The story flows on: A multi-study on the flow experience

Alma Mª Rodríguez Sánchez

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Alma Mª Rodríguez Sánchez

Departamento de Psicología Evolutiva, Educativa, Social y Metodología.

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Directora: Prof. Dr. Marisa Salanova Soria

Co-directores: Dr. Eva Cifre Gallego

Prof. Dr. Wilmar B. Schaufeli

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The mountaineer does not climb in order to reach the top of the mountain, but tries to reach the summit in order to climb

(Mihaly Csikszentmihalyi, 1988)

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Foreword

The current thesis began when Marisa Salanova placed a book into my hands: 'Finding flow' (Csikszentmihalyi, 1997). Until then, I had never heard of flow and the positive psychology movement before. But when I discovered this experience myself, I realised that scholars in psychology have also focused traditionally on understanding and solving problems or pathologies in occupational contexts. But why not study the bright side of life? Besides, flow studies applied to work settings were scarce, so the need to understand the 'positive' side of occupational psychology motivated me to take on this challenge. This 'positive' approach is considered to supplement the traditional focus of psychology on disease, damage, disorder and disability. Therefore, organisations that are interested in improving the quality of their employees' working life have to move forwards to amplify positive psychosocial emotions and experiences. Concepts such as job satisfaction, organisational commitment and job engagement are increasingly relevant to generate healthy jobs and healthy workers. Thus, the concept of flow or optimal experience plays a role is in this context. Besides the interest in an in-depth study into flow as a phenomenon that needs to be clarified and to be applied to different contexts, such as work or study, is the main research interest that motivates the current thesis.

This thesis is a research work that has been conducted on flow in the heart of the WoNT Research Team. Its main aim is to find good ways to improve the quality of working life and to help build healthy organisations through accurate research and practice. Therefore, the current thesis covers its own path to provide answers to different questions posed in the study of flow. In addition, this path is also a learning path, and one that leads the author, me, to explore the slippery issue of the flow phenomenon by means of different methods and to also experience the flow phenomenon in this process, or story, under the guidance of Marisa Salanova, Eva Cifre and Wilmar Schaufeli. This thesis learns from past results and also grows from the use of one method to become another different method; that is, a thesis which also grows in the knowledge achieved and one that continues to grow.

Chapter 1. Introduction

"It is a feeling that I experience when I am drawing: time flies, you are alone with the sheet of paper, everything else is forgotten, the more immerse you are in the drawing itself, the more you progress in it, everything turns out better and you enjoy what you do. This often happens to me when something is complex and needs all my attention to get it right, it's like a challenge, like something I have to prove to myself that I can do it." (Design student)

"I was programming and I cannot describe it because it was what usually happens when I programme, simply a matter of doing my job and time flew suddenly; 4 hours went by without my stopping" (Computer technician)

Similar quotations are the origins of the study of flow, also called optimal experience, since Csikszentmihalyi, in the course of his doctoral research with a group of artists (Csikszentmihalyi, 1965), observed that artists were greatly concentrated hour after hour each day with their paintings or sculptures. They obviously enjoyed their work immensely, and thought it was the most important thing in the world. ***That is how the story begins***.

The study of flow is framed into the Positive Psychology approach, that is, the scientific study of human strength and optimal functioning (Seligman & Csikszentmihalyi, 2000). This approach is considered to supplement the traditional focus of psychology on disease, damage, disorder, and disability. Therefore, the study of flow is becoming a relevant issue nowadays given the desire to improve the quality of life among people in different domains (e.g., work, study, leisure...etc.). Although most flow studies have focused on flow in sports, artistic activities and leisure (Jackson & Marsh, 1996), there is little empirical evidence of flow in the work domain. Therefore, the current thesis explores flow experience at work and also at study (considered as student work), specifically the flow experience structure, patterns and antecedents, with the main aim of extending an existing model of flow.

1.1 A bit of history about the origins of flow research

As mentioned above, flow study – also known as *optimal experience* or *subjective experience* – starts from the observations and interviews made by Csikszentmihalyi, initially in the framework of both humanistic theories and the interest of the study of intrinsic motivation (Csikszentmihalyi, 1988). But first in the mid-sixties, during the first stages of studying flow experience, the study of flow came quite close to the studies that Abraham Maslow was developing about ‘peak experiences’. In research, flow may usually be confounded with an extremely unusual experience such as peak experience. However, this term has never been used by Csikszentmihalyi, and there is plenty of evidence of differences between the two states. Peak experience, as originally defined by Maslow is “The most wonderful experience or experiences of your life, happiest moments, ecstatic moments, moments of rapture” (Maslow, 1962). Peak experiences are quite rare events which arise unexpectedly and “capture” the person regardless of her will or intention. Moreover, few people report peak experiences in their life: in Maslow’s pioneer studies, only one of 3000 participants described it. Otherwise, regarding flow, preliminary results from a qualitative study (Rodríguez-Sánchez, Salanova, Schaufeli, & Cifre, 2007) also indicate that 98% of the participants recognised and had known this flow experience. In fact, if we compare the findings in both peak experience and flow experience, clear differences emerge between these two states (for a systematic discussion, see Delle Fave, Bassi, & Massimini, in press); for instance, optimal experience, unlike peak experiences, is not an extreme condition, and is also far from being an unusual or rare condition; an optimal experience can be a part of a person's daily living.

Therefore, although flow research was clearly influenced by not only humanistic theories, but also by the origins of the Self-Determination Theory (specifically in Edward Deci's intrinsic motivation research), flow study progressed to explore the *quality of subjective experience* that made a given behaviour intrinsically rewarding. The study of subjective flow experience led Csikszentmihalyi to interview many very different people (amateur athletes, chess masters, rock climbers, dancers, etc.) with the aim of finding out how such people described their activity when it was going particularly well (Csikszentmihalyi, 1988). The results of these studies constitute the first coherent statement about flow (Csikszentmihalyi, 1975). Although the first studies focused on arts, sports and leisure activities, flow may also occur at work since flow was quite similar between play and work settings (Nakamura & Csikszentmihalyi, 2002). However, research into flow in the work context is lacking.

1.2 Flow definition

During the interviews, people described experiences in their activities that made them feel good and motivated because they were doing something that was worth doing for its own sake. Csikszentmihalyi named this experience 'flow' because many respondents used it in the interviews to explain what the optimal experience felt like (Csikszentmihalyi, 1988). But, what is flow? How can it be defined? Indeed it seems that although one can recognise and describe flow easily, flow is difficult to define and perhaps even more difficult to operationalise.

Therefore, different definitions of flow can be found in the literature (for an extended review of these definitions, see the work of Novak & Hoffman, 1997), and Csikszentmihalyi defined it in 1997 as: “The holistic sensation that people feel when they act with total involvement” (Csikszentmihalyi 1997, p.36). Thus, flow is a condition in which people are so involved in an activity that nothing else seems to matter at the time, and the experience is so enjoyable that people will do it even at great cost for the sheer sake of doing it (Csikszentmihalyi, 1990). It is “a state that is characterized by enjoyable feelings, concentration, immersion, and intensive involvement” (Chen, 2006; p. 222). In fact, flow would occur when there is a balance between high level of challenges and high level of skills (Csikszentmihalyi & Csikszentmihalyi, 1998). If we specifically focus on the first of Csikszentmihalyi’s studies (1975), he considered flow experience to be the situation where challenges match person’s skills. Csikszentmihalyi formed a model based on this challenge-skills ratio coined the ‘channel model of flow’ (see Figure 1.1). This model was later developed and analytically described by Massimini and Carli (1988). In subsequent studies, the channel model was tested, and Csikszentmihalyi (1988) point out that to experience flow, challenges and skills must not only be in balance, but must also exceed levels in a way that one must increase the complexity of the activity by developing new skills and taking on new challenges. Then, when both challenges and skills are high, the flow experience is likely to arise (Delle Fave & Bassi, 2000). In other words, “when both challenges 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). Applied to the work domain, this means that employees should particularly experience flow when their job demands match their professional skills. Evidently, the level refers to the subject’s perception of a challenging task according to his/her own skills. Then, this level has to be related to the subject’s mean level (Massimini, Csikszentmihalyi, & Carli, 1987), thus it is easy to understand why flow experience is also known in the literature as *subjective experience*.

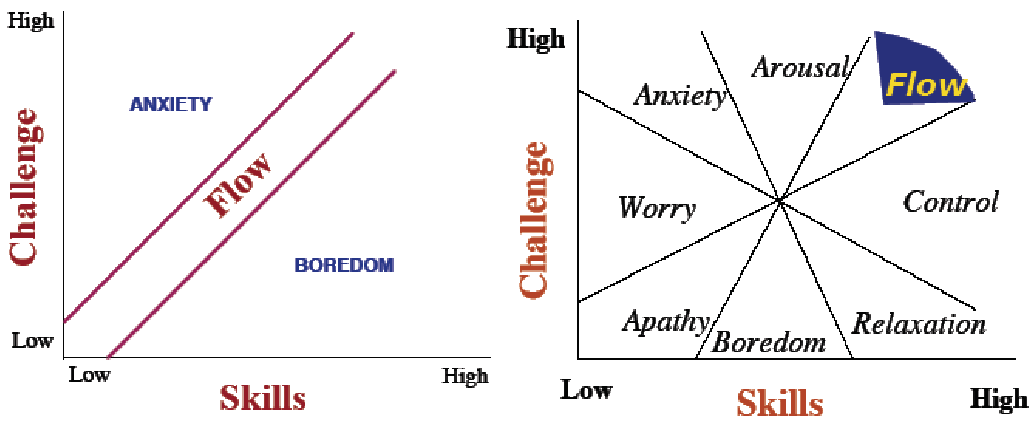

Figure 1.1. On the left, Original Channel model of flow (Csikszentmihalyi, 1975). On the right, Developed Channel model or also known as Experience Fluctuation Model (Csikszentmihalyi, 1988; Massimini & Carli, 1988).

In the literature we can find a number of flow definitions that start from the initial flow conceptualisation as a product of challenges and skills; in other words, this high skills and high challenges ratio has been used in a number of subsequent studies as the flow concept (e.g., Csikszentmihalyi & LeFevre, 1989; Delespaul, Reis, & deVries, 2004; Delle Fave, Bassi, & Massimini, 2003; Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005). But then, what is the flow experience? And how can it be operationalised?

1.3 Flow operationalisation

Besides challenges and skills, Csikszentmihalyi also defined flow in a more descriptive way in his studies. Thus, when a person's skill is just right to cope with the demands of a situation, the quality of the flow experience improves noticeably (Csikszentmihalyi, 1988). The quality of experience is characterised by: 1) clear goals, 2) immediate and unambiguous feedback, 3) personal skills well suited to given challenges, 4) 'merger of action and awareness' (i.e., the person focuses so much on the activity that it leads to a state of harmony between the activity and the self), 5) concentration on the task at hand, 6) a sense of potential control, 7) 'a loss of self-consciousness' (i.e., the self is fully functioning, but not aware of doing it), 8) an altered sense of time and 9) experience which becomes *autotelic* (i.e., intrinsically rewarding) (Csikszentmihalyi, 1975, 1988, 1990, 1997). In other words, flow, when applied to the work or the study domain, may be described in terms of the employee having a clear goal to achieve, for instance, to finish a financial report. Besides, this employee is receiving clear feedback about how he/she is doing the task. For instance, he/she realises that the budget is correct and that the operations tally. Furthermore, he/she perceives the task as challenging as he/she has to tally all the operations and financial data, but he/she also has enough skills to overcome this challenging task. During the task, the employee is totally focused and concentrated since it is important not to lose track of the task in order to do it correctly. Therefore the employee loses his/her sense of time and can spend hours doing the financial report and, indeed, this activity is intrinsically rewarding for the employee. But does this evaluation occur before, after or during the activity?

The problem of Csikszentmihalyi's description of flow is that it does not specify the way in which each dimension or characteristic works in the flow experience or in which order they come into play. That is, the variables making up the very flow experience. Then there is the matter of what flow experience is beyond its prerequisites, which remains a tricky question to be solved.

A number of authors have based their work on Csikszentmihalyi's model of nine characteristics to present a clear and practical flow operationalisation. For instance, Chen, Wigand and Nilan (1999) classify Csikszentmihalyi's model of nine dimensions into three levels: antecedents, experience, and affects or emotions. This differentiation has been empirically validated by Chen et al. (2000). Their results identify clear goals, immediate feedback, potential control, and the merger of action and awareness as antecedents or prerequisites of flow. However, the flow experience itself is made up of concentration, loss of self-consciousness and time distortion. Finally, the consequences of flow were positive affects and autotelic experience. This distinction has also been supported by Nakamura and Csikszentmihalyi (2002) in a more clarifying chapter on flow in the Handbook of Positive Psychology. They argue that high perceived skills, that are well matched with high challenges, clear goals and immediate feedback, are all necessary prerequisites to experience flow. It is worth noting that very recent research also relates the concept of efficacy beliefs as an important antecedent that can enhance flow experience (Bassi, Steca, Delle Fave, & Caprara, 2007; Salanova, Bakker, & Llorens, 2006).

Therefore, what are the core components of flow experience beyond its prerequisites and consequences? And how can flow experience be measured? In order to assess flow, it is important to firstly find a clear operationalisation of the variables that comprise flow experience. After a careful review of the literature, it seems that all the different flow experience definitions have three common elements. The first refers to a sense of involvement, total concentration, focused attention or loss of self-consciousness, in other words, being entirely engrossed in the activity at hand, that is, what we call *absorption* (Chen, 2006; Csikszentmihalyi, 1997; Ghani & Deshpande, 1994; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi, 1996; Novak & Hoffman, 1997; Trevino & Webster, 1992). Absorption implies a cognitive state of deep concentration. A second common element involves positive feelings of *enjoyment* that are associated with the activity (Clarke & Haworth, 1994; Ghani & Deshpande, 1994; Moneta & Csikszentmihalyi, 1996; Novak & Hoffman, 1997). Enjoyment refers to an affective component of flow experience. The last element refers to the interest in performing the activity for its own sake rather than for an extrinsic reason, that is, *intrinsic interest* (Moneta & Csikszentmihalyi 1996; Novak & Hoffman, 1997; Trevino & Webster, 1992). This last element is obviously related to a motivational aspect of flow experience.

Then, in line with an examination of previous research, we state that the following three components (absorption, enjoyment and intrinsic interest) are the main constituents of flow experience. These three elements, found in the literature, also match recent research that agrees on the cognitive, motivational and emotional components of optimal experience (Bassi et al., 2007; Delle Fave & Massimini 2004; Delle Fave & Massimini 2005b; Jackson & Csikszentmihalyi 1999). In accordance with Chen's definition of flow (2006), Delle Fave and Massimini (2005b) also highlighted that the core and stable structure of optimal experience mostly comprises the cognitive component (i.e., absorption or deep engrossment) which did not show remarkable changes across samples and activities, although affective and motivational variables varied widely in intensity across activities. Previous studies of flow at work also support this three factorial operationalisation (Bakker, 2005; Demerouti, 2006; Salanova et al., 2007).

It is noteworthy that the difficulty to measure and to 'capture' optimal experience makes the explanation of its components even more difficult. That is why flow experience operationalisation is still a topic of discussion because, specifically, three major issues need to be solved. Firstly, since flow is a state or momentary experience, when measuring it, the involved person automatically leaves out state of flow. Therefore flow is assessed outside flow which leads to a retrospective bias. Secondly, given its short-lived nature, when asking people how they feel when experiencing flow, they immediately agree about concentration and forgetting everything around them. But what about enjoyment? Is enjoyment part of or a result of flow experience? Interviewees also report enjoyment, but it might be biased by the affective evaluation after the experience. Then it is logic to think that when being completely absorbed by the activity one is engaged in – for instance, doing a presentation with PowerPoint – it is impossible to concentrate on one's own inner feelings because all one's attention is focussed on the activity at hand. But surely the person was enjoying him/herself while creating slides for his/her presentation. Finally, the same question arises for intrinsic interest: during flow experience while doing an activity (e.g., writing a report), is intrinsic interest part of or an antecedent of flow experience? On the one hand, the task is intrinsically motivating and the person is carrying it out with great interest because that person wants to continue doing the activity and to experience flow (intrinsic interest as a consequence). But on the other hand, it can also be argued that the person firstly perceives the task as intrinsically interesting, and then experiences flow (intrinsic interest as an antecedent). However these three major issues are not addressed in the literature in such detail, so the current thesis attempts to answer all these questions about flow experience operationalisation itself.

In short, finding a unified and clear flow definition and operationalisation is, nowadays, a challenge in the study of optimal experience. In fact, research into what the core of flow is today is a 'hot spot' in the study of flow. In order to overcome this challenge, the way that scholars interested in this topic measure the flow phenomenon is of special relevance, especially since the methodology employed has to be highly efficient to capture this tricky phenomenon. Besides, one can argue that flow operationalisation may differ depending on the measure used. In other words, it is likely that information on what flow experience is may differ whether we ask the individual to describe one experience of flow (i.e., qualitative data through interviews), or if we ask him/her to fill out a questionnaire (measuring the frequency and intensity of several flow-related items) once or several times a day (i.e., study diary). Therefore, it is advisable to use different techniques and methods to measure flow. In the current thesis, an overview of the main methods will be used to study flow at work and also in the use of technology context.

1.4 Measuring Flow

Then what is the best way to 'capture' flow? Initially, the study of flow emerged from qualitative interviews about the nature of this optimal experience when a particular activity was going well (Csikszentmihalyi, 1975, 2000). This qualitative method was, and still is, a relevant tool for initial research works into these kinds of phenomena and experiences, such as flow, especially when the intention is to identify and find rich descriptions of flow experience. For instance, descriptions of flow in athletes (Jackson, 1995) or in writers (Perry, 1995) enabled the characteristics of this flow state and the factors that help to experience flow to be known (Nakamura & Csikszentmihalyi, 2002). Although this approach provides initial information, it is not useful to 'measure' flow; for instance, to know the frequency of flow experiences, the differences in its occurrence across contexts or individuals, or for examining whether there are differences in the frequency of flow between different kinds of occupations.

One step forward in the study of flow has been the use of paper-and-pencil questionnaires. Some of the information that appears in such questionnaires can be obtained from initial interviews, such as the Flow State Scale (Jackson & Marsh, 1996), which assesses Csikszentmihalyi's model of nine dimensions (e.g., clear goals, immediate feedback, high skills matching high challenges, merger of action and awareness, concentration, control, loss of self-consciousness, altered sense of time, and autotelic experience) in the sport context. However with empirical research into flow at work – and also in study contexts- most of the research done on flow usually has measured it in terms of a combined product of high challenges and high skills (Csikszentmihalyi & LeFevre, 1989; Delespaul et al., 2004; Delle Fave et al., 2003; Eisenberger et al., 2005). Thus, empirical studies that assess flow experience using a measure that, from our point of view, 'captures' the core components of flow experience beyond its prerequisites (challenges and skills) are lacking.

Therefore to assess the frequency of flow experiences at work, at study and also at work using technology, we developed a questionnaire based on the WOLF Inventory (WOrk-reLated Flow Inventory, Bakker, 2008), a recent questionnaire used in the work context to assess the three flow experience components (absorption, work enjoyment and intrinsic work motivation) which is based on previous research (e.g., Bassi et al., 2007; Delle Fave & Massimini 2004). Items in the WOLF scales are formulated in general terms; for instance, an example of an item that assesses absorption is *'I get carried away by my work'*. Then we adapted the items using a specific measure of flow for the activity at hand; for instance, we developed the following item in the context of work with technology: *'Time flies when I'm working with technologies'*. So, the novelty and strength of the current thesis is the way we consider flow experience. Items refer to flow as being a momentary experience related with a specific activity rather than a general behaviour during work. Likewise, we also rather preferred to measure *intrinsic interest* than *intrinsic motivation* because motivation implies a long-term process rather than a momentary one attached to the activity that is interesting. Using questionnaires offers some benefits that interviews cannot, such as providing quantitative information, for instance, about the frequency of flow occurrence, as well as comparing results across different contexts or individuals. Finally, they are easy to hand out and to use in large number of different settings. All these benefits favour the use of questionnaires as a main tool of flow assessment, and as part of the challenge to build a valid and reliable tool to measure flow, specifically in work and student settings, which are the main aim and contribution of this thesis.

1.5 Measuring *daily* flow

Questionnaires provide valuable data. However, the weaknesses of interviews and questionnaires lie in their reliance on the retrospective reconstruction of past experience. Firstly, respondents have to average across many discrete experiences to build a picture of the typical flow experience, and then estimate the frequency and/or the intensity of this experience (Nakamura & Csikszentmihalyi, 2002). So what is the best way to assess flow experience? And also it would be a major goal for the current thesis to answer the question of how flow works during the day. Therefore, to overcome such problems, and to explore flow during the day, researchers have developed a tool called the Experience Sampling Method (ESM) (Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & Larson, 1987). This diary method consists in providing respondents with an electronic pager and a questionnaire booklet to be used during a week. The pager randomly signals seven or eight times a day, and then respondents fill out one sheet of the booklet. The information collected in one week refer to activities performed by respondents, personal experiences and, traditionally, the levels of challenges and skills. The use of this method in the study of flow is of special relevance since researchers not only have information about inter-person variations in the experience, but also about intra-person differences, which is of interest in the current thesis given the need to understand flow patterns and dynamics not only in a specific context (i.e., work), but also in others (i.e., leisure). But once again, the question of how flow can be measured and operationalised, even using a diary study or ESM, remains unsolved. In fact, in the first daily studies on flow (e.g., Csikszentmihalyi & Larson, 1987), the issue about how flow can be measured was approached. For instance, it could be argued that the intensity of response on the happy-sad scale or the amount of concentration reported would make a good intensity of flow index. Instead, Csikszentmihalyi and colleagues decided to take the challenges and skills ratio as a flow measure (Csikszentmihalyi & Csikszentmihalyi, 1988). Then, how can flow in everyday life be measured? In terms of goals or prerequisites (challenges and skills), or in terms of emotions or experiences (that is, the core components of flow) lived at that time? In the current thesis, we chose to use an alternative way to traditional studies to explore flow patterns during work and non-work activities (e.g., Csikszentmihalyi & LeFevre, 1989). Furthermore, the traditional study of flow in everyday life has been characterised by the flow (measured in terms of challenges and skills) that is attached to a specific activity. In other words, most of the studies relate flow experiences during the day with particular activities, such as studying, doing homework, socialising, arts and hobbies (e.g., Carli, Delle Fave, & Massimini, 1988; Massimini & Carli, 1988). Since research into the dynamics of daily fluctuations of flow experiences is scarce, other questions emerge and need to be solved: how does flow *fluctuate* during the day. Does flow experience show a daily pattern? Is this pattern related to the hour of the day or to the day of the week? In other words, the current thesis aims to explore daily patterns of flow by studying the core components of flow experience beyond its prerequisites (challenges and skills). Therefore, the interest in measuring flow and in exploring its daily patterns led us to use the electronic diary study as an appropriate tool to assess daily patterns of flow.

1.6 Flow antecedents

Nakamura and Csikszentmihalyi (2002) argued that high perceived skills well matched high challenges, clear goals and immediate feedback, which are necessary prerequisites to experience flow. However, there is no empirical evidence to validate how these factors can foster flow experiences at work. Again, only the challenges and skills ratio has been employed as flow antecedents at work (e.g., Eisenberger et al., 2005). Besides, antecedents are usually confounded with flow experience itself.

Therefore, if flow experience is mixed with challenges and skills as antecedents, how can flow antecedents be studied?

Given the lack of empirical research into flow antecedents at work, in this thesis we accept the challenge of exploring which factors boost flow experiences at work beyond challenges and skills by starting out with the following idea: what makes a person perceive a task as challenging? The answer lies in self-efficacy beliefs.

According to the Social Cognitive Theory (Bandura, 1997, 2001), self-efficacy is defined as: "…beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Whatever other factors serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired effects by one's actions; otherwise, one has little incentive to act or to persevere in the face of difficulties. In this way, it relates well to the idea that self-efficacy could influence the way people perceive challenges according to their skills. Therefore, self-efficacy may be taken into account as an antecedent of flow experience. Along the same lines, Wigfield and Eccles (2001) also found that students in the schooling context do not necessarily value challenging tasks optimally, rather tasks in which they believe they can succeed. Furthermore, the key role that self-efficacy beliefs play in the occurrence of optimal experiences has been tested by Bassi et al. (2007) in academic settings. Specifically, they found that students with high self-efficacy beliefs spend more time learning activities than those with low self-efficacy. Besides, they experience more flow in learning activities than low self-efficacy students. However, Bassi et al. (2007) employed the traditional ratio of challenges and skills as a measure of flow. Hence in the current thesis, we take the challenge of exploring self-efficacy as an antecedent of flow – measured in terms of absorption, enjoyment and intrinsic interest – given the lack of research on flow at work that meets this issue. Only the study of Salanova et al. (2006) approaches the issue that efficacy beliefs have to be taken into account as antecedents of flow experience. They provided empirical evidence that supports the idea that personal resources (e.g., self-efficacy beliefs) have a positive influence on the occurrence of flow among teachers over time. Briefly, more research is needed to be able to provide the still hidden answers to research questions about flow antecedents at work.

1.7 Specific research aims: The thesis chapters plan

As already shown, the flow study presents certain difficulties, or better still, challenges. Firstly, the fact that flow is a phenomenon, that is, of a momentary nature as an experience, does not allow researchers to measure it easily. In relation to this, a second relevant challenge to be overcome is that the study of flow has never been based on a solid theory. Therefore many critiques who review a submitted paper on flow state that there is a lack of theoretical support or theoretical framework. Feldman (2004) shed some light on this by stating that "…There should be room in our field for both theory-driven and phenomenon-driven research; papers that push the envelope in theory but are disconnected from real world phenomena are no more valuable than papers that use a hodge-podge of theories to explain an important real world phenomenon…" (Feldman, 2004, p. 566). These challenges also form part of the common critiques that the positive psychology movement receives in terms of its sometimes poor/weak measures, lack of longitudinal studies, lack of integration of the two perspectives ('positive' and 'negative'), among others (see Lazarus 2003 for a review).

In order to overcome these main challenges in flow study, in this thesis we will study the flow phenomenon from different approaches and with different methodologies using several samples in various work and study contexts. Therefore this thesis will not only be an attempt to describe a phenomenon, but will also measure it with different methods and approaches in order to shed some light on the study of such a ephemeral and subjective state that flow experience is. In that sense, specific research aims are developed in the various chapters that compose the current thesis. Each chapter represents a step forward on the path to clarify flow experience. Therefore, this thesis explores flow experience at work, specifically the structure, patterns and antecedents of flow experience, for the main purpose of extending an existing model of flow.

The first step is to explore the traditional challenges and skills ratio – 'channel model of flow' (Csikszentmihalyi, 1975; 1988) – between two different occupations, and to combine this model with an alternative flow operationalisation based on previous flow studies at work (Bakker, 2005; Demerouti, 2006; Salanova et al., 2007). Specifically in **Chapter 2,** we assume that workers who perceive that their jobs present high challenge and high skills will experience flow more frequently than others who perceive an imbalance between the levels of challenge and skills. Furthermore, we expect significant differences in the frequency of flow experience (i.e., enjoyment, intrinsic interest and absorption) among the workers of two different occupations (i.e., tile workers and secondary school teachers). More specifically, we expect that secondary school teachers will experience flow more frequently than tile workers.

The next step consists in the flow experience operationalisation, and commences with the previous work presented in Chapter 2 where we use an adapted version of the WOLF scale (WOLF; Bakker, 2001; 2008) to measure flow. In **Chapter 3,** we use a self-constructed specific scale of flow for Information and Communication Technology (ICT) users to confirm the three dimensional construct of flow (i.e., absorption, enjoyment and intrinsic interest) among ICT users (students and workers who use ICT in their daily working/studying activities) since the use of ICT is apparently a setting that facilitates the occurrence of flow experiences (Finneran & Zhang, 2003; Ghani & Deshpande 1994; Trevino & Webster 1992). However, the growing interest in the study of flow experience operationalisation leads us to consider, in **Chapter 4,** an in-depth explanation of the core components of flow experience while using technology, which we coin *technoflow*. In **Chapter 4,** we explore the elements that make up the very flow experience while using ICT (technoflow) in two samples of students who employ ICT in their daily studying tasks. Indeed, we explore the structure of technoflow among Spanish and Swedish students.

