the completed questionnaires in a sealed envelope either to the person who had distributed them or directly to the research team.

In order to test whether the sociodemographic variables differed between the two samples, we compared them in relation to the background variables (i.e. frequency of flow experience, challenge and perceived skills) of both samples. The following sociodemographic variables were tested: (1) age and gender in both samples; (2) company, type of jobs and contract (permanent versus temporary) in tile workers; and (3) educational level (graduates versus teachers), type of contract (permanent versus temporary) and type of school (private versus public) in secondary school teachers. Analyses of variance and chi-square showed non-significant differences in the background variables as regards the sociodemographic variables in both samples.

Measures

Frequency of flow experience

We measured the 'frequency of the flow experience at work' using a Spanish adaptation (Salanova et al., 2006) of the WOLF (WOrk-reLated Flow; Bakker, 2001) to assess three dimensions: enjoyment (four items; e.g. 'When I am working, I feel happy'), absorption (six items; e.g. 'When I'm working, I forget everything around me') and intrinsic interest (six items; e.g. 'I get my motivation from the work itself, and not from the rewards for it'). Participants had to answer how often (i.e. the frequency) they had had these experiences at work in the last 6 months on a seven-point scale (0 'never' to 6 'every day').

Frequency of flow prerequisites

We measured the frequency of 'flow prerequisites' by assessing two dimensions: perceived challenge and perceived skills. *Challenge* was measured by two items from the dedication scale of the Spanish version (Salanova et al., 2000) of the Utrecht Work Engagement Scale (UWES; Schaufeli, Salanova, González-Romá, & Bakker, 2002). The two items (0 'never' and 6 'always') were 'My job is stimulating and inspires me' and 'My job gives me new challenges'. Secondly, *perceived skills* was measured by six items (0 'never' and 6 'always') of the professional competence scale from the Spanish version (Salanova et al., 2000) of the Maslach Burnout Inventory—General Survey (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996). An example of the items used is 'I can effectively solve the problems that arise in my work'. Cronbach's alpha and the intercorrelations of each scale in each sample are shown in Table I.

Data analyses

Firstly, we calculated internal consistencies (Cronbach's α), descriptive analyses and intercorrelations among the variables in the study using SPSS Statistics 19.0 (IBM Company, New York, USA). Secondly, we computed a

Table I. Means (*M*), standard deviations (SD), correlations (tile workers below the diagonal), *t*-test and Cronbach's alpha (tile workers/ secondary school teachers) on the diagonal (N = 957)

Variables	Tile (*N* = 474)		Teachers (*N* = 483)		df	*F*	η^2	1	2	3	4
	Mean	SD	Mean	SD							
1. Flow: enjoyment	4.03	1.33	4.48	1.10	1,955	31.02***	0.038	0.89/.91	0.53***	0.58***	0.64***
2. Flow: absorption	3.09	1.24	3.56	1.05	1,955	38.65***	0.206	0.55***	0.82/0.79	0.51***	0.44***
3. Challenge	3.30	1.67	3.83	1.28	—	—	—	0.55***	0.65***	*r* = 0.66***/0.66***,[†]	0.58***
4. Skills	4.40	0.95	4.27	0.81	—	—	—	0.41***	0.43***	0.48***	0.78/0.82

Notes. df: degrees of freedom.
[†]This is a correlation between the two items that compose the 'challenge' variable.
***$p < 0.001$.

procedure to test for bias due to common method variance. Different methods to test for common factor bias are shown in Podsakoff, MacKenzie, Lee and Podsakoff (2003). Since all of them display potential problems, we used the simplest and one of the most widely utilized techniques: Harman's single factor test (Iverson & Maguire 2000; cf. Podsakoff et al., 2003) with CFA using the Analysis of MOment Structures (AMOS) software package (v. 19.0). The most important limitation is that Harman's single factor test is a diagnostic technique for assessing the extent to which common method variance may be a problem, but it does not actually control for method effects statistically. In order to get round this limitation, we also computed an alternative multiple factor test with CFA, and finally, we checked for significant differences between this multiple factor model and Harman's single factor model.

Thirdly, the AMOS 19.0 software program was used to implement different second-order CFA in order to confirm the factorial structure of the frequency of flow experience scale. Four plausible models were compared: M1, the three-factor model, in which the 16 items load in the original specific dimensions of the flow experience: enjoyment, absorption and intrinsic interest; M2, the first-order factor, in which the original 16 items load in a single latent factor; M3, a second-order two-factor model, in which items load in two specific dimensions of flow experience: enjoyment and absorption; and finally, M4, the one-factor reduced model, in which the 10 items (from enjoyment and absorption scales) load in a single latent factor. Different goodness-of-fit indices were tested: the χ^2 goodness-of-fit statistic, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), Tucker–Lewis Index (TLI, also called the Non-normed Fit Index), Incremental Fit Index (IFI) and Expected Cross-Validation Index (ECVI). Values below 0.08 for the RMSEA, the lowest for ECVI and above 0.90 for the rest of the indices indicate an acceptable fit (Byrne, 2001).

