

# Flow and Happiness in Later Life: An Investigation into the Role of Daily and Weekly Flow Experiences

Amy Love Collins · Natalia Sarkisian · Ellen Winner

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**Abstract** Fifty-four older adults ranging in age from 70 to 86 years old ( $M = 77.54$ ) reported daily levels of positive and negative affect, life satisfaction and daily activities for seven consecutive days. Hierarchical linear modeling (HLM) was used to investigate inter- and intra-individual effects of flow experiences on affect. Higher quality of flow was positively associated with high arousal positive affect (i.e., feeling peppy, enthusiastic, happy), negatively associated with low arousal negative affect (i.e., feeling sad and disappointed), and positively associated with life satisfaction. However, more frequent flow experiences throughout the week predicted lower average levels of positive affect and life satisfaction. Overall, the results demonstrate that flow is linked to the affective experiences of older adults, and that an individual's overall propensity to experience flow may be influential beyond the immediate effects of a given flow experience.

**Keywords** Happiness · Life satisfaction · Flow · Older adults · Aging

In light of research demonstrating that happiness is linked with better coping, lower morbidity, and lower mortality (Fredrickson 2001; Pressman and Cohen 2005; Salovey et al. 2000), older age is a time when happiness is particularly important. Fortunately, despite stereotypical notions that people get depressed as they age, there is little evidence to support a link between aging and diminished happiness (Blazer 2003). Numerous studies demonstrate that there is either no decline or a small decline in average levels of happiness in old age (Baltes and Mayer 1999; Brandtstaedter and Wentura 1995; Cantril 1999; Carstensen et al. 2000; Mroczek and Kolarz 1998; Ryff 1989; World Values Study Group 1994). Many studies report that happiness increases with age, particularly after midlife (Cantril 1999; Diener and Suh 1997; Ryff 1989; World Values Study Group 1994).

A. L. Collins (✉)

Office of Population Research, Princeton University, 263 Wallace Hall, Princeton, NJ 08544, USA  
e-mail: alc@princeton.edu

N. Sarkisian · E. Winner  
Boston College, Chestnut Hill, Boston, USA

These findings may depend on the aspect of happiness under consideration, however, as happiness is a multi-faceted construct (Diener et al. 2003b). In later life, adults may experience slightly less positive affect than younger individuals, but that is accompanied by a decline in negative emotions, especially the higher arousal emotions such as anger and fear (Gross et al. 1997; Kunzmann et al. 2000; Labouvie-Vief et al. 1989; Stacey and Gatz 1991). A decline in negative emotions suggests that older adults may be better at regulating their emotions than younger adults (Carstensen 1995; Labouvie-Vief et al. 1989).

However, while depression and negative affect decline with age on average, inter-individual variation in happiness increases with age (Headey and Wearing 1989; Lawton et al. 1995; Lucas et al. 2003). The differences between “advantaged” and “disadvantaged” individuals become more pronounced in terms of their cognitive, physical, social, and financial resources as they age (Dannefer 1987). Therefore, the discrepancy between older adults who age successfully and those who do not is perhaps larger than at any other point in the life span (Dannefer 1987). Research exploring this variation finds that cognitive and personality factors such as intelligence and extraversion, social capital factors like marital status and social network size, and economic resources and physical health can account for some of the variation in levels of happiness in older adults (Isaacowitz and Smith 2003; Mroczek and Kolarz 1998; Pavot and Diener 2004). Importantly, these factors remain relatively stable for a given individual over time and therefore cannot account for intra-individual variation in feelings of happiness. Hence, we argue that it is important to examine how older adults’ daily activities and experiences may contribute to the variation in levels of happiness—both for a given individual over time and across individuals. Specifically, in this study we examine one factor that may contribute to higher positive affect, reduce the levels of negative affect, and boost life satisfaction in later life—the presence of flow.

Flow is an intrinsically rewarding or optimal state that results from intense engagement with daily activities (Csikszentmihalyi 1990). Because the ability to be highly engaged in daily activities is a characteristic of successful aging (Rowe and Kahn 1997), the capacity and opportunity to experience flow may increase positive affect and life satisfaction and protect against negative affect in late adulthood. Structured and meaningful activities are particularly important for subjective well-being in individuals who are faced with new constraints on their daily lives, like those who are retired (Hendricks and Hendricks 1986). While retirement may initially result in an increase in well-being (Kim and Moen 2002), continued retirement may lead to an increase in depressive symptoms for some individuals, particularly for those deficient in economic and social resources, those with physical health problems, and those lacking structured, meaningful activities (Kim and Moen 2002; Pinquart and Schindler 2007; Wang 2007). In contrast, those engaged in flow activities may experience higher well-being in retirement. The present study tests this hypothesis by examining relationships between daily and weekly levels of happiness and experiences of flow in the lives of retired older adults.