Given the aim of the current thesis to explore the daily flow patterns among work and non-work tasks, a challenging method, which the electronic diary study or ESM is, is employed in **Chapter 5**. Since this method is a useful tool to analyse flow experience, we explore the daily flow patterns using an alternative way of flow operationalisation (absorption and enjoyment) based on previous studies. Besides, we explore daily flow patterns beyond the prerequisites of flow (traditionally, challenges and skills), and we explore it in two different samples: healthy and burned-out individuals. This also involves an additional feature of the current study and thesis because flow patterns is not only studied in healthy individuals (a traditional approach), but also in a contrast group like burned-out individuals. Furthermore, the methodology introduces three main novelties: 1) the use of an alternative operationalisation of flow experience (absorption and enjoyment) beyond its prerequisites; 2) the use of an electronic device (Palm One) to collect the diary data, and 3) the period that participants have this diary is increased to two weeks (to increase the reliability of the method).

As regards flow study antecedents, in **Chapter 6** we present a longitudinal study done among teachers whose basic aim is to explore the role of self-efficacy beliefs as an antecedent of flow experience at work. Specifically, the main objective of this study is to extend Csikszentmihalyi's 'channel model' (1975) by including self-efficacy as a predictor and antecedent of the combination of challenges and skills, and flow experience itself. This study represents a step beyond the research on flow because once the flow core components are known, it is necessary to look towards the facilitators or the prerequisites of optimal experience, and to look beyond the challenges and skills combination. In that sense, the link between efficacy beliefs and flow experience represents a future direction in optimal experience research.

Finally **Chapter 7** is a summary of the main findings of this thesis. In this final chapter, the steps taken to clarify flow experiences theoretically, the different methods used, and the strengths and weaknesses of the current thesis are discussed.

Chapter 2. Extending the Channel Model of Flow Experience among Occupations[1]

Summary

This study has two objectives: 1) to extent the Csikszentmihalyi's (1975) 'channel model' of where flow is experienced more frequently in jobs with high levels of challenge and high levels of perceived skills; 2) to analyze whether there are significant differences in the frequency of flow experiences among different occupations. A retrospective analysis of flow was performed among 957 workers of private and public organizations (i.e., tile workers and secondary school teachers). Results confirmed the channel model predictions. People working in jobs characterized by high levels of challenge and high levels of skills experienced flow more frequently than people who did not. Results also showed significant differences in the frequency of flow experience between occupations.

Introduction

Nowadays, interest in health and quality of life at work is a reality in many work organizations, and research on human strength and optimal functioning has aroused attention in modern organizations. In this sense, Positive Psychology, considered a supplement to the traditional focus on psychology on disease, damage, disorder and disability, has gained more adepts. Based on this positive focus, organizations are interested in optimizing positive psychosocial emotions and experiences. Concepts such as job satisfaction, organizational commitment, and job engagement are increasingly relevant to generate healthy jobs and healthy workers.

[1] Chapter 2 has been submitted for publication as: Llorens, S., Salanova, M., & Rodríguez-Sánchez, A.M. Extending the Channel Model of Flow Experience among Occupations.

One of these positive phenomena receiving more attention in work settings is 'flow'. The concept of flow has aroused the interest of a growing number of researchers since Csikszentmihalyi began talking about it and explaining the phenomena in different papers and books (e.g., Csikszentmihalyi, 1975, 1990, 1997, 2003). He interviewed artists, athletes, composers, dancers, scientists, and so on, so they could describe the experiences in their activities that made them feel good and motivated because they were doing something worthwhile for its own sake.

Despite the fact that the first studies on flow were carried out in people who practised sport, or who did any activity characterized by creativity or enjoyment, researchers formed a picture of the general characteristics of optimal experience and its proximal conditions. This research found that flow was reported by people from different cultures, socio-economic status, ages and levels of educational in association with daily activities (Delle Fave & Massimini, 2005a). In a similar way, the results of this optimal experience show that flow is quite similar between entertainment and work settings (Nakamura & Csikszentmihalyi, 2002) and study contexts (Delle Fave & Bassi, 2000).

The present study focuses on flow experience in the workplace. Specifically, it has been conducted among two types of workers: people working with 'things' (i.e., tile workers) and people working with 'people' (i.e., secondary school teachers). This study extends the 'channel model' proposed by Csikszentmihalyi (1975). Furthermore, whether there are significant differences in the frequency of flow experience among different occupations (i.e., tile workers and secondary school teachers) is also tested.

Flow experiences at work

Within the framework of Positive Psychology, the flow concept has been studied in recent decades. Positive Psychology has only been defined as the scientific study of human strengths and virtues (Sheldon, & King, 2001). Thus, by applying Positive Psychology to work contexts, the Positive Organizational Psychology (POP) arises which is defined as “the scientific study of optimal functioning of people and teams on organizations, besides their effective management”. So, the aim of POP is “to describe, explain and predict the optimal functioning in those contexts (work and organizations), thus, to optimize and boost the quality of working life” (Salanova, Martínez, & Llorens, 2005a, p. 353-354).

In this framework, Csikszentmihalyi (1975, p.29) has defined flow as a positive experience that “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” (Csikszentmihalyi, 1997, p. 30).

Thus, following this definition and previous studies, it is important to note four important features: (1) flow is not a ‘peak’ or extreme experience, but is very common in daily living (in this case, in work settings), (2) it is determined by the combination of perceived challenge and skills, (3) any person doing whatever activity, even at work, can experience flow provided that the above-mentioned conditions are present and (4) the quality of this optimal experience changes according to the associated activities that people do (Delle Fave & Massimini, 2005b).

Although flow operationalisation is still a topic of discussion, recent research agrees on the cognitive, motivational and emotional components of optimal experience (for example, Bassi, Steca, Delle Fave, & Caprara, 2007; Delle Fave &

Massimini, 2004 and 2005b; Jackson & Csikszentmihalyi 1999). Based on this, different scholars show that people who experience flow are engrossed in an activity. This involvement at work is so deep that nothing else seems to matter at the time. In addition to the pleasure derived from the activity and the intrinsic interest to continue doing it, the total immersion in an activity seems to be a central aspect of the flow experience (Csikszentmihalyi, Rathunde, & Whalen, 1993; Ellis, Voelkl, & Morris, 1994).

If we focus on the work situation, Bakker (2005) as well as Salanova, Bakker and Llorens (2006) developed the concept of flow during work activities and defined it as an optimal experience at work that is characterized by work enjoyment (i.e., the emotional component), intrinsic work motivation (i.e., the motivation component) and absorption (i.e., the cognitive component). Employees *enjoy* their work and feel happy. This enjoyment is the outcome of cognitive and affective evaluations of the flow experience (cf. Diener, 2000; Diener & Diener, 1999). *Intrinsic work motivation* 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). Intrinsically motivated employees are continuously interested in the work they are involved in (Harackiewicz & Elliot, 1998), they want to continue their work and are fascinated by the tasks they perform (Csikszentmihalyi, 1997). Finally, *absorption* refers to a state of total concentration whereby employees are totally immersed in their work. In this situation, time flies and they forget everything else around them (cf. Csikszentmihalyi, 1990).

Based on this previous literature about the concept and the dimensions of flow, in the present study 'flow at work' is considered an optimal and momentary experience attached to a specific activity in work domain where workers experience enjoyment, intrinsic interest in a specific activity and are absorbed during this activity. Although the concept of flow is more or less clear, it is necessary to do more research to clarify what job characteristics help make a 'flowing' job.

What makes a 'flowing' job?

Several scholars have pointed out the motivational potential of job resources to facilitate the flow experience at work. For instance, the Conservation of Resources (COR) theory states that job resources can potentially be motivating in their own right through the creation, maintenance and accumulation of resources (Hobfoll, 1989 and 2001). This theory states that gaining resources increases the resource pool, which makes the subsequent acquirement of more resources more likely, and consequently, motivation and well-being will increase (see also Houkes, Janssen, de Jonge, & Nijhuis, 2001).

Similarly, the Job Demands-Resouces (JD-R) model (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) constitutes a heuristic and parsimonious model which specifies that motivation (e.g., work engagement) and organizational commitment may be a consequence of the presence of available job resources (Schaufeli & Bakker, 2004).

More specifically, the Job Characteristics Model (JCM; Hackman, & Oldham, 1980) proposes that every job has a specific motivational potential that depends on the presence of five core job characteristics. Different studies have pointed out the beneficial aspects of these positive characteristics to enhance job satisfaction, health, performance, low absenteeism, low turnover and high work motivation (Fried & Ferris, 1987; Griffin, 1991; Tierney & Farmer, 2002). One of the task characteristics is the opportunity to use a variety of skills which is considered as a pivotal element in the 'channel model' (Csikszentmihalyi, 1975 and 1990).

Similarly, O'Brien (1983) found an additional task characteristic that might contribute to job satisfaction and motivation, which is the equivalence between the challenge of one's work and the ability to meet it. In the same line, Csikszentmihalyi's flow theory proposes that the flow experience (measured by enjoyment, intrinsic interest and absorption in the present study) depends on the match between two relevant characteristics of the task: perceived challenge and skills inherent in this task (Csikszentmihalyi, 1975 and 1990; Csikszentmihalyi & Rathunde, 1993).

According to the 'channel model' (Csikszentmihalyi, 1975), flow would be experienced as a result of the combination of high perceived challenge and high perceived skills. More recently, this channel model has been extended to the 'Experience Fluctuation Model' (Csikszentmihalyi, 1990 and 1997; Massimini & Carli, 1988) which represents a model with eight channels: flow, apathy, anxiety, boredom arousal, relaxation, worry and control. However, the present study is focused on the original model (Csikszentmihalyi, 1975) since it was tested using single administration questionnaires as in the present study. On the one hand, this model allows to distinguish between flow and other such experiences (e.g., boredom, anxiety) based on different challenge-skills formulae. According to this, activities (in our study, work activities) in which skills and challenge are high would lead to flow experiences. On the other hand, boredom would appear in activities with high skills compared to challenge; finally, anxiety would appear in tasks characterized by low skills and high challenge.

Based on these previous studies, there are two criteria to experience flow: (1) there must be a balance between perceived challenge that an activity possesses and perceived skills to face challenge and (2) such perceived challenge and skills must be relatively high in accordance with the subject mean in both variables (Asakawa, 2004; Massimini & Carli, 1988; Massimini, Csikszentmihalyi, & Carli, 1987; Moneta & Csikszentmihalyi, 1996).

Although, Csikszentmihalyi and LeFevre (1989) reported that the combination of high challenge and skills occurred three times more often during work than leisure (see also Haworth & Hill, 1992), this combination of high challenge and high skills has been tested in a variety of non employment settings. For example, schooling (Moneta & Csikszentmihalyi, 1996; Rheinberg, Manig, Kliegl, Engeser, & Vollmeyer, 2007), computing (Chen, Wigand, & Nilan, 1999), leisure (Csikszentmihalyi, & LeFevre, 1989), and competitive and recreational sports (Catley & Duda, 1997), while there is a lack of studies in work settings.

Since flow has normally been tested using diary studies, namely the 'Experience Sampling Method' (ESM) (Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & LeFevre, 1989), little empirical research using this methodology exists in work settings because it is more difficult to implement it in these contexts. Although the ESM permits the assessment of the subjects' experience in their natural environment to be repeated (Massimini et al., 1987), sometimes this methodology is not plausible in work contexts given its repeated assessment nature. In this sense, here we attempt to investigate the flow channel model in different occupations using a single administration questionnaire which allowed us to collect information from workers more easily.

So far, perceived challenge and skills are both antecedents of flow experiences. Nakamura and Csikszentmihalyi (2002) state these two variables (high perceived skills well matched with high challenge) are necessary prerequisites to experience flow. Besides, by applying these conditions related to the organizations, the opportunity to perform challenging tasks skilfully might have benefits for employees and their organizations (Eisenberger et al., 2005). Consequently, we assume that employees in jobs characterized with a balance between these two factors will experience flow more frequently. However, more research is needed to clarify whether there are some specific occupations in which workers may experience flow more frequently than others.

Do all occupations experience flow?

The different occupations used to study flow experience were secondary school teachers (Salanova, Bakker, & Llorens, 2006), music teachers (Bakker, 2005), information and communication technology users (Chen et al., 1999; Rodríguez-Sánchez, Cifre, Salanova, & Åborg, 2008), and workers from different occupations (Salanova, Martínez, Cifre, & Schaufeli, 2005b).

At this point, we can expect that workers in any occupation may experience flow doing job tasks. In this sense, we assume that it is possible in any occupation to find tasks characterized by high challenge and high perceived skills, considered the more proximal antecedents of flow according to the channel model (cf. Chen, 2006). Accordingly, these tasks may potentially generate flow experiences in employees. All of those studies support the idea that flow can be experienced in any kind of occupation, whenever all the conditions mentioned above are satisfied.

Although major research on flow has been based on the level of each flow dimension, this present study has focused on the frequency of flow experience in work settings. In this sense, the present study centers on the flow experience at 'jobs' related to work which was developed over a lengthier period of time (in the last 6 months).

In order to know whether there are some specific occupations in which workers may experience flow more frequently than others is a further step in this research. Although a research on this issue is lacking, Salanova et al. (2005b) studied flow in 770 workers from different occupations (i.e., clerical workers, teachers, technical staff, laboratory workers, sales staff, tile workers and management). This research suggests significant differences in the three dimensions of flow depending on the type of occupational group. Generally speaking, managers and teachers (i.e., both people working with people) showed experiences of flow more frequently than the rest of occupational workers, particularly more than clerical and tile workers (i.e., people working with data and things). It could be that managers and teachers work in occupational settings in which the development of a balance between high challenge and high perceived skills is more probable.

In this context, the objective of the present study is twofold. On the one hand, we are interested in extending the 'channel model' (Csikszentmihalyi, 1975) related to the activities within jobs. In this sense, employees whose jobs are characterized by high challenge and high perceived skills, experience flow. The second objective is to test whether there are significant differences in the frequency of flow experiences according to the type of occupation (in our study, tile workers and secondary school teachers). According to previous research, we expect:

Hypothesis 1): Workers who perceive their jobs with high challenge and high skills will experience flow more frequently than others with an imbalance between the levels of challenge and skills.

Hypothesis 2): Significant differences in the frequency of flow experience (i.e., enjoyment, intrinsic interest and absorption) between workers from two different occupations (i.e., tile workers and secondary school teachers). More specifically, we expect that secondary school teachers will experience flow more frequently than tile workers.

Method

Participants and Procedure

The total sample consisted of 957 Spanish individuals (53% women and 47% men). Taking into account the differentiation established by Fine and Cronshaw (1999) roughly half the sample (*n* = 474; 51%) were people working with 'things'; specifically Sample 1 was composed of tile workers from the ceramic industry (Sample 1). The other half of the sample (*n* = 483; 49%) were people working with 'people'; specifically Sample 2 was made up of secondary school teachers (Sample 2). The mean age of the full sample was 36 years and 8 months (sd = 9.0) ranging from 18 to 62 years.

Tile workers worked on the production line of three private tile companies, whereas secondary school teachers worked in 34 schools, most of which were public (83%). In Sample 1 (i.e., tile workers) (52% men; 48% woman), ages ranged from 18 to 62 years (M = 33.2; sd = 8.4). In Sample 2 (secondary school teachers) (56% women and 44% men), ages ranged from 23 to 60 years (M = 40.24; sd = 8.2). Secondary school teachers were significantly older than tile workers ($t(928) = -12.73$; $p < .001$); according to Cohen (1988) and based on the effect size $d = .84$, this is a 'large' effect.

Participants received instructions to fill out the RED questionnaire (Resources, Emotions/Experiences and Demands at work) in the paper-and-pencil version. This instrument tests three types of variables: (1) personal resources (e.g., skills) and job resources (e.g., autonomy), (2) emotions and experiences (e.g., burnout, engagement, flow), and (3) job demands (e.g., quantitative overload). The validity of this instrument has been tested in previous studies with more than 2,500 workers (e.g., Schaufeli, Bakker, & Salanova, 2006; Schaufeli, Salanova, González-Romá, & Bakker, 2002).

Human resources officers and principals distributed the questionnaires in the tile companies and the secondary schools, respectively, as part of an occupational health and safety audit. A cover letter explained the purpose of the study, clarifying that participation was voluntary and that confidentiality was guaranteed. Respondents received instructions to return the completed questionnaires in a sealed envelope either to the person who had distributed them or directly to the research team.

Variables

The assessment of the *Frequency of flow experiences at work* was based on an adaptation of the WOrk-reLated Flow scale (WOLF; Bakker, 2001) included in the RED questionnaire. The WOLF includes sixteen items measuring work enjoyment (4 items), intrinsic interest (6 items) and absorption (6 items). Participants should answer how often they had experienced the following experiences at work in the last 6 months (0 = never, 6 = every day): '*When I am working, I feel happy*' (work enjoyment), '*I get my* *motivation from the work itself, and not from the rewards for it'* (intrinsic interest) and '*When I am working, I forget everything else around me*' (absorption).

Challenge was assessed by two items from an adapted Spanish version of the dedication scale with the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002) included in the RED questionnaire. The items are '*My job is stimulating and inspires me*' and '*My job gives me new challenge*'. A seven-point scale ranging from 0 'never' to 6 'always/every day' rated the items.

Skills were measured by six items using an adapted Spanish version (Salanova et al., 2000) of the professional efficacy scale from the Maslach Burnout Inventory-General Survey (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996) included in the RED questionnaire. An example of item is '*I can effectively solve the problems that arise in my work'*. Participants indicated the extent to which they agreed with each sentence on a seven-point rating scale (0 = never, 6 = always/every day). Cronbach's alpha of each scale is shown in Table 2.1.

Data Analyses

We computed the means, standard deviations, Cronbach's alpha coefficients and bivariate correlations for all scales. Secondly, we used the *t-test* to clarify the characteristics (i.e., challenge and skills) of the most flowing jobs. Finally, we also computed the Analyses of Variance (ANOVAs) using the occupation as the independent variable and the three dimension of the flow experience as dependent variables. In order to interpret the relationship among challenge, skills and flow, ±1sd was used in this study to select the participants with extreme values in these variables (high levels, +1sd; low levels, -1sd), as recommended by Cohen and Cohen (1983), and by Jaccard, Turrisi, and Wan (1990).

Results

Descriptive Statistics

First at all, the means, standard deviations, Cronbach's alpha coefficients and bivariate correlations were computed for each sample separately (see Table 2.1). As seen in this table, all the variables had an alpha coefficient higher than .70 as recommended by Nunnally and Bernstein (1994).

Generally speaking, the pattern of correlations shows that, as expected, enjoyment, intrinsic interest and absorption are significantly and positively related in both samples. Along these lines, challenge also shows a significant and positive relationship to skills in both samples. As seen, challenge show higher correlations (r_{mean} = .59) with flow (i.e., enjoyment, intrinsic interest and absorption) than skills (r_{mean} = .39) in tile workers, while similar correlations between challenge and skills with flow (r_{mean} = .55) were obtained in secondary school teachers (see Table 2.1).

Table 2.1

Means (M), Standard Deviations (SD), Cronbach's alpha (tile workers/secondary school teachers) on the diagonal. Correlations for the study variables (tile workers below the diagonal).

	Tile (*n* = 474)		Teachers (*n* = 483)			Correlations				
	Mean	SD	Mean	SD	*t*	1	2	3	4	5
1. Enjoyment	4.03	1.33	4.48	1.10	13.26***	.89/.91	.84***	.53***	.58***	.64***
2. Intrinsic interest	2.59	1.42	3.95	1.26	10.22**	.72***	.85/.89	.56***	.57***	.57***
3. Absorption	3.09	1.24	3.56	1.05	14.82***	.55***	.60***	.82/.79	.51***	.44***
4. Challenge	3.30	1.67	3.83	1.28	-	.55***	.58***	.65***	r=.66***/.66***[2]	.58***
5. Skills	4.40	.95	4.27	.81	-	.41***	.33***	.43***	.48***	.78/.82

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

[2] This is a correlation between the two items that compose the 'challenge' variable

Testing the Flow Channel Model

The first objective of this study was to extend the flow channel model (Csikszentmihalyi, 1975).According to this, those workers in jobs characterized by high challenge and high skills will experience flow more frequently than others with other formulas between challenge and skills. In order to do this, we selected participants in high levels (+1 sd) and low levels (-1 sd) of challenge and in high levels (+1 sd) and low levels (-1 sd) of skills in both samples taken together (*n* = 957) (Cohen & Cohen, 1983; Jaccard, Turrisi, & Wan, 1990).

Following this process, those participants with extreme conditions in both the simultaneously analyzed samples (i.e., high/low in challenge and high/low in skills) were selected, and the four groups of the challenge and skills combinations proposed by the quadrants in the 'channel model' (Csikszentmihalyi, 1975) were obtained. Workers in jobs characterized by high challenge + low skills compose Group 1 (G1) (*n* = 12*)*; group 2 (G2) includes workers in jobs characterized by high challenge + high skills (*n* = 64); group 3 (G3) includes workers in jobs characterized by low challenge + low skills (*n* = 71); and finally group 4 (G4) comprises workers with perception of low challenge + high skills (*n* = 2).

Table 2.2 shows the means and standard deviations in each flow dimension (i.e., enjoyment, intrinsic interest and absorption) for each group. On the one hand, only 6% of the workers in our whole sample (*n* = 957) experienced flow more frequently than the rest of the groups. These workers belong to Group 2 (G2), characterized by workers in jobs with a combination of high challenge and high skills. On the other hand, we see that Group 3 (G3) presents the lowest values for the frequency of flow experience, which includes workers in jobs with low challenge and low skills. G3 could experience apathy. According to Csikszentmihalyi (1975) and to Massimini and Carli (1988), these two groups are opposites and would reflect the channel model of flow. Moreover, G1 is characterized by workers in jobs with a combination of high challenge and low skills. Finally, G4 is characterized by workers in jobs with low challenge and high skills. According to Csikszentmihalyi (1975, 1997) and to Massimini and Carli (1988), these two groups of workers could have experiences near to anxiety and to boredom, respectively.

Table 2.2

Flow dimensions, means and standard deviations by groups.

	Enjoyment		Intrinsic interest		Absorption	
	Mean	SD	Mean	SD	Mean	SD
G1) High challenge + low skills (*n* = 12)	5.20	1.12	2.72	1.43	2.97	1.00
G2) High challenge + high skills (*n* = 64)	5.53	0.57	4.68	1.17	4.52	0.99
G3) Low challenge + low skills (*n* = 71)	2.89	1.28	1.86	1.14	2.05	0.97
G4) Low challenge + high skills (*n* = 2)	5.00	0.00	4.00	1.41	3.66	0.23

In the next step, we calculated the *t-test* (see Table 2.3) in order to demonstrate whether differences exist in the experience of flow dimensions in these two specific groups (G2 and G3). As expected, significant differences in the frequency of the three dimensions of flow are observed. Thus, significant differences are shown between G2 and G3 in terms of frequency of experiencing enjoyment [$t(133) = 15.75$; $p < .001$], frequency of intrinsic interest [$t(133) = 14.13$; $p < .001$], and frequency of absorption [$t(133) = 14.63$; $p < .001$] in both groups. Moreover according to Cohen (1988), these significant differences were considered 'large' effects based on the effect size $d = 2.73$, $d = 2.45$ and $d = 2.53$ for enjoyment, intrinsic interest and absorption, respectively,

In this sense, if we compared G2, the group comprising workers with high challenge and high skills to workers in jobs characterized by low challenge and low skills, that is G3, , G2 displays enjoyment, intrinsic work motivation and more absorption more frequently than G3 (see Table 2.3). These results confirm our Hypothesis 1.

Table 2.3

T-test analyses for the groups in the channel model in flow dimensions in G2 (n = 64) and G3 (n = 71).

	G2) High challenge + high skills (n = 64)	G3) Low challenge + low skills (n = 71)	
	Mean	Mean	*t-test*
Enjoyment	5.53	2.89	15.75***
Intrinsic interest	4.68	1.86	14.13***
Absorption	4.52	2.05	14.63***

Note. *** $p < .001$

Analyses of Variance

In order to test whether there are significant differences in the frequency of flow experience at work (i.e., enjoyment, intrinsic interest and absorption) between different types of occupations (i.e., tile workers and secondary school teachers) ANOVAs were calculated by taking into account both samples separately (Huberty & Morris, 1989).

The results show that if compared to tile workers, who work on the line production of different tile companies, secondary school teachers experience enjoyment more frequently [$t(945) = 14.82$; $p < .001$]; according to Cohen (1988) and based on the effect size $d = .96$, this is a 'large' effect. Moreover, secondary school teachers also experience intrinsic work interest more frequently [$t(944) = 10.22$; $p < .01$] than tile workers, which is considered a 'medium' effect (effect size $d = .66$). Finally, secondary school teachers also experience absorption more frequently [$t(940) = 13.26$; $p < .001$] than tile workers. According to the effect size ($d = .86$), this is a 'large' effect (Cohen, 1988).

Based on these results, and as expected, secondary school teachers experience flow more frequently than tile workers. That is, compared to tile workers, secondary school teachers experience enjoyment, intrinsic interest in the tasks and absorption more frequently.

Discussion

This study focused on the flow experience at the workplace. Specifically, the objective of the present study was twofold. On the one hand, we were interested in extending Csikszentmihalyi's (1975) 'channel model', where flow is experienced more frequently in jobs with high levels of challenge and high levels of perceived skills. In this sense, we expected that workers who perceive their jobs with high challenge and high skills will experience flow more frequently than others with an imbalance between the levels of challenge and skills. The second objective was to analyze whether there were significant differences in the frequency of flow experience among different occupations (i.e., tile workers and secondary school teachers). In this sense, we expected significant differences in the frequency of flow experience between workers from the two different occupations: secondary school teachers would be expected to experience flow more frequently than tile workers.

This study contemplated the conceptualization of flow in the workplace as an optimal experience in daily work activities, which is more frequently produced in jobs characterized by a combination of high challenge and high skills (Csikszentmihalyi, 1975; Massimini & Carli, 1988). Moreover in the present study, flow has been characterized by work enjoyment (i.e., the emotional dimension), intrinsic interest (i.e., the motivational dimension) and absorption (i.e., the cognitive dimension) (Bassi et al., 2007; Delle Fave & Massimini 2004 and 2005b). Work enjoyment refers to a positive emotion of feeling happy and endorses a very positive judgment about the quality of the working life. Intrinsic interest relates to the unbroken interest of employees in continuing working and to their fascination by the task they perform. Absorption refers to a state of total concentration whereby employees are totally immersed in their work; time flies and they forgot everything else around them (Bakker, 2005).

Another important remark is that this study uses a new way to measure flow in organizations. That is, we used frequency of flow rather than intensity of flow as tested by a single administration questionnaire. This measure allows us to know the frequency of flow (i.e., enjoyment, absorption and intrinsic interest) experienced by the participants with a single administration questionnaire to overcome the difficulties in assessing the experience sampling method in work settings. It is also a simple way to test flow in all the workers of one firm and to establish optimization activities at an organizational level in order to increase optimal experiences at work.

According to the first objective, we expected that workers who perceive their jobs with high challenge and high skills would experience flow more frequently than others with different formulae between the levels of challenge and skills. In this sense, the *t-test* results showed that those employees working in jobs characterized by high challenge and high skills experienced flow more frequently than others who had an imbalance between the levels of challenge and skills. In this sense, we obtained different groups experiencing apathy, anxiety and boredom. Thus Hypothesis 1 is confirmed given the evidence in favour of extending the 'channel model' (Csikszentmihalyi, 1975) using the frequency instead of level of flow. More specifically, and as expected, those jobs characterized by high challenge and high skills are the right combination to generate flow experiences in workers more frequently. These findings are consistent with Csikszentmihalyi's model and with Csikszentmihalyi and LeFevre (1989) suggestions that assume that high challenge and high skills create an optimal subjective experience relative to other combinations of skill and challenge, and that dispositional differences influence the extent to which high skill and challenge produce an elevated subjective experience (see also Eisenberger et al., 2005).

It has to be noted that a particular result was found in G4, characterized by low challenge + high skills. According to the 'channel model' (Csikszentmihalyi, 1975), this group has been characterized by being more prone to boredom. However, it is odd to note that, according to Table 2.2, this group shows high scores in the three dimensions of flow (more similar than the values of G2, which is categorized as the flow group). Although it may be an unexpected result, other research works have obtained similar results. Thus, Clarke and Haworth (1994) showed a sample of American college students in which challenge is exceeded by skill, and how a positive relationship exists with enjoyment, happiness and relaxation.

According to the second objective, we expected significant differences in the frequency of flow experiences (i.e., enjoyment, intrinsic interest and absorption) between workers from two different occupations (i.e., tile workers and secondary school teachers). The results of the ANOVAs supported our second hypothesis. More specifically, the results showed that secondary school teachers experienced flow more frequently than tile workers. In this sense, school teachers felt enjoyment, intrinsic interest and absorption more frequently in comparison to tile workers. This means that although both samples may experience flow, secondary school teachers, that is, people working with ‘people’ -according to Fine and Cronshaw (1999)- are more likely to experience flow more frequently than tile workers, that is, people working mainly with ‘things’. These results confirm our Hypothesis 2.