Fourthly, we computed different multiple analyses of variance (MANOVA) with the SPSS program (v. 19.0) to test for (1) significant differences in the frequency of the flow experience (as the dependent variable) according to the 'group' (established on the prerequisites of

flow as an independent variable), taking tile workers and secondary teachers into account simultaneously following the hypothesis of the flow analysis model in work settings; and (2) significant differences in the frequency of the flow experience (as the dependent variable) across occupations (i.e. tile workers and secondary school teachers as independent variables). In order to interpret the relationship among the frequency of prerequisites of flow (i.e. challenge and skills) and the frequency of the flow experience itself, we took ±1SD with respect to the mean in each variable (i.e. challenge and skills). Specifically, a high value in a variable corresponds to scores one standard deviation higher than the mean, whereas a low value corresponds to scores one standard deviation below the mean. This procedure allows us to select the participants with extreme values in these variables (high scores, +1SD; low scores, −1SD), as recommended by previous research (i.e. Cohen & Cohen, 1983; Jaccard, Turrisi, & Wan, 1990).

Results

Descriptive analyses

Table I displays the means, standard deviations, internal consistencies (Cronbach's alpha) and intercorrelations of the variables for each sample separately. All the alpha values meet the 0.70 criterion (Nunnally & Bernstein, 1994), as they range from 0.78 to 0.91. The pattern of correlations shows that, as expected, frequency of enjoyment, absorption and intrinsic interest (i.e. the frequency of flow experience itself) are positively and significantly related in both samples. The prerequisites of flow also show positive and significant intercorrelations with one another: frequency of challenge shows a significant and positive relationship to frequency of skills in both samples. Additionally, frequency of challenge as well as skill shows higher positive correlations with the frequency of the flow experience (i.e. enjoyment, absorption and intrinsic interest) in tile workers and in secondary school teachers.

Furthermore, the results of Harman's single factor test with CFA for the frequency of the flow experience and the frequency of flow prerequisites reveal a poor fit to the data for the variables in the study,

Table II. Fit indices of the confirmatory factor analyses for the frequency of flow experience scale ($N = 957$)

Model	χ^2	df	RMSEA	CFI	IFI	TLI	ECVI	χ^2 diff	RMSEA	CFI	IFI	TLI	ECVI
M1. Three-factor model	2630.25	204	0.112	0.73	0.74	0.68	2.897						
M2. One-factor model (16 items)	1944.60	280	0.09	0.81	0.81	0.78	2.170						
Difference between M2 and M1								685.65	0.02	0.08	0.07	0.10	0.727
M3. Two-factor model	659.30	68	0.07	0.88	0.88	0.84	0.778						
Difference between M3 and M1								1970.95	0.04	0.01	0.07	0.16	2896.22
Difference between M3 and M2								1285.30	0.06	0.07	0.07	0.06	1.392
M4. One-factor model (10 items)	1237.60	70	0.13	0.77	0.77	0.70	1.380						
Difference between M4 and M1								1392.65	0.02	0.04	0.03	0.02	1.517
Difference between M4 and M2								707.00	0.04	0.04	0.04	0.08	0.790
Difference between M4 and M3								578.30	0.06	0.11	0.11	0.14	0.602
M3 revised. Two-factor model revised	462.88	66	0.07	0.92	0.92	0.90	0.577						
Difference between M3r and M1								2167.37	0.04	0.19	0.18	0.22	2.32
Difference between M3r and M2								1481.72	0.02	0.11	0.11	0.12	1.593
Difference between M3r and M3								196.42	0.00	0.04	0.04	0.06	0.201
Difference between M3r and M4								774.72	0.06	0.15	0.15	0.20	0.803

Notes. χ^2: Chi-square; df: degrees of freedom; RMSEA: Root Mean Square Error of Approximation; CFI: Comparative Fit Index; IFI: Incremental Fit Index; TLI: Tucker–Lewis Index; ECVI: Expected Cross-Validation Index.

$\chi^2(7) = 841.85$, RMSEA $= 0.35$, CFI $= 0.63$, NFI $= 0.61$, TLI $= 0.47$, IFI $= 0.63$, AIC $= 857.85$. To avoid the problems related to the use of Harman's single factor test (see Podsakoff et al., 2003), we compared the results with an alternative model that included multiple latent factors. Results show a significantly lower fit of the model with one single factor when compared with the model with multiple latent factors, Delta $\chi^2(3) = 703.67$, $p < 0.001$. Hence, one single factor could not account for the variance in the data. Consequently, we may consider common method variance not to be a serious deficiency in this dataset.

Confirmatory factor analyses for the frequency of flow experience scale

Table II shows the results of the second-order CFA conducted to confirm the structure of the frequency of the flow experience at work by multigroup analyses (Byrne, 2001). The findings indicate that the original three-factor model of the frequency of the flow experience (M1) does not show adequate goodness-of-fit indices in either the tile or the teacher samples. Similar poor findings are observed when M2, the one-factor original model, is tested. None of these models showed adequate goodness-of-fit indices and thereby did not lend support to consider either three-factor or one-factor validity for this scale to measure the frequency of flow experience at work. A review of Table II shows that M3,[1] a second-order two-factor model composed of enjoyment and absorption, fits the data better than the previous models: M1, the original three-factor model, Delta $\chi^2(136) = 1970.95$, $p < 0.001$;

M2, the one-factor model, Delta $\chi^2(212) = 1285.30$, $p < 0.001$; and M4, the 10-item one latent factor model, Delta $\chi^2(2) = 578.3$, $p < 0.001$. According to the Modification Index, the fit of the hypothesized M3 model could be significantly improved, Delta $\chi^2(2) = 196.42$, $p < 0.001$, by constraining one pair of errors (absorption4–absorption5, which refer to the difficulty involved in detaching oneself from the activity). Again, this revised M3 fits significantly better than previous models: M1, the original three-factor model, Delta $\chi^2(138) = 2167.37$, $p < 0.001$; M2, the original one-factor model, Delta $\chi^2(214) = 1481.72$, $p < 0.001$; and M4, the 10-item one-factor model, Delta $\chi^2(4) = 774.72$, $p < 0.001$.