In Csikszentmihalyi’s (1982, 1990) view, happiness is not the result of good fortune or chance. Rather, it is achieved by the cultivation of and control over one’s inner experience so that one can have optimal experience, or flow. Csikszentmihalyi (1988, 1990) posits that flow experiences do not occur in passive moments but at times when one is intensely engaged in a motivating activity, intently focused, and challenged. This engagement creates a feeling of exhilaration, satisfaction, and happiness. Flow experiences tend to derive from a balance between challenges and skills: the experience must contain enough challenge to stimulate the person, but not so much as to create anxiety (Csikszentmihalyi 1988, 1990).

According to Csikszentmihalyi (1988, 1990), flow-generating activities involve intense concentration, time distortion (i.e., time is reported to speed up or slow down during the flow activity), increased confidence, and a loss of self-awareness (Csikszentmihalyi 1988). What constitutes a flow activity varies greatly. Flow activities studied and reported in the literature range from playing golf to composing music to engaging in housework (Asakawa 2004; Csikszentmihalyi 1988, 1990; Han 1988).

Flow is not easily quantifiable (Csikszentmihalyi 1982; Csikszentmihalyi and LeFevre 1989). Many researchers have operationalized flow by assuming that flow is always present when an activity involves a certain ratio of challenges and skills. Such assumptions are problematic, however, especially given that different studies used different ratios. Some studies have defined flow by the condition that the rating of the challenges of an activity must equal the rating of skills one possesses (Csikszentmihalyi 1988; Voelkl and Ellis 1998); others have proposed that for older adults, flow occurs when challenges are slightly above the competence of the individual (Lawton 1989); yet others have defined flow as engagement in activities in which the level of challenges and skills are both above average for the individual (Csikszentmihalyi and LeFevre 1989) or for the group studied (Asakawa 2004; Csikszentmihalyi and Rathunde 1993).

An alternative way to measure flow, one which we believe may be more authentic, is to avoid such assumptions and to rely on individuals' self-evaluations of their experiences of flow. This method asks participants if they recognize descriptions of a flow experience as something that they are currently experiencing or have experienced in the past (Csikszentmihalyi 1988; Han 1988). Moreover, as Asakawa (2004) showed in a study of flow in Japanese college students, this method makes it possible to assess the quality of the flow experiences by asking respondents to rate the strength of their feelings of intense concentration, confidence, and "losing oneself." Hence, our study relies on subjective ratings of the presence of flow and its quality.

Only about one-third of individuals in a survey of the United States and Germany never or rarely experienced flow (Gallup Poll 1988, as cited in Asakawa 2004), but the frequency and quality of flow experiences varies across individuals. Whereas individuals have different overall proclivity to experience flow, their experiences may vary day to day (Asakawa 2004; Csikszentmihalyi 1990). To capture both the daily variation and the overall personal predisposition, it is important to collect multiple measurements over time. Such repeated measurement data should then be analyzed with techniques that allow differentiating between the effects of daily fluctuations in flow experiences and the effects of the overall propensity to experience flow.

Multiple studies connect flow with positive affect in younger populations (Asakawa 2004; Csikszentmihalyi 1988, 1990; Csikszentmihalyi and Hunter 2003; Csikszentmihalyi and LeFevre 1989). Flow is also linked to self-esteem, life satisfaction, and successful coping (Csikszentmihalyi 1990; Han 1988; Wells 1988). The causality of these relationships remains uncertain. It is possible that flow provides momentary positive affect, or that people seek out flow experiences when they are in a good mood. It is likely that the relationship runs in both directions: flow experiences make one feel happier and people are better able to experience flow when they feel happy. This is consistent with evidence that positive affect seems to be related to less self-focus and more outward directed behavior (Csikszentmihalyi and Figurski 1982; Greenberg and Pyszczynski 1986; Ingram 1990).

Flow has been studied extensively as an optimal state for younger people (e.g., Csikszentmihalyi and Hunter 2003; Csikszentmihalyi and LeFevre 1989), but few studies

have examined flow and happiness in old age. Two exceptions are studies by Han (1988) and Voelkl (1990), conducted on a sample of older, Korean immigrants and a sample of nursing home residents, respectively. These studies demonstrate that older adults can experience flow and that flow is positively related to feelings of happiness in some older adults. However, the samples used in these studies make it difficult to generalize the findings to other older populations. Moreover, the Han (1988) study was cross-sectional and did not conduct multiple measurements over time. Voelkl's (1990) study used the experience sampling method (ESM) to collect measurements of flow and affect on 12 nursing home residents. ESM uses a palm pilot or beeper technology to prompt participants to record their momentary thoughts and activities at random intervals throughout the day. While this technology provides unparalleled immediate, event contingent sampling, it presents problems when studying an older population, as many older adults may not be accustomed to using handheld computer devices. This method may also fail to detect very brief, momentary flow experiences that would be better reflected in a retrospective assessment of emotions and flow activities collected at the end of the day (Kahneman et al. 2004). Furthermore, despite the availability of multiple measurements, Voelkl (1990) did not separate the effects of the overall individual propensity to experience flow and the effects of daily fluctuations in flow experiences.