These results are in line with the study of flow in different samples studied by Salanova et al. (2005b). This suggests the idea that workers in any occupation may experience flow doing job tasks whenever the conditions of high challenge and high skill are satisfied. However, people working with ‘people’ are more likely to experience flow than people working with ‘things’ and ‘data’ (Fine & Cronshaw, 1999). Maybe the job content of those workers working with ‘people’ (i.e., secondary school teachers) could be more creative, more controlled and more challenging than jobs with people working on a production line (i.e., tile workers) (Cifre, Llorens, Salanova, & Martínez, 2003; Gold & Roth, 1993). In fact, these last jobs are defined as being less creative with less control as workers are only submitted to the pace of the tile machine and the supervisor's orders.

Collectively, our results show that flow is a common positive experience in daily lives at work, and that it is determined by the combination of challenge and skills irrespectively of the occupation (i.e., tile workers and secondary school teachers). According to Delle Fave, and Massimini (2005b), any person (in our study, workers) doing any activity could experience flow when high challenge and high skills are present. The findings in this study show that, according to the 'channel model', flow in both tile workers and secondary school teachers will be experienced when both challenge and skills are high (Csikszentmihalyi, 1975). Moreover, other relevant results suggest that it is possible to differentiate such jobs, and that this is more likely to be due to experience flow. The results in the present study suggest that secondary school teachers (i.e., people workers) are more likely to experience flow more frequently than other workers in other types of job, such as tile workers (i.e., "things" workers). This suggests that organizations may facilitate 'flow experience' in workers by creating challenging jobs and increasing skills among their employees.

Study limitations and future research

Despite the relevance of this study to generate 'positive jobs', it is necessary to interpret the results with caution because of the non-experimental nature of this study. Another limitation is that the study is cross-sectional in nature. It implies the necessity to interpret the relationships obtained between challenge, skills and the frequency of flow experience with caution. Finally, we used self-report questionnaires to collect the data used in this study, whose results may be affected by the variance of the common method. This could be an alternative solution to obtain data in such contexts where it is more complicated to use the Experience Sampling Method (ESM; Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & LeFevre, 1989) because of its repeated assessment nature, but it may be a first step. In this sense, complementing these with more data, for example using 'diary studies' (Stone & Shiffman, 2002) would be an interesting option. For instance, by implementing diary studies to a specific subgroup from the initial questionnaire database participants.

Finally, this study is limited to the context of tile workers and secondary school teachers. Since the hypotheses were confirmed as regards the 'channel model' and the differences in frequency of flow experience across both samples, it would be interesting and relevant to examine this phenomenon in other occupational fields, particularly in specific ICT users or in teleworkers, and in workgroups, for example.

Theoretical and practical implications

From the results, we can point out some theoretical and practical implications. There are two main implications related to the theory development about flow at the theoretical level. The first relates to the extension of the channel model and to the comprehension and prediction of the frequency of flow experiences. Generally speaking, this model focuses on 'activities' related to a 'positive' experience in time. People experience flow while doing the activity. In this context, it is usual to test the intensity of flow experience. In the present study however, the channel model generalizes 'jobs' and experience related to work (in the last 6 months) which is lengthier in time. In this sense, we have extended the channel model by focusing on the frequency of this experience over a period of time and not on the intensity of flow experience.

Regarding this, the second innovation of this study is the adaptation of the 'channel model' to a single questionnaire assessment. As we have explained, the channel model commences with repeated measures from the ESM assessment, whereas we have used a single administration questionnaire which allowed us to collect information from workers working in a company more easily. Although 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), other works have shown them as a strategy to not only collect retrospective data of past flow experiences, but to also obtain a descriptive picture of these positive experiences (for example, Chen, Wigand, & Nilan, 2000).

The practical implications are twofold. On the one hand, they relate to the job (re)design in order to increase workers' challenge and skill perceptions. Thus, only those jobs characterized by high challenge and high skills will provide employees with the opportunity to experience flow (Csikszentmihalyi, 1990; Eisenberger et al, 2005). The opportunity to work in contexts characterized by challenging tasks with accurate levels of skills will enhance 'healthy workers' working in 'healthy jobs', which will increase the positive mood (Csikszentmihalyi, Rathunde, & Whalen, 1993), task interest (Catley & Duda, 1997) and 'healthy products' (Salanova, 2008). On the other hand, the results suggest that training plays a pivotal role in generating flow more frequently. This training should focus on promoting the levels of skills that can help people to perceive themselves more skilfully and of being capable of achieving the challenge that their work offers.

Chapter 3. Flow Experiences among Information and Communication Technology Users[3]

Summary

The use of technologies is more common in our daily lives, working with technologies might be associated with positive experiences such as flow. However, little empirical research exists on flow experiences in technology settings. The main aim of this study was to confirm the three dimensional construct of flow, i.e., absorption, enjoyment and intrinsic interest, among 517 Information and Communication Technology (ICT) users (234 students - with a mean age of 23 (SD = 3.8) - from different areas of study, mainly Law, Public Administration, Chemistry and Psychology, and 283 employees - with a mean age of 33 (SD = 7.8) - of 21 different companies from various sectors of production namely public administration, industrial production and services). Results show that, as expected, flow is a three dimensional psychological construct, what is invariant among samples of technology users. Practical and theoretical implications as well as future research are discussed.

Introduction

The concept of 'flow' has been of interest to researchers since it was introduced by Csikszentmihalyi (1975, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988). He interviewed professionals such as artists, athletes… and scientists, and asked them to describe "optimal experiences" that made them feel good and motivated

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them because they were doing something that was worth doing for its own sake. He coined this experience 'flow', because many interviewees used this term spontaneously to explain what their optimal experience felt like (Csikszentmihalyi & Csikszentmihalyi, 1988). Thus, flow is defined as an optimal and extremely enjoyable experience. It is characterized by total concentration and joy and a high degree of interest in the activity (Moneta & Csikszentmihalyi, 1996).

Flow is a complex concept difficult to operationalize particularly because in the original description of Csikszentmihalyi (1975, 1990, 1997; Csikszentmihalyi & Csikszentmihalyi, 1988) the flow experience itself is confounded with its antecedents and consequences. For instance, Csikszentmihalyi (1990, 1997) describes flow in terms of nine dimensions: clear goals, immediate feedback, personal skills well suited to given challenges, merger of action and awareness, concentration on the task, sense of control, loss of self-consciousness, altered sense of time, and the experience becoming "autotelic", i.e., for its own sake or intrinsically rewarding. However, a closer look reveals that clear goals, immediate feedback and personal skills well suited to given challenges can be considered as antecedents or necessary conditions for flow, whereas the experience becoming "autotelic" might be considered a consequence.

To date, over three decades after the concept of flow was introduced, there is still no agreement about its operationalisation. For instance, it has been maintained that flow is characterized by the perception of a balance between high environmental challenges and adequate personal skills, deep concentration, involvement, enjoyment, control of the situation, clear-cut feedback on the course of the activity, and intrinsic motivation (Deci & Ryan, 1985). Chen (2006) defined flow as a state that is "characterized by enjoyable feelings, concentration, immersion, and intensive involvement" (p. 222). In a similar vein, Ghani and Deshpande (1994, p. 383) described flow in the context of human-computer interaction, as: "(a) total concentration in an activity and (b) the enjoyment which one derives from an activity".

A critical examination of the literature suggests that most definitions of flow seem to have three elements in common. The first refers to a sense of involvement, total concentration, focused attention or loss of self-consciousness, in other words, being entirely engrossed in the activity at hand (Trevino & Webster, 1992; Ghani & Deshpande, 1994; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi 1996; Csikszentmihalyi, 1997; Novak & Hoffman, 1997). Here, this deep involvement is labelled absorption. A second common element involves positive feelings of enjoyment that are associated with the activity (Privette & Bundrick, 1987; Ghani & Deshpande, 1994; Moneta & Csikszentmihalyi, 1996; Novak & Hoffman, 1997).That is, the activity is perceived as intrinsically enjoyable, so the second characteristic is labelled enjoyment. The last element refers to the interest in performing the activity for its own sake rather than for an extrinsic reason (Trevino & Webster, 1992; Moneta & Csikszentmihalyi 1996; Novak & Hoffman, 1997;). This is labelled intrinsic interest. It has to be noted that, according to the meaning of flow, items refer to flow like an optimal experience related with a specific activity rather than a general behaviour during the work. In such a way, it makes sense to measure intrinsic interest than intrinsic motivation, also according to the flow definition provided by Moneta and Csikszentmihalyi (1996), they used the term 'high interest' and not motivation related with a specific activity. We used 'interest' instead of 'motivation' in order to be closer to this original definition of flow.

In sum, based on the common elements in various descriptions of flow, we propose three elements as main components of the flow experience: absorption, enjoyment, and intrinsic interest. At least three previous studies used this operationalisation of flow and found that the intercorrelations between these three flow components were relatively high in samples of music teachers and students (Bakker, 2005), secondary school teachers (Salanova, Bakker, & Llorens, 2006) and also in workers from small and medium sized companies (Demerouti, 2006). In these three studies, correlations between absorption, enjoyment and intrinsic interest scales range from .40 to .83 (mean correlation: .60) . However, few of these studies examined the factorial validity of the three dimensional measure of flow.

In addition, all three studies used the same measure of flow, which was rather general. However, according to the original meaning of flow as a short-term optimal experience that is inherent to a specific activity, it seems more appropriate to operationalize it in terms of a specific work activity, for instance, while using Information and Communication Technologies (ICT). This specific group was selected because flow is quite prevalent among those who use ICT, presumably because of the intrinsically motivating nature of these technologies (Chen, Wigand, & Nilan, 2000). Specific items that refer to the use of ICT were used for. So instead of including general flow items such as "*I do my work with a lot of enjoyment*" and "*When I am working, I forget everything else around me*" as was done by the three studies of flow mentioned above, more specific items were included, such as "*I enjoy the work I do using these technologies/ICT*" and "*When I'm working with these technologies/ICT, I forget everything else around me*".

Hence, according to the meaning of flow experience and the need to use specific measures to assess this optimal experience, the present study had two hypothesis. First, it was expected that a three-factorial model including absorption, enjoyment and intrinsic interest would fit better to the data than a one-dimensional model that assumed that all items loaded on one underlying undifferentiated flow dimension (Hypothesis 1). Second, it was expected that the three factor model would be invariant across both workers and students who use ICT. (Hypothesis 2).

Method

Participants

Sample 1 consisted of 234 university students (66% women) enrolled in various graduate and undergraduate programs. Ages ranged from 17 to 43 years (*M*= 23; *SD* = 3.8). Only those students who used ICT on a daily basis were included, for instance by browsing through the internet, word processing, or using spreadsheets or statistical software packages.

Sample 2 was made up of 283 employees (61% women). Ages ranged from 18 to 60 years (*M*= 33; *SD* = 7.8). They worked in 21 different companies and in various occupational sectors, ranging from agriculture to public administration. Like the students, the employees were included based on their daily use of ICT.

Measure

The questionnaire included a wide range of variables, among others, both students and employees were asked to specify the type of software they used and to describe their daily work activities.

Flow was measured using three subscales (see Appendix 1: Flow items). Absorption was assessed using a slightly adapted version of the absorption scale of the Utrecht Work Engagement Scale (UWES; Schaufeli, Salanova, González-Romá, & Bakker, 2002). All 5 items were reworded to refer specifically to ICT work; for instance, the item *'Time flies when I'm working'* was rephrased as *'Time flies when I'm working with technologies'*.

Enjoyment and intrinsic interest were each assessed using a self-constructed 3-item scale based on previous research (Rodríguez-Sánchez, Cifre, & Salanova, 2004; Rodríguez-Sánchez, Salanova, & Cifre, 2004). In the introduction, two examples were given of reformulated items.

The participants were asked to indicate how often they had flow experiences during the preceding week. All flow items were scored on a 6-point frequency scale, the answer scale was: 0 = not at all/never; 1 = hardly at all/a couple of times a year; 2 = rarely/once a month; 3 = sometimes/a couple of times a month; 4 = fairly often/once a week; 5 = frequently/a couple of times a week; 6 = always/every day.

Procedure

Students (Sample 1) and employees (Sample 2) were asked to participate in the study by PhD students who approached various universities and companies. The sample 1 was chosen for two reasons: first, because students use ICT in their daily work as students, and second it was a convenient sample easy to approach. Similarly, sample 2 was chosen because of the companies were familiar to PhD students who conducted their research. Only respondents from ICT-jobs were sampled. All respondents, who voluntarily participated in the study, filled in the paper-and-pencil version of the Resources, Emotions and Demands. Information and Communication Technologies (RED.TIC) questionnaire. This questionnaire starts with a section dealing with general information (i.e. age, level of education, kind of job, working hours) that asks about the kind of technology the person uses, experience with ICT, etc. In the present study, we used this section to uncover whether both samples studied and worked using ICT and which kind of ICT-activities they were involved in.

Results

Descriptive Statistics

Students used word processors (99%), internet (86%), spreadsheet (80%), database (60%), powerpoint (62%), and statistics packages (38%). Employees used word processors (94%), electronic mail (91%), spreadsheet (86%), internet (80%), and intranet (70%). Both samples were asked to fill out the flow items imagining ICT activities they mentioned previously.

Table 3.1 shows the means, standard deviations, internal consistencies (Cronbach's α), and intercorrelations of the three flow scales in both samples.

Table 3.1

Means, Standard Deviations of the three factors of flow and Cronbach's alphas (students/employees) on the diagonal. Correlations for the Study Variables (employees below the diagonal).

	Students (234)		Employees (283)		Correlations		
Dimensions of flow	M	SD	M	SD	1	2	3
1. Absorption	2.84	1.19	2.92	1.21	.84/.86	.42**	.37**
2. Intrinsic interest	2.79	1.39	2.89	1.44	.48**	.85/.80	.58**
3. Enjoyment	3.25	1.34	3.86	1.29	.49**	.62**	.88/.85

Note. ** $p < .01$

As can be seen from Table 3.1, all variables demonstrated good internal consistencies by not only satisfying the usual criterion of α greater than .70 (Nunnaly & Bernstein, 1994), but even the more stringent criterion of α greater than .80 (Henson, 2001). In addition, Table 3.1 shows that absorption, intrinsic interest and enjoyment correlate positively and significantly. Mean correlation among students and employees was .46 and .53, respectively.

Factorial structure of flow

In order to test Hypothesis 1, two alternative models were fitted to the data separately for each sample, using confirmatory factor analyses: a one-factor model (M1) that assumed one latent variable underlying all flow items, and a three-factor model (M2) that assumed that items would load on three correlated scales, absorption, intrinsic interest and enjoyment. The AMOS 4.0 software package (Arbuckle & Wothke, 1999) was used to analyze data. Table 3.2 shows the results for Sample 1 and Sample 2 for the one-factor model (M1), the three-factor model (M2), and the null model (M3, reference model).

Table 3.2

Confirmatory Factor Analyses of the three dimensions of flow (n= 234 student, n= 283 employees).

	Model	χ^2	df	p	GFI	AGFI	RMSEA	NNFI	CFI	IFI	$\Delta\chi^2$	Δdf
234 students	(M1) 1 Factor	440.51	44	.001	.69	.54	.20	.64	.66	.66		
	(M2) 3 Factors	49.22	41	.17	.96	.94	.03	.96	.99	.99	M1-M2=391.29***	3
	(M3) Null model	1209.67	55	.001	.39	.27	.30	-	-	-		
283 employees	(M1) 1 Factor	523.17	44	.001	.69	.54	.20	.67	.69	.69		
	(M2) 3 Factors	137.54	41	.001	.92	.87	.09	.91	.94	.94	M1-M2=385.63***	3
	(M3) Null model	1606.69	55	.001	.34	.21	.31	-	-	-		

Note. df= degrees of freedom; p= significance test; GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index;

RMSEA = root mean square error of approximation; NNFI = non-normed fit index; CFI = comparative fit index; IFI = incremental fit index.

M1 did not fit the data well; the non-normed fit index (NNFI) and the comparative fit index (CFI) all fell below the acceptance criterion of .90 (Hoyle, 1995) in Sample 1 (NNFI= .64; CFI= .66), as well as in Sample 2 (NNFI= .67; CFI= .69). The value for the root mean square error of approximation (RMSEA) was also higher than the critical value of .08 (Browne & Cudeck, 1993) in Sample 1 (RMSEA= .20) and also in Sample 2 (RMSEA= .20). In contrast, the hypothesized model M2 fit the data well, with values for both relative fit indexes above .90 in Sample 1 (NNFI = .96; CFI = .99) and in Sample 2 (NNFI = .91; CFI = .94). Also, the value of RMSEA was below .08 in Sample 1 and approached this criterion in Sample 2. The results of the chi-square difference between M1 and M2 showed a superior fit of M2 for both samples (see .2 2). Hence, it was concluded that rather than one undifferentiated dimension, flow includes three correlated dimensions: absorption, enjoyment and intrinsic interest, which supported Hypothesis 1.

Factorial Variance/Invariance across samples

In order to assess the invariance of the three-factor model of flow, it was fitted simultaneously to the data of both samples, using multigroup analyses (MGA). As can be seen from Table 3.3, M1 fits well to the data (NNFI, CFI, IFI > .90; RMSEA < .08).

Table 3.3

Multigroup Confirmatory Factor Analysis of the three dimensions of flow (n= 234 students and n= 283 employees).

Model	χ^2	df	p	GFI	AGFI	RMSEA	NNFI	CFI	IFI	$\Delta\chi^2$	Δdf
(M1) 3 Factors free	186.73	82	.00	.94	.90	.05	.95	.96	.96		
(M2) Full Constrained	199.26	93	.00	.93	.90	.04	.95	.96	.96	M2-M1=12.53 ns	11
(M3) Null Model	2816.31	110	.00	.36	.23	.21	-	-	-		

Note. df= degrees of freedom; p= significance test; GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index;

RMSEA = root mean square error of approximation; NNFI = non-normed fit index; CFI = comparative fit index; IFI = incremental fit index.

Next, a model (M2) was fitted to the data in which all factor loadings as well as all covariances between the three latent factors were constrained to be equal across both samples. As can be seen from Table 3.3, compared to the freely estimated model (M1), the fit of this fully constrained model (M2) did not improve. The fact that M1 and M2 fit equally well to the data of both samples suggested that that the factor loadings and the covariances between the factors did not differ significantly between samples. In other words, the three-factor model of flow was invariant across students and employees, which supported Hypothesis 2. Figure 3.1 displays the standardized factor-loadings and correlations between factors in both samples. Please note that the differences between the standardized indices are not significant for both samples.

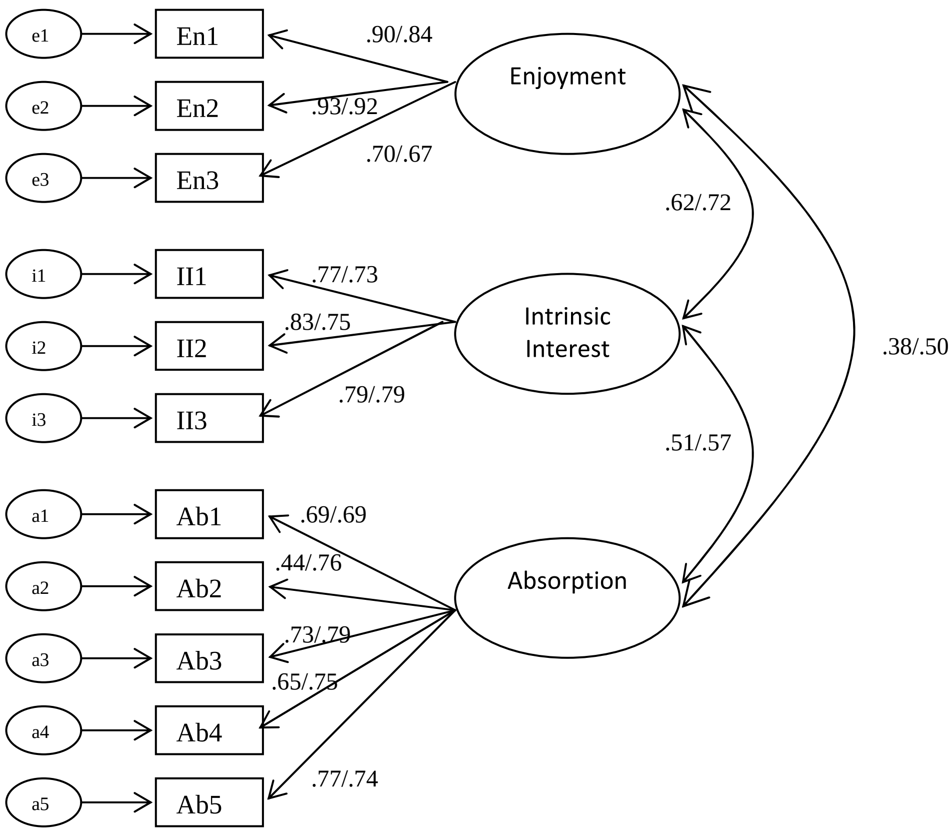

Figure 3.1. Three-factor model of flow resulting from CFA using multigroup analysis for n= 234 students and n= 283 employees.

Discussion

The aim of this study was to investigate the three-dimensional construct of flow, absorption, enjoyment and intrinsic interest, among 517 Information and Communication Technology (ICT) users, and to check its invariance across samples. In this sense, the results supported Hypothesis 1, that assumed that rather than a unitary construct, the flow experience is multidimensional and includes absorption, intrinsic interest and enjoyment. According to the results, 14% and 50% of the variance between the flow factors was shared, indicating a moderate overlap. In addition, all the three subscales showed a high degree of internal consistency.

Also, Hypothesis 2 was supported since multigroup analyses showed the invariance of the three-factor model of flow across both samples, students and employees. In other words, the three-dimensional flow experience can be generalized across two quite different groups that have in common that they frequently use ICT.

These findings supported the factorial validity of the three-factor model of flow that was used in previous studies (Bakker, 2005; Demerouti, 2006; Salanova, et al., 2006). In addition, the findings also showed that the flow experience can very well be operationalized using *specific* rather than general items as used in previous research. This is a main contribution of the present study. Accordingly, the present study reveals the need to use items that refer, in this case, to the use of ICT, in order to assess flow during a specific activity.

As we stated in the introduction, the theoretical framework for the present study was the three-dimensional operationalisation of flow used in previous studies (Bakker, 2005, Demerouti, 2006; Salanova, et al., 2006), except that, in the present study, flow was considered to be an optimal experience that is by definition related to specific activities, rather than to the job in general. Although the three previously mentioned dimensions of flow have been used by others, the present study makes two main contributions. Firstly, testing the factorial validity of this specific operationalisation of flow across different samples. And secondly, the use a specific measure of flow (related to work with ICT) rather a general measure (related to work in general). In other words, the assessment of the flow experience by means of this measure was in the context of technology use. Using a specific measure of flow, for instance in the context of ICT, allows discrimination of flow from a related concept, work engagement. Work engagement is defined as a persistent, pervasive and positive affective-motivational state of fulfilment in employees that is not focused on any particular object, event, individual or behaviour (Schaufeli, et al., 2002). So the difference between work engagement and flow is that the former is a more general and pervasive state of mind that is related to the job as such, whereas the latter is a specific optimal experience that is of limited duration and is related to a specific activity. It is plausible that engaged employees are more likely to experience short-time, transitory, optimal experiences (flow) during their work, compared to those who are not engaged. Using the present operationalisation of flow as an optimal experience that occurs in *specific* work activities, it was possible to test this hypothesis; In the case of the more general operationalisation of flow, the concept is almost equivalent with work engagement. Based on the present results, it is proposed that specific flow questionnaires be used in future research that are tailored towards specific work activities such as working with pupils (teachers), manufacturing (craftsmen), research (R&D employees), solving logistic puzzles (work planners), and so on.

Based on the above reasoning, future research could explore the relationship between work engagement, as a kind of 'predisposition' for experiencing flow, and the flow experience itself. Also, another relevant issue is to explore the nature of the activities that are highly related with flow, for instance, in this case it would be interesting to study the differences, regarding flow experience, between working with a spreadsheet or working with the PowerPoint. This is also related with a another avenue for future research, that it is to study the antecedents and consequences of flow. Various authors have pointed to the issue that in the original definition of flow, the experience itself is confounded with causes and consequences (Trevino & Webster, 1992; Ghani & Deshpande, 1994; Chen et al., 2000; Finneran & Zhang, 2003). Using the present flow measure which assesses the flow experience itself, this challenge can be taken up. Of special interest is to investigate to what extend the three dimensions of flow that were identified are *differently* related to antecedents and consequences. In other words, for future research on flow, it would be interesting to know more about which the conditions are that are needed to experience flow (antecedents) and the consequences of its experience.

While it may seem that much has already been achieved, flow research still has a long way to go. Since Csikszentmihalyi introduced flow in 1975, many researchers have taken an interest in this intriguing state of optimal experience and studied it in such different fields as sports, games, music, and work, (Nakamura & Csikszentmihalyi, 2002). Based on the present results, a brief, specific self-report questionnaire that consists of three related dimensions, absorption, enjoyment and intrinsic interest, could be used for assessing the flow experience itself.

Chapter 4. Technoflow among Spanish and Swedish students: a Confirmatory Factor Multigroup Analysis[4]

Summary

Despite the relevance of flow in recent research in Positive Psychology, there exist few studies on this optimal experience in technology settings. The aim of this study is to confirm the three-factorial (enjoyment, absorption and intrinsic interest) structure of *technoflow*. 154 university students who use computers in their studies (N=78 Spanish students and N=76 Swedish students) answered a questionnaire. Confirmatory Factor Analyses showed a better adjustment of a bifactorial model of technoflow (enjoyment and absorption). Multigroup Analyses showed that the model is invariant across samples. Practical and theoretical implications as well as future research are also discussed.

Introduction

Information and Communication Technology (ICT) has become a usual tool in our daily activities. Literally speaking, computing technology has moved into every element of our daily lives. Having technology that is useful in our workplaces, homes, schools, community organizations, is of paramount importance. Then, the study of Human Computer Interaction is at the center of the evolution of effective tools to improve the quality of our lives (Olson & Olson, 2003). However, most of the approaches have been focused on the negative effects of the use of ICT, such as negative consequences of the implementation of technology (Åborg & Billing, 2003; Arnetz & Wiholm, 1997; Korunka & Vitouch, 1999; Salanova, 2003; Salanova, Cifre, &

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Martin, 1999), burnout (Salanova & Schaufeli, 2000), and technostress (Ballance & Rogers, 1991; Towell & Lauer, 2001; Salanova et al., 1999). Nevertheless, in the last decade researchers have turned also their eyes into the positive effects that ICT may produce, and to the study of the positive attitudes towards ICT and positive experiences related to this, as affective psychological well-being (Martínez, Cifre, Llorens, & Salanova, 2002), engagement and self efficacy (Salanova, Grau, Llorens, & Schaufeli, 2001; Sensales & Greenfield, 1995; Shih, 2006). Those studies have been carried out not only in the context of work but also in the context of education.

This desire to understand the positive effects of ICT use might be framed within the Positive Psychology movement, based on the scientific study of the human virtues and strengths (Sheldon & King, 2001). One of the most popular concepts in this context is 'flow' (as a 'good or optimal experience') as the research and theory on flow have had its origin in the desire to understand this intrinsic or autotelic (from the Greek auto-telos that means intrinsically rewarding by itself) phenomenon.

Flow experience has attracted the interest of a growing number of researchers since Csikszentmihalyi introduced and explained the concept in his research (e.g., Csikszentmihalyi, 1975, 1988, 1990, 1997, 2003). He interviewed artists, athletes, composers, and scientists, and asked them to describe "optimal experiences" that made them feel good and motivated because they were doing something that was worth doing for its own sake. He coined this experience 'flow', because many interviewees used this term spontaneously to explain what their optimal experience felt like (Csikszentmihalyi & Csikszentmihalyi, 1988). Thus, flow experience is a condition in which people are so involved in an activity that nothing else seems to matter at the time; the experience is so enjoyable that people will do it even at great cost, for the sheer sake of doing it (Csikszentmihalyi, 1990).

Due to flow experience is a phenomenon which is difficult to measure, there is still no agreement about its operationalisation . However, recently it is generally accepted that there are three closely related aspects of flow: flow antecedents, flow experience and flow consequences (Chen, 2006; Chen, Wigand, & Nilan, 1999; Chen, Wigand, & Nilan, 2000; Ghani & Deshpande, 1994; Trevino & Webster, 1992).These studies, carried out in the context of ICT use, reveal the necessity to distinguish the conditions that unleash flow from the flow experience itself. It has to be noted that researchers interested in the study of flow experience must not confound flow stages (antecedents, flow experience and flow consequences) with the elements or dimensions that constitute each stage. In the present study we will focus on the understanding of flow experience stage by itself.