In sum, the revised M3—in which the frequency of the flow experience is composed of 10 items distributed in two latent factors (enjoyment and absorption)—is the best model, with all fit indices satisfying the criteria. Results show significant first-factor weights higher than 0.72 and 0.79 and second-factor weights higher than 0.44 and 0.23 for tiles and teachers, respectively. Based on these previous empirical analyses, in the following analyses, the frequency of the flow experience will be computed on the basis of just its two core dimensions: enjoyment and absorption. On the basis of these results, and regarding *Hypothesis 1*, statistical analyses do not reject the null hypothesis.

Testing the flow analyses model in work settings: Frequency of flow experience and flow prerequisites

Table III shows the descriptive analyses for the frequency of the flow experience (i.e. enjoyment and absorption) of four groups of workers: tile workers and secondary school teachers being taken into account simultaneously. According to the flow analysis model

---

[1]The error variance of enjoyment indicator was constrained by using the formula $[(1 - \alpha) * \sigma^2]$ in order to avoid error misrepresenting relationships between variables (Stephenson & Holbert, 2003).

Table III. Means (M) and standard deviations (SD) for frequency of flow experience (i.e. enjoyment and absorption) by 'groups' based on the frequency of flow prerequisite combinations ($N = 149$)

Frequency of flow experience	Group 1 Low challenge + high skills ($n = 12$; 8%)		Group 2 High challenge + high skills ($n = 64$; 43%)		Group 3 Low challenge + low skills ($n = 71$; 48%)		Group 4 High challenge + low skills ($n = 2$; 1%)		df	F	η^2	Tukey's HSD
	M	SD	M	SD	M	SD	M	SD				
Enjoyment	5.21	1.12	5.53	0.57	2.89	1.28	5.00	0.00	3,145	80.79***	.59	2 > 3***; 3 < 1,4***
Absorption	2.97	1.00	4.52	0.98	2.04	0.97	3.67	0.23	3,145	71.92***	.62	2 > 3,1***; 3 < 1***

Notes. Results are significant at ***$p < 0.001$. Challenge and skills are tested by frequency. df: degrees of freedom.

in work settings, these four groups are characterized by a combination of high/low frequencies on challenge and skills (the prerequisites of flow). We selected participants with high (+1SD) and low (−1SD) frequencies on flow prerequisites, i.e. with high (+1SD) and low (−1SD) frequencies on challenge and with high (+1SD) and low (−1SD) frequencies on skills in both samples analysed together ($N = 957$). Following this process (Cohen & Cohen, 1983; Jaccard et al., 1990), participants with extreme conditions in the two samples simultaneously analysed (i.e. high/low frequencies on challenge and high/low frequencies on skills) were selected ($N = 149$; 15%). This resulted in the four groups of frequency of challenge and skills combinations proposed by the different channels. Workers in jobs characterized by low frequency of challenge plus high skills made up Group 1 ($n = 12$; 8%); Group 2 included workers in jobs characterized by a balance between high frequency of challenge and high frequency of skills ($n = 64$; 43%); Group 3 included workers in jobs characterized by a balance between low frequency of challenge and low frequency of skills ($n = 71$; 48%); and, finally, Group 4 comprised workers with a perception of high frequency of challenge plus low frequency of skills ($n = 2$; 1%). Chi-square analyses revealed that the distribution of the sample in the four quadrants is statistically significant, $\chi^2(3) = 100.26$, $p < 0.001$.

Results in Table III also show that only 43% ($n = 64$) of the workers in our 'extreme' sample ($n = 149$) (6% of the whole sample of 957) are classified in Group 2 (high frequency of challenge plus high frequency of skills), in which the prerequisites of the frequency of flow experience are present in balanced high frequencies. According to the flow analysis model in work settings, this Group 2 will experience flow at work more frequently. Results of a MANOVA taking the 'group' (established on the basis of the combinations of frequency of flow prerequisites) into account as the independent variable and the frequency of the flow experience (i.e. enjoyment and absorption) as dependent variables show consistent statistically significant differences among the four groups in the frequency of the flow experience itself, $F(6,288) = 46.23$, $p < 0.001$. More specifically, these significant differences were shown in both dimensions of the frequency of flow experience: enjoyment, $F(3, 145) = 80.79$, $p < 0.001$, $\eta^2 = 0.59$, and absorption, $F(3,145) = 71.92$, $p < 0.001$, $\eta^2 = 0.62$. According to Cohen (1988), these significant differences are considered to be 'large' effects based on the effect size $d = 2.73$ and $d = 2.53$ for enjoyment and absorption, respectively.

We employed Tukey's HSD follow-up tests for pairwise comparisons among the four groups that were corrected for experiment-wise error rates. As expected, Group 2 (workers with a perceived balance between high frequency of challenge and high frequency of skills) had significantly higher scores in the frequency

of both flow experience dimensions (i.e. enjoyment and absorption) than the rest of the groups—above all Group 1 (low frequency of challenge and high frequency of skills) and Group 3 (workers with balanced low frequency of challenge and low frequency of skills). On the other hand, Group 3 (balance between low frequency of challenge and low frequency of skills) shows significantly lower scores in the frequency of flow experiences; that is to say, they experience enjoyment and absorption less frequently than the other groups.

