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RESEARCH PAPER

Fluctuation of Flow and Affect in Everyday Life: A Second Look at the Paradox of Work

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Abstract Studies with the Experience Sampling Method (ESM) have shown that individuals experience more flow at work than at leisure. This indicates that people enjoy working but paradoxically at the same time leisure activities are preferred ("paradox of work"). We took a second look at the paradox of work by measuring flow directly, including affect measures, and differentiating between active and passive leisure activities. We also adopted a dynamical approach based on the idea that the transitions of experiences has to be taken into account to get the total picture. For the period of 1 week, data of 100 employees with different professions were collected with the ESM (in total 4,504 measurements). In accordance with existing work, we found that flow was high during work. It was slightly (albeit significantly) higher than during active leisure activities and considerably higher than during passive leisure activities. At the same time, negative activation was low during passive and active leisure activities and lower than during work and vice versa for valence (happiness). Thus, leisure activities do have a positive affective quality that could explain why people prefer leisure to work. Regarding the dynamical approach, we tested whether flow during work would lead to higher valence in leisure but could not support this assumption. We discussed the findings and made suggestions for future research. In an additional analysis, we reveal that perceived outcome experience could partially explain why work and leisure experience differed.

Keywords Flow · Paradox · Work · Leisure · Affect · Well-being

1 Introduction

We often do things simply because we feel good while doing them. This is a basic form of hedonism and is an important part of human striving (Freud 1963; Waterman et al. 2008).

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It also seems that the reliance on our feelings is a good guide for behavior built up through learning and evolutionary processes. For example, we feel good eating, and eating is important for our survival. The reliance on our feelings seems even more warranting when keeping in mind that humans are not especially good in knowing their reasons for their action (Nisbett and Wilson 1977), and the absence of attentive deliberation can lead to better decisions (cf. Dijksterhuis 2004). Thus, "feelings" are important aspects for guiding behavior. This does not exclude that humans are able to orient their behavior on (self-set) long-term goals which sometimes makes it necessary to sacrifice feeling good while doing things (Goschke 2003).

The importance of the subjective experience while doing things was not of a major concern when Csikszentmihalyi began his research agenda in the 1970s. In explicit contrast to the behavioristic paradigm, Csikszentmihalyi (1975) began to consider the experience of an activity as an important part for explaining why people are highly committed to doing certain things (cf. McReynolds 1971; White 1959; Deci and Ryan 1980). He studied individuals who recurrently engage in hobby and work activities such as climbing, dancing, doing artwork, or carry out surgical operations. Using questionnaire and interview studies, Csikszentmihalyi revealed a common aspect for all the activities, which he called flow experience. A similar research strategy was adopted in Germany by Rheinberg (1989, 2008) after he recognized the desideratum of disregarding the experience of the activity (cf. Engeser and Schiepe-Tiska 2012). He found that it does not only help to explain leisure activities but also helps understanding learning motivation (Rheinberg 2008).

1.1 Flow Experience

Flow is an absorbing state in which the individual feels in control of the action even under high demand (Csikszentmihalyi 1975; Rheinberg 2008). In a flow state the individual loses a sense of time, the activity seems to be guided by an inner logic and is not separated from the self, leading to a merging of self and activity and a loss of self-consciousness. In flow, each step of the activity is self-evident, contains no contradictory demands, and provides clear, unambiguous feedback on what to do next (Engeser and Schiepe-Tiska 2012). Thus, the flow experience is comprised of different aspects of experience referred to as the characteristic, dimensions, or components of flow (Jackson and Csikszentmihalyi 1999; Nakamura and Csikszentmihályi 2009). Being in flow is rewarding in itself and it explains why people are highly committed to tasks even when lacking external rewards (Nakamura and Csikszentmihályi 2009).

The flow state has also a strong functional aspect. Individuals are in a state of high concentration while feeling optimally challenged and in control of the action. This explains why flow experience is often related to high performance (Engeser and Rheinberg 2008; Jackson and Csikszentmihalyi 1999) and is considered as an optimal experience. While the flow experience is rewarding, positive emotions like joy and happiness may not be felt during the flow experience. However, individuals often express positive affect at the end of a flow experience or when a flow experience is remembered (Nakamura and Csikszentmihályi 2009).

1.2 Paradox of Work

Csikszentmihalyi and LeFevre (1989) studied flow during work and leisure activities with the Experience Sampling Method (ESM) and found contradicting results. First, flow experience is more frequent at work. Second, at work individuals more frequently stated

the wish of doing something else thus indicating low intrinsic motivation. This is paradoxical as flow is a rewarding experience and, nevertheless, the individuals wanted to do something else ("paradox of work"). The paradox of work has also been reported in other studies (Bassi and Delle Fave 2011, 2012; Clarke and Haworth 1994; Delle Fave and Bassi 2000; Ellis et al. 1994).

One explanation of the paradox given by Csikszentmihalyi and LeFevre (1989) was "whether they wish to work or not, people judge their desires by social conventions rather than by the reality of their feelings" (cf. Bassi et al. 2011). Although such a conventional bias may explain the results, we have some reluctance to accept this easily. If we take this explanation literally, it would mean that we could only conditionally rely on the statements given in ESM studies. A second explanation Csikszentmihalyi and LeFevre (1989) presented was that "the lack of flow in leisure … is due to inability to organize one's psychic energy in unstructured free time." People rely too much on television and media where they do not feel happy and strong. This explanation has some interesting implications for how a happy and satisfying life may look like (or not look like) in modern societies (Delle Fave and Massimini 2003). However, methodological considerations might provide other accounts for the paradox, too.