Experiencing flow using technology: technoflow

Taking up again the issue of ICT positive effects, it might be noticed that flow experience might easily appear during the use of computers in particular, or ICT in general, presumably because of the intrinsically motivating nature of these technologies (Chen et al., 2000; Trevino & Webster,1992) and also because using ICT represents a clear-goal activity. Flow while using computers has been studied both in general (Finneran & Zhan, 2003; Ghani & Deshpande, 1994; Webster, Trevino, & Ryan, 1993) and during performing on-line or Web activities in particular (Chen, 2006; Chen et al., 1999; Chen et al., 2000; Skadberg & Kimmel, 2004).

An examination of previous literature reveals that all definitions of flow experience in general and also in the context of ICT, seem to have three elements in common. The first refers to the sense of involvement, total concentration, focused attention or loss of self-consciousness, in other words, *absorption* (Chen, 2006; Csikszentmihalyi, 1975; Ghani & Deshpande, 1994; Novak & Hoffman, 1997; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi 1996; Trevino & Webster, 1992). A second common element involves the positive feeling of enjoyment while doing the activity, which becomes an intrinsically enjoyable experience (Ghani & Deshpande, 1994; Hedman & Sharafi, 2004; Novak & Hoffman, 1997; Moneta & Csikszentmihalyi, 1996; Privette & Bundrick, 1987), considered as *enjoyment*. Last element specifically refers to the interest in performing the activity for its own sake, not because it has to be done for one reason or another (Novak & Hoffman, 1997; Moneta & Csikszentmihalyi 1996; Trevino & Webster, 1992); that is to say, *intrinsic interest*.

It has to be noted, that intrinsic interest might be understood also as an antecedent or prerequisite of the flow experience. So, there are still some doubts about including intrinsic interest as part of the flow experience. Skadberg and Kimmel (2004) used in their research time distortion (as a result of focused attention and complete involvement) and enjoyment to measure the state of flow. Also Ghani and Deshpande (1994) understand that the two key characteristics of flow are (a) total concentration in an activity and (b) the enjoyment which one derives from an activity. On the other hand, there are also some studies (Bakker, 2005; Demerouti, 2006; Salanova, Bakker, & Llorens, 2006) that use the three-factorial operationalisation (absorption, enjoyment and intrinsic interest) to measure flow experience. On the basis of these differences in the operationalisation of flow experience stage, in the present study we will try to shed some light on this operationalisation. In order to do that we assume that technoflow (flow in ICT context) is a short-term peak experience when using ICT characterized by *absorption*, *enjoyment* and *intrinsic interest*. These three dimensions might be considered the elements that make up the very experience of flow while using ICT, or what could be named *technoflow.*

The aim of the current study is to investigate the structure of technoflow using two samples (Swedish and Spanish students) in order to test the invariance of the flow structure. According to previous studies (Novak, Hoffman, & Duhachek, 2003) we will select only those students that use ICT in their studies (and not in their leisure time), as it is during these goal-oriented activities technoflow is more probable to occur.

More specifically, we hypothesize that:

H_1: Technoflow experience will be a multidimensional structure composed by *absorption*, *enjoyment* and *intrinsic interest.*

H_2: This three-factorial structure of technoflow will be invariant across the two samples.

Method

Participants and Procedure

Sample 1 consisted initially of 234 undergraduate students (66% women) from five different Spanish universities who voluntary filled out the questionnaire. Ages ranged from 17 to 43 years old, with a mean age of 23 (*SD* = 3.8). These students came from different areas of study from Social Sciences to Technical Sciences. The process of data collection lasted around 7 months. Although all the students used ICT in their activities (study, communication and play) we only selected those who reported that they used ICT in their studies frequently. Thus, the final sample was composed by 78 students, 54 were women (69%) and 24 men (31%). Their mean age was 23 (*SD* = 3.8).

Sample 2 consisted of 76 undergraduate Swedish students (68% women) from the Social Sciences and the Technical Sciences area at Örebro University. Ages ranged from 19 to 37 years old, with a mean age of 24 (*SD* = 4.2). Data collection lasted around 1 month. This sample, consists of students who only used computers for their studies. They voluntarily filled in the questionnaires and returned them directly to the researcher.

Variables

All students were asked to answer the RED.ICT questionnaire (Resources, Emotions/Experiences and Demands. Information and Communication Technologies) in its paper-and-pencil version. This questionnaire was developed by the researchers. The validity of this instrument has been obtained in different previous studies (e.g., Salanova, et al., 2006; Schaufeli, Bakker, & Salanova, 2006; Schaufeli, Salanova, González-Romá, & Bakker, 2002).The questionnaire is available in Spanish and English. The Spanish participants filled in the Spanish version and the Swedish students the English one.

The three dimensions of flow were measured through the following variables included in the RED.ICT questionnaire, both in Spanish and in English.

Absorption was assessed using a slightly adapted version of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002). All 5 items were reworded to refer specifically to ICT work; for instance, the item *'Time flies when I'm working'* was rephrased as *'Time flies when I'm working with computers'.*

Intrinsic interest was assessed by 3 self-constructed items (Salanova et al., 2006) (e.g., *'I work with computers because I like them, not because I have to'*).

Enjoyment was assessed by 3 self-constructed items (Salanova et al., 2006) (e.g., *'I enjoy the work I do using computers '*).

All items scored on a 6-point frequency rating scale ranging from '0' (not at all/never) to '6' (always/every day).

Results

Descriptive Statistics

Data were analysed with the statistical program SPSS 13.0. Descriptive analyses were performed and internal consistencies were computed for the scales in each sample separately (see Table 4.1). In all samples values of Cronbach's α are higher than the criterion of .70 (Nunnally & Bernstein, 1994). In both samples most scales satisfied even the more stringent criterion of .80 (Henson, 2001), except for the case of intrinsic interest in the Swedish sample (α= .77) Then, it can be said that all constructs that were assessed demonstrated good internal consistencies. Regarding correlations, we found that the three variables have positive significant correlations with a mean correlation of r=.57, p<.01. These results are in line with our hypothesis that these three variables are part of the flow experience.

Table 4.1

Means (M), Standard Deviations (SD), internal consistencies (Cronbach's α) and inter-correlations (Spanish/Swedish) of the study variables in Spanish students (n=78) and Swedish students (n=76)

	Spanish Students			Swedish Students				
	M	SD	α	M	SD	α	2	3
1. Absorption	3.02	1.18	.83	2.29	1.24	.86	.58**/ .63**	.44**/ .59**
2. Intrinsic Interest	2.71	1.44	.86	2.24	1.32	.77		.60**/ .59**
3. Enjoyment	3.26	1.25	.85	2.82	1.32	.81		

Note. ** $p < .01$

Confirmatory Factor Analyses

In order to test hypothesis 1 Structural Equation Modelling (SEM) was employed, as implemented by the AMOS program (Arbuckle & Wothke, 1999) to test two factorial models: (1) the traditional correlated three-factor flow model including absorption, intrinsic Interest, and enjoyment (M1); (2) the alternative correlated two-factor flow model that includes, what we called, the core of the flow experience (absorption and enjoyment). Both models were first fitted to the data of each sample separately, and then, in order to assess factorial invariance across samples, a multi-group analysis was performed including both two groups simultaneously, using multi-group analyses (Byrne, 2001; pp. 173-199).

Maximum likelihood estimation methods were used and the input for each analysis was the covariance matrix of the items. The goodness-of-fit of the models was evaluated using relative and absolute indices. As recommended by Jöreskog and Sörbom (1986) and Marsh, Balla and Hau (1996), the absolute and relative goodness-of-fit indices computed were: (1) the $\chi 2$ goodness-of-fit statistic; (2) the Root Mean Square Error of Approximation (RMSEA); and (3) the Goodness of Fit Index (GFI) (4); Normed Fit Index (NFI); (5) Incremental Fit Index (IFI); and (6) Comparative Fit Index (CFI); (7) Expected Cross-Validation Index (ECVI). Non-significant values of $\chi 2$ indicate that the hypothesized model fits the data. Values of RMSEA smaller than .08 indicate an acceptable fit and values greater than 0.1 should lead to model rejection (Cudeck & Browne, 1993). In contrast, the distribution of the GFI and the AGFI is unknown, so that no statistical test or critical value is available (Jöreskog & Sörbom, 1986). For all three relative fit-indices, as a rule of thumb, values greater than .90 are considered as indicating a good fit (Hoyle, 1995).

Results of this first step come from performing this three-factor model using Confirmatory Factor Analysis (CFA) in order to test hypothesis one. We tested the fit of M1 (absorption, enjoyment and intrinsic interest) and M2 (absorption and enjoyment) to the data of all three samples separately.

First of all, CFA were carried out in 234 Spanish students. As can be seen in the first row in Table 4.2 the three-factor model (M1) fits the data well. Its fit indexes (GFI, AGFI, CFI, and NNFI) all meet the acceptance criteria of .90. The value for the RMSEA is also higher than .08 (.083). Although all this indexes are acceptable, the ECVI, that is better whenever it is lower, is higher in comparison with the two-factor model (M2). The second row in Table 4.2 shows the results for the proposed hypothetical two-factor model (M2). We can observe that its fit indexes have values above .90. On the other hand, the Root Mean Square Error of Approximation (RMSEA) has a value under .08 (.079). Therefore, the data fit well to the proposed model, with a high quality of these fit-indexes, even the ECVI is better and lower than M1.

As a second step, a CFA was performed in order to test the fit of M1 (absorption and enjoyment, including intrinsic interest) and M2 (only absorption and enjoyment) again in a different sample composed by 76 Swedish students. Results are shown in third and fourth rows of Table 4.2. As it can be seen M2 fits slightly better than M1 in the Swedish sample due to the ECVI is better when we test the two-factor model.

The third step was to test the model among Spanish students with the same conditions as the Swedish sample. 78 students were selected from the whole Spanish sample on the criteria of using ICT *only* for their studies (as it has been explained before). Results are shown in fifth and sixth rows of Table 4.2. As it can be seen M2 fits slightly better than M1 also in the Spanish sample due to the ECVI is better when we test the two-factor model.

Hence, on balance, it can be concluded that M2, which includes only two variables/dimensions as flow core (absorption and enjoyment), fits slightly better or at least equally well, to the data than the model (M1) which includes also intrinsic interest.

Table 4.2

Confirmatory Factor Analyses to of the three dimensions of Flow (n= 234 students, n=78 Spanish students, n=76 Swedish students).

	Model	χ^2	df	p	GFI	AGFI	RMSEA	NNFI	CFI	IFI	ECVI
234 Spanish	(M1) 3 Factor	100.99	41	.00	.93	.88	.08	.93	.96	.96	.65
students	(M2) 2 Factors	49.49	19	.00	.95	.90	.08	.95	.97	.97	.36
76 Swedish	(M1) 3 Factor	53.46	41	.09	.88	.81	.06	.88	.96	.97	1.38
students	(M2) 2 Factors	26.81	19	.11	.91	.84	.07	.91	.97	.97	.81
78 Spanish	(M1) 3 Factor	106.45	41	.00	.81	.70	.14	.79	.86	.86	2.03
students	(M2) 2 Factors	38.10	19	.01	.89	.80	.11	.87	.93	.93	.94

Note. Df= Degrees of freedom; p= significance test; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; ECVI = Expected Cross-Validation Index.

Multigroup Analyses

Next, in order to test Hypothesis 2, a multi-group analysis of M2 was performed across both samples simultaneously. As can be seen from Table 4.3, M2 fits the data well, with all fit indexes satisfying their criteria. Moreover, as expected, the latent absorption and enjoyment factors are significantly positively correlated: the mean correlation across both samples: r = .57 (see Figure 4.1).

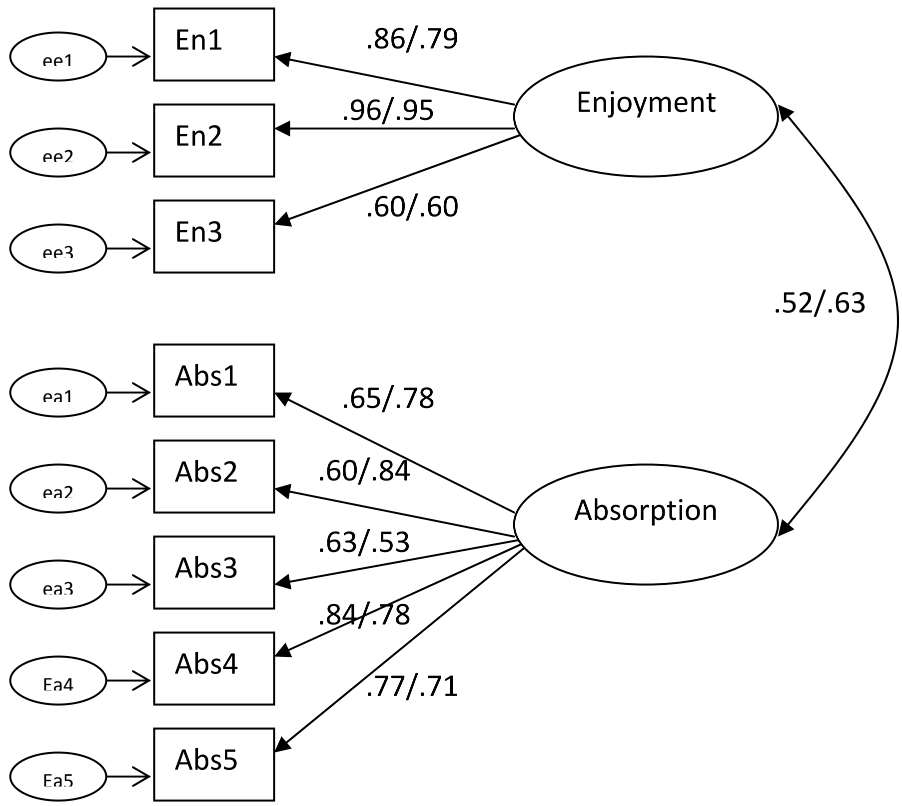

Figure 4.1. Results of the multi-group analyses (Final Model). Spanish students (n=78) / Swedish students (n=76).

Table 4.3

Multiple group analyses (MGA) of the two-factor flow model including Spanish users (n=78) and Swedish users (n=76).

	$\chi 2$	df	p	GFI	RMSEA	NFI	IFI	CFI	$\Delta\chi^2$	Δdf
M2	64.904	38	.04	.90	.00	.89	.95	.95		
$M2_c$	87.719	45	.00	.87	.08	.86	.92	.92	$M2_c$ - M2 = 22.815***	7
$M2_{co}$	64.935	39	.00	.90	.06	.89	.95	.95	$M2_{co}$ - M2 = 0.031	1
$M2_{fa}$	86.869	44	.00	.87	.08	.86	.92	.92	$M2_{fa}$ - M2 = 21.965***	6
$M2_{fi}$	70.115	43	.00	.90	.00	.88	.95	.95	$M2_{fi}$ - M2 = 5.211	5

Note. χ^2 = Chi-square; df=degrees of freedom; GFI=Goodness-of-Fit Index; RMSEA=Root Mean Square Error of Approximation; NFI= Normed Fit Index; IFI = Incremental Fit Index; CFI=Comparative Fit Index; M2= Flow Model with two flow latent factors (absorption and enjoyment) (freely estimated); $M2_c$ = Fully constrained model. $M2_{co}$ = Constrained correlations; $M2_{fa}$ = Constrained factor loadings; $M2_{fi}$ = Final model; *** $p < .001$.

Following the procedure recommended by Byrne (2001), the invariance of M2 across both samples was investigated (see Table 4.3). The invariance of correlations between factors and the invariance of factor loadings was assessed by comparing the fit of the model in which the targeted estimates were constrained to be equal across all both samples (M2c) with that of the unconstrained model (M2) in which this was not the case. When the fit did not deteriorate, the model was deemed to be invariant across samples. However, compared to M2 the fit of the fully constrained model (M2c) deteriorated significantly, meaning that the correlations and the factor loadings of M2 are not invariant across samples.

Next, a model with only the correlations between the latent factors constrained to be equal (M2co) as well as a model with only the factor loadings constrained to be equal (M2fa) was simultaneously fitted to the data of the two samples, respectively. Again, compared to M2 the fit of M2fa deteriorated significantly but not the fit of M2co. The model with the correlations where the latent factors were constrained to be equal was deemed to be invariant across samples. In order to constrain as much factors loadings as possible, different models with factors loadings constrained were fitted to data. Finally, a model was tested with factor correlations and all factors loadings constrained to be equal between both samples, except paths from ABS to items Abs1 and Abs2 what were free because when were constrained the fit of the models were deteriorated significantly. Compared to M2 the fit of M2fi did not deteriorate, so that it can be concluded that the correlations between factors and almost all the factor loadings are invariant across both samples.

From these results, we can say that hypothesis 1 was partially confirmed, although the model was consistent among samples, the two dimensional model of technoflow fits better to the data than the three-dimensional one. Also this two-factor structure is invariant across the two samples. This result confirms the hypothesis 2; absorption and enjoyment are the core elements of the technoflow experience.

Discussion

The main aim of the current study was to test the dimensions of technoflow and its invariance across samples. As predicted by Hypothesis 1, technoflow experience was composed of absorption, enjoyment and also of intrinsic interest. However, results show that the bifactorial model of technoflow (absorption and enjoyment) showed a better adjustment to data than the three-factorial model . Thus, we can say that the so-called core of flow is made up by enjoyment and absorption. This result was consistent among the two samples studied. So, hypothesis one is partially confirmed.

The role of intrinsic interest in the flow experience is a difficult issue in this research field due to several reasons. One is because the difficulty, as has been mentioned, of discriminating it as a part or not of the flow experience. This study tries to take a step further in the clarification of this question: What kind of role is intrinsic interest playing in the flow experience? The interesting results found in relation to this bidimensionality of technoflow concerns the possibility of considering intrinsic interest as an antecedent of the flow experience. In this line, more research in terms of antecedents of technoflow need to be done. For instance, it is not a crackpot idea to think that intrinsic interest could be related to high levels of flow (absorption and enjoyment) and satisfaction. In fact, there are authors (e.g. Finneran & Zhang, 2003) that state that task should have particular characteristics (intrinsically interesting) that may influence the likelihood of an optimal experience.

Another reason why intrinsic interest is a slippery issue is the difficulty to also operationalise this concept. It has to be noted, that we label this concept *intrinsic interest* instead of *intrinsic motivation* as some authors do (Bakker, 2005; Moneta, 2004). According to the meaning of flow, items refer to flow like a peak experience related with a specific activity (in this case technology use) rather than a general behaviour during the studies or daily life. Motivation is a wide and general concept, and 'interest' comes from 'motivation' but is related with a very specific activity and moment. That is why we rather prefer measuring *intrinsic interest* than *intrinsic motivation*.

On the other hand, and regarding Hypothesis 2, a strong point of this study is its multisampling character. The current findings show the stability of the bidimensional structure of technoflow among samples. It opens a new slope on the operationalisation of technoflow experience. The results still need to be interpreted with some caution and to be seen as tentative because of the small size of the samples. It also would be interesting to replicate our results in some other countries using different and heterogeneous samples, in order to test the strength of this technoflow structure. That is why more research in this line is needed, the present study takes a first step on it.

Taken together, our results seem to suggest that rather than a three-factor model of flow, genuine enjoyment and absorption constitute the core of flow (or technoflow) experience. This agrees not only with the theoretical view that absorption is one of the central characteristics of flow (Csikszentmihalyi, 1975), and also enjoyment is experienced on this optimal experience, but also with previous research on the structure of flow (Ghani & Deshpande, 1994; Novak & Hoffman, 1997; Moneta & Csikszentmihalyi, 1996; Privette & Bundrick, 1987). In addition, our findings also show that the flow experience can very well be operationalised using *specific* rather than general items. That is, items that refer – in our case – to the use of ICT. In this sense, the present work shows the validity of the measures employed in order to assess technoflow. In sum, the novelty of this study regarding the findings on the structure of technoflow experience as bidimensional, fulfils the parsimony principle. It is also a fairly practical measure with an added value: its applicability.

Chapter 5. An Electronic Diary Study on Daily Flow Patterns[5]

Summary

This study explores the daily flow patterns related to working and non-working tasks among healthy and burned-out individuals using the Experience Sampling Method. The main aim is to explore patterns of flow in everyday life using an alternative operationalisation that focuses on the flow experience itself, rather than on the combination of high challenge and high skills. Forty healthy participants and sixty clinically burned-out individuals kept an electronic diary on activities (work/non-work), and levels of flow (enjoyment and absorption) for 14 days, and made entries several times a day (3-7), thus rendering 5,455 diary entries. A curvilinear daily flow pattern was observed, with lower levels of flow during working hours (10-16h). Moreover, we found differences between both components of flow: enjoyment was higher when performing non-working tasks, whereas absorption was higher when working. There were no differences in daily flow patterns between the healthy and burned-out group, although the mean levels of flow differed significantly with the former experiencing more flow than the latter. In sum, the results confirmed the validity of the alternative way of measuring flow by using enjoyment and absorption as its indicators.

Introduction

Flow experiences have captured the attention of a growing number of researchers since Csikszentmihalyi introduced the concept in the mid 1970s (e.g., Csikszentmihalyi, 1975, 1988, 1990, 1997, 2003). He interviewed artists, athletes, composers, and scientists, and asked them to describe the “optimal experiences” that

[5] Chapter 5 has been submitted for publication as: Rodríguez-Sánchez, A.M., Schaufeli, W., Salanova, M., Cifre, E., & Sonnenschein, M. An electronic diary study on daily flow patterns.

made them feel good and motivated as they were doing something that was worth doing for its own sake. He coined this experience ‘flow’ because many interviewees used this term spontaneously to explain what their optimal experience felt like (Csikszentmihalyi & Csikszentmihalyi, 1988). Thus, flow is a condition in which people are so involved in an activity that nothing else seems to matter at the time, and the experience is so enjoyable that people will do it even at great cost for the sheer sake of doing it (Csikszentmihalyi, 1990). Chen (2006) defined flow as a state that is “characterized by enjoyable feelings, concentration, immersion, and intensive involvement” (p. 222). In a similar vein, Ghani and Deshpande (1994, p. 383) described flow in the context of human-computer interaction, as: “(a) total concentration in an activity and (b) the enjoyment which one derives from an activity”. Both definitions include two key elements: enjoyment or pleasure and immersion or absorption.

Although these definitions of flow seem to be clear, some problems exist in operationalizing the construct. This is mainly due to the difficulty of assessing or ‘capturing’ the flow experience as it is a momentary and brief experience. Traditionally, the flow experience is measured in terms of the combination (i.e. product) of high challenges and high skills (Csikszentmihalyi & Lefevre, 1989; Delespaul, Reis, & deVries, 2004; Delle Fave, Bassi, & Massimini, 2003; Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005). Namely, “when both challenges and skills are high, the person is not only enjoying the moment, but also stretching his or her capabilities with the likelihood of learning new skills and increasing self-esteem and personal complexity. This process of optimal experience has been called flow” (Csikszentmihalyi & Lefevre, 1989, p. 816). So, according to Csikszentmihalyi and Lefevre (1989) perceived challenge and skills are both antecedents of flow and constitute the experience itself. More recently, Nakamura and Csikszentmihalyi (2002) concur with this view and state that a match of high perceived skills and high challenges is a necessary – but not sufficient – prerequisite to experience flow. But how can flow in everyday life be measured best? In terms of prerequisites (the combination of high challenges and high skills), or in terms of momentary experience itself? In our study we decided for the latter because we would like to make a conceptual distinction between the major antecedent of flow (i.e., the match of high challenges with high skills) and the actual flow experience itself (i.e., enjoyment and absorption).

The Nature of Flow

A review of the literature reveals that all definitions of flow experience seem to have three elements in common. The first refers to a sense of deep involvement and total concentration, in other words, *absorption* (Chen, 2006; Csikszentmihalyi, 1975; Ghani & Deshpande, 1994; Novak & Hoffman, 1997; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi, 1996; Trevino & Webster, 1992). A second common element involves the positive feeling of enjoyment while being engaged in the activity, in other words *enjoyment* (Ghani & Deshpande, 1994; Hedman & Sharafi, 2004; Novak & Hoffman, 1997; Moneta & Csikszentmihalyi, 1996; Privette & Bundrick, 1987). The final element specifically refers to the interest in performing the activity for its own sake and not because of external demands or pressures, in other words *intrinsic interest*. (Novak & Hoffman, 1997; Moneta & Csikszentmihalyi 1996; Salanova, Bakker, & Llorens, 2006; Trevino & Webster, 1992). We would like to point out that -- in our view -- rather than a constituting element of flow, intrinsic interest might acts as an antecedent or prerequisite of the flow experience itself (Rodríguez-Sánchez, Cifre, Salanova, & Åborg, 2008). Furthermore, conceptually speaking, intrinsic interest should be conceived as a motivational factor that drives a person to engage in a particular intrinsically rewarding activity. By doing so, the likelihood of experiencing flow is increased. However, during the flow experience itself, intrinsic interest is not experienced. Hence, for empirical and conceptual reasons we limit the flow experience to enjoyment and absorption, thereby excluding intrinsic interest (cf. Chen, 2006; Csikszentmihalyi, 1990; Ghani & Deshpande, 1994). More specifically, enjoyment is considered to be the emotional component of flow and absorption its cognitive component.

Flow in Healthy and Non-healthy Individuals

As the flow experience is positive by its very nature, it is plausible that 'healthy' individuals are more likely to experience flow than 'non-healthy' individuals. Perhaps for that reason previous research on flow typically used healthy samples. However, in the current study, we also use an non-healthy, burned-out group by way of contrast. In doing so we investigate the implicit claim of previous flow studies that flow experiences are typically found in healthy individuals. Burnout is defined as a chronic, work-related stress reaction characterized by exhaustion (i.e., fatigue due to excessive work demands), cynicism (i.e., indifferent, detached and distant attitudes toward one's work) and a lack of professional efficacy (i.e., the tendency to evaluate one's work negatively and feel incompetent) (Maslach, Schaufeli, & Leiter, 2001). However, there is accumulating evidence that exhaustion and cynicism constitute the core of burnout (Schaufeli & Taris, 2005). Being a positive psychological state that is constituted by enjoyment and absorption, it is plausible that flow is negatively related to burnout, as conceived by exhaustion and cynicism. For instance, it is difficult to imagine that a burned-out individual, who is cynical and doubts the significance of his or her work, may experience flow which is characterized by opposite experiences such as enjoyment and absorption. Therefore, we expect that:

Flow levels are significantly higher in healthy individuals as compared to burned-out individuals (Hypothesis 1).

Daily Fluctuations in Flow

Research into the dynamics of daily fluctuations of flow experiences is scarce. In fact, most of the studies relate flow experiences across the day with particular activities, such as studying, doing homework, socializing, arts and hobbies (e.g. Carli, Delle Fave, & Massimini, 1988; Massimini & Carli, 1988). But how does flow *fluctuate* across the day? As far as we know, only Guastello, Johnson and Rieke (1999) paid attention to fluctuations of flow across time, and found that flow fluctuates in a non-linear dynamical fashion over a period of one week. However, time-flow correlation was not examined in terms of time spent working.

Because flow includes an affective component (enjoyment), the literature on daily fluctuations of emotions might be helpful in understanding patterns of flow across time. Research shows that emotions exhibit non-linear rather than linear patterns of change in diurnal (e.g. Murray, Allen, Trinder, & Burgess, 2002; Rusting & Larsen, 1998) and weekly cycles (e.g. Larsen & Kasimatis, 1990). Most likely, the reason is that human emotions follow diurnal biological rhythms. For instance, Clark, Watson and Leeka (1989) found that various indicators of positive affect rose sharply from early morning until noon, then they remained relatively constant until 9 p.m., and then fell rapidly. Murray (2007) found similar results suggesting that positive affect displayed a diurnal rhythm in which a quadratic wave form was most prominent, consistent with the presence of a circadian component, typically experienced as a positive mood variation with mood being worse upon waking and better in the evening (Boivin et al., 1997; Koorengevel, Beersma, Gordjin, den Boer, & van den Hoofdakker, 2000). These results suggest that positive affect follows a diurnal rhythm and shows a non-linear pattern characterized by an inverted U shape. It seems that the typical quadratic wave form found in diurnal positive affect under normal sleep-wake conditions can be understood as a segment of the 24-hour circadian rhythm (Clark et al., 1989).