In accordance with the predictions based on the flow analysis model in work settings, only Group 2 experiences flow (i.e. enjoyment and absorption) since it is located in Channel 2, which is characterized by a balance between high frequency of challenge and high frequency of skills. A deeper analysis of this group ($n = 64$; 43%) who experiences flow reveals that it is made up of 35 tile employees (55%) and 29 secondary school teachers (45%) (Table IV). Following the flow analysis model in work settings, the rest of the groups describe other experiences that are opposite of flow. Firstly, Group 3 ($n = 71$; 48%) corresponds to Channel 6 (balance between low frequency of challenge and low frequency of skills), in which workers experience apathy. Specifically, this group is made up of 43 tile employees (61%) and 28 secondary school teachers (39%). Secondly, Group 1 ($n = 12$; 8%) corresponds to Channel 4 (low frequency of challenge plus high frequency of skills), in which workers experience relaxation. This group is basically made up of 11 tile employees (92%) and only 1 secondary school teacher (8%). Finally, Group 4 ($n = 2$; 1%) corresponds to Channel 8 (high frequency of challenge plus low frequency of skills), in which workers experience anxiety at work. This group is made up exclusively of secondary school teachers ($n = 2$, 100%) (Table IV). On the basis of these results, and with regard to *Hypothesis 2*, the statistical analyses rejected the null hypothesis.

Frequency of flow experience across occupations

In order to test whether there are significant differences in the frequency of the flow experience at work between different types of occupations (i.e. production and human-services employees), MANOVAs were calculated taking into account the 'occupation' as the independent variable and the frequency of the flow experience (i.e. enjoyment and absorption) as the dependent variable (Huberty & Morris, 1989).

Results showed consistent statistically significant differences between tile workers and secondary school teachers in the frequency of the flow experience, $F(2,954) = 22.74$, $p < 0.001$. As expected, secondary school teachers experienced flow more frequently than tile workers, i.e. absorption, $F(1,955) = 38.65$; $p < 0.001$; $d = 0.86$, 'large' effect, and enjoyment, $F(1,955) = 31.02$; $p < 0.001$; $d = 0.96$, 'large effect' (Table I). Despite the fact that, as *Hypothesis 2* has confirmed, both of the occupations (tile workers and secondary school teachers) could work in contexts in which the conditions to experience flow (high frequency of challenges and high frequency of skills) could be presented (55% in tile workers and 45% in secondary school teachers), secondary school teachers experience the phenomenon of flow more frequently than tile workers. Further analyses based on the distribution among groups per occupation (tile workers and secondary school teachers) reveal similar results. In fact, the distribution shows that when considering the type of occupation, secondary school teachers are mainly classified in Group 2 (flow; 48%), whereas tile workers are mainly classified in Group 3 (apathy; 43%) (Table IV). Consequently, and with regard to *Hypothesis 3*, statistical analyses rejected the null hypothesis.

Discussion

The aims of the current study was to test (1) the factorial structure of the frequency of flow experience at work in two samples (tile workers and secondary school teachers); (2) the flow analysis model in work settings by differentiating the frequency of the flow experience at work and the frequency of its prerequisites (i.e. challenge and skills); and (3) whether there are significant differences in the frequency of flow experiences depending on the occupation (tile workers and secondary school teachers) on the basis of the flow analysis model in work settings.

With regard to the first objective, we expected a traditional three-factor model of frequency of flow

Table IV. Classification of workers per group and per number of occupation considering the prerequisites of flow experience

Group	Characteristics	N total per group (%)	Per group		Per occupation	
			Tile workers n (%)	Teachers n (%)	Tile workers ($n = 99$) n (%)	Teachers ($n = 60$) n (%)
Group 1	'Relaxation'	12 (8)	11 (92)	1 (8)	11 (11)	1 (2)
Group 2	'Flow'	64 (43)	35 (55)	29 (45)	35 (35)	29 (48)
Group 3	'Apathy'	71 (48)	43 (61)	28 (39)	43 (43)	28 (47)
Group 4	'Anxiety'	2 (1)	—	2 (100)	—	2 (3)