Most previous studies of flow relied on affect to assess happiness, although some utilized measures of life satisfaction (e.g., Han 1988). Studies focusing on affect usually measured positive and negative affect on a single continuum (e.g., Voelkl 1990). Measuring positive and negative emotions separately has been considered essential in subjective well-being research, however, since Bradburn (1969) discovered that they are related but distinct constructs (Diener et al. 2003b). Indeed, positive affect is not the absence of negative affect, and the two types of affect have distinct physiological and neurobiological correlates (Cacioppo and Bernston 1999; Cacioppo et al. 1999; Hamer 1996; Ryff et al. 2006). In addition, affect has both valence and arousal level, whereby higher arousal emotions, like peppy and happy, are distinct from lower arousal emotions such as calm and relaxed (Feldman Barrett and Russell 1998).

The present study conceptualizes happiness as a multi-faceted construct (Diener et al. 2003b) and utilizes five separate measures of happiness, including positive and negative affect as separate constructs with both high and low arousal levels as well as the life satisfaction scale. Furthermore, building on the Han (1988) and Voelkl (1990) studies, we rely on detailed, retrospective assessment of happiness and flow collected at the end of each day over a period of 1 week, and use such repeated measures of flow and happiness to examine separately the effects of both the daily fluctuations in flow and the average experiences of respondents.

The primary research question asks whether or not flow is a significant predictor of happiness. Based on the findings of past research, we tested the following three hypotheses: (1) Older adults will report higher positive affect and life satisfaction and less negative affect on those days that they experienced flow (as measured by recognizing descriptions of flow as similar to specific personal experiences); (2) Older adults will report higher positive affect and life satisfaction and less negative affect on those days that they reported a higher quality of flow (as measured by how strongly participants felt that certain aspects of flow were part of these recalled experiences); (3) Older adults with more frequent flow experiences and with higher average quality of flow experience will have higher average levels of positive affect and life satisfaction but lower average levels of negative affect.

## 1 Methods

### 1.1 Participants

Participants were volunteers recruited through senior centers and other community organizations in the greater Boston area. Eighty retired, older adults initially volunteered to participate in the study. Seven volunteers were excluded based on the screening procedures that assessed their ability to follow the directions of the study as well as the medications they were taking. More specifically, we excluded those volunteers whose medications indicated chronic mental or physical illness that might interfere with participation in this study. Nineteen volunteers dropped out of the study for various reasons including illness, relocation, and lack of interest. The remaining sample consisted of 13 men and 41 women ( $N = 54$ ) with an age range of 70–86 years ( $M = 77.54$ ;  $SD = 3.74$ ). Women constituted the majority of our sample, which reflects the trend at older ages in the United States population (Smith 2003). Still, the disproportionately large number of women in our study may have introduced a potential bias. The participants reported their ethnicity as White with the exception of one woman who identified herself as Hispanic. Forty-three percent of the sample was married and 44% was widowed. The remaining 13% were single, divorced, or indicated “other.” The majority of the sample had had at least a college education, with 30% having attended or completed college and 31% having attended graduate school. Over a third of the participants (39%) had no more than a high school level education. Most participants rated their health as very good (50%) or excellent (41%), and only one participant rated her health as poor. These self-reports of physical health suggest that this was a high functioning group of older adults.

### 1.2 Procedure

Respondents provided repeated retrospective assessments of daily flow experiences and happiness over the course of seven days. Interested participants were mailed a packet that included a consent form, a clear description of the procedure, and the measures in the order that they were to be filled out over the course of the 7 day observation period. All of these measures were to be filled out at the end of each day. A few days after the study packet was mailed, participants were called in order to make sure that they understood the instructions. Importantly, a pilot study conducted at an earlier stage confirmed that older adults understood the instructions and the measures and were successfully able to follow the procedure. The initial packet also included addressed, stamped envelopes which participants used to mail back the informed consent form and packet of measures upon completion. A total of 378 daily observations were collected from 54 participants.