Since our conceptualization of flow also includes a cognitive component (i.e., absorption) research on circadian rhythms in human cognition is of relevance too. For instance, Schmidt, Collette, Cajochen, and Peigneux (2007) observed that time-of-day modulations impacts the performance on several cognitive tasks, and that these performance fluctuations are additionally contingent upon inter-individual differences in the circadian preference. Besides this study found that some cognitive processes were particularly sensitive to variations at the circadian arousal level, whereas others were less affected.

Based on the diurnal variation found in positive affect and some cognitions, we hypothesize that:

The flow experience is related to time of day according to a diurnal pattern characterized by inverted U shape (Hypothesis 2).

In addition, fluctuations in positive affect also appear to relate with socially determined rhythms, including the day of the week and the season of the year (e.g., Rossi & Rossi, 1977; Smith, 1979; Stone, Hedges, Neale, & Satin, 1985). In the present study we also explore differences in flow between weekdays and weekends. Following Csikszentmihalyi and LeFevre (1989) we expect that flow will be higher during workdays as compared to with weekends. Please note that we do not simply replicate this study because the operationalisation differs fundamentally. Whilst Csikszentmihalyi and LeFevre (1989) use the match of high challenge and high skills, we use absorption and enjoyment as indicators of the flow experience itself. As elucidated above, in our view the combination of high challenge and high skills constitutes a necessary prerequisite for the flow experience but is not identical to the experience itself. Hence, we hypothesize that:

Levels of flow tend to be higher on working days as compared to weekends (Hypothesis 3).

Flow in Working and Non-Working Tasks

As noted above, it has been observed that individuals report more flow experiences during work than off-work, but at the same time – and quite paradoxically – they prefer leisure above work. This is known as the 'paradox of work' (Csikszentmihalyi, 1990): work is likely to provoke more flow experiences than leisure, but leisure is preferred above work. Since we operationalized flow in terms of two dimensions we are able to study the paradox in greater detail. Namely, on the one hand, based on the study of Csikszentmihalyi and LeFevre (1989), that was recently replicated by Rheinberg, Manig, Kliegl, Engeser and Vollmeyer (2007), we expect that particularly levels of enjoyment are higher in non-working tasks as compared to working tasks. On the other hand, working tasks are by definition goal directed and usually include cognitive processes that require concentration and a certain amount of absorption (Schmidt et al., 2007). Or put differently, 'concentration' (Schallberger &

Pfister, 2001) – or absorption in our terms – is more characteristic for working activities than for non-working activities. Thus, we expect that:

Enjoyment is positively related to non-working tasks, whereas absorption is positively related to working tasks (Hypothesis 4).

Finally, since there is no a priori reason why 'healthy' and 'non-healthy' individuals would differ in terms of their daily patterns of flow experiences, we hypothesize that *the daily patterns of flow experiences are similar for healthy and burned-out individuals* (Hypothesis 5). Please note that Hypothesis 1 assumes that the *levels* of flow differ between healthy and non-healthy individuals.

Method

Participants

The participants were 40 healthy individuals (M age = 41.8, SD = 9.98: 65% females; 65% educated at college/university) from different occupational groups, and 60 clinically burned-out individuals (M age = 42.9, SD = 8.75: 55% females; 58% educated at college/university). Healthy participants were recruited through newspaper advertisements (25%) and personal contacts (75%). In order to be labelled "healthy", participants had to score below the validated cut-off points for burnout (Schaufeli, Bakker, Hoogduin, Schaap, & Kladler, 2001) on the Dutch version of the Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli & Van Dierendonck, 2000). Sixty healthy participants responded to the call, and 50 healthy participants (83%) returned the screening questionnaire. Three healthy participants produced unreliable data because they disregarded the instructions. In addition, seven participants were excluded given their high burnout scores (MBI; n = 5) or for having an age exceeding the range (18-65 years) that was established for the current study (*n* = 2).

Clinical burned-out participants were recruited from new enrollments of Dutch centers of expertise in burnout treatment (42%) and through the Internet (58%). The burned-out and control groups were matched for gender, age and level of education in order to prevent intergroup differences which may attribute to these variables. We classified participants as “clinically burned-out” when they suffered from severe burnout complaints according to the validated cut-off points from the MBI-GS (Schaufeli, et al., 2001). Burnout recruitment rendered 409 responses, of whom 289 (71%) were willing to participate, and 65 respondents (22%) actually met the inclusion criteria. The relatively small number of participants that was included was mainly due to the fact that many clinical burned-out individuals received another diagnoses as well (mostly depression), and/or used of antidepressants. Three clinically burned-out participants decided to leave the project during the first week of the dairy study because they considered that the effort required was too high. The data of two burned-out participants were lost because of technical problems. The burned-out and control groups were matched for gender, age and level of education in order to prevent intergroup differences which may attribute to these variables.

The final sample was composed of 100 participants, 40 healthy and 60 clinically burned-out participants. All burned-out participants were on sick leave; 53% were on full sick leave and 47% on partial sick leave. The average period of sick-leave was four months (SD= 3.60). Partial sick leave in the Netherlands occurs within the framework of a rehabilitation program, that is, when an employee is considered fit to work for only a part of the contractual working hours. Please note that this sample has been used before in another study on energy erosion and burnout (see: Sonnenschein, Sorbi, van Doornen, Schaufeli, & Maas, 2007). Instead of burnout, the current study focuses on flow experiences.

Participants received an informed consent form and a 1-hour instruction at home on the use of the electronic diary. They received a telephone call two days later to discuss their first experiences and potential problems. Telephone support was also available during the entire recording period, which concluded with a debriefing interview and the collection of the personal digital assistant pocket computer, and offering a remuneration of €25 (roughly 30 US$). The Medical Ethics Review Committee of the Utrecht University Medical Centre approved the study.

The Electronic Diary Study

In order to test our hypotheses, we used a technique that allows the ‘capturing’ and assessment of flow experiences related to any kind of activity and time of the day. In addition, this technique avoids the *retrospection bias* produced by questionnaires at the end of the day or the week, because these require a remembering and cognitive integration of past experiences (Peters et al., 2000; Stone, Broderick, Shiffman, & Schwartz, 2004).

Evidence shows that studying the same person repeatedly makes it possible to estimate stability and change in a person’s everyday life (Zautra, Affleck, Davis, Tennen, & Fasman, 2007). Thus, diurnal patterns of flow experiences can be investigated by taking measurements with the Experience Sampling Method (ESM) several times a day. A number of studies have focused on flow using the ESM (Csikszentmihalyi, Larson, & Prescott, 1977), since this method allows for the repeated assessment of subjects' experiences in their natural environment (Massimini, Csikszentmihalyi, & Carli, 1987; Christensen, Barrett, Bliss-Moreau, Lebo, & Kaschub, 2003). Moreover, an electronic diary allows the assessment of within-person fluctuations of symptoms (Bolger, Davis, & Rafaeli, 2003). In addition to accuracy and ecological validity, an electronic diary provides the unique opportunity to acquire diurnal patterns of the flow experience.

Measurements

All variables used in this study were obtained by means of an electronic diary. The diary was programmed into a PalmOne™ personal digital assistant (PDA) pocket computer with an integrated alarm and soft-touch screen, allowing for simultaneous presentation and the answering of items. Each day for two consecutive weeks, the participants filled an average of five alarm-controlled diaries. A beeping signal occurred randomly within 2.5 hour time units and prompted participants to fill in the alarm-controlled diary. All diary entries were automatically time-stamped and the variables of the present study were assessed: *enjoyment* and *absorption* with single questions according to ESM premises; items are to measure states instead of constructs, and they mimic an internal dialog. They must be concise and presented in a common language (Delespaul, 1995). Two flow items were selected from the Utrecht Work Engagement Scale (UWES; Schaufeli, Salanova, González-Romá, & Bakker, 2002) based on their face validity and their high factor-loadings. These items are: "I enjoy what I'm doing now" (enjoyment) and "I'm engrossed in what I'm doing" (absorption) The answers were scored on a 7-point anchored Likert scale ranging from 1 = *not at all* to 7 = *very much*. So flow was defined as a continuous variable (cf. Csikszentmihalyi, & Csikszentmihalyi, 1988; Delle Fave & Massimini, 2005b) consisting of an emotional (enjoyment) and a cognitive (absorption) component that were averaged in an overall flow measure.

In addition to flow experiences (i.e. enjoyment and absorption), the diary provided other information, such as the *time* of the day the beep signaled, the day of the week, and if the participant was engaged in *working tasks* or *non-working tasks*. The study yielded a total of 5,455 alarm-controlled diaries. On average, a participant rendered 71 alarm-controlled diaries, which equals a response of 81%, indicating that compliance was high in both groups. No influence of the method itself on the measurements (reactivity) was detected. These results are presented elsewhere; see Sonnenschein, Sorbi, Van Doornen and Maas (2006).

Statistical Analyses

We carried out descriptive analyses and ANOVAs using the statistical software package SPSS 15. In order to test the study hypotheses, we employed multilevel regression modeling (Hox, 2002), a method recommended for ESM-data (Schwartz, & Stone, 1998) because it accounts for within-subject dependencies of data points (since diary entries are nested within days, which are nested in their turn within participants). Longitudinal data can be viewed as multilevel data, with repeated measurements nested within individuals (Hox, 2002). Using multilevel models to analyze the repeated measures data offers several advantages, which Bryk and Raudenbush mentioned (1992). One of these advantages is that multilevel analysis can handle missing data. More accurately, this refers to the ability to handle models with varying time points. As multilevel regression models do not assume equal numbers of observations, respondents with missing observations pose no special problems here, and all cases can remain in the analysis (Hox, 2002). Within multilevel analyses, it is possible to test and compare several models starting with a null model that includes only the intercept. In the following steps, the consecutive addition of predictor variables is possible at the different levels, and improving one model based on a previous one can be examined using a likelihood ratio statistic (Sonnentag, 2001). To run multilevel analyses, we employed the MlwiN 2.02 program (Rashbash, Browne, Healy, Cameron, & Charlton, 2005). In our study, data on three levels were available: at the beep level (time and working tasks), at the day level (weekend or weekday), and at the person level (the healthy group or the burned-out group).

Results

Preliminary Analyses

Table 5.1 shows the means, standard deviations and correlations between the study variables at the person level, that is to say, we aggregated diary records to obtain the individual averages (M) and the within-person variability (SD). Table 5.1 also displays the correlations between the variables at the same time, that is to say, at the first level, the beep or time level (n = 4,017 – 5,455). As can be seen in Table 5.1, both components of flow substantially correlate at the person level ($r = .73$; $p < .001$) as well as at the time level ($r = .62$; $p < .001$).

Table 5.1

Means, Standard Deviations, and Correlations Between the Study Variables.

		Mean	SD	1	2	3	4	5	6	7	8
1	Time linear slope (time)	-	-	-		-.36**	.08**	.06**	.05**	.09**	-.00
2	Time quadratic slope (hour quadratic)	-	-	.99**	-	-.35**	.07**	.07**	.06**	.10**	.00
3	Working activity (0=no; 1=yes)	-	-	-.36**	-.35**	-	-.24**	-.30**	-.01	-.09**	.06**
4	Weekday (0=not weekend; 1=weekend)	-	-	.98	.88	.40	-	-.01	.05**	.07**	.01
5	Group (0= healthy; 1= burned-out)	-	-	.24*	.23*	-.70**	-.06	-	-.13**	-.14**	-.11**
6	Flow (Enjoyment and Absorption)	4.61	.58	.18	.19	.14	-.19	-.29**	-	.89**	.91**
7	Enjoyment	4.74	.60	.08	.08	.10	-.14	-.30**	.92**	-	.62**
8	Absorption	4.49	.65	.25*	.26**	.16	-.21*	-.23*	.93**	.73**	-

Note. Below the diagonal: Person level data (N=100), averaged across 15 days. Above the diagonal: beep level data (*N =4017-5455). * p<.05,* ** *p* < .01.

Before running the multilevel analyses, we examined group differences (burned-out versus healthy) in flow by carrying out an Analyses of Variance (ANOVA) on individual averages (M). We found significant differences between the two groups (t = 8.70, p < .01): the healthy group scored significantly higher on flow than the burned-out group. We observed the same effect for each dimension of flow separately: enjoyment (t = 9.62, p < .05) and absorption (t = 5.68, p < .05). More detailed analyses revealed that clinically burned-out participants on full sick leave exhibited *no* significant differences in flow compared to the clinically burned-out participants on partial sick leave (t = .00, *n.s.*). The same was true of each separate dimension: enjoyment (t = .06, *n.s.*) and absorption (t = .05, *n.s.*). Because no differences were observed between those on partial and full sick-leave the burned-out group was treated as a single, undifferentiated group. Thus, these preliminary analyses - to be confirmed in the multilevel analyses - led us to assert that, as we formulated in Hypothesis 1, healthy individuals experience more flow than those who are burned-out. Whether or not burned-out employees were on full or partial sick leave appeared to make no difference to the level of flow they experienced.

Multi-level Analyses and Test of Hypotheses

Before testing our Hypotheses 2 and 5, we calculated the intraclass correlation for flow in order to estimate the proportion of variance that is explained at each level (Hox, 2002). The results showed that 69% of the variance in flow is explained by the first level, which is at the beep (or time) level. The variance explained on the second level (day) was 9.56%, and 20.64% at the third level (person), respectively. The results evidence the existence of three levels of analyses, as suggested by the significant proportion of variance explained by the time level, that is to say, within-person fluctuations across the 3-7 occasions. The previous results allow us to continue with multilevel analyses.

In order to test Hypotheses 2 and 5, we tested four nested models: (1) the Null (intercept-only) Model; (2) Model 1, in which we added variables at the first level such as the time of the day, quadratic hour (or quadratic slope), and working/non-working activity; (3) Model 2, where we added the variable at the second level (type of day); and (4) Model 3, in which we added the variable at the third level (group). Besides, we also tested for interaction effects between group and time linear, and group time quadratic but they were not significant. Table 5.2 presents unstandardized estimates, standard errors, and *t*-values for all predictor variables of the four models. It also presents the deviance (- 2 x log) of the four models, as well as the differences in the deviance between the nested models. A significant decrease in the deviance indicates a better fit of the model.

Table 5.2

Multilevel Estimates for Models Predicting Flow Experience (Enjoyment and Absorption)

Model:	Null			1			2			3		
Variables	Estimate	*SE*	*t*	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*
Intercept	4.608	.058	79.432	5.158	0.247	20.925	5.129	0.246	20.802	5.358	0.256	20.885***
Time linear slope (time)				-0.081	0.031	-2.644**	-0.083	0.031	-2.697**	-0.083	0.031	-2.729**
Time quadratic slope (time2)				0.002	0.001	2.943**	0.003	0.001	3.002**	0.003	0.001	3.024**
Working activity (0=no; 1=yes)				-0.071	0.050	-1.443	-0.041	0.051	-0.797	-0.057	0.051	-1.120
Weekday (0=not weekend; 1=weekend)							0.126	0.045	2.814**	0.122	0.044	2.725**
Group (0= healthy; 1= burned-out)										-0.357	0.113	-3.139**
- 2 x log			12102.5			12085.1			12077.2			12067.8
Δ – 2 x log						17.39**			7.90**			9.40**
Df						3			1			1

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

The analyses revealed that Model 1 showed a significant improvement over the null-model, so time and the hour quadratic (see Figure 5.1) are significantly related to flow. This means that flow exhibits a curvilinear daily pattern, whereby lower levels of flow are more frequent during working hours (10-16h). In other words, the pattern found shows higher levels from 8h to 10h, lower levels from 10h to 16h, and higher levels again from 16h to 23h. Furthermore, whether being engaged in a working activity or not had *no* significant effect on flow experiences.

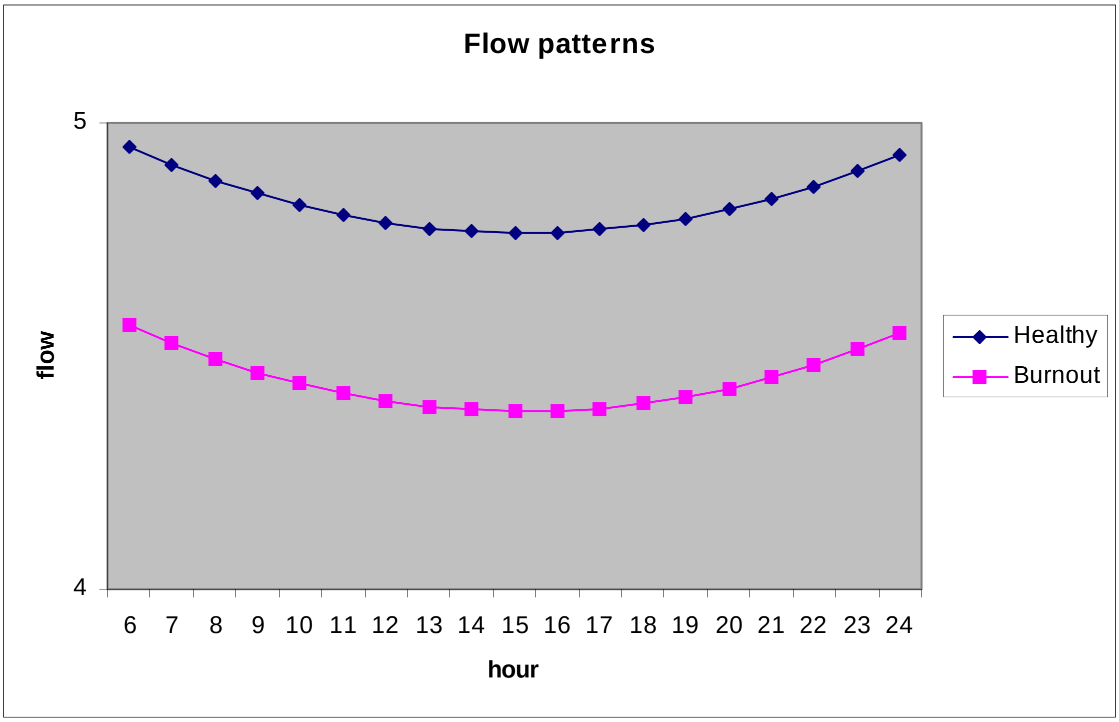

Figure 5.1. A flow pattern graph for 40 healthy participants and 60 clinically burned-out participants.

In the next step, we compared Model 2 with Model 1. Again, this new model showed a significant improvement. This indicates that including the type of day also adds to explaining flow. That is to say, weekends positively relate with flow experiences, or put differently, participant's level of flow was higher during weekends than during other days of the week.

In Model 3, significant differences between groups were found, revealing that healthy participants scored significantly higher on flow than burned-out participants. Besides, a significant improvement was observed in comparison with the previous model (Model 2).

In conclusion, the best fitting model was Model 3 which showed significant effects of time, weekday, and group; that is, flow experiences follow a particular daily pattern (partially supporting Hypothesis 2), flow experiences occur at the weekend rather than on weekdays (not supporting Hypothesis 3), working or non-working tasks has a differential effect on flow, depending on its dimension (supporting Hypothesis 4), and flow levels are higher in healthy individuals than in burned-out individuals (supporting Hypothesis 1), whereas flow patterns do not differ for healthy and burned-out individuals (supporting Hypothesis 5). Hence, our results fully support Hypotheses 1 and 5, whereas Hypothesis 2 was partially supported and. Hypothesis 3 was *not* supported. So far, Hypotheses 4 was not tested, because no differentiation was made yet between enjoyment and absorption. However, at this stage, Table 5.2 shows that levels of flow – as assessed with the composite score – did *not* differ between working and non-working tasks.

Differentiating Between Flow Components

In order to further investigate the negative result related to Hypothesis 3 and in order to test Hypothesis 4, a distinction was made between both components of flow. Alternative multilevel models were tested with each of the two flow components separately. Table 5.3 shows the results for enjoyment and Table 5.4 depicts those for absorption. Regarding Hypothesis 3, levels of enjoyment are higher on weekends as compared to weekdays (Table 5.3), whereas no difference for absorption was observed (Table 5.4). Regarding Hypothesis 4 – as expected – enjoyment is significantly associated with non-working activities (Table 5.3), whereas absorption is significantly associated with working activities (Table 5.4). Hence, Hypotheses 4 was supported. In sum, the combined score of both dimensions of flow does not relate to the type of activity that the participants engage in. This is most likely caused by the fact that both dimensions have an opposite effect: enjoyment relates to non-work activities, whereas absorption relates to work activities.

Table 5.3

Multilevel Estimates for Models Predicting Enjoyment

Model:	Null			1			2			3		
Variables	Estimate	*SE*	*t*	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*
Intercept	4.734	.061	77.606	5.296	0.262	20.176	5.260	0.262	20.038	5.552	0.272	20.390***
Time linear slope (time)				-0.086	0.033	-2.623**	-0.087	0.032	-2.684**	-0.088	0.032	-2.724**
Time quadratic slope (time2)				0.003	0.001	3.178**	0.003	0.001	3.243**	0.003	0.001	3.272**
Working activity (0=no; 1=yes)				-0.299	0.053	-5.638***	-0.261	0.054	-4.809***	-0.028	0.054	-5.189***
Weekday (0=not weekend; 1=weekend)							0.155	0.047	3.270**	0.150	0.047	3.157**
Group (0= healthy; 1= burned-out)										-0.454	0.117	-3.862***
- 2 x log			12669. 470			12586.27			12575.61			12561.69
Δ – 2 x log						83.13***			10.67**			13.91***
df						3			1			1

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

Table 5.4

Multilevel Estimates for Models Predicting Absorption

Model:	Null			1			2			3		
Variables	Estimate	*SE*	*t*	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*
Intercept	4.483	.064	70.047	5.031	0.291	17.319	5.009	0.291	17.213	5.177	0.301	17.153***
Time linear slope (time)				-0.078	0.036	-2.150**	-0.079	0.036	-2.194*	-0.080	0.036	-2.21*
Time quadratic slope (time2)				0.002	0.001	2.168**	0.002	0.001	2*	0.002	0.001	2.22*
Working activity (0=no; 1=yes)				0.153	0.058	2.637**	0.178	0.06	2.966**	0.164	0.060	2.734**
Weekday (0=not weekend; 1=weekend)							0.094	0.051	1.843	0.091	0.051	1.77
Group (0= healthy; 1= burned-out)										-0.260	0.127	-2.035*
- 2 x log			13384.75			13370.3			13366.92			13362.86
Δ – 2 x log						17.39**			7.90**			4.04*
df						3			1			1

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

Discussion

The aim of this study was to explore the dynamic, daily patterns of flow experiences using an alternative way to assess flow, as characterized by enjoyment and absorption, among both healthy and burned-out individuals. The results of our study support Hypotheses 1, 4, and 5, meaning that levels of flow are higher for healthy than for non-healthy individuals (Hypothesis 1), enjoyment is related to non-working tasks whereas absorption is related to working tasks (Hypothesis 4), and – despite differences in level – the daily pattern of flow does not differ between healthy and unhealthy individuals (Hypothesis 5). Hypothesis 2 was partially supported since a significant quadratic slope was found, but not as expected in the form of an inverted U-shape, but as a genuine U-shape. Hypothesis 3 was *not* supported because, instead of weekdays, levels of flow (particularly enjoyment) were higher on weekends.

Flow Patterns and Their Correlates

Our results suggest that flow experiences follow a curvilinear diurnal pattern. However, the linear slope is negative, and it represents a flattened U-shaped trend (see Figure 5.1) where lower levels of flow are more frequent during working hours (10-16h) and flow levels tend to increase at the end of the day. Two explanations may be offered for this unexpected result. Firstly, when participants leave their work they engage in leisure activities of their choosing, and specially recreation, that is the source of the most rewarding experiences in life (Csikszentmihalyi & LeFevre, 1989). This means that, our results corroborate the findings of Csikszentmihalyi and LeFevre (1989) who used a different operationalisation of flow in terms of the combination of high challenges and high skills. In other words, our results confirm the validity of our conceptualization of the flow experience as a combination of enjoyment and absorption. Secondly, it appears that the effect (*t*-value) of enjoyment is larger than that of absorption (see Tables 5.3 and 5.4), which means that the predictive power of the diurnal pattern is stronger for the former than for the latter. This poses some intriguing questions, such as, what is the core of the flow experience: enjoyment or absorption? Perhaps absorption plays a key role in the flow experience, at least during working activities, since estimate for working activity in absorption has more predictive power than for enjoyment.

On the other hand, enjoyment is better predicted at weekends than during work days and by contrast, there is no difference in level of absorption between weekends and not weekends. Perhaps, while recovering during the weekend from the strain of the working week, individuals engage in less challenging activities which require less cognitive effort (absorption). This may be explained by the fact that people need to recuperate from the intensity of work (high cognitive effort) in low intensity free time activities. So people report more enjoyment during their leisure time (Csikszentmihalyi & LeFevre, 1989).This interpretation is also in accordance with the findings of Delle Fave and Massimini (2005b) who highlighted that the core feature and most stable element of the optimal experience is the cognitive component of flow, that is absorption.

Working Tasks or Non-working Tasks: The Paradox of Work

Enjoyment relates negatively to performing non-working tasks, whereas absorption relates positively to working tasks. The fact that work activities are compulsory or obligatory, and that non-working tasks are (usually) not, may explain the negative relationship between enjoyment and work. This relates to the above-mentioned ‘paradox of work’ (Csikszentmihalyi & LeFevre, 1989) which states that individuals experience more flow at work than in their leisure time, and yet they prefer leisure above work. The fact that the compulsory nature of work masks its positive experience that it engenders, might be an explanation for this obvious paradox. Moreover, Csikszentmihaly and LeFevre (1989) argue that in deciding whether individuals wish to work or not, they judge their desires by social conventions rather than by the reality of their feelings. Hence, individuals conceive work as a negative and compulsory activity instead of a creative activity and as an opportunity to live positive experiences or to find enjoyment in it. Rheinberg et al. (2007) found results that agree with those from our study, they revealed that flow scores were higher during work, but scores for happiness/satisfaction were higher during leisure time. Their study focused on goal adjustment and found that participants' activities at work addressed attaining goals more often. So, goal adjustment had a strong positive effect on flow, but not on happiness/satisfaction. It follows from Rheinberg et al. (2007) that the paradox of work can be partially attributed to stronger goal adjustment during work.

Unlike enjoyment, no affective evaluation is included in the experience of absorption. For instance, when being completely absorbed by the activity one is engaged in, it is impossible to concentrate on one’s own inner feelings because all attention is focussed on the activity at hand. Seen from this perspective, absorption and enjoyment seem to be relatively independent, at least at the momentary level. Although enjoyment and absorption share 36% of their variance, about twice as much of the variance is not explained. In addition, on a more philosophical level, hedonic and eudemonic perspectives assume that enjoyment is related to the former, whereas absorption is related to the latter. From a hedonic perspective well-being is defined in terms of attaining pleasure and avoiding pain, so its core emotion is pleasure or enjoyment (Kahneman, Diener, & Schwarz, 1999). In contrast, eudemonia focuses on the full development of a person's capabilities for the development of which engagement and absorption in challenging activities is crucial (Ryan & Deci, 2001). Hence, absorption, or being entirely engrossed in the activity at hand, is the hallmark of the flow experience, with enjoyment as an a posteriori affective evaluation (Ghani & Deshpande, 1994; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi 1996; Trevino, & Webster, 1992). It should not be overlooked, though, that the flow experience is positive in itself -- albeit a posteriori -- (Csikszentmihalyi, 1975) and that therefore the positive affective component has to be included in the measurement of flow. So in the present study we used the combination of absorption and enjoyment to assess the flow experience; the former being the cognitive component and the latter being the affective component. We showed that the absorption component relates positively to working tasks, and that the enjoyment component relates positively to non-working tasks

Flow Among Healthy and Burned-out Individuals

Our results show that flow levels in healthy individuals are significantly higher than in burned-out individuals, thus supporting Hypothesis 1. Moreover, as expected, Hypothesis 5 was also supported which revealed that there are *no* significant differences in daily flow patterns between healthy and burned-out individuals. The first finding reveals that healthy individuals experience more flow than burned-out individuals, which is understandable because burnout is associated with cynicism, dissatisfaction, lack of concentration, and negative emotions (Le Blanc, Bakker, Peeters, van Heesch, & Schaufeli, 2001; Schaufeli & van Rhenen, 2006). In addition the same trend was found regarding flow patterns among the healthy and the burned-out participants. Even among those who were on partially or fully on sick leave, the diurnal pattern was the same. Please note that the latter group also carried out also “working” tasks, for instance related to household work. The fact that similar daily flow patterns were found in both groups adds to the robustness of these patterns.

Strengths and Weaknesses

There were three main limitations in this study. First, we did not study the concurrent validity of both conceptions of flow (the combination of challenges and skills vs. absorption-enjoyment) by direct comparison because our main aim was to study the flow experience by itself and not its prerequisites or antecedents. We considered that the inclusion of a combination of challenges and skills would complicate the electronic diary questionnaire too much and increase its duration beyond what we felt was tolerable for the participants. It would be interesting, however, to compare and test multilevel models of the flow experience with the flow antecedents, such as the combination of high challenges and high skills.

