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Enjoyment and Absorption: An Electronic Diary Study on Daily Flow Patterns

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Abstract

Flow experience is a state of mind in which one is totally absorbed in a task. This study explored the daily flow patterns related to working and non-working tasks among healthy and non-healthy (burned-out) individuals using the Experience Sampling Method. The main aim of this study was to explore flow throughout the day using an operationalization that focused on the flow experience itself, as indicated by enjoyment and absorption. Forty healthy participants and 60 burned-out individuals kept an electronic diary on activities (work/non-work), and levels of flow (enjoyment and absorption) for 14 days. Entries were prompted by a signal on average five times a day, thus rendering 5,455 entries. A curvilinear daily flow pattern was observed, with lower levels of flow during working hours. Differences were found between the components of flow: enjoyment was higher during non-working tasks, whereas absorption was higher when working. There were no differences in flow patterns between the healthy and burned-out group although the actual levels differed with the former experiencing more flow than the latter. The results confirm the validity of this means of measuring flow, using enjoyment and absorption as indicators.

[188 words]

Keywords: Flow, Experience Sampling Method, Daily Patterns, Positive Psychology, Burnout, Diary study.

Introduction

The phenomenon of “flow” has captured the attention of a growing number of researchers since Csikszentmihalyi introduced the concept in the mid 1970s (Csikszentmihalyi, 1975). He interviewed artists, athletes, composers and scientists, and asked them to describe the “optimal experiences” that 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).

Although the concept of flow may seem to be clear at first glance, some problems exist in operationalizing the construct. This is mainly due to the difficulty of assessing or ‘capturing’ the flow experience itself, as it is momentary and experiential. Because this “volatile” nature is inherent to flow, it is difficult to discriminate between the proximal antecedents and the flow experience itself. This also complicates the operationalization of flow. Traditionally, the flow experience has been 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 in itself sufficient – prerequisite to the experience of flow. However, how can flow in everyday life best be measured? In terms of prerequisites (the combination of high challenges and high skills), or in terms of a momentary experience? We decided on the latter because for our study, the main purpose of which was to explore daily patterns of flow, it was crucial to identify the flow experience itself and to distinguish it from its proximal antecedents (i.e., the match of high challenges with high skills).

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). In our view, rather than a constituting element of flow, intrinsic interest might act as an additional 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. Note that in the present study we employed the term ‘healthy’ to refer to individuals (in our case employees) who were neither on sick leave nor suffered from mental or physical illness. However, by way of comparison we also used a non-healthy, burned-out group. In doing so, we were able to investigate the implicit claim of previous flow studies that flow experiences are mainly 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 components of burnout (Schaufeli & Taris, 2005). In addition, we expected to find differences between flow in the healthy and the burned-out employees, since burnout is the opposite of engagement, which is closely related to (but not the same as) flow. More specifically, engagement represents a more long-term, positive work-related experience that bears some similarity to flow at work (Demerouti, 2006). Engagement is defined as a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication and absorption. Besides, engagement refers to a persistent, pervasive and positive affective-motivational state of fulfillment in employees that does not focus on any particular object, event, individual or behaviour (Schaufeli, Salanova, González-Romá, & Bakker, 2002). The difference between work engagement and flow is that the former is a more general and

pervasive work-related state of mind, whereas the latter is a more specific optimal experience of limited duration that relates to a specific objective (i.e. activity).

Therefore, since flow is 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 employee, who is cynical and doubts the significance of his or her work, will experience flow, which is characterized by the opposite experiences such as enjoyment and absorption. Therefore, in our study we expected that:

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

Daily fluctuations in flow

Research into the dynamics of daily fluctuations of flow experiences is scarce. In fact, most previous studies have related flow experiences across the day to 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 fluctuated in a non-linear dynamic fashion over a period of one week. However, no information exists about whether flow experiences follow a daily pattern that is associated with a specific activity. More particularly, it is not clear whether or not experiencing flow is related to the time of the day (i.e. follow a daily pattern analogously to the circadian rhythm) or to a particular work or leisure activity, irrespective of the time of the day. All we know so far is that flow is related to challenging activities.