### 1.3 Measures

#### 1.3.1 Affect

In concordance with Diener et al.’s (2003a, b) and Feldman Barrett and Russell’s (1998) recommendations, we utilized separate measures of positive and negative affect, both low arousal and high arousal. Participants rated their emotions each day using a list of positive and negative affect terms that refer to emotions characterized by varying degrees of arousal (adapted from Feldman Barrett and Russell 1998). Participants indicated on an eight point Likert-type scale the extent to which each adjective described their emotion for that day

overall (e.g., 0 = neutral to 7 = very calm). *Positive Affect – Low Arousal* was the total score of three low arousal positive affect terms (satisfied, relaxed, calm) with a possible range of 0–21. *Positive Affect – High Arousal* was the total score of three high arousal positive affect terms (peppy, enthusiastic, happy) with a possible range of 0–21. *Negative Affect – Low Arousal* was the total score of low arousal negative affect terms (sad, disappointed) with a possible range of 0–14, and *Negative Affect – High Arousal* was the sum of high arousal negative affect terms (nervous, afraid, aroused) with a possible range of 0–21. In our analyses, we used the square root of all affect variables in order to correct for heterogeneity of variance (Snijders and Bosker 1999; Raudenbush and Bryk 2002).

### 1.3.2 Life Satisfaction

Life satisfaction was measured at the end of each day using The Satisfaction with Life Scale (Pavot et al. 1991). The Satisfaction with Life Scale has been shown to be a valid and reliable measure of life satisfaction and is suitable for use in a wide range of age groups. Participants were asked to rate on a five-point Likert scale how strongly they agreed with five statements: (1) In most ways my life is close to my ideal; (2) The conditions of my life are excellent; (3) I am satisfied with life; (4) So far I have gotten the important things I want in life; (5) If I could live my life over, I would change almost nothing. The life satisfaction variable was the total score of these items with a possible range of 5–25. We used the square root of the life satisfaction variable in order to correct for heterogeneity of variance (Snijders and Bosker 1999; Raudenbush and Bryk 2002).

### 1.3.3 Presence of Flow

Participants filled out a flow questionnaire (adapted from a questionnaire developed by Csikszentmihalyi 1982) towards the end of each day of the study. The questionnaire asked participants to read two descriptions of flow (i.e. “I am so involved in what I am doing. I don’t see myself as separate from what I am doing.” and “My mind isn’t wandering. I am not thinking of something else. I am totally involved in what I am doing...I don’t seem to hear anything...I am less aware of myself and my problems.”), and to indicate if they had had a similar experience that day. If participants reported such an experience after reading the two quotations, they were considered to be participants who experienced flow (1 = yes and 0 = no). Those who reported flow experiences were then asked to describe which activity during that day they most readily associated with that experience. The majority of the sample understood the concept of flow and reported having had at least one activity during which they had the experience over the 7 day observation period. They associated flow with activities like working, reading and writing, watching or playing sports, spending time with grandchildren, using the computer, and working on personal projects. These types of activities are commonly reported to be sources of flow in various populations (Csikszentmihalyi 1988, 1990; Han 1988). We calculated a weekly measure of number of days with flow (ranging from 0 to 7) by adding up the number of days during the seven day observation period when participants reported the presence of flow.

### 1.3.4 Quality of Flow Experience

Those participants who reported flow on a given day were then asked about the degree of intense concentration, increased confidence, and loss of self-awareness during their flow

experiences on that day; this information was used to create the quality of flow experience scale ( $\alpha = 0.74$ ; 5 items). Specifically, participants were asked to consider the activity or activities that made them experience flow that day and to rate on a five-point Likert scale how strongly they agreed with five statements adapted from the Leisure Diagnostic Battery (Witt and Ellis 1987): (1) When I was involved in the activity, I forgot about everything else; (2) I paid very close attention to the activity I was involved in; (3) During the activity, there were times when things were going so well, I felt I could do almost anything; (4) I forgot my worries during the activity I was involved in; (5) I thought less about my problems during the activity. These items were summed to create a scale with a possible range of 5–25. The average (person level) quality of flow measure was calculated as the mean of all available quality of flow scores for a given individual over the 7 day period.

### 1.3.5 Control Variables

Socio-demographic variables including age (in full years), gender (1 = female and 0 = male), education (1 = at least some college and 0 = high school or less), and self-assessed health (1 = excellent and 0 = less than excellent) were utilized as control variables.

## 1.4 Data Analyses

Hierarchical linear modeling (HLM) was used to analyze two levels of data, with seven daily observations of happiness and flow nested within 54 individuals age 70 and older. In this study, Level 1 (day level) variables contain information about individuals' experiences on specific days of study; they can be used to test Hypotheses 1 and 2. In contrast, Level 2 (person level) variables describe individuals' socio-demographic position as well as characterize their experiences over the entire week. Level 2 variables can be used to test Hypothesis 3, that is, to determine if the overall propensity to experience flow in general and quality flow in particular influenced one's happiness.