Second, although our sample is a heterogeneous sample composed of different workers from different occupations, this heterogeneity is also a limitation because it eliminates the opportunity to compare the flow levels of the participants in the same kind of working tasks. Thus, the role that particular working task plays is not controlled for in the current study. A suggestion for future research is to collect data from different kinds of job samples in order to compare the daily flow patterns in different occupations.

Finally regarding the methodology used, even though the electronic diary is a very useful method to measure flow experiences, it also has the disadvantage that, perhaps, the signal-contingent strategy may interfere with the flow experience. Consequently, we recommend using the electronic diary together with an end-of-the-day diary in future studies which would allow the participants to register and indicate whether they had flow experiences during the day which the diary did not reflect.

The current study has also its strong points. First, conceptually speaking, the novelty of the present study lies in the study of *daily flow patterns* because, as far as we know, there is a lack of research exploring the diurnal pattern of flow (except Guastello et al., 1999). Second, this is the first study on flow that uses two contrasting samples (healthy vs. burned-out). Finally, this study offers an alternative explanation for the ‘paradox of work’ by differentiating between absorption and enjoyment.

In short, the present study allowed us the chance to explore and find interesting flow patterns across time, using an alternative operationalisation of the phenomenon. It also produced in-depth knowledge of the flow experience itself by means of a new electronic diary methodology. Like similar previous studies on positive psychology (Clarke & Haworth, 1994; Oishi, Diener, Choi, Kim-Prieto, & Choi, 2007), the current study encourages researchers to use the electronic diary method to investigate the amazing but also tricky flow experience.

Chapter 6. Self-efficacy and flow at work: A virtuous circle?[6]

Summary

The main objective of this study was to extend the Channel Model of Flow (Csikszentmihalyi, 1975) by including self-efficacy as a predictor of the challenges X skills combination, and the flow experience itself, based on the predictions of the Social Cognitive Theory (Bandura, 1997, 2001). We expect that 1) self-efficacy will predict flow experiences (i.e. absorption and enjoyment) directly and indirectly through the challenges X skills combination, and 2) self-efficacy and flow will be reciprocally related, thus constituting a virtuous circle (i.e., the more self-efficacy at Time 1, the more flow experiences at Time 2, and vice versa). Structural Equation Modelling was carried out in a longitudinal study with 258 secondary school teachers. The results firstly showed that the model including self-efficacy as an antecedent of flow fitted the data better than the model including only the challenges X skills combination. Secondly, the more self-efficacy, the more flow and higher levels of challenge X skills were seen which, in turn, predicted flow over time. The influence of self-efficacy on flow over time was mediated by the challenges X skills combination at T2.

Introduction

Since the beginning of this century, increased attention has been paid to what has been coined positive psychology: the scientific study of human strength and optimal functioning (Seligman & Csikszentmihalyi, 2000). This approach is considered

[6] Chapter 6 is in preparation to be submmitted as: Salanova, M., Rodríguez-Sánchez, A.M., Cifre, E., & Schaufeli, W. Self-efficacy and flow at work: A virtuous circle?.

to supplement the traditional focus of psychology on disease, damage, disorder, and disability. Therefore, those organisations interested in improving the quality of their employee's working life have to optimise positive psychosocial emotions and experiences. Concepts such as job satisfaction, organisational commitment, work engagement and flow at work are increasingly relevant to generate healthy jobs, employees and organisations. In the current study, we focused on the relationships between two positive relevant psychosocial constructs: flow at work and self-efficacy. Specifically, it tests the 'channel model' of flow originally proposed by Csikszentmihalyi (1975, 1990, 1997, 2003) which takes flow experience to be a result of the combination of high challenges and high skills. Furthermore, we tested an expanded channel model that includes self-efficacy, such as playing a key role as a flow experience antecedent, beyond the challenges X skills combination formula.

Dissecting flow: Operationalisation of optimal experiences at work

The optimal momentary experience of flow is complex and difficult to measure because of its ephemeral and temporary nature. In fact, the literature offers a number of flow definitions; for instance, flow has been defined as a condition in which people are so involved in an activity that nothing else seems to matter at the time, and the experience is so enjoyable that people will do it even at great cost for the sheer sake of doing it (Csikszentmihalyi, 1990). Flow is recognised as a state that is "characterised by enjoyable feelings, concentration, immersion, and intensive involvement" (Chen, 2006, p. 222). In the same vein, Ghani and Deshpande (1994, p. 383) described flow as: "(a) total concentration in an activity and (b) the enjoyment which one derives from an activity".

Although operationalisation of flow is still a topic of discussion, we critically examined previous literature to shed some light on it. This examination revealed that recent research agrees with the cognitive, motivational and emotional components of optimal experience (for example, Bassi, Steca, Delle Fave, & Caprara, 2007; Delle Fave & Massimini, 2004 and 2005b; Jackson & Csikszentmihalyi 1999). Based on this, different scholars (Chen, 2006; Ghani & Deshpande, 1994; Moneta & Csikszentmihalyi, 1996)have shown that people who experience flow are engrossed in an activity. This involvement at work is so deep that nothing else seems to matter at the time. In addition to the enjoyment they feel while doing the activity and the intrinsic interest to continue doing it, the total immersion in an activity seems to be a central aspect of the flow experience (Csikszentmihalyi, Rathunde, & Whalen, 1993; Ellis, Voelkl, & Morris, 1994).

Despite the fact that the first studies on flow were carried out among people who practiced sports, or who did any activity characterised by creativity, researchers formed a picture of the general characteristics of optimal experience and its proximal conditions, and found that the flow experienced while undertaking entertainment and work activities was quite similar (Nakamura & Csikszentmihalyi, 2002). For instance Bakker (2005), and Salanova, Bakker and Llorens (2006), developed the flow concept during work activities and defined it as an optimal experience at work that is characterised by work enjoyment (i.e., the emotional component), absorption (i.e., the cognitive component) and intrinsic interest (i.e., the motivational component).

Based on previous definitions of flow however, one might not consider this last element (i.e., intrinsic interest) to be a part of the flow experience, rather an antecedent or prerequisite of the flow experience. This was shown in a recent study which compared two competitive models of flow with three- and two- factor models (i.e., enjoyment, absorption and intrinsic interest, and enjoyment and absorption, respectively). The two-factor model fitted the data better than the three-factor model and found that intrinsic interest (i.e., the motivational component) was more an antecedent of the flow experience than a dimension of the flow experience itself (Rodríguez-Sánchez, Cifre, Salanova, & Åborg, 2008). Meanwhile, absorption refers to a state of total concentration whereby employees are totally immersed in their work. In this situation, time flies and they forget everything else around them (cf. Csikszentmihalyi, 1990), and people *enjoy* doing the activity at hand (Ghani & Deshpande, 1994).

Based on this previous research into the concept and the dimensions of flow, in the present study 'flow at work' is considered an optimal and momentary experience in connection with a specific activity in the work domain where workers experience enjoyment and are absorbed while performing this activity. Although the flow concept is more or less clear, flow antecedents and consequences are still tricky questions that need to be clarified.

The Channel Model of Flow

The first studies on flow by Csikszentmihalyi (1975) considered flow as the situation where challenges are matched with the person's skills. Csikszentmihalyi formed a model based on this challenge-skill ratio which was coined 'Channel Model of Flow'. Later, it was developed and analytically described by Massimini and Carli (1988). In subsequent studies, this Channel Model has been tested and Csikszentmihalyi (1988) pointed out that to experience flow, challenges and skills must not only be in balance, but must also exceed levels in such a way that one must increase the complexity of the activity by developing new skills and taking on new challenges. Then when both challenges and skills are high, the flow experience is likely to arise (Delle Fave & Bassi, 2000). That is in Csikszentmihalyi's and LeFevre's words, 'when both challenges 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 increasing self-esteem and personal complexity' (Csikszentmihalyi & LeFevre, 1989, p. 816).

It is important to consider that although the flow experience has been defined as an optimal experience characterised by high levels of enjoyment and absorption, the empirical research done on flow has usually found that this experience is measured in terms of a combination of high challenges and high skills (e.g., Asakawa, 2004; Csikszentmihalyi & Lefevre, 1989; Delespaul, Reis, & deVries, 2004; Delle Fave, Bassi, & Massimini, 2003; Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005). Thus, antecedents are usually confounded with the flow experience itself. We believe that the combination of high challenges and skills boosts the psychological experience of flow (i.e., feelings of enjoyment and absorption), but that this is not the experience itself. So it is important to bear in mind that perceived challenges and skills seem to be antecedents and prerequisites of the flow experience (Nakamura & Csikszentmihalyi, 2002), and that although they are necessary, they are not the only existing prerequisites of the flow experience. Recently, these authors also stated that apart from high perceived skills being well matched with high challenges, clear goals and immediate feedback are also necessary prerequisites to experience flow. However, not only situational conditions, but also personal conditions (i.e., skills and self-efficacy) are not the only prerequisites of the flow experience (i.e., challenges, feedback, clear goals). Finally, it is worth noting that recent research has shown that self-efficacy is an important antecedent that can enhance the flow experience (Bassi et al., 2007; Salanova et al., 2006).

Self-efficacy and flow

According to the Social Cognitive Theory (Bandura, 1997, 2001), self-efficacy is defined as: "…beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Beliefs about one's own efficacy contribute to motivation by influencing: (a) the challenges people pursue, (b) the effort they expend, (c) their perseverance in the face of difficulties and (d) how people feel while doing the activity. Whatever the other factors which serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired effects by one's actions; otherwise, one has little incentive to act or to persevere in the face of difficulties. Accordingly, self-efficacy could influence the way that people perceive challenges according to their skills and, in turn, could lead people to experience the psychological state of flow. Therefore, self-efficacy may be considered an antecedent of flow experience.

Besides, people's beliefs about their competences and success differ in the distinct areas of their life, and there is considerable evidence for the positive effects of self-efficacy on performance in different domains such as the workplace, school and sports (Bandura, 1999, 2001). Moreover, one of the sources of self-efficacy is positive psychological states; for instance, when people feel happy doing a task, it positively influences their efficacy beliefs, but when they feel anxious, this influence is negative. This influence is reciprocal because efficacy beliefs also make people feel better. For example, research into the work domain shows that high levels of efficacy beliefs have a positive impact on employee well-being, such as job satisfaction (Grau, Salanova, & Peiró, 2001) and job engagement (Llorens, Schaufeli, Bakker, & Salanova, 2004; Salanova, Llorens, Cifre, Martínez, & Schaufeli, 2003; Salanova, Llorens, & Schaufeli, 2008; Salanova, Schaufeli, Xanthopoulou, & Bakker, 2009).

More specifically, self-efficacy has also been related with flow experiences. In academic settings for example, Bassi et al. (2007) found that students with high self-efficacy beliefs spend more time learning activities and they experienced more flow than those with low self-efficacy beliefs. In addition, research into work settings, specifically in the teaching context, supports the idea that personal resources (e.g., self-efficacy beliefs) have a positive influence on flow occurring among teachers over time (Salanova et al., 2006). In the same vein, but in terms of personal resources, the study of Shin (2006) conducted in schooling contexts underlined that the individual differences among the variables of flow antecedents, such as having a clear goal and concentration, were more strongly correlated with flow than to instruction-related variables, such as skill and challenge. Collectively, past research has shown that not only the balance of high challenges-skills is needed to experience flow, but that efficacy beliefs also come relatively close to the idea stated by Wigfield and Eccles (2001) in the schooling context. These authors partially disagreed with the premise of the flow theory, and contended that students do not necessarily value challenging tasks optimally, rather tasks with which they believe they can succeed. However, past research failed to simultaneously test both antecedents of flow experiences, that is, the challenges X skills combination and efficacy beliefs.

The present study

So far, the present study has integrated efficacy beliefs (Bandura, 1997) into the Channel Model of Flow Theory (Csikszentmihalyi, 1990, 1997, 2003). There is little empirical research that connects these two theoretical perspectives, that is, the Channel Model of Flow Theory (Csikszentmihalyi, 1990, 1997, 2003) and the Social Cognitive Theory (Bandura, 1997). Although studies like the aforementioned (e.g., Bassi, et al., 2007; Salanova et al., 2006; Wigfield & Eccles, 2001) have taken a step forward in the understanding of how self-efficacy beliefs contribute to the flow experience, there is a lack of empirical research into the contribution of efficacy beliefs to explain flow experience with the Channel Model. Thus, according to the predictions of Csikszentmihalyi's Flow Theory and Bandura's Social Cognitive Theory, the predictive role verifies that self-efficacy plays the role of an antecedent of flow experience at work, and is also novel in that it extends the 'Channel Model' in terms of whether self-efficacy offers added value to the 'Channel Model'. Besides, this relationship will be studied over time as a kind of positive circle. Therefore, we assume that self-efficacy predicts flow experience not only directly, but also indirectly through the challenges X skills combination over time in a kind of virtuous circle

More specifically we expect that:

Hypothesis 1: The extended Channel Model, which includes self-efficacy as a predictor of flow experience, will fit the data better than the original Channel Model (only the challenges X skills combination).

Hypothesis 2: Self-efficacy and the challenges X skills combination are positively related to flow (at T1 and T2) . That is, the more self-efficacy, the more higher levels of challenges X skills and the more flow at T1, and the same occurs at T2.

Hypothesis 3: Self-efficacy and flow will both be reciprocally related in a kind of virtuous circle over time. That is, the more self-efficacy at T1, the more flow experiences at T2, and vice versa.

Method

Sample and Procedure

A follow-up two-wave study was carried out among secondary school teachers. At the beginning of the academic year, a letter was sent to 50 secondary schools explaining the goal of the research. The sample at T1 was composed of 483 teachers (56% women) who taught at 34 different secondary schools (81% response rate). Ages ranged from 23 to 60 years (M = 40.2; SD= 8 years and 2 months); 13% held a bachelor degree and the remaining 87% held a Master's degree. Moreover, 83% worked in public schools.

Teachers were requested to answer a set of self-report questionnaires at the beginning of the academic year. Self-report questionnaires, including scales to measure the study variables, were delivered in an envelope and handed out to 600 secondary school teachers. A cover letter explained the purpose of the study, and that participation was voluntary and confidentiality was guaranteed. Respondents were asked to return the completed questionnaires in a sealed envelope to the person who had handed them out or directly to the research team.

Eight months later, at the end of the same academic year, questionnaires were handed out again to the same 34 schools (T2). After deleting missing cases, 258 secondary school teachers (57% women) from the 24 secondary schools participated in the longitudinal study. Furthermore, 53% of the teachers who participated at T1 also participated at T2. Ages ranged from 23 to 60 years. The mean age of the sample was 40 years (SD = 7 years and 5 months). Thus the final sample was composed of 258 secondary teachers who participated in the longitudinal study and who answered the questionnaires at both T1 and T2.

In order to test whether drop-outs differed from the panel group, we compared the T1 background variables of both groups (i.e., age, gender, type of school -private vs. public-, teaching experience and organizational tenure), as well as the main psychosocial variables considered in the study. The MANOVA results and the $\chi2$ analyses showed that there were no significant differences between the groups in terms of background and study variables (i.e., self-efficacy, enjoyment, absorption, challenges and skills). We therefore concluded that the panel group did not differ because of drop-outs in terms of background and study variables.

Measures

Self-efficacy (SE) is a specific construct adapted from the general self-efficacy scale (10 items) by Schwarzer (1999) to a more specific work context (Salanova et al., 2006). According to the SCT, which specifies the activities for which one judges one's efficacy as a requirement, the general items from the original scale were rephrased in the current study to cover the teachers' more specific job domains. For instance, we changed "*I can solve most problems if I make the necessary effort*" to "*I can solve most* *problems in my teaching job if I make the necessary effort*". The scoring of the items ranged from 0 ('*never*') to 6 ('*always*').

Flow experience was assessed by two scales: *Absorption* and *Enjoyment*. *Absorption* was assessed by 6 items from an adapted Spanish version of the Absorption Dimension of the Utrecht Work Engagement Scale (UWES; Schaufeli, Salanova, González-Romá, & Bakker, 2002). An example of an item is: "*When I am working, I forget everything else around me*". *Enjoyment* was assessed by 4 self-constructed items (Rodríguez-Sánchez et al., 2008; Salanova et al., 2006). An example of an item is: *"I feel happy while I am working".* The adapted enjoyment and absorption scales were also validated by Rodríguez-Sánchez, et al. (2008) in a sample of Swedish and Spanish students. Participants indicated the frequency of these experiences of enjoyment and absorption during the preceding week on a 7-point frequency rating scale ranging from 0 ('*never*') to 6 ('*every day*').

Challenge was assessed by 2 self-constructed item measures which referred to the level of challenge and inspiration that work implies for employees. The items were "*My job provides me with new challenges*" and "*My job is stimulating and inspires me*". *Skill* was assessed by 6 items that measure perceived competence from an adapted Spanish version of the Professional Efficacy Scale from the Maslach Burnout Inventory-General Survey (MBI-GS; Salanova et al., 2000; Schaufeli, Leiter, Maslach, & Jackson, 1996). An example of an item is "*In my opinion*, *I am good at my work*". Participants indicated the extent to which they agreed with each sentence on a seven-point rating scale (0 = never, 6 = every day) in both scales of challenges and skills.

According to the Flow Channel Model (Csikszentmihalyi, 1990, 1997, 2003), flow is likely to arise when people show high levels of challenges and skills. Therefore, we used the multiplicative Challenges X Skills variable to find the high levels of both the challenges and skills that would lead to experiencing flow.

Data Analyses

We computed the means, standard deviations, Cronbach's alpha coefficients and bivariate correlations for all the scales. Structural Equation Modelling (SEM) methods, as implemented by AMOS (Arbuckle & Wothke, 1999), were used to test our hypotheses longitudinally, and two waves were used in the two models employed: the Channel Model and the Extended Channel Model (including self-efficacy). We now go on to explain the more complex model (the Extended Channel Model).

Firstly, the Stability Model (M1) was tested without cross-lagged structural paths, but with temporal stabilities and synchronous correlations. Temporal stabilities were specified as correlations between the corresponding constructs at T1 and T2. M1 estimated the total stability coefficient between T1 and T2 without specifying the variance in direct or indirect paths (Pitts, West, & Tein, 1996). Secondly, the fit of this stability model was compared to the three more complex models: (1) the Causality Model (M2), which is identical to M1 but includes additional cross-lagged structural paths from T1 self-efficacy to T2 challenges X skills and to T2 flow, as well as from T1 challenges X skills to T2 flow; (2) the Reversed Causation Model (M3) which is also identical to M1, but includes additional cross-lagged structural paths from T1 challenges X skills to T2 self-efficacy, as well as from T1 flow to T2 self-efficacy and T2 challenges X skills; (3) the Reciprocal Model (M4), which includes reciprocal relationships among self-efficacy, challenges X skills and flow and, therefore, includes all the paths of M2 and M3.

In addition, the measurement errors of the corresponding indicators of T1 and T2 were allowed to covary over time. According to Pitts et al. (1996), the covariation of the corresponding measurement errors over time accounts for the systematic (method) variance associated with each specific indicator (McArdle & Bell, 2000; Pitts et al., 1996). In fact, failing to specify the covariances between the measurement errors leads to an overestimation of the size of the stability coefficients and, therefore, to a poor model fit.

Model fit. Maximum likelihood estimation methods were used, and the input for each analysis was the covariance matrix of the items. The goodness-of-fit of the models was evaluated with the absolute and relative indices. The absolute goodness-of-fit indices calculated were: the χ^2 Goodness-of-Fit Statistic, Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and the Root Mean Square Error of Approximation (RMSEA).

Because χ^2 is sensitive to sample size, the probability of rejecting a hypothesised model increases when sample size also increases. To overcome this problem, the computation of relative goodness-of-fit indices is strongly recommended (Bentler, 1990). Following Marsh, Balla and Hau (1996), three such fit indices were computed: (1) the Comparative Fit Index (CFI); (2) the Incremental Fit Index (IFI); and (3) the Non-Normed Fit Index or Tucker-Lewis Index (TLI). Since the distribution of GFI and AGFI is unknown, no critical values exist. Values smaller than .08 for RMSEA are indicative of an acceptable fit, while values greater than 0.1 should lead to model rejection (Browne & Cudeck, 1993). As a rule of thumb, the values for CFI, IFI, and TLI greater than .90 are considered a good fit (Hoyle, 1995). Finally, we computed the

Akaike Information Criterion (AIC; Akaike, 1987) and the Expected Cross-Validation Index (ECVI) to compare competing models because they were particularly well suited for comparing the adequacy of non-nested models that fit to the same correlation matrix. The lower the AIC and ECVI indices, the better the fit is. The various nested models were compared by means of the χ^2 difference test (Jöreskog & Sörbom, 1986).

Results

Preliminary analyses

Following Caprara, Pastorelly, Regalia, Scabini and Bandura (2005), Confirmatory Factor Analyses (CFA) were computed to differentiate the constructs of self-efficacy and perceived competence (for measuring levels of skills). Three models were tested: (1) A one-factor model which hypothesised that the two constructs were the expression of a single latent factor (i.e., all the covariances were fixed at 1); (2) A two-factor orthogonal model which assumed that both constructs were independent of each other (i.e., all the covariances were fixed at 0); and (3) a two-factor oblique model which assumed that the factors interrelated (i.e., all the covariances were freely estimated).

Table 6.1 presents the results of the CFA tested between self-efficacy and perceived competence. The chi-square ($\chi 2$) of all the models was statistically significant; the oblique model showed the best fit indices (see AIC; Akaike, 1987) and met the criteria. These results stress that self-efficacy and perceived competence were interrelated but had distinct constructs.

Table 6.1

Fit indices of confirmatory factor analyses (n=258)

Models	χ^2	*df*	GFI	AGFI	RMSEA	CFI	IFI	TLI	AIC
1. Unique factor model	289.45	99	.87	. 82	.09	.92	.92	.90	363.45
2. Orthogonal model	327.45	99	.86	.81	.10	.90	.90	.88	401.45
3. Oblique model	246.14	98	.88	.84	.08	.94	.94	.92	322.15

Note. χ2 = Chi-square; df = degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC= Akaike Information Criterion.

Descriptive Analyses

Table 6.2 displays the means, standard deviations, internal consistencies (Cronbach's α), stabilities and intercorrelations for the scales in the longitudinal study among secondary school teachers. All the α values met the criterion of .70. As expected, the pattern of correlations showed that all the scales were significantly and positively related, both between variables and between variables over time.

Table 6.2

Means (M), Standard Deviations (SD), Internal Consistencies (Cronbach's α) Stabilities (on the diagonal), and zero-order correlations in Secondary School Teachers (n = 258).

Variables	M	SD	α	1	2	3	4	5	6	7	8	9	10	11
1. T1Self-efficacy	3.94	.88	.93	-										
2. T2 Self-efficacy	4.01	.83	.95	.65**	-									
3. T1 Absorption	3.88	.97	.79	.37**	.36**	-								
4. T2 Absorption	3.80	.97	.83	.27**	.39**	.71**	-							
5. T1 Enjoyment	4.45	1.08	.90	.51**	.42**	.67**	.53**	-						
6. T2 Enjoyment	4.42	1.01	.89	.45**	.57**	.54**	.58**	.73**	-					
7. T1 Challenge	3.80	1.21	.65r	.38**	.26**	.51**	.42**	.52**	.40**	-				
8. T2 Challenge	3.73	1.21	.66r	.33**	.36**	.50**	.57**	.51**	.61**	.58**	-			
9. T1 Skills	4.28	.79	.81	.51**	.48**	.47**	.39**	.63**	.51**	.55**	.42**	-		
10. T2 Skills	4.19	.78	.79	.41**	.56**	.32**	.40**	.39**	.54**	.32**	.47**	.61**	-	
11. T1 ChallXSkills	16.77	7.25	-	.48**	.39**	.56**	.44**	.61**	.47**	.92**	.58**	.80**	.48**	-
12. T2 ChallXSkills	16.09	6.95	-	.41**	.49**	.48**	.58**	.52**	.64**	.55**	.92**	.56**	.75**	.62**

Note. * *p*< .05, ** *p*< .01, T1 = Time 1, T2 = Time 2

The Hypothesised Structural Model

First of all, the Channel Model, including the multiplicative challenges X skills combination as a predictor of flow experience, was tested using longitudinal SEM with two waves. As seen from Table 6.3 and Figure 6.1, the Reciprocal Model (M4) data fit was superior to the rest of the models. However, although the fit indices (CFI, IFI, TLI, AIC and ECVI) were acceptable, the RMSEA exceeded the .08 criterion. So even when constraining the model, this Channel Model presented some deficiencies as values greater than 0.1 should lead to model rejection (Browne & Cudeck, 1993).

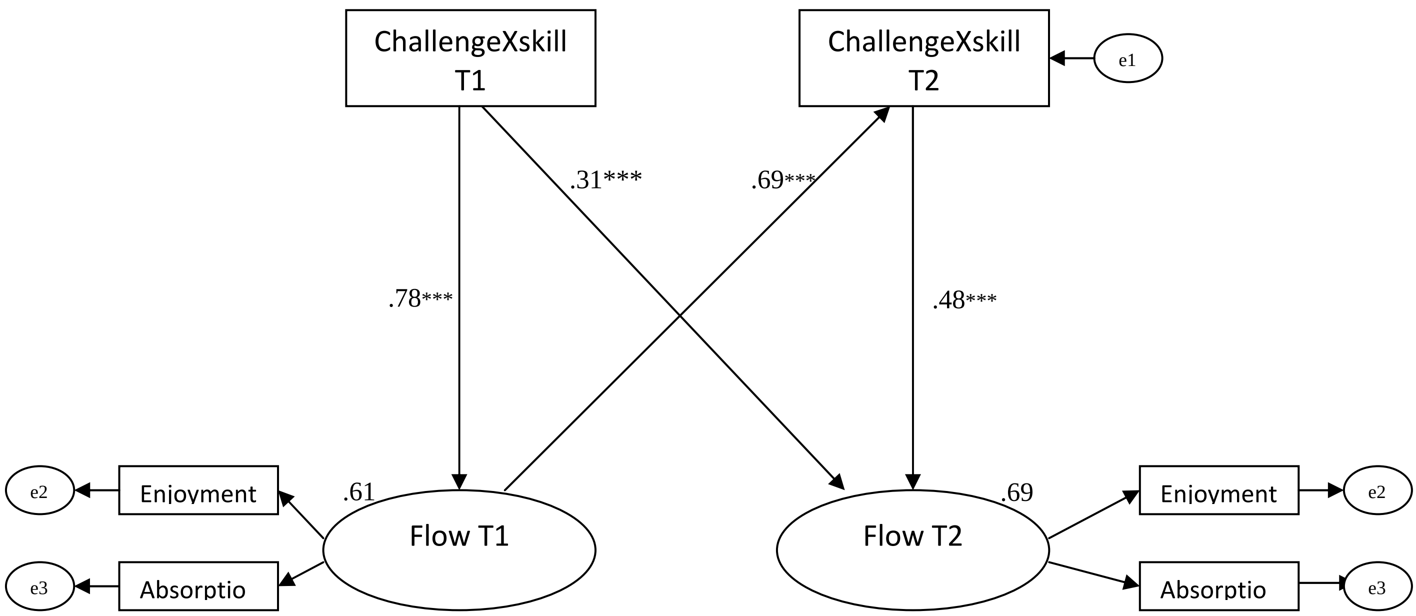

Figure 6.1. Longitudinal Channel Model including the multiplicative challenges X skills combination as a predictor of flow experience which results from the Structural Equation Modelling Analyses (SEM) in 258 secondary school teachers. Only significant paths are shown in this figure.

Table 6.3

Longitudinal Channel Model fit in Teachers (n=258): Structural Equation Modelling Analyses

Models	χ^2	df	p	GFI	AGFI	RMSEA	CFI	IFI	TLI	AIC	ECVI	Difference test
M1. Stability	163.13	6	.00	.85	.48	.32	.83	.83	.57	193.13	.751	
M2. Causality	144.02	5	.00	.87	.47	.33	.85	.85	.54	176.02	.685	a = 19.11(1)***
M3. Reversed	45.24	5	.00	.95	.78	.18	.96	.96	.87	77.24	.301	a = 117.89(1)*** a = 98.78 (0)
M4. Reciprocal	20.64	4	.00	.97	.85	.13	.98	.98	.93	54.64	.213	a = 142.49(2)*** a = 123.38(1)*** a =24.6(1)***

Note. $\chi 2$ = Chi-square; df=degrees of freedom; GFI=Goodness-of-Fit Index; AGFI=Adjusted Goodness-of-Fit Index; RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC= Akaike Information Criterion; ***p < .001; a = Chi-square difference.