experience in work settings that included enjoyment, absorption and intrinsic interest to fit the data better than a two-factor model (in which items are assumed to be loaded in enjoyment and absorption) or a one-dimensional model (all items are assumed to be loaded on one underlying undifferentiated flow dimension) (*Hypothesis 1*). The multigroup confirmatory factorial analyses conducted among both tile workers and secondary school teachers showed the two-factor structure of the frequency of flow experience when tested by the WOLF Inventory (Bakker, 2001). Thus, statistical analyses accepted the null hypothesis (*Hypothesis 1*). Contrary to previous research (Bakker, 2005; Demerouti, 2006; Nielsen & Cleal, 2010; Salanova et al., 2006), the frequency of flow experience at work (i.e. among tile workers and secondary school teachers) is not made up of one or three dimensions. Results from the latest research on the measurement of the frequency of flow experience at work (Rodríguez, Cifre et al., 2008; Rodríguez, Schaufeli et al., 2008) offer evidence in favour of the core dimensions of the frequency of flow experience at work: enjoyment (e.g. Ghani & Deshpande, 1994; Moneta & Csikszentmihalyi, 1996) and absorption (e.g. the central characteristics of flow; Csikszentmihalyi, 1975). It seems that the particular feeling of happiness (enjoyment; cf. Diener, 2000) and the state of being fully concentrated and engrossed in one's work, whereby time passes quickly (absorption; cf. Novak & Hoffman, 1997), constitute the real essence of the flow experience in work settings. On the other hand, it seems that intrinsic interest (cf. Deci & Ryan, 1985; Moneta & Csikszentmihalyi, 1996) may play another role in the flow experience, since it is not a constituent dimension but possibly an antecedent (Ghani & Deshpande, 1994; Skadberg & Kimmel, 2004). In fact, some authors have shown a positive relation among intrinsic interest, the core dimensions of flow experience (enjoyment and absorption) and satisfaction at work (e.g. Finneran & Zhang, 2003). However, more research in terms of the antecedents of the flow experience in work settings needs to be conducted in order to give an accurate answer.

On the basis of the premises of the flow analysis model in work settings, we also expected that only workers, independently of occupation, who perceive balanced high frequency of challenge and skills in their jobs would experience flow more frequently, than others who perceive different combinations between challenge and skills (*Hypothesis 2*). MANOVA showed that, as expected, employees (tile workers and secondary school teachers simultaneously analysed) perceiving a balance between high frequencies of challenge and skills at work (Group 2; 6% of the total sample) experienced flow more frequently compared with others who had a different combination of frequencies of challenge and skills. Thus, statistical analyses rejected the null hypothesis (*Hypothesis 2*). More specifically, evidence in favour of Channel 2 is also obtained using

the frequency of the flow experience itself (i.e. enjoyment and absorption) and its prerequisites (i.e. the perception of a balance between high frequency of challenge and high frequency of skills) in work settings, independently of the type of occupation. These findings are consistent with suggestions from previous research in different areas, such as public and private schools, web users, online shopping and physical activity (i.e. Bassi & Delle Fave, 2011; Chen et al., 1999; Guo & Poole 2009; Kawabata & Mallett, 2011; Keller & Bless 2008; Keller & Blomann 2008; Mesurado 2009; Pearce et al., 2005), and in work settings (Salanova et al., 2006) that assume that (1) challenge and skills are prerequisites of flow and (2) a balance between high challenge and high skills creates an optimal subjective experience relative to other combinations of skills and challenge independently of occupation [tile workers and secondary school teachers (Channel 2)]. These results also allow us to distinguish between the flow experiences itself and its prerequisites independently in two occupations: tile workers and secondary school teachers. This represents an advance in the research on flow at work since it reduces the confusion about the frequency of flow experience and the conditions that make a job more probably to allow people experience flow more frequently. As suggested by previous scholars, it seems that the frequency of flow prerequisites and the frequency of flow experience in the work setting are also closely related aspects of flow but should be distinguished (Chen et al., 1999; Ghani & Deshpande, 1994; Trevino & Webster, 1992). Different experiences at work were also obtained on the basis of other combinations of challenge and skills, i.e. apathy (Group 3; Channel 6), relaxation (Group 1; Channel 4) and anxiety (Group 4; Channel 8), as proposed by previous flow literature (Csikszentmihalyi & Csikszentmihalyi, 1988; Delle Fave & Bassi, 2000; Delle Fave & Massimini, 2005; Massimini & Carli, 1988; Salanova et al., 2006). It must be noted that a particular result was found in Group 4, characterized by high challenge plus low skills. According to the model of flow in work settings, this group is characterized by being more prone to anxiety. However, it is odd to note that, according to Table III, this group shows scores in enjoyment and absorption that are not significantly different from those of Group 2 (the group who experience flow more frequently). The values of enjoyment in this Group 4 are especially high, and this could be produced as a consequence of the high frequency of challenge scores that workers perceived. It is important to note that only an increase in frequency of skill perception is needed in this group to change from Channel 8 to Channel 2, i.e. the flow channel. All in all, we could also explain this interesting finding in terms of the artefactual result, since only two workers are included in this group. A deeper analysis reveals that, in fact, the workers in this group are exclusively secondary school teachers (100%) working in public

schools with fixed contracts, which may explain at least the challenge frequencies in this group.

Finally, according to the third objective of the current study, and on the basis of previous studies on flow experience at work from different occupations (Demerouti, 2006; Salanova et al., 2005), we expected significant differences in the frequency of the flow experience between workers from two different occupations: tile workers (i.e. production workers) and secondary school teachers (i.e. human-services employees) on the basis of the flow analysis model in work settings. More specifically, we expected secondary school teachers to experience flow more frequently than tile workers (*Hypothesis 3*). Again, MANOVA showed that secondary school teachers indeed experienced flow more frequently than tile workers. That is to say, school teachers felt enjoyment and absorption more frequently than tile workers. This means that although both samples may experience the prerequisites of flow (50% approximately), secondary school teachers (i.e. human-services employees) experience flow more frequently than tile workers (i.e. production workers who depend on the pace of the machinery). In fact, it seems that secondary school teachers are mainly classified in the flow group (Group 2), compared with tile workers who are mainly classified in 'apathy' group (Group 3). Thus, statistical analyses rejected the null hypothesis (*Hypothesis 3*). These results are in line with the study of flow in different occupations conducted by Salanova et al. (2005). Despite both types of workers in the study perceive that their jobs are challenging and that they have the skills to cope with these job demands, it seems that secondary school teachers perceive that they experience flow more frequently than tile workers. There is evidence that human-services employees (and specifically teachers) experience flow more frequently than production workers (particularly office and tile workers). It seems that when employees works with people, in intrinsically motivating and creative occupations (e.g. the settings in secondary school teachers), and with more resources (i.e. autonomy, feedback and variety) (Warr, 1990, 2007), they are more likely to report higher perception of flow experience at work (Gold & Roth, 1993; Salanova et al., 2005). If the work conditions are relevant to increase the probability to experience flow, it seems that the perception of workers about the experience of flow itself increases when workers work with 'people' (Salanova et al., 2005).