1.3 Methodological Considerations

One problematic methodological aspect is that Csikszentmihalyi and LeFevre (1989) did not measure flow directly. Instead, flow was inferred in accord with the flow model (Csikszentmihalyi and Csikszentmihalyi 1988; Delle Fave and Massimini 2005; cf. Moneta 2012). The flow model assumes that an individual will experience flow when the challenge and the skills needed to face the task are both high. Hence, every time an individual reports that the challenge and skill are above the individual mean level, flow experience is assumed. Based on this, the paradox looks less paradoxical: In a working context, individuals face more challenges and need more skills compared to leisure activities and in such instances they would like to do something else.

Another problem is that asking participants whether they want to do something else may not be the best indicator to use to measure intrinsic motivation (Keller and Landhäußer 2012). In the context of work, it could be that an individual likes to work but has an especially rewarding activity in mind when indicating wanting to do something else (e.g., a favored hobby activity or going on a date with a loved one). Comparing the current working activity with all possible other activities could therefore be misleading and research better asked individuals to indicate what they would like to do. Alternatively, one could separate leisure activities into finer grid categories to determine more precisely what the working context is being compared to (see below).

Schallberger and Pfister (2001) have pointed out that the results presented by Csikszentmihalyi and LeFevre (1989) do not show such a clear-cut difference between work and leisure as is implied by the paradox of work. Individuals in Csikszentmihalyi and LeFevre's (1989) study reported feeling stronger and being more concentrated at work, but feeling more relaxed in leisure activities. Furthermore, there were no differences in positive affect and satisfaction. Thus, taking into account more aspects of the daily experiences, the paradox could be resolved. With such a look on the paradox of work, Schallberger and Pfister (2001) allow for an alternative explanation taking into account different facets of subjective daily experiences.

1.4 The Present Research

The methodological considerations allow for alternative explanations of the paradox of work. First, it could be that direct measures of flow would lead to different results. Second, being asked the question about doing something else could stimulate the respondent's wish to do a certain leisure activity. In the present research, we wanted to address these methodological problems in order to tap into a more conclusive understanding of the paradox of work. First, we measured flow with all its components. Thus, we avoided some problems of former research on flow in ESM studies that inferred flow from a high challenge/high skill combination. We further separated the non-working contexts into the two leisure categories of active and passive leisure and into obligations. We also measured affect for each data point in order to see if these measures would help to solve the paradox. For additional analyses, we also measured the perceived outcome importance (cf. Abuhamdeh 2012).

Based on these measures and considering different categories for leisure activities, we expect that flow is higher in work than in active and passive leisure activities. We therefore expect to replicate existing findings with a direct measure of flow, too. Especially, we expect a more pronounced difference for work and passive leisure. Second, we expect that affect experienced during active and passive leisure activities is more positive (i.e., of better quality) than that experienced at work (i.e., less negative affect and higher valence). If we would confirm these expectations, this would offer an explanation as to why individuals would like to do something else while being at work even though flow is higher during work than during leisure time.

We further wanted to address if the fluctuation and interplay of experiences provides a source of happiness and fulfillment. This is derived from the broader considerations that fluctuations are part of daily life. For example, action and sleep or being self-determined and relying on others fluctuate during the course of 1 day. Analogously, experiencing flow in challenging activities and resting are two states to be considered in conjunction. Peifer (2012) outlined that flow shares some central aspects with stress, and cortisol data support this reasoning. A challenging activity, therefore, should be alternated with less challenging activities or rest in order to prevent aversive experiences or harm. Similarly, too much rest will lead to boredom when not alternated with challenging activities.

As mentioned above and in line with the assumption that fluctuations and alternations are an important perspective for understanding daily experiences, Nakamura and Csikszentmihályi (2009) reasoned that flow would lead to happiness after the experiences (cf. Fullagar and Kelloway 2009). In a similar vein, Baumann and Scheffer (2010, 2011) found that actively seeking difficulty (which tends to reduce positive affect) and confidently mastering difficulty (which helps to restore positive affect) facilitate flow. Thus, flow is as an important ingredient for a happy life without necessarily being a state of happiness (Bassi and Delle Fave 2012; Csikszentmihalyi 1996). With respect to the paradox of work, individuals' flow experience at work might lead to a higher enjoyment of leisure activities after work. When asking individuals what they would prefer to do, they might think of this enjoyment afterwards. These considerations lead to our third hypothesis. We expect that flow at work leads to more positive affect (happiness) in subsequent leisure activities.

Summing up our expectations, we propose that flow is higher in work than in other activities (Hypothesis 1a) and is especially high in comparison to passive leisure (Hypothesis 1b). Second, we expect that passive and active leisure activities are associated with affective qualities that are perceived as better than those experienced at work (Hypothesis 2). And finally, we propose that flow at work leads to higher enjoyment in

subsequent leisure activities (Hypothesis 3). Support for Hypotheses 1 and 2 would provide an alternative account to explain the paradox of work, and the support for Hypothesis 3 would complement this explanation based on a dynamical understanding of daily experiences.

2 Method

2.1 Participants and Procedure

One hundred and one participants took part in the study conducted at the University of Potsdam. Participants were recruited via newspaper advertisement, requests in companies and via personal communication. They received 30 Euros for participation. One participant did not answer the affect scale at any time and was excluded from the analysis. One participant did not provide personal data for age, gender, occupation, and marital status, and three participants did not provide information for the number of children. In order to include these participants in all analyses, we replaced the missing data by the mean values of the sample, thus assuming average values in respect to the missing data. Of the 100 participants included in the analysis, 69 indicated being female. The ages ranged from 18 to 60 years, with $M = 39.0$ ($SD = 9.51$). The sample included persons from various occupations: 35 staffers, 24 research assistants and scientists, 15 secretaries, 10 technical staff, 4 students, and 11 others (e.g., musicians, teachers). Sixty-eight indicated that they are married or in a committed relationship, 31 are divorced or single, and 84 participants indicating having at least one child. Therefore, this sample represented a diversified sample, although the proportion of (unskilled) workers and craftsman are underrepresented.

