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LEARNING-RELATED ACTIVITIES: THE IMMEDIATE AND DELAYED EFFECTS ON SUBJECTIVE WELL-BEING

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Abstract

Problem statement: Satisfaction and enjoyment in everyday experience, work and leisure is important for understanding subjective well-being. However, people experience different levels of pleasure, meaning, and engagement during specific activities. Research questions: The study investigated the effect of activity type (related or unrelated to learning) on momentary positive and negative affect and satisfaction. Purpose: Students generally find meaning in education-related activities, although they usually do not enjoy them. Whereas pleasurable (predominantly freely chosen) activities immediately increase well-being, meaningful activities that are often imposed, may have a delayed effect on satisfaction and affect. However, the temporal extent of these effects is still unclear. Research methods: 117 students (aged 18-27 years, 28% males) participated in the experience sampling study during one week. They were prompted five times per day to describe what they were doing and to assess momentary positive and negative affect and satisfaction on hand-held devices. Reported activities were coded as learning-related or other activities. Findings: Hierarchical linear modelling showed that engaging in learning activities immediately decreased satisfaction and increased negative affect, when compared with other activities. The delayed effects were significant up to three hours for negative affect and six hours for satisfaction. On the other hand, the activity type had neither immediate nor delayed effect on positive affect. Conclusions: Learning-related activities decrease subjective well-being, but this effect ceases after six hours. In general, freely chosen activities are source of pleasure and enjoyment. On the other hand, learning-related activities are necessary for the realization of long-term goals, but they are often not enjoyable because they are mainly imposed.

Keywords: Learning activities, subjective well-being.

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1. Introduction

Everyday experience, work and leisure, as well as enjoyment and satisfaction with it, is key to the understanding of well-being (Haworth & Lewis, 2005; Kuykendall, Tay, & Ng, 2015; Mannell, 2007). The broad and multifaceted concept of well-being basically refers to optimal psychological functioning and experience and can be considered as an umbrella term for different conceptualizations of happiness. The hedonic perspective defines well-being in terms of pleasure attainment and pain avoidance (typically operationalised as subjective well-being), whereas the eudaimonic perspective focuses on meaning and self-realization. The three essential components of subjective well-being are positive affect, life satisfaction, and infrequent negative affect (for most recent review, see Diener, Oishi, & Tay, 2018). In the last few decades, there is a growing body of research on well-being in general and in specific domains. In 2019, the whole issue of the journal "Educational Psychology" is dedicated to well-being of students and teachers/educators. Well-being of students is important both for personal and community future because it facilitates many aspects of successful educational performance, like academic outcome and university drop-out (Antaramian, 2017). Hence, more attention should be given to this topic (Ekelman, Bazyk, & Bazyk, 2013; Mazzucchelli & Purcell, 2015).

Genetic and environmental factors explain up to 56% of subjective well-being: heritability accounts for 32-41% (Bartels, 2015; Nes & Røysamb, 2015) whilst life circumstances explain additional 3-15% (Diener, Suh, Lucas, & Smith, 1999). Still, about 40% of well-being can be attributed to intentional activities (Lyubomirsky, Sheldon, & Schkade, 2005). An activity can be defined as „a type of pursuit, wherein participants in it mentally or physically (often both) think or do something, motivated by the hope of achieving a desired end" (Stebbins, 2018, p. 9). For most people, the main activities are related either to obligatory work (or school) or to freely chosen leisure. The importance of work-leisure balance for well-being has been recognized for a long time (Headey & Muffels, 2018; Loveday, Lovell, & Jones, 2017). Even though studying is not exactly the same as work, there are some relevant similarities between the two - for example, students are engaged in goal-orientated activities in the same way as employees. Furthermore, studying activities are highly structured and compulsory (e.g. taking classes, writing obligatory papers etc.), therefore they can also be qualified as "work" (Sulea, van Beek, Sarbescu, Virga, & Schaufeli, 2015). Yet, there is one important difference between studying or attending university lectures, and work. Often, individuals perceive their jobs as an end-point, in a sense that one cannot move forward, get a promotion or achieve some other personally important goal. For most people, studying is a goal-oriented activity: students study to expand their knowledge, but also to get a good grade, to get a degree and find a good job. Therefore, both similarities and differences should be considered when comparing work and studying.