First, preliminary analyses were performed to obtain descriptive statistics and correlations among day level (Level 1) and person level (Level 2) variables. Here as well as in the multivariate analyses, we used an alpha level of 0.10 to establish statistical significance because of our small sample size on Level 2, as determined by power analysis using Optimal Design software (Spybrook et al. 2006).

Second, HLM models with random intercepts were estimated. Such models utilize both Level 1 and Level 2 predictors, and include two error terms, Level 1 ( $e_{ij}$ ) and Level 2 ( $u_j$ ), in order to account for the multilevel structure of the unexplained variance. Two sets of random intercept models were estimated. In both sets, the dependent variables were the square roots of the happiness measures, and the controls included four Level 2 socio-demographic variables. The first set estimated on the total sample of days aimed to test Hypotheses 1 and 3 by assessing the effects of the presence of flow on positive and negative affect and life satisfaction. In this model, the main independent variables of interest were the presence of flow on Level 1 and the number of days with flow on Level 2:

$$\text{Happiness}_{ij} = \beta_0 + \beta_1(\text{Presence of Flow}_{ij}) + \beta_2(\text{Number of Days with Flow}_j) \\ + \beta_3(\text{Age}_j) + \beta_4(\text{Female}_j) + \beta_5(\text{Education}_j) + \beta_6(\text{Health}_j) + u_j + e_{ij}.$$

The second set was estimated on a subsample of those days when flow was reported, which included 46 respondents and 242 days. These models aimed to test Hypotheses 2 and 3 by evaluating the effects of the quality of flow. Therefore, the main independent variables included the daily quality of flow on Level 1 and the average quality of flow on Level 2:

$$\text{Happiness}_{ij} = \beta_0 + \beta_1(\text{Quality of Flow}_{ij}) + \beta_2(\text{Average Quality of Flow}_j) + \beta_3(\text{Age}_j) \\ + \beta_4(\text{Female}_j) + \beta_5(\text{Education}_j) + \beta_6(\text{Health}_j) + u_j + e_{ij}.$$

In order to obtain estimates that are more robust and easier to interpret (Raudenbush and Bryk 2002), we mean-centered all independent variables (both Level 1 and Level 2) by subtracting their overall sample means, except for the dichotomous variables on both levels (presence of flow, gender, health, and education) that were left uncentered.

## 2 Results

The means and standard deviations of all the variables are presented in Table 1. Within-participant correlations for Level 1 variables are reported in Table 2 and between-participant correlations for Level 2 variables are reported in Table 3 (affect and life satisfaction variables were aggregated across time for each participant in this analysis). All of the within-participant correlations among happiness measures are in the expected direction and statistically significant. In contrast to our hypotheses, happiness measures demonstrate no

**Table 1** Descriptive statistics

Variable	Full sample			Subsample of days with flow		
	<i>N</i>	Mean or percent	SD	<i>N</i>	Mean or percent	SD
Daily (Level 1) characteristics						
Positive Affect – Low Arousal (square root)	374	3.89	0.52	238	3.86	0.51
Positive Affect – High Arousal (square root)	371	3.79	0.74	237	3.73	0.81
Negative Affect – Low Arousal (square root)	375	1.04	1.07	239	1.15	1.07
Negative Affect – High Arousal (square root)	371	1.16	1.22	235	1.29	1.22
Life satisfaction (square root)	375	5.07	0.56	240	5.00	0.60
Presence of flow	377	64.19%	–	–	–	–
Quality of flow	–	–	–	239	19.48	2.35
Individual (Level 2) characteristics						
Number of days with flow	54	4.48	2.54	–	–	–
Average quality of flow	–	–	–	46	19.29	1.76
Age	54	77.54	3.74	46	77.35	3.84
Female	54	74.07%	–	46	71.74%	–
College education	54	61.11%	–	46	63.04%	–
Excellent health	54	40.74%	–	46	43.48%	–

**Table 2** Level 1 (within participant) correlations (and the corresponding sample sizes)

Variable	Positive affect		Negative affect		Life satisfaction	Presence of flow	Quality of flow <sup>a</sup>
	Low arousal	High arousal	Low arousal	High arousal			
Positive Affect – Low Arousal	1.00 (374)						
Positive Affect – High Arousal	0.50*** (370)	1.00 (371)					
Negative Affect – Low Arousal	-0.39*** (374)	-0.39*** (371)	1.00 (375)				
Negative Affect – High Arousal	-0.25*** (370)	-0.10* (367)	0.50*** (371)	1.00 (371)			
Life satisfaction	0.31*** (372)	0.33*** (369)	-0.19*** (373)	-0.12** (369)	1.00 (375)		
Presence of flow	0.08 (373)	0.07 (370)	0.00 (374)	0.06 (370)	0.03 (374)	1.00 (377)	
Quality of flow <sup>a</sup>	0.13* (235)	0.22*** (235)	-0.19*** (236)	-0.01 (232)	0.17** (237)	-	1.00 (239)