In a first session, we introduced the aim of the study and provided instructions regarding ESM sampling. Participants provided basic biographical data. Each participant was beeped seven times a day during 8:30 a.m. and 9 p.m. during the period of 1 week. Participants were allowed to decide if the signals should be sent to a Casio Pocket viewer or a mobile phone (signals were programmed on the chosen device). We appointed time frames of 1.5–2 h for each signal with a minimum interspace of 30 min. Participants filled out their paper booklets including all questions (see below), which takes about three to 4 min for each measurement point.

2.2 Current Activity

The activities, when beeped, were determined from the response to "I am doing: …". We coded each response into four broad categories according to our research question to differentiate non-working activities and to compare them with working activities. The work category included all instances when respondents indicated that they were actually working on their job. We separated the non-working activities into active and passive leisure activities and obligational activities (cf. Mannell et al. 1988). For the work category, we used four subcategories listed in Table 1. In the subcategory "core work", we coded all activities that represent the main task of the respective work (e.g., data management for a technical staff). "Cooperation and communication" included activities to share information with others (e.g., talking to colleagues, emails). As "routine" work, we classified all highly repetitive work, which could be managed with basic skills only (e.g., sorting incoming post). The fourth category was "planning and organizing" (e.g., making

Table 1 Frequency of activities and means for flow and affect

	N	%	Flow[a]	Positive activation[a]	Negative activation[a]	Valence[a]
Working	1,577	35	5.28	4.97	3.01	4.92
Active leisure	888	20	5.20	4.88	2.45	5.45
Passive leisure	455	10	4.33	3.66	2.34	5.24
Obligations	1,556	36	4.71	4.40	2.91	4.97
Working						
Core work	716	16	5.40	5.00	2.97	4.98
Cooperation and communication	470	11	5.19	5.07	3.14	4.89
Routine	268	6	5.01	4.61	2.96	4.75
Planning and organizing	123	3	5.53	5.20	2.79	4.96
Active leisure						
Affiliation and intimacy	379	8	4.95	4.82	2.49	5.46
Mental active	228	5	5.29	4.52	2.44	5.20
Sport/exercise	107	2	5.52	5.52	2.66	5.67
Creative active	87	2	5.72	4.52	2.25	5.68
Walking	87	2	5.09	4.97	2.19	5.62
Passive leisure						
Consuming	272	6	4.35	3.75	2.38	5.21
Resting	131	3	4.25	3.26	2.26	5.31
Break	52	1	4.38	4.19	2.37	5.22
Obligations						
Housekeeping	484	11	4.93	4.38	3.04	4.89
Basic needs	475	11	4.73	4.45	2.50	5.29
Transportation	363	8	4.44	4.29	3.04	4.85
Routines others	125	3	4.83	4.74	3.18	4.71
Duties (social)	72	2	4.76	4.60	3.40	4.75
Waiting	37	1	3.61	3.65	3.36	4.54

$N = 4{,}476$ data sampling points

[a] SD for the main categories range from 1.04 to 1.31 for flow, from 1.18 to 1.20 for PA, from 1.17 to 1.29 for NA, and from 1.14 to 1.26 for VA

schedules). Active leisure includes five subcategories. The first includes all instances of being with friends and loved ones and was labeled "affiliation and intimacy". The second includes activities like reading, learning a language, visiting an exhibition, and surfing in the Internet and were categorized as "mental active". "Sport/exercise" includes all kinds of physical activities ranging from playing golf to weight training. Under the category of "creative active", we subsumed activities like gardening, making music, or painting. The category "walking" included all instances were individuals report going for a walk alone or in the company of others or with a dog.

Passive leisure includes three categories. "Consuming" includes watching television, watching a movie in the cinema, and listening to music. "Resting" includes lying on bed/couch, taking a bath, and lounging around. "Break" includes coffee or lunch breaks that did not have an explicit affiliative quality. Obligations include six categories.

"Housekeeping" includes activities like cleaning, cooking, and shopping for food or other daily products. "Basic needs" were eating and drinking (not explicitly affiliative in nature) and showering/bathing or otherwise preparing for the day (e.g., shaving, putting on makeup). "Transportation" includes car driving or riding in a car, public transportation or getting around on bike or by foot (not explicitly taking a walk or riding a bike for fun). "Routines others" included private desk work like home banking, repairing the car, visiting the doctor's office, and preparing for travel. "Duties (social)" included taking care for children and doing work for others. Finally, "Waiting" was coded whenever the participants mentioned waiting for an upcoming event. Only a small number (28 cases; <1 % of the all responses) of activities could not be coded in one of the categories mentioned above and, therefore, were not included in the analysis.

2.3 Flow

We measured flow with the Flow Short Scale (Engeser 2012a). The Flow Short Scale has been validated and successfully used in various applications (e.g., Baumann and Scheffer 2010, 2011; Engeser and Rheinberg 2008; Schüler 2010). This scale measures the components of flow experience with ten items on a seven-point scale (see "Appendix"). The mean of the items was calculated as the flow score used in all analyses (thus flow values could range from 1 to 7). Low values indicate little experience of flow and high values indicate strong experience of flow. The scale also contains three additional items to measure the perceived outcome importance ("Something important to me is at stake here", "I must not make any mistakes here", and "I am worried about failing" and was also measured with a seven-point scale; Engeser 2012a).