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 for this 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; 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 impacted on the performance of several cognitive tasks, and that these performance fluctuations were additionally contingent upon inter-individual differences in the circadian preference. Besides, that 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 cognitive processes, we hypothesize that:

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

In the same way as the time of the day may influence positive affect and certain cognitive processes, weekly fluctuations may have an effect on flow experiences too. In addition,

fluctuations in positive affect also appear to relate with the day of the week and the season of the year (e.g., Rossi & Rossi, 1977; Smith, 1979; Stone, Hedges, Neale, & Satin, 1985).

Weekly fluctuations might be influenced by the type of activities that individuals are carrying out. In other words, the activities in which people engage on weekdays differ from weekend activities. For instance, people work during weekdays and have more free time during the weekends. Therefore, the combination of the type of activity and the day of the week may influence in the likelihood of experiencing flow. Besides, flow tends to occur in challenging activities that require high levels of personal skills. In fact, people tend to experience more flow during work than in leisure activities, since using one's skills in a challenging situation is difficult to achieve outside work (Csikszentmihalyi & LeFevre, 1989). Thus, in order to clarify whether flow fluctuations are due not only to the type of activity but also by the day of the week, in the present study we also explore differences in flow between weekdays and weekends. Hence, we hypothesize that:

Hypothesis 3. Levels of flow will tend to be higher on weekdays as compared to weekends.

Flow in working and non-working tasks

It has been observed that individuals report more flow experiences during work than off-work, but at the same time – and 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. During work people tend to take on more challenging activities than during leisure (Csikszentmihalyi & LeFevre, 1989). Besides, there is evidence for a positive relationship between flow experiences and high positive activation (Larsen & Diener, 1992; Russell & Carroll, 1999), which is more frequently observed at work than during leisure. So not surprisingly, it has been found that flow scores are higher during work, but scores for happiness or satisfaction are higher during leisure time (Rheinberg, Manig, Kliegl, Engeser, & Vollmeyer, 2007). Then, what is the

reason for the paradox of preferring leisure activities over work, even though it provides more flow experiences? Since we operationalised flow in terms of two dimensions - enjoyment (affective) and absorption (cognitive), we are able to study this paradox in greater detail. Namely, on the one hand, we expected that particularly levels of enjoyment would be 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 of working activities than of non-working activities. Thus, we expect that:

Hypothesis 4. Enjoyment will be positively related to non-working tasks, whereas absorption is positively related to working tasks.

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 hypothesized that:

Hypothesis 5. The daily patterns of flow experiences will be similar for healthy and non-healthy (burned-out) individuals.

Note that whereas this hypothesis refers to *patterns*, Hypothesis 1 assumes that the *levels* of flow differ between healthy and non-healthy individuals.

Method

Participants

The participants were 40 healthy individuals (Mean age = 41.8, SD = 10.0: 65% females; 65% educated at college/university) from different occupational groups, and 60 clinically burned-out individuals (Mean age = 42.9, SD = 8.8: 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). Clinical burned-out participants were voluntarily recruited from new enrolments of Dutch centres 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 that could 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). All participants were offered a remuneration of €25 (roughly 30 US\$), to be awarded if they took part.

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 ($SD= 3.6$). 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. Note that this sample has been used before in another different study on energy erosion and burnout (see: Sonnenschein, Sorbi, van Doornen, Schaufeli, & Maas, 2007).

Participants received an informed consent form and a 1-hour instruction at home on the use of an electronic diary, which was in the form of a personal digital assistant (PDA) pocket computer. They received a telephone call two days later to discuss their first experiences of using the diary, and potential problems. Telephone support was also available during the entire recording period, which concluded with a debriefing interview and the collection of the pocket computer, and offered the remuneration. 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 plus the time of the day – the Experience Sampling Method (ESM) (Csikszentmihalyi, Larson, & Prescott, 1977). This method allows for the repeated assessment of individuals’ experiences in their natural

environment (Massimini, Csikszentmihalyi, & Carli, 1987; Christensen, Barrett, Bliss-Moreau, Lebo, & Kaschub, 2003) and for the assessment of within-person fluctuations in these experiences (Bolger, Davis, & Rafaeli, 2003). In addition, this technique avoids the retrospection bias produced by questionnaires that are responded to 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). In addition to accuracy and ecological validity, ESM provides the unique opportunity to acquire diurnal patterns of the flow experience. In this paper we use the term *electronic diary* for ESM applied using a PDA.