Limitations and strengths

One of the limitations of this study is that the results must be interpreted with caution because of its non-experimental nature. However, this limitation has been reduced by considering a broad sample including different occupations (i.e. tile workers and secondary school teachers) from different enterprises belonging to two different economic sectors (i.e. tile companies and public and private secondary schools). Another limitation is that the data were obtained by self-report measures. However, we followed the Harman test (Podsakoff et al., 2003) and checked for common method variance in our data. Although we cannot completely rule out the possibility that method variance may play a role, results show that this is not a serious problem in the present study. Thirdly, this study is limited to the context of tile workers and secondary school teachers, and consequently, findings cannot be generalized. Thus, a wide range of occupations as well as multigroup comparisons and cross-cultural studies need to be accounted for in future studies. Finally, although the sample size is quite large, the subsamples in each channel are still rather small, particularly in Group 4. Finally, a retrospective cross-sectional design was used. Further research with longitudinal analyses will be useful to test the antecedents (i.e. working conditions) and consequences (i.e. individual, group and organizational outcomes) of the frequency of flow experience. Since 6% of secondary school teachers and 7% of tile workers experience flow, there is a special need for research to test the role of job resources (e.g. autonomy, feedback and variety) and personal resources (e.g. efficacy beliefs and intrinsic motivation) in the development of the frequency of flow experience at work.

Conversely, our study also has the following main strengths. Firstly, the current study integrates the literature on flow experience and its prerequisites in work settings by using frequency and single administration questionnaire. Secondly, it establishes that the flow experience at work is composed of two core dimensions, i.e. enjoyment and absorption. Thirdly, it attempts to test our flow analysis model in work settings by distinguishing the core dimensions of the flow experience (i.e. enjoyment and absorption) and its prerequisites (a balance of high challenges and skills) in the same study in work settings on the basis of frequency (instead intensity) and by using a single questionnaire administration. Fourthly, this study investigates the differences in the frequency of flow experiences across two occupations, i.e. tile workers and secondary school teachers.

Theoretical and practical implications

The present results may have some important implications for future flow research and practice at work. Firstly, the current study corroborates the two-factor structure of flow experience (i.e. enjoyment and absorption) tested by the frequency of flow in two different occupations: tile workers and secondary school teachers. This offers evidence of the bidimensionality of the frequency of flow experience, which leads to a more parsimonious understanding of the flow experience at work by testing its essence: frequency of enjoyment and absorption. The second implication is that the flow experience at work (measured by frequency instead of intensity) has been related with but, at the same time,

distinguished from the prerequisites of flow. This result provides support for the flow analysis model in work settings, since it analyses the impact of a balance of high challenge and skills being the real predictors of the flow experience at work. Also, these results give evidence of the accuracy to test the flow analysis model in work settings by using a single administration retrospective instrument in terms of frequency. Thirdly, the current study has demonstrated that there are significant differences in the frequency of the flow experience based on the type of occupation (but not in the perception about their prerequisites).

With regard to the practical implications, the results obtained in this study can be used as recommendations. Thus, the findings warn organizations of the need to take care of frequency of challenge and skills if they want their employees to obtain flow experiences more frequently. Specifically, results show the significance of organizations promoting job (e.g. autonomy, feedback and variety) and personal characteristics (e.g. creative and intrinsic motivation) in order to generate more challenging settings and more highly skilled employees, which in turn enhance the frequency of flow experience at work. In this sense, job (re)design plays a key role in being able to increase the frequency of one of the prerequisites of flow experience, i.e. workers' perceptions of challenge at work. Results also suggest that training plays a pivotal role in generating flow at work more frequently. This training should focus on promoting the development of skills that can help people to perceive themselves as being more skilful and as being capable of meeting the challenge that their work offers. Furthermore, another practical implication is related to the frequency of flow experience itself in work settings. Because it only has two dimensions (enjoyment and absorption), practitioners can measure the frequency of flow experience at work quickly and easily by using just a single questionnaire. Some research works have criticized the use of questionnaires because they do not yield good quality data for eliciting phenomenological perceptions, since subjects are not used to putting these perceptions into words (Massimini et al., 1987). Nevertheless, other works have shown them to be a strategy that can be used not only to collect retrospective data of past flow experiences but also to obtain a descriptive picture of these positive experiences (e.g. Bakker, 2008; Chen et al., 1999; Mäkikangas et al., 2010).