2.4 Affect

We assessed affect with an instrument that has been developed specifically for implementation in studies using the ESM (Schallberger 2005). The instrument includes 10 bipolar items measured on a seven-point scale and measures positive activation (PA; energetic—shiftless, tired—wide awake, elated—bored, dull—highly motivated), negative activation (NA; stressed—relaxed, untroubled—annoyed, calm—nervous, worried—secure), and valence (VA; unhappy—happy, satisfied—unsatisfied; PANAVA). Schallberger based the construction of the items on a circumplex model with a two-dimensional space of pleasure–displeasure and degree of arousal (cf. Russell and Carroll 1999). VA assesses the dimension of pleasure–displeasure directly. However, arousal is assessed in combination with pleasure–displeasure (cf. Watson et al. 1988). This means that high PA is a state of being positive and active at the same time (with low PA implying a negative state with low arousal such as, e.g., being bored), and high NA is a state of displeasure and high arousal (with low NA implying a positive state of pleasure and low arousal such as, e.g., being relaxed). As PA and NA are orthogonal within the circumplex model, they should not correlate, but both should exhibit medium high correlations with VA (i.e., positive for PA and negative for NA; cf. Russell and Carroll 1999). After recoding the reverse-scored items 1 and 3 for PA, items 1 and 4 for NA, and items 2 for VA, we calculated the mean of the items for PA, NA, and VA for all analyses. Hence, high PA values mean high positive activation, high NA value signify high negative activation, and high VA values denote high valence (with possible values ranging from 1 to 7).

3 Results

3.1 Compliance

Of the 4,900 possible responses to the random signals, 4,504 were answered completely. This 92 % total response rate was considerably high compared to other ESM studies (cf. Csikszentmihalyi and LeFevre 1989; Delle Fave and Bassi 2000; Schallberger and Pfister 2001). The individual response rates ranged from 29 to 49 signals with $M = 45.04$ ($SD = 4.73$). Participants' compliance was not significantly associated with demographic information or other measures used in the analyses. For all analyses, we excluded data from 28 sampling points because the reported activities could not be coded within the categories reported above. Thus, unless otherwise specified, analyses were conducted using 4,476 randomly sample data.

3.2 Frequency of Activities

Table 1 reports the frequencies for the main categories of work, active leisure, passive leisure, and obligations as well as for their subcategories. Participants spent 35 % of their time on work activities, 20 % on active leisure activities, 10 % on passive leisure, and 36 % on obligations. Frequencies for work were quite similar to those reported by Csikszentmihalyi and LeFevre (1989) who found a frequency of 29 % spent on work activities (they reported 21 % leisure activities and 49 % "others"; however, due to a different coding system, the results are not comparable).

The percentage of total beeps gives an estimate of the time spent on an activity. Participants were beeped seven times during a 12½ h time frame (i.e., 8:30 a.m. until 9 p.m.). Our findings of 35 % for the category work implies that, during the 12½ h frame, our participants worked about 4 h and 20 min each day (including weekend). Likewise, they spent 2½ h participating in active leisure activities, 1 h and 15 min participating in passive leisure activities, and 4½ h for obligations (however, leisure and mostly passive leisure would most likely be more prevalent if we would have sampled during later hours of the day).

3.3 Descriptive Analysis and Correlations

The overall means of the flow and affect measures are as follows: flow $M = 4.97$ ($SD = 1.16$), positive activation (PA) $M = 4.62$ ($SD = 1.26$), negative activation (NA) $M = 2.79$ ($SD = 1.25$), and valence (VA) $M = 5.07$ ($SD = 1.22$). In Table 1, we present the mean values of flow and affect for work, passive and active leisure, and obligations separately (see also means for the subcategories in the lower part of Table 1). Flow and PA were slightly higher at work compared to active leisure activities and considerably higher than for passive leisure. On a descriptive level, this is in line with our Hypotheses 1a and 1b. In contrast, NA was higher and VA was lower at work than when pursuing active and passive leisure activities. These findings are in line with our expectation that active and passive leisure activities are more favorable than work in (some) of their affective qualities (Hypothesis 2), and this finding could explain why people indicate that they want to do something else than work. This holds especially when looking at the subcategories of active leisure. For example, the subcategory "creative active" was associated with high PA values, low NA values, and high VA values. Flow was also very high, even higher than for work (and its subcategories).

Table 2 Correlations, reliability, and means of flow and affect

	1	2	3	4	*M*	*SD*
1 Flow	*.85*	.59	−.19	.31	4.97	1.16
2 Positive activation		*.85*	−.17	.40	4.62	1.26
3 Negative activation			*.86*	−.63	2.79	1.25
4 Valence				*.78*	5.08	1.22

$N = 4{,}476$ data sampling points. Correlations for standardized values (standardized within individual); all correlations are significant at 1 % level; in the diagonal (italics) reliability (Cronbach's alpha based on the median of all single data points)

Passive leisure (compared to work and active leisure activities) was primarily characterized by lower flow and PA values. Passive leisure also had the lowest values for NA. VA for passive leisure was higher than in work and only slightly lower than in active leisure. On a descriptive level, passive leisure activities have some affective qualities that are better than those assigned to work and, to a minor extent, active leisure. Experiences in obligations fall between work, active and passive leisure activities. However, the subcategories (lower part of Table 1) reveal that "duties (social)" and "waiting" were associated with even more NA than that experienced at work and, in this respect, represent the least favorable activities.

The diagonal of Table 2 lists the internal consistencies of the measures of flow and affect. Findings indicated satisfactory reliability. Table 2 also presents the correlations for flow and affect ($p < .01$ for all correlations).[1] There was a high correlation ($r = .59$) between flow and PA indicating that both shared 35 % of common variance and, to this extent, tapped into the same aspects. Flow was weakly and negatively correlated with NA and moderately and positively correlated with VA. As expected by the circumplex model, PA and NA correlated weakly with each other, and VA related more strongly to NA than to PA. Thus, the absence of NA was more important for VA than the presence of PA.