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. The computer produced an electronic alarm (a beeping signal), which occurred randomly during the day within 2.5-hour time units to prompt participants to fill in the diary. Each participant filled in between three and seven (average five) alarm-triggered diary entries every day for two consecutive weeks. All diary entries were automatically time-stamped and the variables of the present study were assessed.

Enjoyment and *absorption* were assessed with single questions according to ESM premises.

The items are intended to measure states rather than constructs, and they mimic an internal dialogue. They need to be concise and presented in a common language (Delespaul, 1995).

Two items intended to measure flow were selected from the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 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*. Flow was thus defined as a continuous variable (cf.

Csikszentmihalyi, & Csikszentmihalyi, 1988; Delle Fave & Massimini, 2005) consisting of an

emotional (enjoyment) and a cognitive (absorption) component that were averaged to produce an overall flow measure.

In addition to recording two flow-related experiences (i.e. enjoyment and absorption), the diary provided other information. These included the *time* of the day the electronic alarm sounded a “beep”, the *day of the week*, and whether the participant was engaged in *working tasks* or *non-working tasks*. It had been explained to participants that tasks such as housework should be recorded as working tasks. (This was of particular relevance to the non-working, burned out participants.) The study yielded a total of 5,455 alarm-controlled diary entries. Participants rendered an average of 71 diary entries each, 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. Detailed information about the process of data collecting in the diary study are presented elsewhere (see Sonnenschein, Sorbi, Van Doornen, & 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 modelling (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). 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 the improvement of 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 at three levels were available: at the

electronic signal 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 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 1 also shows the correlations between the variables at the same time, that is to say, at the first level, the electronic signal or time level ($N = 4,017 - 5,455$). As can be seen in Table 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 1 here

Before running the multilevel analyses, we examined group differences in flow (burned-out versus healthy) 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, the healthy individuals experienced more flow than those who were 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 tests 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 was explained at the first level, which is at the signal (or time) level. The variance explained was 9.56% at the second level (day), and 20.64% at the third level (person), respectively. The results were evidence of 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 alarm-signalled occasions per day. 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, i.e. weekday or weekend); and (4) Model 3, in which we added the variable at the third level (group). Table 2 presents unstandardized estimates, standard errors, and *t*-values for all predictor variables of the four models. It also presents the deviance ($-2 \times \log$) 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 2

The analyses revealed that Model 1 showed a significant improvement in fit over the null model, so time and the hour quadratic (in terms of a curvilinear U-shape) were significantly related to flow. This means that for both groups flow exhibited a curvilinear daily pattern, whereby lower levels of flow were more frequent during working hours (10h-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, it is notable that whether being engaged in a working activity or not had no significant effect on flow experiences.

In the next step, we compared Model 2 with Model 1. Again, this new model showed a significant improvement in fit. This indicates that including the type of day also adds to explaining flow. That is to say, weekends positively related 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 the two 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 followed a particular daily pattern (partially supporting Hypothesis 2), they occurred more at the weekend than on weekdays (not supporting Hypothesis 3), working or non-working tasks had a differential effect on flow, depending on its dimension – enjoyment or absorption (supporting Hypothesis 4), and flow levels were higher in healthy individuals than in burned-out individuals (supporting Hypothesis 1), whereas flow patterns did 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. However, Table 2 shows that, at this stage, 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 2 shows the results for the best fit model: Model 3 for enjoyment and for absorption separately. Regarding Hypothesis 3, levels of enjoyment were higher at weekends as compared to weekdays (Table 3, model 3 enjoyment), whereas no difference for absorption was observed

(Table 3, model 3 absorption). Regarding Hypothesis 4 – as expected, enjoyment was significantly associated with non-working activities (Table 3, model 3 enjoyment), whereas absorption was significantly associated with working activities (Table 3, model 3 absorption). Hence, Hypotheses 4 was supported.

Table 3

To summarize, the combined score of both dimensions of flow did not relate to whether the participants were engaged in working or non-working activities. The most likely explanation for this is that the two dimensions operate in different situations: it could be that enjoyment relates more to non-work activities, whereas absorption relates to work activities.