<sup>a</sup> Subsample of days on which participants experienced flow (*n* = 242)

\* *p* < 0.10; \*\* *p* < 0.05; \*\*\* *p* < 0.01

**Table 3** Level 2 (between-participant) correlations ( $N = 54$ )

	Positive affect		Negative affect		Life satisfaction	No. of days with flow	Average quality of flow <sup>a</sup>	Age	Female	College education	Excellent health
	Low arousal	High arousal	Low arousal	High arousal							
Positive Affect – Low Arousal	1.00										
Positive Affect – High Arousal	0.64***	1.00									
Negative Affect – Low Arousal	-0.41***	-0.12	1.00								
Negative Affect – High Arousal	-0.17	0.12	0.79***	1.00							
Life satisfaction	0.47***	0.29**	-0.31**	-0.05	1.00						
No. of days with flow	-0.21	-0.22	0.26*	0.20	-0.24*	1.00					
Average quality of flow <sup>a</sup>	0.14	0.30**	-0.11	-0.06	-0.06	0.30**	1.00				
Age	0.14	-0.07	-0.25*	-0.23*	0.16	-0.32**	-0.32**	1.00			
Female	-0.04	0.01	-0.21	-0.38***	-0.28**	0.05	0.32**	-0.14	1.00		
College education	-0.16	-0.02	0.12	0.32**	0.03	0.09	0.00	0.02	-0.39***	1.00	
Excellent health	0.10	-0.08	-0.05	-0.11	0.01	0.08	0.16	-0.03	-0.03	0.04	1.00

<sup>a</sup> Subsample of participants who experienced flow ( $N = 46$ )

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

significant associations with the presence of flow. They are, however, significantly related to the quality of flow measure, with the exception of the high arousal negative affect measure. At Level 2, number of days with flow shows two unexpected correlations, a negative correlation with life satisfaction ( $r = -0.24$ ), and a positive correlation with low arousal negative affect ( $r = 0.26$ ). The relationship between high arousal positive affect and average quality of flow is in the expected direction ( $r = 0.30$ ). High arousal negative affect and levels of life satisfaction are lower on average among women than among men, and negative affect is lower among older individuals than among younger individuals. Interestingly, high arousal negative affect is higher among those with college education than among those less educated. In terms of the relationships among the independent variables, number of days with flow was significantly related to mean reported quality of flow ( $r = 0.30$ ). There were significant negative correlations between age and both the number of days with flow ( $r = -0.32$ ) and the average quality of flow ( $r = -0.32$ ). Females were also more likely to experience higher average quality of flow than males ( $r = 0.32$ ).

The results of the HLM analyses are summarized in Table 4. The variance components reveal that there was substantial variation both over time and between individuals for all outcome measures. They also show that there was more variation in negative affect than in positive affect or life satisfaction for this sample.

With regard to Hypothesis 1, our results indicate that presence of flow did not significantly predict any of the outcomes. With regard to Hypothesis 2, the results show that on the days that participants experienced flow, the reported quality of flow was a significant direct predictor of high arousal positive affect,  $t(228) = 3.16$ ,  $p < 0.01$ , and life satisfaction,  $t(230) = 2.28$ ,  $p < 0.05$ . Flow quality was also inversely related to low arousal negative affect,  $t(229) = -2.35$ ,  $p < 0.05$ . Hypothesis 3 was not supported. There were no significant relationships between average flow quality and the outcome measures. Unexpectedly, a higher number of days with flow predicted lower average levels of both low arousal and high arousal positive affect as well as of life satisfaction,  $t(48) = -2.24$ ,  $p < 0.05$ ,  $t(48) = -3.19$ ,  $p < 0.01$ , and  $t(48) = -2.15$ ,  $p < 0.05$ , respectively.

With regard to the socio-demographic variables, the models revealed that being older was related to lower levels of negative affect, which is consistent with previous research (Gross et al. 1997; Labouvie-Vief et al. 1989; Mroczek and Kolarz 1998). Female participants reported significantly lower levels of high arousal negative affect than did males. Generally, studies have shown that older women have higher negative affect than older men (Mroczek and Kolarz 1998), but these studies do not distinguish low from high arousal negative affect. Finally, self-assessed health and education did not significantly predict any of these outcomes. This finding is consistent with previous literature demonstrating that socio-demographic variables generally do not explain much of the variance in individuals' levels of happiness (Diener et al. 2003b).