Next the second model, which extended the Channel Model, was tested, and included self-efficacy and the challenges X skills combination as antecedents of the flow experience. As seen from Table 6.4, the models which included self-efficacy indicated a good fit since all the fit indices were equal to or higher than 0.90; even the RMSEA was smaller than 0.08 in all the models. The final model (M5), which did not include the reverse paths between T1 flow to T2 self-efficacy, challenges X skills T1 to T2 self-efficacy, and T2 challenges X skills, was superior to the rest of the models as it showed the best data fit, and all the fit indices met the acceptance criterion. Moreover, it presented the lowest RMSEA value of the remaining models as it was considered to indicate a good fit. Besides, the AIC and ECVI indices were also the lowest of the remaining competing models. The final model is shown in Figure 6.2.

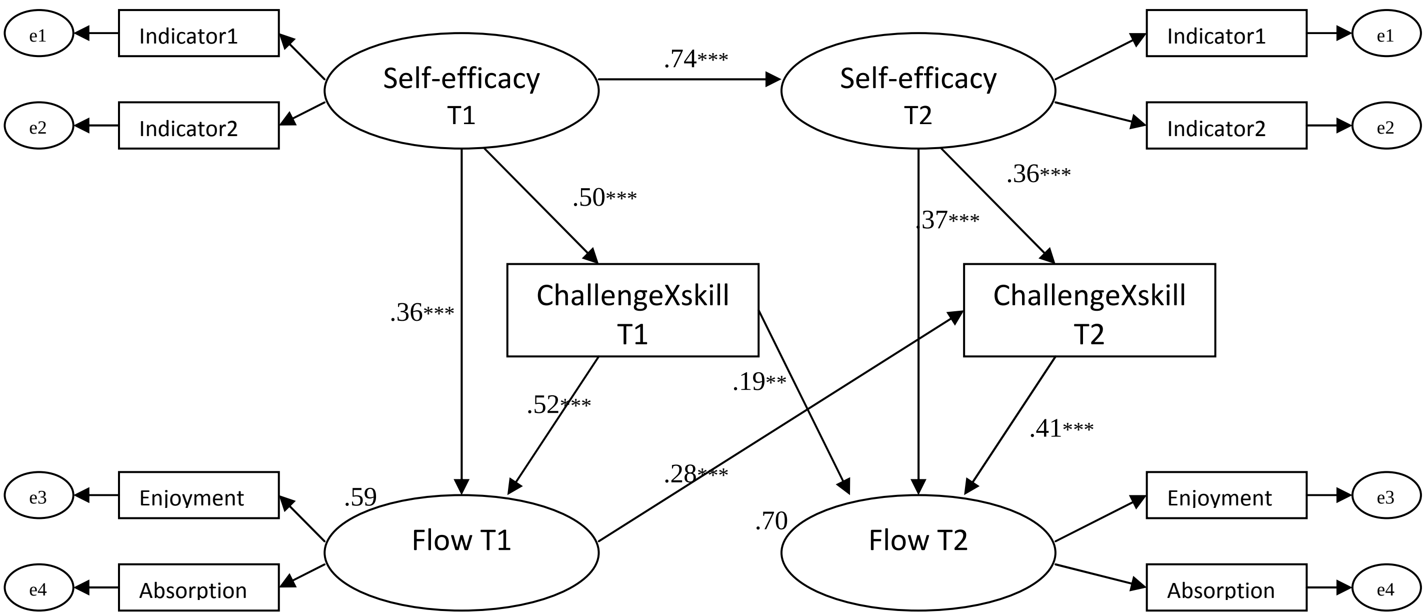

Figure 6.2. Longitudinal Extended Channel Model including self-efficacy which results from Structural Equation Modelling Analyses (SEM) in 258 secondary school teachers. Only significant paths are shown in this figure.

Table 6.4

Longitudinal Extended Channel Model fit in Teachers (n=258): Structural Equation Modelling Analyses

Model	χ^2	df	p	GFI	AGFI	RMSEA	CFI	IFI	TLI	AIC	ECVI	Difference test
M1. Stability	56.28	25	.00	.96	.91	.07	.98	.98	.97	116.28	.452	
M2. Causality	40.17	22	.01	.97	.92	.06	.99	.99	.98	106.17	.413	a = 16.11(3)*
M3. Reversed	40.25	22	.01	.97	.93	.06	.99	.99	.98	106.25	.413	a = 16.03(3)*** a = 0.08(0)
M4. Reciprocal	29.73	19	.05	.98	.93	.05	.99	.99	.98	101.73	.396	a = 26.55(6)*** a = 10.44(3)* a =10.52(3)*
M5. Final	32.47	23	.09	.98	.94	.04	.99	.99	.99	96.47	.375	a = 23.81(2)*** a = 7.7(1)** a = 7.78(1)** a = 2.74(4)ns

Note. $\chi 2$ = Chi-square; df=degrees of freedom; GFI=Goodness-of-Fit Index; AGFI=Adjusted Goodness-of-Fit Index; RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC= Akaike Information Criterion; *p < .025, **p < .01, ***p < .001, ns = non-significant; a = Chi-square difference.

These results confirm Hypothesis 1 in which we expected that the extended Channel Model, which included self-efficacy as a predictor of flow experience, would show a better data fit than the original Channel Model (which only included the challenges X skills combination). Specifically, the RMSEA (the original Channel Model = .13; the Extended Channel Model = .04) index of the original Channel Model should lead to model rejection. Besides, the rest of the fit indices in the Extended Channel Model showed a better fit.

With Hypothesis 2, we expected self-efficacy would not only directly lead to flow experience, but also indirectly through the challenges X skills combination. From the results obtained, we observed the significant lagged and positive effects from T1 self-efficacy to T1 flow, from T1 self-efficacy to T1 challenges X skills, and from T1 challenges X skills to T1 flow. The same relationships were also shown at T2. Besides, 59% of the T1 flow variance was accounted for by the hypothesised predictors, that is, T1 self-efficacy (which accounted for 21.24% of the variance) and T1 challenges X skills (which accounted for 30.68% of the variance). Hence, Hypothesis 2 is supported.

With Hypothesis 3, we expected both self-efficacy and flow to be reciprocally related in a kind of virtuous circle over time; that is, the more self-efficacy at T1, the more flow experiences at T2, and vice versa. The results showed that the influence of T1 self-efficacy on T2 flow was also observed over time but, in this case, it was mediated by T2 challenges X skills. Specifically, T2 flow variance (70.0%) was partially explained by T1 challenges X skills (13.3%), T2 self-efficacy (25.9%), and by T2 challenges X skills (28.7%). However, the reciprocal relationship between T1 flow as a predictor of T2 self-efficacy was not confirmed, although a virtuous positive circle between challenges X skills and flow at both T1 and T2 was found. The scenario so far is: the more T1 challenges X skills, the more T2 flow, and vice versa. Thus, Hypothesis 3 was only partially confirmed because a causal relationship was noted between T1 self-efficacy and T2 flow, which was mediated by T1 challenge X skills and T2 self-efficacy.

Further analyses were performed in order to know whether the studied variable levels increased from T1 to T2.

Moreover, repeated measures analyses were conducted in order to check whether there were significant differences in all the study variables between T1 and T2. The results revealed that there were no significant differences among all the variables, such are self-efficacy $F(1, 251) = 2.07$, $p = .15$; absorption $F(1, 256) = 3.84$, $p = .06$; enjoyment $F(1, 256) = .27$, $p = .60$; challenge $F(1, 251) = .77$, $p = .38$; and skills $F(1, 253) = 3.62$, $p = .06$.

Discussion

The main objective of this study, which has focused on flow antecedents, was to extend the channel model (Csikszentmihalyi, 1990, 1997, 2003) by including self-efficacy as an additional predictor of the high levels of challenges X skills combination of the flow experience itself (defined as work absorption and enjoyment). In other words, we expected self-efficacy to play a predicting role in flow experience directly and indirectly, and synchronically and diachronically, through the challenges X skills combination. The results provided evidence for our predictions. In particular, Hypotheses 1 and 2 were confirmed, thus favouring our Extended Channel Model. However, Hypothesis 3, which refers to the virtuous circle over time, was partially confirmed.

Extending the Channel Model of Flow: self-efficacy as a flow antecedent

As expected, the results also showed that Hypothesis 1 (the model which included self-efficacy) and the Channel Model to be flow predictors, and which fitted the data better than the Channel Model of Flow with a combination of high scores on challenges X skills. Hence these data evidence that the current study contributes to improve the Channel Model formulated by Csikszentmihalyi in 1975 and developed by Csikszentmihalyi and cols. in following years (Hektner & Csikszentmihalyi, 1996; Massimini & Carli, 1988; Moneta & Csikszentmihalyi, 1996; Nakamura & Csikszentmihalyi, 2002). The current study also provides empirical evidence and supports the idea that not only the combination of high challenges and high skills is needed to experience flow, but also a belief in one's skills to overcome the challenge in the activity at hand in the future. In other words, although high challenges and skills are necessary, they are not sufficient conditions to experience flow. Thus the combination of Csikszentmihalyi's Channel Model and Bandura's Social Cognitive Theory resulted in a more complementary and complete model that explains both the flow experience and its antecedents.

This finding is closely related to Hypothesis 2 which was also confirmed by this study. Thus, it is confirmed that self-efficacy works as an antecedent directly and indirectly leads to flow through the challenges X skills combination. Our study also shows the relevant role that self-efficacy plays as an antecedent of flow experience. So far, both self-efficacy and the challenges X skills combination are prerequisites of the flow experience. This assertion is also supported by the results obtained in terms of the flow variance explained by each variable. According to these results, 21.0% of the variance of the T1 flow experience is explained by T1 self-efficacy , and 30.0% of the variance is explained by T1 challenges X skills. Likewise, these findings are replicated after 8 months at T2 when T2 self-efficacy accounted for almost (26.0%) the same percentage of variance of T2 flow experience as T2 challenges X skills (29.0%).

Flow antecedents over time

The results showed that T2 flow is accounted for by T1 challenges X skills which, at the same time, is accounted for by T1 self-efficacy. Specifically, the T2 flow variance (70.0%) was partially explained by T1 challenges X skills (13.0%). Unexpectedly, no direct path was found between T1 self-efficacy and T2 flow, although this cross-lag relationship was mediated by the perception of T1 challenges X skills. Apparently, it was as though feeling efficacious predicted higher levels of challenges and skills which, in turn, predicted flow experiences over time.

Since flow is a momentary experience, self-efficacy has to be very specific not only about the activity that the person is doing at that time, but also about the perception of a person's skills to overcome the challenges. In this way, the results found that T1 self-efficacy related more strongly to flow experiences, and that this situation occurred at the same time (T1) as in the flow experience, which took place 8 months later at T2. Finally, this virtuous circle was seen to occur between challenges X skills and flow over time. So, the more challenges X skills perceived at T1, the more flow experiences at T2, and vice versa.

Limitations and future research

Despite the relevance of this study extending the Channel Model by taking self-efficacy as an antecedent of the flow experience, it is necessary to interpret the results with caution because of its non-experimental nature. Thus, the present study has its limitations. The first is the use of self-report questionnaires to collect the data used in this study as their results may be affected by the variance of the common method. Although some research criticises the use of questionnaires since they do not yield good quality data to elicit phenomenological perceptions as subjects are not used to putting those perceptions into words (Massimini, Csikszentmihalyi, & Carli, 1987), other research works have shown them to be a sufficient strategy to collect retrospective data of their past flow experiences and to obtain a descriptive picture of these positive experiences (for example, Chen, Wigand, & Nilan, 2000). So this can be an alternative solution for collecting data in contexts in which it is more complicated to use the Experience Sampling Method (ESM; Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & LeFevre, 1989) given its repeated assessment nature, although it can be used as a first step. Then, these questionnaires may be complemented with more data. For instance, one solution could be to implement diary studies to a specific sub-group from the initial questionnaire database participants.

A second limitation of this study is that we did not have information about what kind of tasks the teachers were referring to when they completed the questionnaire (e.g., teaching, preparing classes, evaluating works). This makes it difficult to compare self-efficacy and flow levels over time because; for example, while a teacher at T1 could answer about teaching, they could be referring to preparing classes at T2. Therefore, a suggestion for future research would be to collect data about the activities that teachers do and to focus only on one such activity when answering the questionnaire at T1 and T2.

Thirdly, this study uses two waves to allow us to explore the circle encountered since an upward trend was found in self-efficacy. In order to explore the upward-spirals in self-efficacy and flow, it would be advisable to include three time points, or more, in future research.

Fourthly, this study is limited to the secondary school teacher context. Since the main hypotheses regarding causal relationships between self-efficacy and flow were confirmed, it would be interesting and relevant to examine this phenomenon in other occupational fields.

Finally, a conceptual question based on the relationship between flow and engagement arises and should also be explored in future research. It is worth noting that these two concepts are very close; in fact they share the absorption variable as a common variable in both constructs. Work engagement is defined as a persistent, pervasive and positive affective-motivational state of fulfilment in employees which does not focus on any particular object, event, individual or behaviour (Schaufeli, et al., 2002). So the difference between work engagement and flow is that the former is a more general and pervasive state of mind related to the job as such, whereas the latter is a specific optimal experience of a limited duration and relates to a specific activity. Engagement represents a more long-term, positive work-related experience with some similarities to flow at work (Demerouti, 2006). So it is plausible that engaged employees are more likely to experience short-time, transitory, optimal experiences (flow) at work compared to those who are not engaged. Further research is also needed to clarify and test the relationship of work engagement and flow.

Theoretical and practical implications

The first theoretical implication is the step forward that this study represents in the knowledge of flow antecedents, namely self-efficacy plays a key role as a flow prerequisite at a given time and also over time, as mediated by high challenges X skills.

So by comparing those models which include self-efficacy, or not, as an antecedent of the flow experience, we have shown that the model fits the data better when it includes self-efficacy. This result is based on the predictions of Bandura's Social Cognitive Theory (SCT, Bandura, 2001), and since self-efficacy is "the belief in one's capabilities to organise and execute the sources of action required to manage prospective situations" (Bandura, 2001), and refers to the beliefs that individuals hold about their competences (in this case, about competences or skills related to work), it influences the perception of their skills and of the challenges to cope. In that sense, and according to the SCT, people with high efficacy beliefs will perceive more challenges immediately, and will feel more competent (skilled) which, in turn, will influence more flow experiences over time.

In the same vein, the testing of the two models, one including the challenges X skills combination and the other including self-efficacy beliefs, represents the two theoretical approaches: the Social Cognitive Theory (Bandura, 1997, 2001) and the Flow Theory (Csikszentmihalyi, 1975, 1990). The inclusion of self-efficacy in the Channel Model is indeed a step forward, which Bassi et al. also began (2007). The combination of these two theories has demonstrated that the more complete model including self-efficacy proves better to explain the optimal experience process. So far, this step forward has provided researchers with a valid and reliable information about flow experience as it can be explained by these two theoretical perspectives. A third conceptual issue is related to the relationship between self-efficacy and perceived competence. Although at first glance they may seem to be the same constructs, it must be noted that professional efficacy is one's *perception* of the current capabilities and skills to do a specific activity (in the present study, teaching). However, self-efficacy refers to the *beliefs* in one's capabilities to teach (in the present study) successfully even though the teacher encounters problems or obstacles during the activity. In other words, professional efficacy refers to the level of skills that teachers possess, while self-efficacy is the belief that the teacher can teach using his/her skills in the future. Furthermore, to avoid the possibility of overlapping problems between these two constructs, a model test has been carried out in this study. The results showed that self-efficacy and professional efficacy were interrelated but had distinct constructs.

The practical implications are twofold. First the results obtained provide evidence of the need to (re)design jobs in order to increase the worker's challenge and skill perceptions. Thus, only those jobs characterised by high challenges performed by high skilled workers will provide those employees the chance to experience flow at work (Csikszentmihalyi, 1990; Eisenberger et al, 2005). The opportunity to work in the contexts characterised by challenging tasks with accurate levels of skills will enhance 'healthy workers' working in 'healthy jobs' which, in turn, will increase positive moods (Csikszentmihalyi, Rathunde, & Whalen, 1993), task interest (Catley & Duda, 1997) and 'healthy products' (Salanova, 2008). Then, as self-efficacy is a relevant antecedent to experience flow, the results suggest that training plays a pivotal role to generate flow more frequently (by increasing the perception of challenge and skills at work, but above all, self-efficacy levels). This training should focus on promoting the four sources of efficacy which include a variety of components that are consistent with the theoretical cues for self-efficacy building (Bandura, 1997, 1999). These include role-playings to provide successful experiences at work (enactive mastery), models of performance (vicarious experiences), coaching and encouragement (verbal persuasion), and reduction of the emotional threats of rejection (managing physiological states) (see Salanova et al., 2003).

In short, the present study allowed us the chance to explore and find such interesting results in relation to the antecedents of the flow experience. Specifically, the study allowed us to go beyond the challenges X skills combination as flow prerequisites by means of self-efficacy beliefs in teachers. Therefore, it has enabled us to extend the Channel Model (Csikszentmihalyi, 1975) thanks to its combination and integration with of the Social Cognitive Theory (Bandura, 1997, 2001). Besides, we also conclude that, in our case, schools may facilitate 'flow experiences' among teachers by them investing in creating challenging tasks and by promoting the idea that 'teachers can do it'.

Chapter 7. Discussion

One never notices what has been done; one can only see what remains to be done.

Marie Curie

The main goal of the current thesis was to obtain a better understanding of the flow phenomenon, specifically that is, to describe, operationalise and explore the dynamics and the antecedents of flow experience at work, study and also in non-work contexts. Since relatively little empirical research regarding the study of flow has been conducted on the operationalisation and explanation of this optimal experience at work, the current thesis has gone one step forward to operationalise and understand the daily flow dynamics as well as its prerequisites. Thus, the studies that make up the current thesis have been carried out in different work domains (i.e., tile workers, heterogeneous sample of workers and technology users) and study settings (i.e., university students, secondary school teachers) and countries (Spain, The Netherlands, Sweden). Moreover, in order to carry out the main research goals, we have also used different methods and designs (i.e., cross-sectional, longitudinal, Experience Sampling Method).

Particularly, the main research aims of the current thesis can be summarised as follows: (1) To find a clear and practical operationalisation of flow experience that extends and goes beyond the traditional Channel Model (Csikszentmihalyi, 1990, 1997, 2003), (2) To explore and measure the daily flow patterns and (3) To explore the antecedents of flow experience. These research questions and the results obtained in the current thesis will be discussed in the following sections. These sections will be structured according to the three main aims: operationalisation, measure and antecedents. Finally, current thesis limitations as well as future research and practical implications will be discussed.

7. 2. Then….what is flow? Definition and operationalisation

Providing a definition of flow experience may mean having to resort to a larger number of definitions found in the literature (see Novak & Hoffman, 1997). Thus, first of all, it is of major interest to understand the components and the process of this optimal experience. Then, one of our main thesis questions has been what is flow experience and how it can be operationalised? In other words, what are the main components of flow experience? Three major steps have been taken to clarify the operationalisation question throughout this thesis.

The first step taken was to distinguish flow antecedents from flow experience. In other words, to distinguish the traditional way of considering flow experience as the combination of challenge and skills from flow experience itself. Traditionally, the study of flow in different settings has operationalised flow as a product of high challenges and high skills (e.g., Csikszentmihalyi & LeFevre, 1989). The same assessment has been followed in the vast majority of the studies done into flow in work settings (e.g., Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005). Nevertheless in the current thesis, and in accordance with our conceptual model, we do not completely agree with this traditional flow operationalisation ('Channel Model of Flow' Csikszentmihalyi, 1990, 1997, 2003).

Besides in the literature, challenges and skills have been frequently considered prerequisites to experience flow, so the role that this combination plays was unclear.

Thus, we proposed a new operationalisation based on the flow descriptions gathered from Csikszentmihalyi's studies and on the common flow elements taken from a literature review on flow definitions (e.g., Chen, 2006; Novak, & Hoffman, 1997), and from recent previous studies (Bakker, 2005; Demerouti, 2006; Salanova, Bakker, & Llorens, 2007) that begin to use a different flow operationalisation at work beyond its prerequisites (i.e., challenges and skills). Our alternative operationalisation, which comprised three components (i.e., absorption, enjoyment and intrinsic interest), was tested in Chapter 2 in combination with the traditional 'Channel Model of Flow'. It was the first step that supported the validity of our flow operationalisation based on three components since the results complemented and extended the traditional model by not only considering the combination of high challenges and high skills as a necessary condition of flow, but by also measuring experience itself (i.e., absorption, enjoyment and intrinsic interest).

The second step taken regarding flow operationalisation was the validation and in-depth study of the flow experience structure. First we tested the three-factor model in Chapter 3 (i.e., absorption, enjoyment and intrinsic interest) in a sample of technology users made up of workers and students, which supports the robustness of the three-factor model. Based on previous definitions of flow, we then considered the possibility that intrinsic interest could be related to flow, but as an antecedent (this topic will be developed in Section 7.4) rather than part of the experience itself. Given our research interest in revealing the core of flow experience, we analysed the main components that make up flow experience. Then in Chapter 4, we compared two competitive models of flow: the previous three-factor model (i.e., enjoyment, absorption and intrinsic interest) and the new two-factor model (i.e., enjoyment and absorption). The results showed that the two-factor model fitted the data better than the three-factor one, thus evidencing that intrinsic interest was not a core part of flow experience. Briefly, we define flow experience as an optimal and momentary experience characterised by high levels of absorption and enjoyment while doing an activity. For example, while the person experiencing flow, for instance an employee working with his/her computer doing a report, he/she can remain absorbed and concentrated while doing the report, that is, when finding the proper words and taking care of the structure, he/she is enjoying the activity, although he/she is not aware of this feeling at that time. But does this evaluation occur before, after or during the activity?

The third step was to explore the two core dimensions of flow experience (absorption and enjoyment). According to the question posed in the Introduction of this thesis, the answer about the role of enjoyment appears to be solved since the results in Chapter 4 demonstrated that enjoyment is part of flow experience. However by using the Experience Sampling Method (ESM, Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & Larson, 1987), the results of an in-depth exploration of the core components of flow in Chapter 5 revealed the differentiated role that absorption and enjoyment play in relation to working tasks. Specifically, enjoyment was higher when performing non-working tasks, whereas absorption was higher at work. These results are in line with the so-called 'paradox of work' (Csikszentmihalyi & LeFevre, 1989). This paradox explains that work is likely to lead to more flow experiences than leisure, but leisure is preferred to work. In other words, people tend to experience more flow experiences at work than during their leisure time, although they state they 'would like to be doing something else' when they are at work, but not when they are at leisure. It can be argued that, by definition, work is a compulsory activity that requires effort, as it can be defined as *'the expenditure of an effort and energy to achieve a goal'* (Handbook of Industrial, Work and Organizational Psychology, p. 1, 2001). Then, work is challenging but requires an investment of effort and application of skills to carry it out. Therefore, people free at leisure tend to disregard challenges more and make less effort to recover from work. That is why enjoyment in Chapter 5 was related to non-working activities. Besides, people judge their desires by social conventions rather than by the reality of their feelings (Csikszentmihalyi & LeFevre, 1989). In that sense, people usually conceive work as a negative and compulsory activity, which is more a social convention rather than a creative and enjoyable activity. Then, socially speaking, people are not expected to enjoy themselves at work, so it may be argued that participants have the mental preconception that one cannot enjoy work.

In short, although the findings of the current thesis revealed that absorption and enjoyment are the core components of flow experience, in Chapter 5 we revealed that the absorption component positively relates to working tasks, while the enjoyment component positively relates to non-working tasks. So it seems that the answer as to whether the core flow components at work are absorption and enjoyment or maybe only absorption lie in the kind of measurement employed. It is worth noting that when we measured flow by means of questionnaires (Chapters 4 and 6), a bi-factorial structure appeared. Yet when we measured flow by means of ESM, absorption and enjoyment seemed to play different roles, at least while differentiating work and non-work domains. Therefore, flow operationalisation is related to the flow measure question, so to explore flow experience in detail, we compared the use of two kinds of methods: questionnaires and ESM.

7.3 How to capture flow? The flow measure

Different methods have been used to explore flow experience, such as single administration questionnaires (Chapters 2, 3 and 4), ESM (Experience Sampling Method) through electronic diary study (Chapter 5), and a questionnaire-based two-wave field longitudinal study (Chapter 6). Traditionally, researchers interested in flow experience have focused and specialised in only one measure, for instance, the most well-known is the use of ESM. In addition, the most used operationalisation in the study of flow has been the challenges and skills combination to assess flow experience by means of questionnaires (e.g., Allison & Duncan, 1988) and also by ESM (e.g., Csikszentmihalyi & LeFevre, 1989; Kubey & Csikszentmihalyi, 1990). In the current thesis, we used a novel approach by not only measuring flow experience by means of an alternative operationalisation, such as absorption, enjoyment and intrinsic interest (Chapters 2 and 3), but also the core flow experience, i.e., absorption and enjoyment (Chapters 4, 5 and 6). We measured flow experience beyond challenges and skills as we considered this combination to be the antecedents or prerequisites of flow experience. In order to explore our alternative flow operationalisation, we used different approaches and combined ESM with questionnaires. The idea was that different approaches provide scientific benefits because using different measures allows researchers to understand flow experience from a much broader perspective. In addition, the use of questionnaires to assess flow offers some advantages over the use of ESM, and vice versa. Therefore it is important to take into account the possible results of measuring flow after (questionnaires) and during (ESM) flow experience. We now take an in-depth look at this topic.

Some research has criticised the use of questionnaires by not yielding a good quality of data as the main reason, for eliciting phenomenological perceptions because subjects are not used to putting these perceptions into words (Massimini, Csikszentmihalyi & Carli, 1987). However, other research has shown questionnaires as a strategy to collect retrospective data of their past flow experiences and to obtain a descriptive picture of these positive experiences (e.g., Chen, Wigand, & Nilan, 2000). Hence, one pitfall is that questionnaires are retrospective measures that may bias the results. Then, with hindsight, flow is positively evaluated. For instance, if we asked a student about flow who had experienced flow while designing a chair towards an academic assignment with a computer when he/she had finished his/her design, he/she would probably answer by describing the concentration and positive feelings he/she had experienced as enjoyment. This affective evaluation is produced "after" the experience. So far, the fact of not measuring enjoyment "during" the activity does not mean that the experience was not enjoyed. This question about measuring flow is indeed tricky. The results from Chapters 2, 3, 4 and 6 provided information about the relevant role that enjoyment plays as part of flow experience, together with absorption. So, it seems that measuring flow experience by means of a questionnaire (which implies a retrospection bias) means considering the core flow experience to be made up of absorption and enjoyment.

Following Nakamura and Csikszentmihalyi's (2002) suggestion, questionnaires are recommended when the goal is not to identify or describe, but rather to measure dimensions of flow experience and/or differences in its occurrence across contexts or individuals. Then in the current thesis, questionnaires were employed to assess flow experience dimensions and to measure the frequency of flow occurrence in different work settings. Therefore, the use of questionnaires in Chapters 2, 3, 4 and 6 provided valid information on the flow experience dimensions. So t it has been possible to test the different flow experience components hanks to the use of this kind of method, and to later confirm the bi-factorial structure of flow (absorption and enjoyment). Therefore, we may confirm that the use of questionnaires is very helpful to assess the flow dimensions. Besides, the use of these scales has allowed us to test this structure in a wide range of samples and contexts which would otherwise prove more difficult with other methods. In fact, the use of questionnaires can be an alternative solution to collect data in those contexts where the use of the Experience Sampling Method is more complicated given its repeated assessment nature.

So far, we have talked about measuring flow by means of questionnaires. Indeed, questionnaires have proved useful to assess flow operationalisation and to also outline a clear structure of flow experience. But another major goal of the current thesis was to explore and measure daily flow patterns, in other words, the question of how flow works during the day remains to be answered. So to answer the issue about measuring daily flow, the use of electronic diary method (in Chapter 5) is a major contribution of the current thesis. The electronic diary study method offers complete information not only about the inter-person variations in the experience, but also about the intra-person differences. That is, the use of this method offers some advantages, such as reliable person-level information and it facilitates the analyses of intra-persons changes over time (Bolger, Davis, & Rafaeli, 2003). It was also possible to compare flow with a control group (burned-out group) for the first time in the study of flow. In addition, the ESM method represents a novelty in scientific research because it has been recently used in many areas, apart from the study of flow, such as the study of burnout (i.e., Sonnenshein, Sorbi, Van Doornen, Schaufeli, & Maas, 2007), work and recovery activities (i.e., Sonnentag, 2001), job resources and engagement (i.e., Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007), and well-being (i.e., Oishi, Diener, Choi, Kim-Prieto, & Choi, 2007), among others (for an extended review of this method, see also Bolger, Davis, & Rafaeli, 2003).