Leisure is most often defined either as a quality of experience (experiential definitions) or as time free from work, chores and obligations (residual definitions). Defining leisure as non-work time is not comprehensive enough because it cannot be applied to retirees, unemployed or women (Roberts, 1999). Nevertheless, the experiential definitions are more appropriate for the purpose of this study inasmuch as they focus on positive experience, autonomy, intrinsic motivation and enjoyment (e.g. Mannell & Kleiber, 2015).

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The important role of leisure in well-being has been established and scientifically proven for a long time (for a review, see Kuykendall, Tay, & Ng, 2015), with extensive debates on how and when leisure promotes well-being. Leisure is one of the most important sources of well-being since it provides people with opportunities for engaging in freely chosen and intrinsically motivated activities. Perceived freedom and intrinsic motivation are the most important characteristics that distinguish leisure from obligatory activities, such as work or school (Csikszentmihalyi, Graef, & Gianinno, 2014). Recently, Newman, Tay and Diener (2014) proposed five basic psychological mechanisms through which leisure enhances well-being: detachment (from work-related thoughts), recovery (from work stress), autonomy, mastery, meaning and affiliation (DRAMMA). These mechanisms promote leisure well-being, which then promotes global subjective well-being, with a possible mediating role of leisure satisfaction (Kuykendall et al., 2015).

As previously explained, leisure activities are important for well-being, but what about activities related to working or studying? Would they enhance or undermine subjective well-being? Learning activities are most often related to the pursuit of long-term goals, e.g. completion of high school or obtaining university degree. Recently published meta-analysis confirmed the positive association between successful goal pursuit and subjective well-being (Klug & Maier, 2014), and this relationship was even stronger when successful goal pursuit was defined as goal progress instead of goal attainment (the average population correlation was .43). These findings suggest that learning/studying would increase subjective well-being. Nonetheless, different results could be expected when equalizing studying and work, as some authors suggest (e.g. Sulea et al., 2015). Work seems to have an adverse effect on momentary well-being, although it gives meaning to life (Bryson & MacKerron, 2015). Obviously, the relationship between work and well-being is complex and needs to be further explored.

The Experience Sampling Method (Csikszentmihalyi & Larson, 1987) is especially suitable for obtaining deeper insight into ways in which people spend time and their feelings during specific activities. In the last decade, several investigations explored momentary mood or satisfaction during various activities, including studying or learning-related activities. Recent studies with university students showed that at within-person level, studying is related to lower momentary enjoyment, contentment and positive affect, when compared to other activities (Goetz et al., 2014; Goetz, Frenzel, Stoeger, & Hall, 2010; Grund, Grunschel, Bruhn, & Fries, 2015; Koudela-Hamila, Grund, Santangelo, & Ebner-Priemer, 2019). Before engaging in different activities, students' mood changes, depending on the type of activities. Students are in a bad mood before studying and in a good mood before other leisure activities (Koudela-Hamila et al., 2019).

2. Problem Statement

Satisfaction and enjoyment in everyday experience, work and leisure, is important for understanding subjective well-being. However, people experience different levels of pleasure, meaning, and engagement during specific activities. Retrospective reports rely more on global semantic judgments than on actual experience, which is why sampling the experiences in the moment are necessary to unveil complex psychological processes during different activities. Experience Sampling Method is rarely used with university students, and it is mostly directed toward their time use, boredom or motivation. In this

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research, we focused on the effect of activity type (related or unrelated to learning) on students' satisfaction and momentary affect (positive and negative).

3. Research Methods

3.1. Participants

117 students (84 females and 33 males) participated in the study. Students' age ranged from 18 to 27 years, with a mean of 21.79 (SD = 1.63). The participation was voluntary, although the enrolled students were compensated with course credits.

3.2. Measures

Momentary satisfaction was measured using single-item measure. Participants were asked to assess how satisfied they were with themselves at that moment. They had to mark a point on a bipolar scale, one end being labelled "not at all satisfied" and the other "completely satisfied". Their assessments were subsequently transformed into numerical data on a scale from 1 to 5, in order to equalise all measures.

Momentary affect was measured with the widely used PANAS scale (Positive and Negative Affect Schedule; Watson, Clark, & Tellegen, 1988), with 10 items measuring positive affect (e.g., interested, inspired) and 10 items measuring negative affect (e.g., upset, nervous). PANAS is one of the most widely used scales to measure affect, with good psychometric properties reported across samples and contexts (Brdar, 2014; Schimmack, 2002).

Activities - Participants were asked to provide information on what activity they were involved in at that moment. In this study, all activities were subsequently grouped into two categories: 1) Activities related to studying and 2) Other activities.