### 3 Discussion

This study explored the relationship between happiness and flow in a sample of 54 older adults. Specifically, we investigated whether or not the presence and quality of flow on a given day was significantly related to low and high arousal positive and negative affect and level of life satisfaction on that day. We also investigated whether the general propensity to experience flow, as indicated by more frequent and higher quality flow experiences over the course of the seven day study period, was associated with affective experiences and life satisfaction. Our analyses revealed three major findings.

**Table 4** Coefficients (and standard errors) of hierarchical linear models

Variable	Presence of flow models				Quality of flow models					
	Positive affect		Negative affect		Positive affect		Negative affect		Satisfaction	
	Low	High	Low	High	Low	High	Low	High		
<b>Level 1</b>										
Presence of flow	0.084 (0.058)	0.094 (0.079)	-0.003 (0.128)	0.124 (0.126)	0.020 (0.032)	-	-	-	-	-
Quality of flow	-	-	-	-	0.026 (0.019)	0.067*** (0.021)	-0.087** (0.037)	-0.006 (0.032)	0.023** (0.010)	-
<b>Level 2</b>										
No. of days with flow	-0.040** (0.018)	-0.079*** (0.025)	0.063 (0.049)	0.037 (0.060)	-0.047** (0.022)	-	-	-	-	-
Average quality of flow	-	-	-	-	0.013 (0.016)	0.049 (0.064)	0.016 (0.078)	-0.012 (0.080)	-0.001 (0.045)	-
Age	0.009 (0.015)	-0.027 (0.022)	-0.047 (0.028)	-0.064 (0.038)	0.007 (0.020)	0.003 (0.025)	-0.062* (0.032)	-0.069* (0.038)	0.016 (0.020)	-
Female	-0.074 (0.132)	0.016 (0.184)	-0.442 (0.259)	-0.789*** (0.304)	-0.348** (0.130)	-0.127 (0.144)	-0.388 (0.310)	-0.886** (0.338)	-0.367*** (0.148)	-
College education	-0.144 (0.107)	0.020 (0.189)	0.021 (0.210)	0.363 (0.250)	-0.070 (0.163)	-0.081 (0.123)	-0.058 (0.209)	0.283 (0.241)	-0.001 (0.181)	-
Excellent health	0.093 (0.104)	-0.074 (0.181)	-0.118 (0.201)	-0.296 (0.236)	0.027 (0.139)	0.112 (0.112)	-0.114 (0.218)	-0.270 (0.246)	0.047 (0.149)	-
<b>Variance components</b>										
Level 2	0.141***	0.363***	0.475***	0.687***	0.259***	0.145***	0.474***	0.605***	0.289***	-
Level 1	0.129***	0.220***	0.633***	0.601***	0.045***	0.132***	0.642***	0.679***	0.056***	-
Sample size	N = 54 n = 373	N = 54 n = 370	N = 54 n = 374	N = 54 n = 370	N = 54 n = 374	N = 46 n = 235	N = 46 n = 236	N = 46 n = 232	N = 46 n = 237	-

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\* $p < 0.01$

First, the majority of the older adults demonstrated an understanding of the concept of flow and reported having had at least one flow experience over the 7 day study period. Although what was deemed a flow activity varied by individual, the reported flow activities were consistent with the types of activities that have been reported in previous studies of flow (Csikszentmihalyi 1988; Csikszentmihalyi and LeFevre 1989; Han 1988). There were, however, individual differences in the ability to experience flow. Bivariate correlations demonstrated that the older participants had fewer days with flow and reported lower quality of flow than did younger participants. In addition, women reported higher quality of flow than did men.

Second, the HLM analyses demonstrated that experiencing flow on a given day was not associated with either affect or life satisfaction. However, there was a relationship between the quality of flow experiences and happiness. Higher quality of flow, defined by intense concentration, loss of self-awareness, and rewarding outcomes, was positively associated with high arousal positive affect (i.e., feeling peppy, enthusiastic, happy), negatively associated with low arousal negative affect (i.e., feeling sad and disappointed), and positively associated with life satisfaction.