3.4 Effects of Context on Flow and Affect (Multi-level Analysis)

For these analyses, due to the nested structure of our data, we performed hierarchical linear modeling with the HLM 6.06 software (Raudenbush et al. 2004) using restricted maximum likelihood estimation with robust standard errors and assuming normal distribution for the dependent variables. To determine whether the context of the activity influenced the flow experience and affect, we used a two-level HLM model (context are level 1 and individual variables are level 2). The context variables were coded according to our research questions with planned contrast codes that are uncorrelated (orthogonal; cf. Davis 2010; Raudenbush and Bryk 2002). The first contrast C1 was "work versus active leisure" (work coded −1/2, active leisure 1/2, and all others as null) allowing us to test the difference between these two contexts. The second contrast C2 was "work and active leisure versus passive leisure" (work and active leisure coded −1/3, passive leisure coded 2/3, and obligations as null) allowing us to test the differences of work and active leisure compared to passive leisure. The third contrast C3 reflects "all categories versus obligations" (all others coded −1/4 and obligations as 3/4).

[1] Values were standardized within each individual to eliminate mean differences between individuals; correlations based on raw scores are very similar.

Before addressing the research questions, we used an unconditional model (i.e., a model with a single dependent variable and no predictors) to estimate the amount of variance of the dependent variable that is explained at the two levels (Raudenbush and Bryk 2002). The analysis indicates that about 37 % of the variance of flow is between measurement points (and not between persons). For PA, NA, and VA, the proportions of variance are 33, 43, and 42 %, respectively. Thus, there are substantial differences of affect from one measurement point to the next. The residual variance of the unconditional model also allows the estimation of the variance explained by the additionally used parameters in a conditional model. When entering the contrasts for context as a level 1 predictor, results revealed that the context accounts for 10 % of the moment-to-moment variance of flow. For PA this was 9 %, for NA this was 4 %, and for VA this was 3 %. Thus, these analyses revealed in conventional interpretation (Cohen 1988) a medium effect size of the context for flow and PA and a small effect size for NA and VA.

In the final model testing the hypotheses regarding the influence of context on flow and affect, we also included age and gender (men coded as 1 and women as 2) as level 2 predictors (age and gender explained a small to moderate proportion of the variance between individuals; 3, 6, 1, and 3 % for Flow, PA, NA, and VA, respectively). Age and gender were entered as centered predictors (cf. Cohen et al. 2003) and cross-level interactions were modeled for C1 and C2. Table 3 presents the results of these analyses. For flow, the first contrast comparing work with active leisure (C1) was negative (see Table 3). This means that flow in active leisure is lower than in work. Thus, the differences between work and active leisure (cf. Table 1) were significant. This confirms our Hypothesis 1a that proposes that flow is higher in work than in active leisure. There were no statistically significant differences in PA. For NA, the significant negative effect of C1 reflects that NA is lower in active leisure compared to work. For VA, the significant effect of C1 indicates that VA is higher in active leisure compared to work. These results confirm our Hypothesis 2 that postulates that active leisure provides experiences that make it understandable that individuals want to do something else when at work.

Work and active leisure compared with passive leisure (C2) showed statistically significant effects for flow, PA, and NA (see Table 3). The negative effect for flow and PA reflects that both are lower when participating in passive leisure activities than when at work or participating in active leisure activities (supporting our Hypothesis 1b). However, the negative effect for NA indicates lower NA for passive leisure activities compared to work and active leisure activities, indicating a distinctive quality of passive leisure that is favorable. Individuals could enjoy their passive leisure time because they indicate less NA, thus supporting our Hypothesis 2. Finally, all contexts, when compared with obligations (see contrast C3 in Table 3), showed a significant negative effect for flow, PA, and VA indicating that all three were lower when participants were fulfilling obligations than in the other contexts. The significant positive effect for NA indicates higher NA for obligations than for the other contexts. Thus, these results indicate that the activity category of obligations is generally not accompanied by the most favorable experiences.

Age showed a positive main effect for PA (see Table 3) indicating that older participants experienced more PA. For VA, there was a moderation effect for work compared to active leisure (see Table 3). Inspection of the data revealed a less pronounced difference for VA between work and active leisure activities. Gender had a positive main effect on flow, PA, and VA indicating that women had higher values for these experiences. Further, for PA, gender moderated the effect of the contrast of work and active leisure activities compared to passive leisure activities (C2; see Table 3). Inspection of the data showed that women indicate higher PA during their work and active leisure time but there were no

Table 3 Flow and affect as a function of age, gender, and context

Parameter[a]	Flow		Positive activation		Negative activation		Valence[b]	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	4.86**	0.06	4.48**	0.05	2.70**	0.08	5.11**	0.07
Age	0.00	0.01	0.01*	0.01	−0.01	0.01	0.01	0.01
Gender (male vs. female)	0.38**	0.13	0.28*	0.11	−0.13	0.16	0.37*	0.16
Work versus active leisure (C1)	−0.15*	0.06	−0.09	0.06	−0.47**	0.06	0.49**	0.06
Age moderation C1	0.00	0.01	0.01	0.01	0.00	0.01	0.01*	0.01
Gender moderation C1	0.12	0.14	0.12	0.14	−0.14	0.12	0.22	0.13
Work and active leisure versus passive leisure (C2)	−0.96**	0.08	−1.23**	0.08	−0.41**	0.06	0.04	0.05
Age moderation C2	−0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01
Gender moderation C2	−0.08	0.18	−0.45*	0.17	0.09	0.14	−0.08	0.11
All others versus obligations (C3)	−0.22**	0.03	−0.09*	0.04	0.24**	0.03	−0.16**	0.03

$N = 4{,}476$ data sampling points

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

[a] Approximate $df = 97$ for all parameters except $df = 4{,}466$ for C3

[b] Due to unreliable level 1 coefficient for C2, the random effect was excluded from the analysis

differences in passive leisure. This shows that women seem to be more sensitive to the context of work and leisure time.