3.3. Procedure

Data were collected using the Experience Sampling Method (Csikszentmihalyi, & Larson, 1987; Hektner, Schmidt, & Csikszentmihalyi, 2007). Each participant received a hand-held device (Palm z22) with installed Experience Sampling Program (Barrett & Barrett, 2001). During one week, they were prompted by a signal five times a day (between 9:00 and 23:00) to rate their momentary state and report what they were doing. The five ratings were roughly evenly spaced, although the exact time varied randomly within one-hour interval. After the tone signal, they could answer only within three minute time-window (to minimize retrospective and delayed responses). On average, each participant completed a series of 20 rating sessions. The mean response rate was 80% for the whole sample - 85% for females and 71% for males. The final dataset comprised 2372 observations for 117 students.

3.4. Statistical analysis

All analyses were carried in the R statistical environment (R Core Team, 2016). Hierarchical linear models were tested in the statistical package 'LME4' for R (Bates, Mächler, Bolker, & Walker, 2015),

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using maximum likelihood estimation method. Response scales for all measures were rescaled to equalize the scale format (from 1 to 5). Mean values represent the average response on the scale for each participant at each time-point.

In order to test the immediate and delayed effects of activity type (learning - not learning) on different indicators of well-being (satisfaction, positive and negative affect), several hierarchical linear models were fitted separately for each dependent variable. The simplest model (model 0) was an unconditional model that served to estimate the amount of within- and between-person variance. This model was also used as a null model to compare more complex models with. Models 1 through 4 included immediate and delayed effects. Lagged effects roughly spaced 3 hours apart to a maximum lag of 9 hours in a stepwise fashion. Whereas Model 1 included immediate effects of learning activities on well-being, other models comprised legged effects: 3 hours lag in Model 2, 6 hours lag in Model 3 and 9 hours lag in Model 4. Each model allowed for the subject intercept random effects, estimating the amount of variance in intercepts, which were attributable to inter-individual differences in well-being. Additionally, in the most complex model (model 5), the immediate by-subject-random learning activities effects were estimated. The Likelihood Ratio Test was used to test the fit gain for the additional complexity of the models. Furthermore, bootstrap confidence intervals (1000 samples) indicated significance of each parameter. Omega squared (Ω2; Xu, 2003) was used to measure the overall effect size.

4. Results

Participants reported a total of 2372 activities, 883 of which were related to learning. Means and standard deviations of well-being measures are presented in Table 1. The between-person descriptive statistics represent descriptives of by-person longitudinal means (N=117) - hence, the mean of these by-subject means represent the whole sample mean. The between-person standard deviations represent variation of by-subject longitudinal means, whilst the whole sample standard deviations show variation of all 2372 ratings.

Table 01. Means and standard deviations for momentary satisfaction, positive and negative affect

Measures	Mean	SD	
		Between-person	Whole sample
Positive affect	2.98	0.51	0.84
Negative affect	1.49	0.39	0.64
Momentary satisfaction	3.81	0.50	0.83

The intraclass correlation coefficient was computed to see how strongly the variability within persons resembles each other. We tested whether the mean correlation between variables measured for one person (intraclass correlation) would be higher than mean correlation between variables measured for different persons. The correlation for all null models was relatively high (.34 for positive affect, .31 for negative affect and .32 for momentary satisfaction), indicating that about one third of the variance of each well-being measure could be attributed to between-person differences.

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Table 02. Goodness of fit indices of the tested models for well-being measures

Well-being measure	Model	df	AIC	BIC	Ω^2	Log-likelihood	χ^2	df(χ^2)
Positive affect	Model 0	3	5143.0	5160.3	.38	-2568.5		
	Model 1	4	5142.9	5166.0	.38	-2567.5	2.04	1
	Model 2	5	5144.6	5173.5	.38	2567.3	0.34	1
	Model 3	6	5143.5	5178.2	.38	-2565.8	3.05	1
	Model 4	7	5143.2	5183.6	.38	-2564.6	2.39	1
	Model 5	9	5119.0	5171.0	.42	-2550.5	28.12***	2
Negative affect	Model 0	3	4072.6	4089.9	.32	-2033.3		
	Model 1	4	4026.8	4049.9	.34	-2009.4	47.79***	1
	Model 2	5	4018.8	4047.6	.34	-2004.4	10.09**	1
	Model 3	6	4017.9	4052.5	.34	-2003.0	2.83	1
	Model 4	7	4019.5	4059.9	.34	-2002.7	0.45	1
	Model 5	9	3972.3	4024.2	.40	-1977.1	51.20***	2
Momentary satisfaction	Model 0	3	5222.1	5239.5	.35	-2608.1		
	Model 1	4	5176.7	5199.8	.36	-2584.3	47.47***	1
	Model 2	5	5172.8	5201.6	.36	-2581.4	5.89*	1
	Model 3	6	5168.8	5203.4	.36	-2578.4	6.02*	1
	Model 4	7	5170.6	5211.0	.36	-2578.3	0.12	1
	Model 5	9	5111.7	5163.7	.42	-2546.9	62.89***	2