In contrast, on the individual level, we observed that a higher number of days with flow exhibited a negative relationship with both low and high arousal positive affect as well as with life satisfaction. This unexpected result demonstrates that person-level variables can operate differently than their lower level counterparts (Snijders and Bosker 1999) and therefore underscores the importance of examining both daily experiences and the overall propensity to experience flow. These results suggest that people who had a higher overall propensity to experience flow, as indicated by a higher number of days with flow, had lower average levels of positive affect and feelings of life satisfaction. The causality of this relationship is not clear. It is possible that flow provides more of a boost for positive feelings when it is a rare occurrence rather than an everyday experience. It is also possible, however, that individuals consciously or unconsciously use flow as an emotion regulation technique. That is, seeking out flow experiences could be a strategy that less happy people use to make themselves feel better. This is consistent with research demonstrating that people are motivated to regulate their moods, particularly those with low self-esteem or high self-focus, as they tend to have more negative mood overall (see Norris 1999, for a review of this literature). Thus, in either case, we cannot argue that flow causes higher or lower positive affect or life satisfaction; we can only make the observation that people who reported a higher number of days with flow had lower average levels of positive affect and life satisfaction, yet participants were happier on the days that they had higher quality of flow.

The study has several limitations that should be addressed in future research. First, we took the hedonic approach to psychological well-being and investigated the relationship of flow to happiness, as measured by positive and negative affect as well as life satisfaction. Other scholars, however, have advocated the eudaimonic approach to psychological well-being, stating that actualization of human potentials is a more valid conceptualization of well-being than subjective experiences of happiness (Ryan and Deci 2001). Future research should examine the impact of flow experiences on measures of both hedonic and eudaimonic psychological well-being.

A second potential limitation is that happiness and flow were daily global ratings that were recalled at the end of each day. One alternative would be to obtain observations of happiness and flow randomly throughout the day using the ESM. However, as mentioned previously, older adults may find the ESM technology difficult to use. In addition, flow experiences might well be fleeting; therefore, random observations would have to be

frequent in order to capture an experience that is infrequent or brief. A better alternative to be utilized in future research might be retrospective assessments which tap specific events or activities. For example, the Day Reconstruction Method (DRM), a retrospective account of the previous day's activities, has been shown to be comparable to ESM in assessing how people spend their time (Kahneman et al. 2004), and might prove to be a good technique for detecting flow experiences. A superior alternative might be to combine the ESM technology with the DRM method.

Third, additional limitations stem from the nature of the sample and unmeasured variables. The study relied on a sample of volunteers, and no data were collected on those who chose not to participate in the study, so it is possible that the sample is biased by disproportionately including individuals who were above (or below) average in their happiness levels or in their propensity to experience flow. The sample used in our study was a particularly high functioning group of White older adults and consisted primarily of women. A larger, more heterogeneous sample would provide more predictive power that might clarify the relationship between flow and happiness. Further, the causes and consequences of happiness may vary according to cultural norms and expectations (Diener et al. 2003a), but the homogenous sample made it impossible to investigate cultural differences in the relationship between flow and happiness. In addition, although we screened participants for medications indicating chronic physical or mental illness, we did not control for potential confounders like physical functioning (beyond self-assessed health), cognitive impairment, depressive symptoms, and anxiety, all of which may be related to both happiness and flow.

Finally, another limitation involves reporting bias that may have resulted from the structure of the questionnaire. First, as all the participants filled out the happiness measures before the flow questionnaire, we cannot eliminate the possibility that reporting happiness may have systematically influenced subsequent flow reports. Second, reporting the presence of flow may have taken more effort than reporting the absence of flow. Those participants who were feeling positive enough to fill out the rest of the questionnaire may have been more likely to report that they had a flow experience. In contrast, participants who were in a bad mood may have perceived that reporting more information took too much effort. It is possible that this reporting bias could account for a portion of the positive association between the quality of flow and happiness. We consider this unlikely, however, since all of our participants were eager and willing to participate and returned their data to us reliably. Finally, it is possible that participants completed all the surveys at one time rather than filling the questionnaires out on subsequent days. We also consider this possibility highly unlikely, considering the participants would have had to spend more than two hours filling out the seven questionnaires at one time.

Despite the above limitations, our study provides a foundation for future research on happiness and flow in late adulthood. Given the strong evidence on the role that happiness plays in improving health and well-being (Fredrickson 2001; Pressman and Cohen 2005; Salovey et al. 2000), it is pertinent to consider ways in which older adults can increase the number of positive experiences in their daily lives. Our results point to the potential importance of flow in generating happiness in older adults. Our findings suggest that seeking flow experiences may be a strategy that older adults could use to regulate their affect, and especially to maximize positive emotions and to minimize low arousal negative emotions. Based on these findings, future investigations should explore what role flow may play in self-regulation in old age and whether or not there is a profile of sociodemographic and personality characteristics which distinguish those who are more likely to use flow to regulate their emotions. Future research should also examine whether the links between

flow and happiness vary depending on cultural context. Finally, there should be further investigation into the relationships between flow, psychological well-being, and physical functioning in late adulthood in order to provide a better understanding of how older adults can improve the quality of their lives.

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