3.5 Contingencies

Due to missing data which also lead to the exclusion of the adjacent measuring points and the exclusions of overnight transitions, the data points decrease to $N = 3{,}832$. Of special research interests are the transitions of our respondents from their work to other contexts. There are 1,281 adjacent data points from work to all other contexts (see Note in Table 4 for the number of each transition). In Table 4, we present the correlations between flow and VA for adjacent measuring points. The time-lag correlations within the same measures were of medium size for flow and VA (indicating that the experience was somehow stable between adjacent measurement points). There were weak to medium sized correlations between adjacent measures of flow and VA, and the positive correlations between flow and subsequent VA are in accord with our expectation that flow at work leads to higher VA afterwards. However, these positive correlations could also be an artefact because flow and valence are moderately stable and both measures were correlated (see Table 2).

To rule out the possibility that the stability and intercorrelations are responsible for the cross-lagged correlation of flow and VA, we controlled for it in a regression analysis. We predicted VA by previous flow (Flow_{n-1}) and included flow at the same time (to control for the intercorrelation of flow and VA) as well as the previous measures (VA_{n-1}; to control for the stability). The predictors were centered around the individual mean. In Table 5, the results are presented for the transitions from work to all other contexts. There was no evidence that the flow preceding the measures of flow (Flow_{n-1}) influenced VA. Thus, our assumption of Hypothesis 3 was not supported. We also reversed this model to predict flow from valence, but could also find no influence in this respect.

3.6 Post hoc Analysis: Perceived Outcome Importance

In an explorative analysis, we tried to understand why the experiences between the contexts are different. As a potential candidate, we analyzed the perceived outcome importance of activities. As could be expected, the perceived outcome importance was higher in work with $M = 3.07$ ($SD = 1.57$) than in all other contexts; for active leisure outcome importance is $M = 1.73$ ($SD = 1.23$), for passive leisure $M = 1.29$ ($SD = 0.81$), and for obligations $M = 2.03$ ($SD = 1.43$).[2] This might explain why the context was experienced differently. It could also be that outcome importance led to different experiences for the different contexts. To test both aspects, we included outcome importance and the interaction with the contexts in our model at level 1 (with outcome importance centered before conducting the analysis). We included all random effects except for the contrast C3 (as in the analysis above; perceived outcome explained a moderate proportion of the variance between individuals; 10 % for flow and 9 % for VA). We restricted the presentation to flow and VA only.

Looking at the results presented in Table 6, the perceived outcome importance showed a positive relation to flow and a negative relation to VA. Thus, importance did not hinder

[2] The differences are significant for the first two contrasts ($B = -1.30$, $p < .01$ and $B = -1.12$, $p < .01$), indicating that outcome importance is higher in work than in active leisure and that it is higher for work and active leisure compared to passive leisure. Outcome importance for obligations did not differ compared to all other contexts ($B = -0.03$, $p = .50$).

Table 4 Correlations of flow and valence (VA) for the transitions from work to other contexts (based on standardized values)

Work[a]	Work		Active leisure		Passive leisure		Obligations	
	Flow	VA	Flow	VA	Flow	VA	Flow	VA
$Flow_{n-1}$	.49	.30	.20	.11	.43	.22	.51	.24
Valence $(VA)_{n-1}$	.24	.48	.17	.49	.26	.41	.26	.51

[a] $N = 911$ transitions to work, $n = 85$ to active leisure, $n = 45$ to passive leisure and $n = 240$ to obligations

Table 5 Valence as a function of preceding flow and valence

Parameter	Work to work[a]		Work to active leisure		Work to passive leisure		Work to obligations	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	4.90**	0.07	5.09**	0.16	5.08**	0.17	4.79**	0.10
$Flow_{n-1}$	−0.04	0.04	0.16	0.21	−0.12	0.20	−0.02	0.10
Flow	0.39**	0.05	0.33**	0.20	0.57**	0.15	0.48**	0.08
$Valence_{n-1}$	0.18**	0.04	0.52**	0.13	−0.10	0.21	0.15*	0.08

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

[a] $N = 911$ transitions work to work (approximate $df = 99$), $n = 85$ to active leisure (approximate $df = 51$), $n = 45$ to passive leisure (due to the small number of units, only the random effect for the intercept was included; approximate $df = 33$ for intercept and $df = 8$ for the other predictors) and $n = 240$ to obligations (approximate $df = 90$)

flow but instead was associated with more flow. At the same time, it was associated with lower VA. Importantly, there were no longer any significant effects for the contrast "work versus active leisure", indicating that more flow in the work context compared to active leisure could be attributed to higher outcome importance at work. Looking at the interaction of context and outcome importance, there was a significant moderation for the contrast of work versus active leisure (contrast C1) for flow and VA. We depicted flow and valence for the four contexts for low and high perceived outcome importance (one standard deviation below and above the mean) in Fig. 1. High perceived outcome importance went along with higher flow values for work but not for active leisure. Thus, perceived importance seems to foster flow in a work context but not in the leisure context. Additionally, perceived importance fosters flow in obligations. Regarding VA, perceived importance had no effect on VA at work, but high importance was associated with lower VA in active leisure. There were also significant moderations for the contrast of work and active leisure versus passive leisure (see contrast C2 in Table 6). High perceived outcome importance was associated with higher flow values for work and active leisure compared to passive leisure (see Fig. 1). On the other hand, high perceived outcome importance was associated with lower VA for passive leisure compared to work and active leisure.