Note: Model 1 is null model (immediate effects), Model 2 with 3 hours lag, Model 3 with 6 hours lag, Model 4 with 9 hours lag. Model 5 comprises the immediate by-subject-random learning activities effects. df = Degrees of freedom; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; *** $p < .001$; ** $p < .01$; * $p < .05$

Comparisons of the null-model and models that include immediate and delayed effects are presented in Table 2. As it can be seen, adding both immediate and delayed effects modestly increased the model fit only for negative affect and satisfaction, but not for positive affect. The most complex model, which included random by-subject variation in immediate effects, significantly improved the model fit for all well-being measures. These results show that immediate effects account for a notable amount of by-subject variance.

The parameters for estimated models are presented in Table 3. For positive affect, neither immediate nor the delayed learning effects were significant. The estimated positive affect was located near the scale mean (2.95). This suggests that positive affect remains the same regardless of activity, and that neither residual nor delayed change in positive affect could be attributed to previous activities. Negative affect had a lower intercept, starting at 1.67. Learning had significant immediate and delayed effects (1 lag - 3 hours) on negative affect. Not engaging in learning activities resulted in lower negative affect, both immediately and with a time lag. This means that engaging in learning activities is associated with higher negative affect, which persists even after three hours. The results suggest that recovery from negative affect related to learning comes after three to six hours.

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Table 03. Estimated coefficients, bootstrap 95% confidence intervals, and variance components of the Model 5[a] (the reference category is 'other activities')

Well-being measure				95% CI			
		Estimate	S.E.	Lower-bound	Upper-bound	Variance	t
Positive affect	Intercept	2.9696	0.0478	2.8759	3.0634	0.2697	62.06
	Immediate	-0.0382	0.0292	-0.0955	0.0189	0.0906	-1.31
	3 h delayed lllagglearning/not learning (1)	0.0164	0.0211	-0.0250	0.0578		0.78
	6 h delayed	-0.0375	0.0211	-0.0788	0.0038		-1.78
	9 h delayed	0.0309	0.0208	-0.0098	0.0717		1.49
	Residual					0.4329	
Negative affect	Intercept	1.5250	0.0372	1.4520	1.5979	0.1987	40.98
	Immediate	0.1115	0.0249	0.0627	0.1603	0.0766	4.48
	3 h delayed lllagglearning/not learning (1)	0.0516	0.0166	0.0191	0.0841		3.11
	6 h delayed	0.0257	0.0165	-0.0067	0.0581		1.55
	9 h delayed	0.0097	0.0163	-0.0223	0.0416		0.59
	Residual					0.2663	
Momentary satisfaction	Intercept	3.7603	0.0473	3.6676	3.7228	0.3161	79.50
	Immediate	-0.1455	0.0325	-0.2091	-0.0818	0.1359	-4.48
	3 h delayed lllagglearning/not learning (1)	-0.0439	0.0211	-0.0852	-0.0026		-2.08
	6 h delayed	-0.0515	0.0210	-0.0927	-0.0103		-2.45
	9 h delayed	0.0050	0.0207	-0.0356	0.0456		0.24
	Residual					0.4288	

Note: [a] Model 5 is the most complex model including the immediate by-subject-random learning; CI - Confidence interval

Activities had greater impact on satisfaction than on affect. Learning-related activities have significant both immediate and delayed effects on students' satisfaction up to six hours. Engaging in learning-related activities decrease satisfaction immediately, and this effect persist longer than six hours before satisfaction returns to its initial level (which happens after 6 - 9 hours). The results are depicted in the Figure 1. The vertical lines show deviations from the estimated baseline (intercept) of the models for each measure of well-being. As all well-being measures had the same response scale format, they are presented in the same graph.