So the use of the diary study in this thesis represents a relevant tool to study flow patterns during both working and non-working activities. Besides, if we take into recent research account, it has introduced four main challenges to increase the accuracy of the method to study flow patterns.

The first challenge was the use of an electronic device such as Palms or Personal Digital Assistant (PDA) in the assessment of flow. It was a novelty because no studies were known to use an electronic diary study in the flow contexts; its use was only found in a similar study using ESM with computers and pop-up windows with a questionnaire (Chen, 2006), but it was limited to web users contexts. The use of a PDA or electronic diary helped the participants to carry this device and to answer questions easily without the inconvenience of losing information and misplacing booklets, for instance.

Secondly, although traditionally only one week of sampling period was considered (Csikszentmihalyi & LeFevre, 1989; Delle Fave, & Massimini, 2005b; Massimini & Carli, 1988), the sampling period in the current thesis, where participants had to carry the PDA, was extended to two weeks. We extended the participation period to collect more information because the data of two weeks is more representative than those of only one week. In this way, the probability of finding biased data corresponding to one week was also avoided. It has to be noted that the data management analysis strategy used was Multilevel Analysis (Hox, 2002). This technique represents a third challenge or novelty.

The use of Multilevel analysis presents a third challenge, since Z-scores were used instead of the the traditional data analysis method, ESM (e.g., Csikszentmihalyi, Rathunde, & Whalen, 1993; Massimini, & Carli, 1988). The use of Z-scores does not take into account the different levels and the variance explained by each level. So, although Multilevel Analysis is not commonly used in the study of flow, in this thesis it provided significant information about the beep level, the day level and the person level, and took into account the nested data structure offered by ESM.

And last but not least, we assessed daily flow patterns using an alternative operationalisation of flow based on the two flow core components: absorption and enjoyment. In short, all these challenges allowed us to explore in detail the daily flow patterns among healthy and burned-out people beyond the traditional challenges and skills combination and which contributes to extend the original Channel Model. Thanks to the use of an electronic diary study, in Chapter 5 it was possible to test that flow experiences follow a curvilinear diurnal pattern (in the form of a U-shape), when it had never before been tested in flow research. Moreover, ESM allowed us to examine the different functioning in terms of core flow components at work (absorption and enjoyment). Whereas enjoyment was higher when performing non-working tasks (or leisure activities), absorption was higher at work. Once again, these results lead us to the question about what the core dimensions of flow experience are. Briefly, the results derived from the questionnaires (retrospective measure) showed a bi-factorial flow structure, whereas the ESM results (not retrospective-biased) illustrated how the two components develop during the course of the day. The ESM results complemented the questionnaire-derived results and explain the differentiated role of the functioning of the two flow core components; absorption and enjoyment. Therefore it seems that flow, because of its phenomenological nature, is quite susceptible to the way we measure it. According to the results of Chapter 5, the daily flow pattern appears to be the same for its two components, that is, it presents the same curvilinear pattern for both absorption and enjoyment. In other words, both components share the same pattern and daily functioning, but one is related to work activities while the other relates to leisure activities. Then by answering the question about flow core components, these results can be elucidated by the already explained ‘paradox of work’ (Csikszentmihalyi & LeFevre, 1989). However, it is worth noting that it is important to pay special attention to the absorption measure.

Then in Chapter 5, absorption is measured by the item “*Ik ben geboeid bezig*” whose English translation would be “I’m engrossed in what I’m doing”. In Dutch, *“geboeid”* means positive or fascinating concentration; in other words, it has a positive connotation. On a more philosophical level, the ‘positive absorption’ relationship – commonly found in working activities – has to do with the eudemonic and hedonic perspectives. We assume that while absorption relates to the former, enjoyment relates to the latter. Eudemonia focuses on the full development of a person’s capabilities for which the development of absorption in challenging activities is crucial (Ryan & Deci, 2001). Hence, absorption, or being entirely engrossed in the activity at hand, is the hallmark of flow experience where enjoyment is an *a posteriori* affective evaluation (Ghani & Deshpande, 1994; Moneta & Csikszentmihalyi 1996; Trevino &

Webster, 1992). This is the reason why measuring flow with questionnaires provides this retrospective affective evaluation, whereas measuring flow by ESM does not offer the chance to do this affective evaluation. In other words, when asking a person about flow at work by means of a questionnaire, the person may answer and be thinking about flow experience while doing a certain working activity (for instance, writing a financial report). This answer may imply the affective evaluation, which is why enjoyment is included as part of flow experience when using questionnaires. If, however, we use the ESM, the beeper will interrupt this flow experience on which the person is totally focused. Then the person has to answer in a very short time. It can be argued that perhaps the person is not aware if he/she is enjoying the activity because when the beep sounds, there is no time for doing this affective evaluation. In short, the fact that flow experience is positive in itself – albeit a posteriori – should not be overlooked (Csikszentmihalyi, 1975). Therefore the positive affective component has to be included in the measurement of flow experience.

To summarise, the use of both measurement tools seems to be an adequate strategy when studying flow as they complement the information obtained by each tool.

7.4 Flow antecedents: Extending the Channel Model

One matter of research interest of this thesis has been the understanding of what facilitates the occurrence of flow experience. Misunderstandings appear frequently in the literature in terms of mixing the flow experience measure with its antecedents. For instance and as previously explained, some researchers state that high challenges and skills combinations are conditions required to experience flow (Nakamura & Csikszentmihalyi, 2002). However in empirical studies, the challenges and skills combination has been used as a measure of flow experience (e.g., Csikszentmihalyi & LeFevre, 1989; Delle Fave, Bassi, & Massimini, 2003; Eisenberger et al, 2005). Thus, our research confirmed that the challenges and skills combination is a necessary but not sufficient prerequisite of flow experience. Besides we began with an alternative operationalisation of flow experience beyond challenges and skills by considering flow experience as absorption and enjoyment. Therefore, the answer of what facilitates flow experience at work is only partially answered in the literature, that is, by means of high challenges and high skills. But what makes a person perceive a task as challenging and if he/she has enough skills to meet it? According to our results, it appears that beliefs in one's capabilities to perform a task could be an antecedent of flow experience. In other words, self-efficacy beliefs.

Therefore, in Chapter 6 of the current thesis we provide empirical support for the antecedent role that self-efficacy plays in flow experience. Moreover, a novelty in the current thesis was to extend the Channel Model (Csikszentmihalyi, 1990, 1997, 2003) – based on challenges and skills as flow prerequisites – by including self-efficacy as an additional predictor of the combination of high levels of challenges X skills and flow experience itself (absorption and enjoyment). We found evidence of the predicting role that self-efficacy plays regarding flow experience over time that goes beyond the challenges and skills combination among teachers. In other words, the results from Chapter 6 provide evidence of the conceptual link between Csikszentmihalyi's Channel Model (Csikszentmihalyi, 1990, 1997, 2003) and Bandura's Social Cognitive Theory (SCT, Bandura, 2001) that resulted in a more complementary and complete model to explain flow experience as well as its antecedents.

As we argued before, another antecedent of flow experience seems to be “intrinsic interest”. The role of intrinsic interest, though not empirically validated in the current thesis, seems to be conceptually related to flow antecedents. Thus, intrinsic interest would be necessary to direct the task and to favour attention to be paid to carry out the activity. Nevertheless, intrinsic interest is not part of flow experience itself; it merely comes just before experience. This is why it is so difficult to find the thin line in research that separates the immediate antecedents from flow experience per se. We ought to point out that we have preferred to label intrinsic interest as the state of intrinsic motivation as we do not agree with research on flow employing the term intrinsic motivation (Bakker, 2005; Moneta & Csikszentmihalyi 1996) as part of flow experience. For example, according to the Self-Determination Theory (Deci & Ryan, 1985), intrinsic motivation is the tendency to engage in tasks because one finds them interesting and enjoyable. In other words, interest is the key promoter of intrinsic motivation as it directs and amplifies attention towards the task (Izard, 1977). This is the reason why we consider the use of interest instead of motivation for a momentary experience, like flow, as the former is punctual factor task-related while the latter is more general long-term drive.

7. 5 Limitations and challenges for future research

The current thesis has resolved previous questions that exist in flow research, such as the operationalisation and measure of flow in different contexts (Chapters 2, 3 and 4), the examination of its patterns (Chapter 5) and some of its antecedents (Chapter 6) by using a wide range of samples (workers, students) and designs (cross-sectional, longitudinal, ESM) and data analysis techniques (CFA, SEM, Multilevel, etc.). Some of strong points of the current thesis have been explained throughout the conclusions presented, so we will now go on to focus on the limitations and how to overcome them in the future.

The first question relates to the core flow experience dimensions, specifically the role of intrinsic interest. Although empirical evidence was found regarding the core of flow in this thesis, one main limitation was the fact of not specifically testing the role that intrinsic interest plays. It is clear from results presented in Chapters 3 and 4 that intrinsic interest is related to high levels of flow (absorption and enjoyment). In fact, some authors (e.g., Finneran & Zhang, 2003) state that tasks should have particular characteristics (intrinsically interesting) that may influence the likelihood of an optimal experience. Then although conceptually speaking the role of intrinsic interest seems to be clear, more research in terms of testing the function as an antecedent that intrinsic interest plays in the flow process is needed.

Another limitation is the lack of examination of the different activities at work/study and their relationship with flow. That is, we neither controlled for the different activities that people do at work in the samples studied, nor how the fact of doing a particular task can provide flow more frequently than another task. In other words, exploring the nature of the activities that are highly related with flow. For instance in the case of technology (Chapters 3 and 4), it would be interesting in future research to study the differences in terms of the flow experience between working with a spreadsheet or working with PowerPoint. Despite the diary study (Chapter 5) having taken activities into account in a general way (working or non-working activities), the specific kind of activity the person is doing should also be included in future research.

In relation to this, a heterogeneous sample of Dutch workers was also studied in Chapter 5; this also limited the study since it eliminates the opportunity to compare the participants' levels of flow in the same kind of working tasks. Thus, once again, the role that the kind of occupation and related tasks play have not been controlled. A suggestion for future research is to collect information about the activity (not only working or non-working activities) the person is doing at that time. This will enable us to extend the categories of activities that the person carries out in both the work and non-work settings to compare flow levels across activities. Moreover, it would be very interesting to replicate the same study (Chapter 5) in the future with other samples of workers to explore whether differences in flow patterns exist among workers of different countries since most research done on cross-national differences has focused on students (Delle Fave & Massimini, 2005b). Besides, although a wide range of samples from different countries and settings were used in this thesis to test the flow structure, more heterogeneous samples are needed to generalise the conclusions of the present thesis.

Thirdly, a challenge for future research implies the understanding of the relationship of flow with other constructs such as engagement. Specifically, engagement refers to a 'persistent, positive affective-motivational state of fulfilment that includes three aspects: vigour, dedication, and absorption' (Schaufeli, Salanova, González-Romá, & Bakker, 2002, p. 72). Engagement represents a more long-term, positive work-related experience with some similarities to flow at work (Demerouti, 2006). Therefore, it is not an outlandish idea to think about the close relationship that may exist between these two constructs. Although flow experience is a momentary experience unlike the more stable nature of engagement since it is a process, the absorption component in both constructs is genuinely close. In fact, the absorption scale used to measure flow in this thesis has been adapted from the absorption dimension of the commonly used tool to assess engagement (the Utrecht Work Engagement Scale, UWES; Schaufeli, Salanova, González-Romá, & Bakker, 2002). Thus, flow at work can be related to engagement in the sense that if one person can experience flow at work very often, he/she can also experience absorption and enjoyment in his/her work. Then, he/she is in a work environment with plenty of work activities that provide him/her flow experiences. Thus, we can hypothesise that it is likely that a person who experiences flow may mean that he/she frequently is engaged in his/her work, or even vice versa. In other words, an engaged employee may frequently note flow experience at his/her work. Therefore, further research to investigate this amazing relationship is required.

Finally for further research, it would be highly advisable to explore not only the antecedents, but also flow consequences. According to Csikszentmihalyi, flow was used to describe the most positive feelings (Csikszentmihalyi, 1975) and the most enjoyable experiences possible in human lives as ‘the bottom line of existence’ (Csikszentmihalyi, 1982, p. 13). Nevertheless little empirical research has confirmed this statement; for instance, research regarding the web use that stated that positive affects and playfulness are consequences of flow experiences (Chen, 2006). Besides, we can hypothesise that engagement is a consequence of flow experience. Therefore, a suggestion for further research would be to clearly explore and identify which factors may compound the ‘box’ of flow consequences, such as positive emotions, engagement or even high performance.

7. 6 Practical implications

The main goal of this thesis was to explore and shed some of light on the explanation of flow experience. Conceptually speaking, therefore, much has been achieved and practical implications may also be developed. Specifically, there are three basic practical implications.

First, the use of specific measures to analyse flow in different work (and non-work) and study settings, such as use of technology which facilitates its application as a practical tool to assess flow. In other words, a reliable measure based on the core flow components (absorption and enjoyment) was built to assess flow in a practical way by means of questionnaires. This measure involving two short scales can be applied and adapted to numerous specific settings.

Second, results found in chapter 2 provide evidence of the need to (re)design jobs in order to increase the worker's challenge and skill perceptions. Thus, only jobs characterized by high challenges performed by high skilled workers will provide those employees the chance to experience flow at work (Csikszentmihalyi, 1990; Eisenberger et al, 2005). The opportunity to work in contexts characterized by challenging tasks with accurate levels of skills will enhance 'healthy workers' working in 'healthy jobs', which will increase the positive moods (Csikszentmihalyi, Rathunde, & Whalen, 1993), task interest (Catley & Duda, 1997) and 'healthy products' (Salanova, 2008).

Besides, since self-efficacy is a relevant antecedent to experience flow, intervention to boost efficacy beliefs will increase positive experiences such as flow. In fact the results from Chapter 6 suggest that increasing self-efficacy levels leads to flow experience. According to the SCT, self-efficacy influences employees' behaviour, thinking, motivations, and feelings (Bandura, 2001). First, it affects how much effort and persistence is mobilised to overcome obstacles. Second, self-efficacy influences the way we think; high levels of self-efficacy are associated with optimism, whereas lack of efficacy is associated with pessimism. Finally, high levels of self-efficacy make us feel good (Schaufeli & Salanova, 2007) and contribute to seek positive experiences such as flow. Therefore, training plays a pivotal role in generating flow more frequently (by increasing the perception of challenge and skills at work, but above all, self-efficacy levels). This training should focus on promoting the four sources of self-efficacy, including a variety of components that are consistent with theoretical cues for self-efficacy building (Bandura, 1997, 1999). These include role-playings to provide successful experiences at work (enactive mastery), models of performance (vicarious experiences), coaching and encouragement (verbal persuasion), and reduction of the emotional threats of rejection (managing physiological states) (see Salanova et al., 2003).

7. 7 Final Note: How flow story 'flowed' on?

In short, the current thesis contributes to the scientific understanding of flow at work/study and also in non-work settings. Specifically, it has been possible to take a further step forward in the explanation of flow experience, operationalisation, measures, daily dynamics and antecedents to find empirical evidence of the extension of the traditional Channel Model (Csikszentmihalyi, 1990, 1997, 2003). That is, clarifying flow beyond the challenges and skills combination. All in all, with our conceptual model, we define flow experience as an optimal momentary experience characterised by high levels of absorption and enjoyment while doing a certain activity. And this flow experience follows a curvilinear daily pattern with higher levels in the morning and the afternoon. Besides, self-efficacy and the challenges and skills combination are prerequisites of flow experience.

While it may seem that much of what this thesis presents has already been achieved, flow research still has a long way to go. Moreover, the steps we have taken have become useful tools to assess flow experience. Nonetheless, it is necessary to generate ways to apply this knowledge to search how to foster flow at work and outside work. Finding flow is clearly a good way of finding happiness and of enhancing well-being. Then, the need to explore practical ways to boost this optimal experience is a main objective of further research … and ***that is how this story flows on***.

It does not seem to be true that work necessarily needs to be unpleasant. It may always have to be hard, or at least harder than doing nothing at all. But there is ample evidence that work can be enjoyable, and that indeed, it is often the most enjoyable part of life.

(Mihaly Csikszentmihalyi, 1990)

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Appendix 1.

Flow items

Enjoyment:

1. I like working with ICT
2. I enjoy the work I do using ICT
3. I like working with ICT more than other people do

Absorption:

1. When I'm working with ICT, I forget everything else around me
2. Time flies when I'm working with ICT
3. I get carried away when I'm working with ICT
4. I'm engrossed when I work with ICT
5. When I work with ICT, I don't think about anything else

Intrinsic Interest:

1. I work with ICTs because I like it, not because I have to
2. I like spending some of my free time using ICT
3. In itself, ICT is motivating

Answer scale: 0 = not at all/never; 1 = hardly at all/a couple of times a year; 2 = rarely/once a month; 3 = sometimes/a couple of times a month; 4 = fairly often/once a week; 5 = frequently/a couple of times a week; 6 = always/every day.

Resumen (Summary in Spanish)

Esta tesis doctoral se enmarca en el contexto de la Psicología Positiva. La Psicología Positiva no es más que el estudio científico de las fortalezas y el óptimo funcionamiento humano (Seligman & Csikszentmihalyi, 2000). Este enfoque complementa el tradicional estudio únicamente en la enfermedad, daños y problemas a los que está acostumbrado el estudio de la Psicología en general, y también así en el estudio de la Psicología del trabajo. Por lo tanto el estudio de la experiencia de flow se está convirtiendo en un tema de especial relevancia hoy en día, debido a este deseo de mejorar la calidad de vida en distintos contextos (ej., trabajo, estudio, tiempo libre, etc.). Aunque la mayoría de los estudios sobre flow se han centrado en flow en el deporte, en actividades artísticas y en el tiempo libre (Jackson & Marsh, 1996), existe poca evidencia empírica sobre flow en contextos laborales. Así pues, el objetivo general de dicha tesis ha sido profundizar en el conocimiento de la experiencia de flow en el trabajo (diferentes tipos de trabajo y trabajo con tecnologías) y también en el estudio (considerando también el estudio como trabajo). Concretamente, el objetivo ha sido describir, operacionalizar, explorar la dinámica y estudiar los antecedentes de la experiencia de flow en distintos contextos de trabajo (ej. trabajadores de cerámica, trabajadores usuarios de TICs, muestra heterogénea de trabajadores holandeses), de estudio (estudiantes universitarios, profesores de educación secundaria) y en distintos países (España, Holanda y Suecia) con el objetivo de extender un modelo existente de flow. Además, para llevar a cabo este objetivo se han utilizado diferentes métodos y

diseños (ej., estudios cross-seccionales, longitudinales, método de muestreo de experiencias /estudio de diario) en los 5 estudios que componen esta tesis.

Principales resultados obtenidos

Los principales resultados obtenidos en esta tesis van en consonancia con los objetivos centrales de la misma y que pueden ser resumidos en tres puntos: (1) Encontrar una clara y práctica operacionalización de la experiencia de flow que extienda y vaya más allá del tradicional Modelo de Canal (Csikszentmihalyi, 1990, 1997, 2003), (2) Explorar y medir los patrones diarios de flow y (3) Explorar los antecedentes de la experiencia de flow.

Operacionalizando la experiencia de flow

Una de las dificultades encontradas en el estudio de la experiencia de flow es la complejidad de la experiencia de flow en sí misma, dicha complejidad hace aún más difícil la medida y operacionalización de este fenómeno. Así, en la literatura encontramos a menudo una confusión entre la experiencia de flow y sus antecedentes inmediatos. Por ejemplo es muy común que la experiencia de flow se operacionalice como producto de altos retos y altas competencias o habilidades (ej., Csikszentmihalyi & Lefevre, 1989) según el Modelo de Canal (Csikszentmihalyi, 1990, 1997, 2003). La misma medida ha sido utilizada por la inmensa mayoría de estudios realizados sobre flow en el trabajo (Ej. Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005). Sin embargo en esta tesis se ha validado una medida alternativa basada en una revisión previa de los elementos comunes de las definiciones de flow encontradas en la literatura (ej., Chen, 2006; Novak, & Hoffman, 1997), y en estudios recientes (Bakker, 2005; Demerouti, 2006; Salanova, Bakker, & Llorens, 2007) que comenzaron a utilizar una operacionalización diferente de flow en el trabajo más allá de sus prerrequisitos (reto y competencia). Con el objetivo de describir y operacionalizar la experiencia de flow más allá del tradicional Modelo de Canal (Csikszentmihalyi, 1990, 1997, 2003) en el Capítulo 2 se puso a prueba nuestra operacionalización alternativa de flow, compuesta por tres componentes (absorción, disfrute e interés intrínseco), en combinación con el tradicional Modelo de Canal. Los resultados aportaron la primera evidencia empírica de que nuestra operacionalización (absorción, disfrute e interés intrínseco) complementaba y extendía el modelo tradicional de flow, no sólo considerando únicamente la combinación de reto y competencia, sino midiendo la experiencia de flow.

El siguiente paso hacia la operacionalización de la experiencia de flow fue la validación y el estudio en profundidad de la estructura de la experiencia de flow. Concretamente en el Capítulo 3 se puso a prueba un modelo tri-factorial de flow (absorción, disfrute e interés intrínseco) en una muestra de trabajadores y otra de estudiantes que utilizaban tecnología en las labores cotidianas de su trabajo y estudio. Este análisis factorial confirmatorio multigrupo confirmó la robustez del modelo de tres factores. Sin embargo, con el objetivo de profundizar en el 'corazón' de la experiencia de flow, y barajando la posibilidad teórica de que el factor interés intrínseco fuera un prerrequisito más que parte de la misma experiencia de flow, se procedió a seguir explorando la estructura de flow en otras muestras. Así en el Capítulo 4 comparamos dos modelos competitivos de flow: el modelo tri-factorial (absorción, disfrute e interés intrínseco) y el nuevo modelo bi-factorial (absorción y disfrute) utilizando para ello dos muestras de estudiantes usuarios de tecnologías (suecos y españoles). Los resultados obtenidos revelaron que el modelo de dos factores mostraba un mejor ajuste que el de tres factores, confirmando así que el interés intrínseco no era parte del 'corazón' de la experiencia de flow.

Patrones diarios de la experiencia de flow

El siguiente paso en el estudio de la experiencia de flow fue explorar estas dos dimensiones corazón del flow (absorción y disfrute) y estudiar sus patrones diarios en relación con el trabajo y también fuera del mismo. Para ello se utilizó en el Capítulo 5 el Método de Muestreo de Experiencias (Experience Sampling Method, o ESM, Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & Larson, 1987) o también conocido como estudio de diario. Esta novedosa metodología permitió conocer el funcionamiento de los patrones diarios de la experiencia de flow en una muestra de trabajadores holandeses sanos y otra muestra de trabajadores holandeses con burnout. Los principales resultados obtenidos en este estudio fueron (1) el patrón diario encontrado de los dos componentes de flow (absorción y disfrute) en forma de U (mayores niveles de flow durante la mañana y durante la tarde a partir de las 5), (2) las diferencias significativas en la frecuencia e intensidad de la experiencia de flow entre las dos muestras (los trabajadores sanos mayores niveles de flow que los empleados con burnout) y (3) el papel diferenciado que juegan la absorción y el disfrute en relación con las actividades laborales. Concretamente, el disfrute presentaba unos valores medios más altos al realizar tareas no laborales, mientras que la absorción era mayor en tareas relacionadas con el trabajo. Estos resultados van en la línea de la llamada 'paradoja del trabajo' (Csikszentmihalyi & LeFevre, 1989) que se refiere a por qué en el trabajo se da mayor número de experiencias de flow que en el ocio, pero sin embargo el ocio es preferido al trabajo. Es decir, las personas tienden a a experimentar más flow en el trabajo que en su tiempo libre, aunque ellos afirman que 'les gustaría estar haciendo otra cosa' cuando ellos están en el trabajo. Esto se puede explicar debido a la naturaleza 'obligatoria' que presenta el trabajo, éste requiere un esfuerzo tal y como se define trabajo en el Manual de Psicología del Trabajo y las Organizaciones (*Handbook of Industrial, Work and Organizational Psychology*) (pág. 1, 2001). Así pues el trabajo es retador pero requiere un esfuerzo y la utilización de nuestras habilidades al máximo normalmente para llevarlo a cabo. Sin embargo las personas solemos necesitar del ocio y tiempo libre para disminuir esas demandas y realizar menos esfuerzos y así recuperarnos del trabajo. Además, socialmente hablando, las personas no esperamos disfrutar del trabajo. Los resultados encontrados en el Capítulo 5 explicarían de este modo esta asunción, ya que el disfrute está más relacionado con las tareas de ocio, y por el contrario la absorción (más ligada a la concentración necesaria para llevar a cabo tareas retadoras) está relacionada con actividades laborales. Estos resultados aunque revelan importantes datos, también nos llevan a realizarnos nuevas preguntas acerca de cuál es la estructura corazón del flow y sobretodo lo susceptible que es de la medida empleada. En relación a esto, en esta tesis también se discuten los resultados obtenidos en función del tipo de diseño empleado: cuestionarios (medida retrospectiva) vs. estudios de diario (medida *on-line*).

Antecedentes de la experiencia de flow: Extendiendo el Modelo de Canal

Uno de los intereses y objetivos principales de esta tesis ha sido el conocimiento de aquellos factores que faciliten la ocurrencia de la experiencia de flow. En la literatura existen algunas confusiones entre lo que es la experiencia de flow y sus condiciones previas como es la combinación de retos y competencias. No obstante, la respuesta sobre qué es lo que facilita la ocurrencia de la experiencia de flow en el trabajo sólo está respondida parcialmente en la literatura, esto es a través de alto reto y alta competencia. Pero ¿qué es lo que hace que una persona perciba una actividad como retadora y si esta persona tiene las habilidades suficientes para realizarla? Según los resultados encontrados en el Capítulo 6, la respuesta reside en las creencias que tiene una persona en las capacidades que posee para desempeñar una actividad. Esto sería la autoeficacia. Así pues, en esta tesis se ha avanzado en el conocimiento de uno de los antecedentes necesarios para experimentar flow como es la autoeficacia. Concretamente, en el capítulo 6 se ha puesto a prueba una extensión del Modelo de Canal (Csikszentmihalyi, 1990, 1997, 2003) – basado en la combinación de reto y competencia como antecedentes del flow – incluyendo la autoeficacia como una variable predictora adicional a la combinación de reto y competencia. Para ello se utilizó un estudio longitudinal en una muestra de profesores de enseñanza secundaria. Los resultados mostraron evidencia empírica del papel predictor que desempeña la autoeficacia en la experiencia de flow (absorción y disfrute) más allá de la tradicional combinación de reto y competencia. Además los resultados del Capítulo 6 proporcionan también evidencias a nivel conceptual de la relación existente entre el Model de Canal de flow de Csikszentmihalyi (1990, 1997, 2003) y la Teoría Social Cognitiva de Bandura (SCT, Bandura, 2001), lo que resulta en un modelo más completo y complementario que explica la experiencia de flow así como sus antecedentes.

En resumen, 5 estudios empíricos con distintas muestras de trabajadores y estudiantes, de tres países distintos y con diferentes diseños metodológicos han probado la evidencia empírica de una medida práctica y aplicable de la experiencia de flow en el trabajo, explorando además los patrones diarios y los antecedentes necesarios para que se pueda dar este fenómeno tan escurridizo de medir pero tan fácilmente identificable por todos, ya que todo el mundo en alguna ocasión hemos experimentado flow en nuestro trabajo. Ahora sólo queda seguir investigando y poder aplicar los conocimientos revelados en esta tesis para poder crear puestos de trabajo que faciliten la experiencia de flow y así crear lugares de trabajo cada vez más saludables.

Curriculum Vitae

Alma M. Rodríguez-Sánchez was born on June 27th, 1980 in Castellón, Spain. In 1998 she started studying Psychology at Universitat Jaume I of Castellón. She graduated in 2003 at the same time she was doing a Human Resources Master and starting the PhD studies on Work and Organisational Psychology (Inter-university program awarded a quality mention by the Spanish Ministry of Science and Education) at Universitat Jaume I. She obtained several research grants collaborating with the WoNT Research Team from the same University until in 2005 she gained a position as Assistant Researcher at WoNT Team in the Department of Social Psychology at Universitat Jaume I. Since then she is involved in several research projects and also teaching at the same University. Her PhD thesis focuses on flow experience at work. Her research interests are related to Positive Occupational Health Psychology (flow at work, resilience, well-being, self-efficacy, assertiveness at work...etc), and also the effects of information and communication technology at work. Her publications mainly deal with positive psychology and flow at work.