4 Discussion

We replicated the finding that the flow experience is high in the work context and generally higher than for active and passive leisure activities and for obligations. At the same time,

Table 6 Flow and affect as a function of context and perceived outcome importance

Parameter[a]	Flow		Valence	
	B	*SE B*	*B*	*SE B*
Intercept	4.87**	0.07	5.02**	0.08
Importance	0.09**	0.03	−0.16**	0.03
Work versus active leisure (C1)	−0.01	0.06	−0.36**	0.07
Importance moderation C1	0.11**	0.04	0.13**	0.05
Work and active leisure versus passive leisure (C2)	0.87**	0.10	0.22*	0.11
Importance moderation C2	0.08	0.08	0.18*	0.09
All others versus obligations (C3)	0.16**	0.04	0.11**	0.04
Importance moderation C3	−0.04	0.03	−0.01	0.03

$N = 4{,}476$ data sampling points

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

[a] Approximate $df = 99$ for all parameters except $df = 4{,}468$ for C3

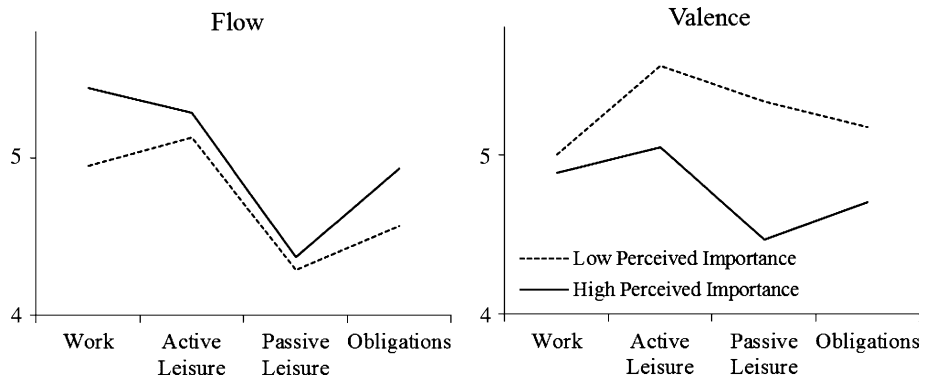

Fig. 1 Flow and valence as a function of context and perceived outcome importance

active and passive leisure have some favorable affective experiential aspects. Compared to work, active and passive leisure is associated with lower values in NA and active leisure is associated with higher VA. This explains the paradox of work in the way that participants prefer leisure activities even though they experience more flow at work. Additionally, some subcategories for active leisure activities are even associated with more flow than work. Participants at work may think of such activities when they indicate wanting to do something else. Age has minor effects on daily experience, but being female is associated with more favorable daily experiences, and women seem to be more sensitive to context variation. Our expectation that flow at work subsequently leads to better affective experiences in leisure activities could not be supported. Additional exploratory analyses revealed that outcome importance had positive effects on flow and could explain the differences in flow between work and active leisure activities.

We outlined that the paradox of work, as found by Csikszentmihalyi and LeFevre (1989), could be due to a methodological artefact. Our results imply that this is not the case. We measured flow directly and still found that flow is higher at work than at leisure.

Flow is highest at work, and participants should enjoy activities in which they experience more flow and they should not indicate that they would like to do something else. Csikszentmihalyi and LeFevre (1989) explained the paradox in such a way that social conventions led their participants to indicate that they would like to do something else. Additionally, they argued that participants were not able to structure leisure activities in order to experience more flow. We see merit in both explanations; however, we found clear evidence supporting the considerations offered by Schallberger and Pfister (2001) and in line with our expectation of the favorable affective experiences of active and passive leisure, these offer a credible explanation as to why participants favor leisure compared to work.

Additionally, active leisure activities were only slightly (albeit significantly) lower in flow experience and slightly (and not significantly) lower in PA than work activities. Thus, active leisure activities do offer the positive experience inherent in work, but have some qualities better than work (lower NA and higher VA). When looking at the subcategories of active leisure, it becomes obvious that some leisure activities do offer the most favorable experience of flow and affect. These are sport/exercise activities and the activities that we categorized as creative active. When at work, participants may think of such creative activities like making music, painting, and gardening when they indicate wanting to do something else.

To test our expectation that flow at work subsequently led to better affect, we examined whether flow at work was related to subsequent valence in active and passive leisure and obligations. When we controlled for the stability of flow and valence, flow had no effect on subsequent valence. We also tested the reverse relationship of valence predicting flow, but could not find any significant effects, either. Thus, we did not find empirical evidence supporting the idea that the sequence of the experience explains the paradox of work or that it reveals a fundamental aspect of human experience. We are still convinced that fluctuations are worth consideration in understanding human experience, although we were not able to confirm our reasoning empirically. We are confident that refined future research will find evidence for the importance of patterns of fluctuation of experiences.