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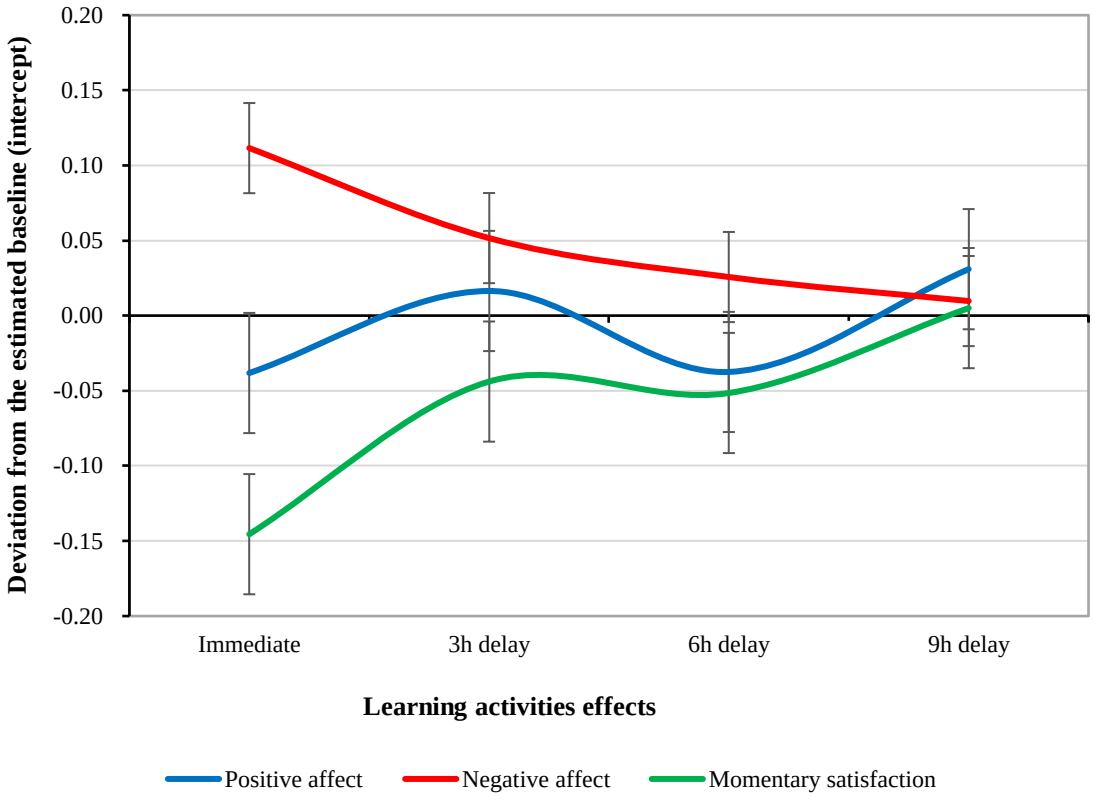

Note: The vertical lines represent deviations from the estimated baseline (intercept) of the models for each measure of well-being.

Figure 01. Immediate and delayed effects of learning activities on well-being measures

Overall, the results show that learning-related activities have a small but detrimental immediate effect on negative affect and satisfaction, but they do not change momentary positive affect. The same appears to be true for the delayed effects, with faster recovery for negative affect than for satisfaction.

5. Discussion

Learning-related activities had a significant immediate effect on negative affect and satisfaction, but these activities did not change positive affect. Similarly, learning activities had a delayed effect on negative affect and satisfaction, but not on positive affect. However, the effects of learning on satisfaction and negative affect were not equal. Whereas immediate effects are comparable, the delayed effects decreased more slowly for satisfaction than for negative affect.

It seems that learning-related activities have a broader impact on satisfaction than on negative affect, at least when looking at it from the temporal perspective. These findings conform to the idea that leisure activities (other than learning) have beneficial effects on well-being (Kuykendall et al., 2015; Schmiedeberg & Schröder, 2016). Although the exact mechanism is still unclear, motivation and freedom of choice have a significant role, especially for immediate effect of leisure activities. The same mechanisms could also be responsible for the detrimental effect of learning activities on well-being. Most often, learning activities are not freely chosen. Moreover, even though these activities result in greater knowledge and competence, it takes time to get there (Newman et al., 2014). Leisure activities contribute to well-being because they provide psychological detachment, which mediates between work stress and

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strain outcomes (Sonnentag, & Fritz, 2015). However, academic pursuits require homework, which often carries over the mental demands into leisure time, thus hindering psychological detachment (Ragsdale, Beehr, Grebner, & Han, 2011). Being able to detach from work or academic stress facilitates recovery that increases well-being and reduces strain. The effect of immediate relief is stronger for non-learning activities, resulting in higher momentary well-being, as compared to learning activities. Nevertheless, the detrimental effect of learning on well-being lasts relatively short (in our study, from 3 to 6 hour) and then well-being returns to the previous level, regardless of the type of activities.