Discussion

The aim of this study was to explore the dynamic, daily patterns of flow experiences using an alternative way to assess the flow experience, which has previously been measured in terms of high challenges and high skills (Csikszentmihalyi & LeFevre, 1989). In our study it was characterized by enjoyment and absorption, in both healthy and non-healthy (burned-out) individuals. The results of our study support Hypotheses 1, 4, and 5, showing that levels of flow were higher for healthy than for non-healthy individuals (Hypothesis 1); that enjoyment was related to non-working tasks whereas absorption was related to working tasks (Hypothesis 4); and (although they showed differences in actual level of flow) the daily pattern of flow did not differ between healthy and non-healthy individuals (Hypothesis 5). Hypothesis 2, which related to time of day, was partially supported since a significant quadratic slope was found, but not in the form of an *inverted* U-shape as expected, but as a genuine U-shape. Hypothesis 3, relating to weekdays and weekends, was not supported because levels of flow (particularly enjoyment) were higher at weekends.

Flow patterns and their correlates

Our results suggest that flow experiences follow a diurnal curvilinear pattern. However, the linear slope was negative, and represented a flattened U-shape in which lower

levels of flow are more frequent during working hours (10h - 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, which may be 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), although they used a different operationalization of flow. In other words, our results confirm the validity of our conceptualization of the flow experience as a combination of enjoyment and absorption. Secondly, we found that the effect (*t*-value) of enjoyment was larger than that of absorption (see Table 3), which means that the predictive power of the diurnal pattern was 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 estimates relating to working activity (i.e. work vs. no-work) had more predictive power for absorption than for enjoyment.

On the other hand, enjoyment was better predicted at weekends than during work days and, by contrast, there was no difference in level of absorption between weekdays and 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. People therefore report more enjoyment during their leisure time (Csikszentmihalyi & LeFevre, 1989). This interpretation is also in accordance with the findings of Delle Fave and Massimini (2005), 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 related positively to performing non-working tasks, whereas absorption related positively to working tasks. These results agree with previous studies that reflect that emotions such as happiness or satisfaction are higher during leisure time (Rheinberg et al. 2007) whereas concentration is more characteristic of working activities than non-working activities (Schallberger & Pfister, 2001; Schmidt et al., 2007). But why are positive emotions (or positive affect such enjoyment) frequently related to non-working tasks? Twenty years ago Csikszentmihalyi and LeFevre (1989) tried to answer this question of the so-called the ‘paradox of work’. They argued that 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. The fact that the compulsory nature of work masks the positive experience that it engenders might be an explanation for this paradox.

However, nowadays work conditions and workers’ attitudes towards work are changing, while research is also advancing on the knowledge of positive emotions at work. Therefore, we hoped that the results from the current study would shed some of light on this issue. Since we explored the functioning of enjoyment and absorption separately we emphasize that, 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 focused on the activity in 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. Therefore these findings may also be viewed from hedonic and eudemonic perspectives. These 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 growth of which engagement and absorption in challenging activities are crucial (Ryan & Deci, 2001). Thus, from a eudemonic perspective, work would be a source for development by means of challenging activities that frequently require high concentration. Hence, absorption is the hallmark of the flow experience, with enjoyment as an *a posteriori* affective evaluation (Ghani & Deshpande, 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 (cognitive) and enjoyment (affective) to assess the flow experience; the former relates positively to working tasks and the latter relates positively to non-working tasks.

Flow among healthy and burned-out individuals

Our results showed that flow *levels* in healthy individuals were significantly higher than in burned-out individuals, thus supporting Hypothesis 1. Moreover, as expected, Hypothesis 5 was also supported: that is, there were no significant differences in daily flow *patterns* between healthy and burned-out individuals. On a theoretical range of 1 – 7, flow scores of the healthy participants decreased from 4.9 at 6 h to 4.7 at 15 hrs, but had returned to 4.9 by the late evening (23h -24h). The flow scores of the burned-out participants followed a very similar pattern but were, on average, 0.3 points lower than those of the healthy participants (burned-out participants scored 4.6 in the early morning and 4.4 at 15hrs). The first finding reveals that the healthy individuals experienced higher levels of 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). However, flow patterns in the healthy and the burned-out participants were similar: even in those non-healthy participants who were on partially or fully on sick leave, the diurnal pattern was the same. Note that the

non-healthy group also carried out “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 of the study