Final note

The current study shows that the frequency of flow experience and its prerequisites are not specific to athletes and artists, but also exist in work settings. Contrary to the claims of some traditional scholars, the frequency of flow experience at work is composed of two genuine dimensions: enjoyment and absorption. Although flow could be experienced in any occupation characterized by a perception of a balance of high frequency of challenges and high frequency of skills, secondary school teachers perceive that they experience flow more frequently than tile workers, especially when they are working at the machines' pace. Thus, this study has led to at least a tentative understanding of the frequency of flow experience and its prerequisites in work settings, that is to say, a clearer view of the dimensions of flow experience, what makes flow and who it is experienced by. We hope that our study will allow scientists and practitioners to go a step forward in measuring and promoting the experience of flow in work domains, above all in this time of social, occupational and economic crisis.

Acknowledgements

REFERENCES

Bakker, A. B. (2001). *Questionnaire for the assessment of work-related flow: The WOLF*. Utrecht University, The Netherlands: Department of Social and Organizational Psychology. The Netherlands.

Bakker, A. B. (2005). Flow among music teachers and their students: The crossover of peak experiences. *Journal of Vocational Behaviour*, 66, 26–44.

Bakker, A. B. (2008). The work-related flow inventory: Construction and initial validation of the WOLF. *Journal of Vocational Behavior*, 72, 400–414.

Bassi, M., & Delle Fave, A. (2011). *Optimal experience and self-determination at school: Joining perspectives. Motivation and emotion*. Netherlands: Springer.

Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications and programming*. Mahway, New Jersey (London): Lawrence Erlbaum Associates, Publishers.

Catley, D., & Duda, J. L. (1997). Psychological antecedents of the frequency and intensity of flow in golfers. *International Journal of Sport Psychology*, 28, 309–322.

Chen, H., Wigand, R. T, & Nilan, M. S. (1999). Optimal experience of Web activities. *Computers in Human Behaviour*, 15, 585–608.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd Ed.). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco, CA: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life*. New York: HarperCollins.

Csikszentmihalyi, M. (2003). *Good business. Leadership, flow and the making of meaning*. London: Coronet Books.

Csikszentmihalyi, M., & Csikszentmihalyi, I. S. (1988). *Optimal experience: Psychological studies on flow in consciousness*. New York: Cambridge University Press.

Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology*, 56, 815–822.

Csikszentmihalyi, M., & Rathunde, K. (1993). The measurement of flow in everyday life: Toward a theory of emergent motivation. *Nebraska Symposium on Motivation*, 40, 57–97.

Csikszentmihalyi, M., Larson, R., & Prescott, S. (1977). The ecology of adolescent activities and experiences. *Journal of Youth and Adolescence*, 6, 281–294.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum Press.

Delespaul, P., Reis, H, & de Vries, M. (2004). Ecological and motivational determinants of activation: Studying compared to sports and watching TV. *Social Indicators Research*, 67, 129–143.

Delle Fave, A., & Bassi, M. (2000). The quality of experience in adolescents' daily lives: Developmental perspectives. *Genetic, Social, and General Psychology Monographs*, 126, 347–367.

Delle Fave, A., & Massimini, F. (2005). The relevance of subjective well-being to social policies: Optimal experience and tailored intervention. In F. Huppert, N. Baylis, & B. Keverne (Eds.), *The science of well-being* (pp. 379–402). New York, NY, US: Oxford University Press.

Demerouti, E. (2006). Job characteristics, flow, and performance: The moderating role of conscientiousness. *Journal of Occupational Health Psychology*, 11, 266–280.

Diener, E. (2000). Subjective well-being, the science of happiness and a proposal for a national index. *American Psychologist*, 55, 34–43.

Diener, E., & Diener, C. (1999). Most people are happy. *Psychological Science*, 7, 181–185.

Eisenberger, R., Jones, J. R., Stinglhamber, F., Shanock, L., & Randall, A. T. (2005). Flow experiences at work: For high need achievers alone? *Journal of Organizational Behavior*, 26, 755–775.

Fine, S. F., & Cronshaw, S. A. (1999). *Functional job analysis: A foundation for human resources management*. Mahwah, NJ: Lawrence Erlbaum Associates Inc.

Finneran, C. M., & Zhang, P. (2003). A person–artefact–task (PAT) model of flow antecedents in computer-mediated environments. *International Journal of Human Computer Studies*, 59, 475–496.

Ghani, J. A., & Deshpande, S. P. (1994). Task characteristics and the experience of optimal flow in human–computer interaction. *The Journal of Psychology*, 128, 381–391.

Gold, Y., & Roth, R. (1993). *Teaching managing stress and preventing burnout. The professional health solution*. London: The Falmer Press.

Guo, Y. M., & Poole, M. S. (2009). Antecedents of flow in online shopping: A test of alternative models. *Information Systems Journal*, 19, 369–390.

Harackiewicz, J. M., & Elliot, A. J. (1998). The joint effects of target and purpose goals on intrinsic motivation: A mediational analysis. *Personality and Social Psychology Bulletin*, 24, 657–689.

Hektner, J., Schmidt, J. A., & Csikszentmihalyi, M. (2007). *Measuring the quality of everyday life: The ESM handbook*. Thousand Oaks, CA: Sage.

Huberty, C. J., & Morris, J. D. (1989). Multivariate analysis versus multiple univariate analyses. *Psychological Bulletin*, 105, 302–308.

Iverson, R. D., & Maguire, C. (2000). The relationship between job and life satisfaction: Evidence from a remote mining community. *Human Relations*, 53, 807–839.