The results show that students rarely experienced positive affect, contentment and enjoyment during learning activities, which is consistent with findings of the previous experience sampling studies (Goetz et al., 2010; Grund, Schmid, & Fries, 2015; Koudela-Hamila et al., 2019). On the other hand, engaging in activities other than learning reduced negative affect and increased momentary satisfaction.

Academic learning is purposeful and meaningful activity, and as such, it represents a typical eudaimonic activity (Huta & Ryan, 2010; Zuo, Wang, Wang, & Shi, 2017). These activities may be accompanied by lower positive affect and greater negative affect (Huta & Ryan, 2010), especially when threatening to well-being (Zuo et al., 2017). Eudaimonic motives for activities are particularly important for more desirable college outcomes (like academic achievement and emotional outcomes) in student population (Kryza-Lacombe, Tanzini, & O'Neill, 2018). Only eudaimonic motives for activities were associated with students' emotional states and academic achievement, while hedonic motives were not. As eudaimonic motives increase, academic achievement increases as well, but depression and stress decrease.

Eudaimonic activities can also be positively related to momentary affect (both positive and negative) and satisfaction, but to a lower extend than hedonic activities (Tončić & Anić, 2015). Freedom of choice (or autonomy) in selecting activities is also important (e.g. Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Students mostly perceive that activities like learning and attending lectures at university are obligatory, and this fact may underlie the differences between results obtained for learning and for all other eudaimonic activities. However, studies by Tončić & Anić (2015) and by Reis and colleagues (2000) investigated any kind of eudaimonic activity, whereas the current study focused only on learning activities, which are mostly perceived as obligatory.

To the best of our knowledge, delayed effects of learning activities on short-term well-being have not been researched yet. According to the intervention study by Huta and Ryan (2010), eudaimonic activities are momentarily associated with lower well-being, but in the long run, they enhance well-being more than hedonic activities. This finding suggests that learning may have only short-term negative effect on well-being, but the long-term effects should be positive, especially if they lead to accomplishment of important goals (Diener et al., 1999).

The asymmetry of activity effects found in the present study could be, at least in part, due to the conceptual and measurement overlap of satisfaction and affect. This appears to be less of an issue in longer time-frames than in shorter time frames or in momentary setting (Jayawickreme, Tsukayama, & Kashdan, 2017a, 2017b; Tončić & Anić, in press). On the other hand, there was a more pronounced effect of learning activities on satisfaction, which can be seen as a composite overall measure, combining both cognitive and affective components of well-being.

6. Limitations of the study

One potential shortcoming of the present study concerns the sample, because students' motivation for activities in the sample might not be representative for the student population. Furthermore, the sample was not balanced with respect to gender. In addition, the delayed effects were statistically estimated, without experimental manipulation. Some limitations are common for all experience sampling studies, although an effort was made to minimize them. Since the activities were sampled approximately every 3 hours, not all students' activities were included in the study. Finally, the period of one week may not be representative of students' activities.

7. Conclusion

Affect plays an important role in academic learning (Mega, Ronconi, & De Beni, 2014). Previous studies found strong impact of emotional experiences in educational settings on learning, achievement and academic development (e.g. Linnenbrink, 2006). However, there might be some biases caused by retrospective self-reports that are used in most studies. They rely more on global semantic judgment rather than on real dynamic experiences (Robinson & Clore, 2002). Even so, experience sampling studies provide more detailed information collected in natural settings, but they are still rare in the university educational context (Goetz et al., 2014). As long as researchers rely on inter-individual studies, they will not be able to fully understand processes during learning. Experience sampling methodology used in this study enabled assessment of participants' mood and satisfaction in natural settings and much closer to the time they occurred. Previous studies controlled for mood before measuring, but they did not investigate long-term effects of activities on well-being. Yet, the current study went one step further - it examined the duration of the effects of activity type on mood and satisfaction.

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