There were two main limitations to this study. First, we did not study the concurrent validity of both conceptions of flow (the traditionally-studied combination of challenges and skills vs. absorption-enjoyment) by direct comparison because our main aim was to study the flow experience 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, even though the electronic diary is a very useful method to measure flow experiences, it also has the disadvantage that the signal-contingent strategy may interfere with the flow experience. Unlike an event-based design (in which participants complete a diary after experiencing the studied event), in the signal-contingent strategy participants should respond immediately when they hear a random signal from the PDA alarm. Consequently, we recommend that in future studies an electronic (alarm-contingent) diary is used together with an end-of-the-day diary. This combination of measures would allow the participants to register and indicate whether they had flow experiences during the day that the diary did not reflect. Another suggestion for future research is that data are collected from different kinds of job in order to compare the daily flow patterns among different occupations.

The 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.

Taken together, these strengths contribute to draw the practical implications of the present study. Mainly, understanding the daily patterns of flow experience may be useful for organisations that want to boost optimal experience in the workplace. In other words, organisations may have into account the functioning of these patterns in order to design interventions to generate optimal experiences. Moreover, occupational health psychologists may be aware of the relevant role that optimal experience play in both healthy and non-healthy employees, thus, finding ways to boost flow experiences in different tasks that non-healthy employees can carry out, as a recovery strategy.

In short, the present study allowed us to explore and find flow patterns across time, using an alternative operationalization of the phenomenon to the one that is more traditionally used. It also produced in-depth knowledge of the flow experience itself by means of an electronic diary methodology. As in previous studies on positive psychology (Clarke & Haworth, 1994; Oishi, Diener, Choi, Kim-Prieto, & Choi, 2007), we hope that the current study will encourage researchers to use the electronic diary method to investigate the the flow experience, which is fascinating but at the same time tricky to study.

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Table 1
Means, standard deviation 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	0.58	.18	.19	.14	-.19	-.29**	-	.89**	.91**
7 Enjoyment	4.74	0.60	.08	.08	.10	-.14	-.30**	.92**	-	.62**
8 Absorption	4.49	0.65	.25*	.26**	.16	-.21*	-.23*	.93**	.73**	-

Note. Below the diagonal: person-level data ($N = 100$), averaged across 15 days. Above the diagonal: electronic signal-level data ($N = 4017-5455$).

* $p < .05$; ** $p < .01$.

Table 2

Multilevel estimates for models predicting flow experience (Enjoyment and Absorption)

	Null model			Model 1			Model 2			Model 3		
	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>
Intercept	4.61	.06	79.43	5.16	0.25	20.92	5.13	0.25	20.80	5.36	0.26	20.89***
Time linear slope (time)				-0.08	0.03	-2.64**	-0.08	0.03	-2.70**	-0.08	0.03	-2.73**
Time quadratic slope (time2)				0.00	0.00	2.94**	0.00	0.00	3.00**	0.00	0.00	3.02**
Working activity (0 = no; 1 = yes)				-0.07	0.05	-1.44	-0.04	0.05	-0.80	-0.06	0.05	-1.12
Weekday (0 = not weekend; 1 = weekend)							0.13	0.05	2.81**	0.12	0.04	2.73**
Group (0 = healthy; 1 = burned-out)										-0.36	0.11	-3.14**
- 2 x log			12102.5			12085.1			12077.2			12067.8
$\Delta - 2 \times \log$						17.39**			7.90**			9.40**
<i>Df</i>						3			1			1

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

Table 3

Multilevel estimates for models predicting enjoyment and absorption separately

Variables	Model 3: Enjoyment			Model 3: Absorption		
	Estimate	SE	<i>t</i>	<i>Estimate</i>	SE	<i>t</i>
Intercept	5.52	0.27	20.39***	5.18	0.30	17.15***
Time linear slope (time)	-0.09	0.03	-2.72**	-0.08	0.04	-2.21*
Time quadratic slope (time 2)	0.00	0.00	3.27**	0.00	0.00	2.22*
Working activity (0 = no; 1 = yes)	-0.03	0.05	-5.19***	0.16	0.06	2.73**
Weekday (0 = not weekend; 1 = weekend)	0.15	0.05	3.16**	0.09	0.05	1.77
Group (0 = healthy; 1 = burned-out)	-0.45	0.12	-3.86***	-0.26	0.13	-2.04*

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

Additional findings concerning the comparison between Models Null, 1 and 2 of enjoyment and also absorption are available on request.