Jaccard, J., Turrisi, R., & Wan, C. K. (1990). *Interaction effects in multiple regression*. Newbury Park, CA: Sage.

Jackson, S. A., & Eklund, R. C. (2002). Assessing flow in physical activity: The flow state scale-2 and dispositional flow scale-2. *Journal of Sport & Exercise Psychology*, 24, 133–150.

Jackson, S., & Eklund, R. C. (2004). *The flow scales manual*. Virginia: Fitness Information Technology.

Kawabata, M., & Mallett, C. J. (2011). Flow experience in physical activity: Examination of the internal structure of flow from a process-related perspective. *Motivation and Emotion*, 35, 393–402.

Keller, J., & Bless, H. (2008). Flow and regulatory compatibility: An experimental approach to the flow model of intrinsic motivation. *Personality and Social Psychology Bulletin*, 34, 196–209.

Keller, J., & Blomann, F. (2008). Locus of control and the flow experience: An experimental analysis. *European Journal of Personality*, 22(7), 589–607.

Lutz, R. J., & Guiry, M. (1994). Intense consumption experiences: Peaks, performances and flow. Paper presented at the Winter Marketing Educators' Conference, St. Petersburg, FL.

Mäkikangas, A., Bakker, A. B., Aunola, K., & Demerouti, E. (2010). Job resources and flow at work: Modelling the relationship via latent growth curve and mixture model methodology. *Journal of Occupational and Organizational Psychology*, 83, 795–814.

Massimini, F., & Carli, M. (1988). The systematic assessment of flow in daily experience. In M. Csikszentmihalyi, & I. S. Csikszentmihalyi (Eds.), *Optimal experience: Psychological studies of flow in consciousness* (pp. 288–318). New York, NY, US: Cambridge University Press.

Massimini, F., Csikszentmihalyi, M., & Carli, M. (1987). The monitoring of optimal experience: A tool for psychiatric rehabilitation. *The Journal of Nervous and Mental Disease*, 175, 545–549.

Mesurado, B. (2009). Comparación de tres modelos teóricos explicativos del constructo experiencia óptima o flow [Comparing three theoretical explanatory models of the flow construct]. *Interdisciplinaria*, 26, 121–137.

Moneta, G. B., & Csikszentmihalyi, M. (1996). The effect of perceived challenges and skills on the quality of subjective experience. *Journal of Personality*, 64, 275–310.

Nielsen, K., & Cleal, B. (2010). Predicting flow at work: investigating the activities and job characteristics that predict flow states at work. *Journal of Occupational Health Psychology*, 15, 180–190.

Novak, T. P., & Hoffman, D. L. (1997). Measuring the flow experience among web users. Paper presented at Interval Research Corporation. Retrieved from http://www2000.ogsm.vanderbilt.edu/research_papers.htm.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.

Pearce, J. M., Ainley, M., & Howard, S. (2005). The ebb and flow of online learning. *Computers in Human Behavior*, 21, 745–771.

Podsakoff, P. M., MacKenzie, S. M., Lee, J., & Podsakoff, N. P. (2003). Common method variance in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88, 879–903.

Rodríguez, A. M., Cifre, E., Salanova, M., & Åborg, C. (2008). Technoflow among Spanish and Swedish students: A confirmatory factor multigroup analyses. *Anales de Psicología*, 24, 42–48.

Rodríguez, A. M., Schaufeli, W. B., Salanova, M., & Cifre, E. (2008). Flow experiences among information and communication technology users: A confirmatory factorial analysis. *Psychological Reports*, 102, 29–39.

Salanova, M., Bakker, A., & Llorens, S. (2006). Flow at work: Evidence for a gain spiral of personal and organizational resources. *Journal of Happiness Studies*, 7, 1–22.

Salanova, M., Martínez, I. M., Cifre, E., & Schaufeli, W. B. (2005). ¿Se pueden vivir experiencias óptimas en el trabajo? Analizando el flow en contextos laborales [Can optimal experiences at work be experienced? Analysing flow in laboral contexts]. *Revista de Psicología General y Aplicada*, 58, 89–100.

Salanova, M., Schaufeli, W. B., Llorens, S., Peiró, J. M., & Grau, R. (2000). Desde el 'burnout' al 'engagement': ¿una nueva perspectiva? [From burnout to engagement: A new perspective?]. *Revista de Psicología del Trabajo y las Organizaciones*, 16, 117–134.

Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). Maslach Burnout Inventory—General Survey. In C. Maslach, S. E. Jackson, & M. P. Leiter (Eds.). *The Maslach Burnout Inventory—Test manual* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of burnout and engagement: A confirmatory factor analytic approach. *Journal of Happiness Studies*, 3, 71–92.

Skadberg, Y. X., & Kimmel, J. R. (2004). Visitors' flow experience while browsing a web site: Its measurement, contributing factors and consequences. *Computers in Human Behaviour*, 20, 403–422.

Stephenson, M. T., & Holbert, R. L. (2003). A Monte Carlo simulation of observable versus latent variable structural equation modeling techniques. *Communication Research*, 30, 332–354.

Trevino, L. K., & Webster, J. (1992). Flow in computer-mediated communication. *Communication Research*, 19, 539–573.

Warr, P. (1990). The measure of well-being and other aspects of mental health. *Journal of Personality and Social Psychology*, 44, 644–651.

Warr, P. (2007). *Work, happiness and unhappiness*. New York: Routledge.