Refinements should include a more tailored design to test sequence effects, as our study is limited in this respect. We sampled, on average, every 2 h. In retrospect, we suspect that between two consecutive beeps it is likely that context (or other) factors have a much stronger influence than the more subtle sequence effects. To tackle this problem, ESM studies could sample more experiences during a day, or could cluster frequent sampling for some periods during 1 day. As this might disturb participants too much, studies might look to include a homogenous group, such as all the employees of a company. This would have the advantage that the time schedule of a day is more similar and time periods of special interest could be sampled (like the transition from work to leisure). Additionally, this would also be favorable as it reduces error variance compared to a heterogeneous sample. Indeed, Fullagar and Kelloway (2009) conducted an ESM study with 40 architecture students on study work and found evidence that flow is associated with subsequent positive mood. Along a similar vein, it would be promising to systematically look for sequential effects in ESM studies that sample special activities (e.g., Aellig 2004; Baumann and Scheffer 2010, 2011; Delle Fave et al. 2003) or in controlled experimental settings (cf. Engeser 2012a). Finally, the inclusion of moderator variables might explain when flow at work leads to higher valence in leisure, such as flow in a workday should result in higher after-work valence only if it fostered meaningful progress in the project one was engaged in at work (Amabile and Kramer 2011).

To explain which factor of the context may be relevant for the different experiences, we conducted supplemental analyses with perceived outcome importance. Outcome importance itself had positive effects on flow and could explain the difference in flow between work and active leisure. Thus, outcome importance is associated with more flow, and more flow at work is due to higher outcome importance. However, moderation effect also revealed a more detailed picture. High outcome importance is associated with more flow at work exclusively. In respect to VA, perceived outcome experience does not reduce valence at work, but reduces valence in leisure activities. We assume that in work contexts, outcome importance is an integral part of the activity that leads participants to enter flow and does not hinder valence. For leisure activities, outcome importance may be avoided and lead to less flow and lower valence.

Future studies may build on this result in order to understand why work and leisure are experienced differently. Knowing more about such aspects missing in our study would provide valuable information on how to improve daily experiences and increase well-being in general. For example, professional musicians could be studied while making music in a work versus leisure context (Bassi et al. 2011). We would expect that outcome importance increases flow especially for the work context (and vice versa for low outcome importance). Testing musicians would also allow an examination of other aspects that differentiate between work and leisure. Being directed by a conductor may help to get into flow as it structures the activity (cf. Schiepe-Tiska and Engeser 2012). On the other hand, this may impair flow due to less self-determination (cf. Bassi and Delle Fave 2012). The moderating effect of outcome importance (for goals see Rheinberg et al. 2007) provides us with a hint that, in a work context, such restriction may be seen as a normal aspect of professional work and may only impair flow and valence in a leisure context (e.g., other musicians trying to take the lead).

We found that perceived outcome is important to increase flow (at work) which may seem to contrast the idea that participants high in flow do not care about the outcome of an activity (Csikszentmihalyi 1975). We expect that outcome importance will not hinder flow as long as individuals have the feeling of mastering the task, but will hinder flow when individuals are in doubt of mastering the task (cf. Abuhamdeh 2012). Thus, perceived outcome importance depends on the demands and skills of a person. Future ESM studies should measure perceived outcome importance along with demands and skills. Measuring demands would also be one variable to understand why there are differences in work and leisure (as discussed in the introduction). At best, researchers could come up with a few basic and exhaustive dimensions to classify activities and could assess (some of) these aspects in ESM studies as well.

Due to the population selected for our study, some caution is warranted in the interpretation because these results might not hold for unskilled workers or for different cultures in general. The present study also concentrated on situational and dynamic features. However, individual differences may also contribute to understanding the paradox of work, thus pointing to a limitation of our study as we have not considered individual differences beyond age and gender. Some individuals dislike challenging situations and do not experience flow in optimal challenge (cf. Engeser and Rheinberg 2008). More specifically, there is evidence that only about one fourth of the population is motivated to actively seek flow arousing situations (Baumann and Scheffer 2010, 2011; cf. Csikszentmihalyi 1996). Individual differences in the implicit achievement motive account for some of these differences (cf. Baumann 2012). For future research, it would be informative to investigate the role of such motive dispositions for the paradox of work and for differences of flow in achievement situations in general (e.g., Abuhamdeh 2012; Keller and Bless 2008).

Finally, we want to point to a general weakness of what Moneta (2012) called a componential approach to flow measurement. We measure flow in its components with rating scales, and all subjects have to indicate how the items for the components represent their current experiences. Beside overall positive psychometric propositions, it remains open which specific value of the rating scales would correspond to flow experience when the person would have been openly questioned (via an interview) or measured according to the flow model (cf. introduction). Some researchers have discussed or offered cut-off-points (Jackson and Eklund 2004; Kawabata and Mallett 2011), and Kawabata and Mallett (2012) go into more detail on this respect. In our paper, we see flow as a continuous phenomenon (like we did for PA, NA, and VA). This is in line with Csikszentmihalyi's (1975) understanding that flow patterns in everyday life exists "on a continuum from extremely low to extremely high complexity" (p. 141; cf. Engeser 2012b). Continuous data also have the methodological advantage of taking all information into consideration and not reducing variance by splitting the data into "non-flow" and "flow" (Cohen 1983; Cohen et al. 2003). In respect to another consideration by Moneta (2012), we did not differentiate between flow preconditions and flow; rather we simply measured flow experience on the subjectively experienced components of flow with ten items. Finally, the internal consistency of the measure provides support for the conclusion that the ten items form a general measure of flow. Thus, the final critical point of the "paradoxes of attention" mentioned by Moneta (2012), reflecting on the possible dissociation of components of flow, is not a fundamental problem in our data.

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Appendix: Flow Short Scale

	Not at all	Partly	Very much
I feel just the right amount of challenge			
My thoughts/activities run fluidly and smoothly			
I don't notice time passing			
I have no difficulty concentrating			
My mind is completely clear			
I am totally absorbed in what I am doing			
The right thoughts/movements occur of their own accord			
I know what I have to do each step of the way			
I feel that I have everything under control			
I am completely lost in thought			
Something important to me is at stake here			
I must not make any mistakes here			
I am worried about failing			

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