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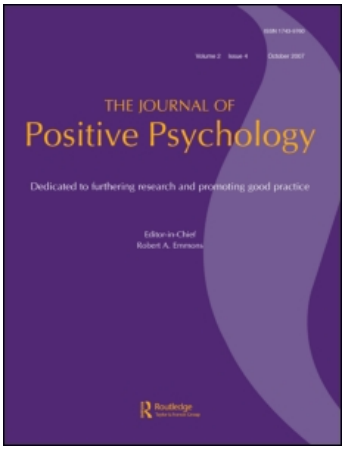

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Flourishing students: A longitudinal study on positive emotions, personal resources, and study engagement

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The aim of this two-wave questionnaire study with a 4-week interval among 391 Dutch university students was to test a gain cycle of positive emotions, personal resources, and study engagement. As a theoretical basis, this study drew on the broaden-and-build (B&B) theory and the conservation of resources (COR) theory. More specifically, it was hypothesized that the experience of positive emotions predicts students' future personal resources and study engagement. Moreover, it was expected that there is a longitudinal relationship between personal resources and study engagement. Furthermore, we hypothesized that positive emotions, personal resources, and study engagement are reciprocally related. Results, obtained by means of structural equation modeling, confirmed both causal (except for the positive relationship between positive emotions and study engagement) and reciprocal hypotheses, thereby successfully integrating the B&B theory with the COR theory.

Keywords: positive emotions; personal resources; study engagement; reciprocal relationships

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Introduction

The appearance of *work engagement* coincides with the rise of *positive psychology* that has shifted the focus from human malfunctioning toward human strengths and optimal functioning (Seligman & Csikszentmihalyi, 2000). Work engagement is defined as '…a positive, fulfilling, and work-related state of mind that is characterized by vigor, dedication and absorption' (Schaufeli & Bakker, 2004, p. 295). More recently, the notion of *study engagement* was introduced. It was maintained that from a psychological point of view, students' core activities can be considered as 'work' (Salanova, Schaufeli, Martínez, & Bresó, 2010). Namely, like employees, students are involved in structured, coercive activities (e.g., doing assignments, attending class) that are directed toward a specific goal (e.g., passing exams, acquiring a degree). Hence, students could also experience engagement regarding their studies. So, analogous to work engagement, study engagement is characterized by feeling vigorous, being dedicated to one's studies, and being absorbed in study-related tasks (Schaufeli et al., 2002).

Earlier studies found a positive relationship between engagement and academic achievement; the more engaged students felt, the better they performed (Salanova, Llorens, Cifre, Martínez, & Schaufeli, 2003; Salanova, Schaufeli, Martínez, et al., 2010). Additionally, dedicated and enthusiastic students are more likely to adopt mastery approaches, and report higher self-control as well as higher grades (Howell, 2009). Moreover, up until now, the relationship between personal resources and engagement has only been demonstrated cross-sectionally among students. Accordingly, it is important to investigate this relationship longitudinally as well. Previous studies – using samples of employees – have focused mainly on environmental resources (*job resources*) as antecedents of engagement, using the *job demands-resources (JD-R) model* as a theoretical framework. The JD-R model states that the presence of job resources (e.g., supervisory support, autonomy) predicts work engagement among employees through a motivational process (Schaufeli & Bakker, 2004). Positive relationships between job resources and work engagement have indeed been well-established (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003; Hakanen, Bakker, & Schaufeli, 2006; see for a review Halbesleben, 2009), not only within time but also over time (e.g., Mauno, Kinnunen, & Ruokolainen, 2007; Schaufeli, Bakker, & Van Rhenen, 2009). The same seems to apply for students: study resources (e.g., task autonomy, teacher support) enhance study engagement (Salanova, Schaufeli, Martínez, et al., 2010). However, the role of *personal resources* (e.g., hope, self-efficacy), which

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may also be important determinants of optimal functioning and well-being (Hobfoll, 1989; Judge & Bono, 2001), is not yet investigated among students. This is noteworthy because among employees personal resources have been found to be positively related to engagement (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). Similarly, with one exception (Schaufeli & Van Rhenen, 2006), the role of short-term emotional states in relation to the more enduring state of engagement has not yet been explored. The study by Schaufeli and Van Rhenen (2006) – which was cross-sectional in nature – found that positive emotions are positively related to work engagement among managers and suggests that these emotions play a mediating role in the relationship between job resources and engagement.

This study was aimed at investigating the motivational process of the JD-R model among university students. Instead of focusing on the role of study resources on study engagement, the objective of this study was to uncover the role of positive emotions as well as personal resources in predicting study engagement. Below, we will explain our research model which is based on two theoretical frameworks: the *conservation of resources (COR) theory* (Hobfoll, 1989, 2002) and the *broaden-and-build (B&B) theory* (Frederikson, 1998, 2001; Frederikson & Joiner, 2002).

Personal resources and engagement

Personal resources are those personal characteristics that are valued by the individual and could serve as a means for attainment of other personal characteristics, objects, energies, or (study) conditions (Xanthopoulou et al., 2007). As such, personal resources are functional in achieving goals, and stimulate personal growth and development (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009). According to COR theory (Hobfoll, 1989), it is unlikely that resources exist in isolation of each other because people try to accumulate their resources. COR theory predicts that, in the long run, this accumulation of resources will result in positive personal outcomes like engagement (Hobfoll, 2002). It has indeed been confirmed that certain combinations of personal resources are positively related to work engagement (Gorgievsky & Hobfoll, 2008). For example, self-efficacy, hope, optimism, and resilience appeared to explain additional variance in employee well-being (i.e., engagement) over time (after controlling for baseline levels of engagement) (Avey, Luthans, Smith, & Palmer, 2010). Similarly, organizational-based self-esteem, self-efficacy, and optimism have been found to be positively related to work engagement (Xanthopoulou et al., 2007).

In this study, the following personal resources were taken into account: *self-efficacy*, *hope*, *and optimism*. The beneficial effects of each of these three personal resources on well-being have been shown in previous research among employees (e.g., Avey et al., 2010; Gallagher & Lopez, 2009). Bandura's *social-cognitive theory (SCT)* defines self-efficacy as the '...belief in one's capabilities to organize and execute the course of action required to produce given attainments' (Bandura, 1997, p. 3). It is expected that (academic) self-efficacy is positively related to (study) engagement because self-efficacy leads to a greater willingness to spend additional energy and effort on completing a task or an assignment and hence to more task involvement and absorption (Schaufeli & Salanova, 2007).

Hope is defined as 'a cognitive set that is based on a reciprocally-derived sense of succesful agency (goal-directed determination) and pathways (planning to meet goals)' (Snyder et al., 1991, p. 571). It can be assumed that hope enables a person to direct energy in dedicatedly pursuing a goal (i.e., to being engaged). Therefore, we expect hope to be an antecedent to (study) engagement too.

Finally, optimism is characterized by the belief that good things will happen (Scheier & Carver, 1985). More specifically, optimists utilize an expectancy framework, in which success is expected when one is presented with a challenge. As opposed to self-efficacy, optimism does not depend upon one's own capabilities (Avey, Wernsing, & Luthans, 2008). Therefore, it is more likely that an optimist will take on a certain task, given the expectation of a positive outcome. This, in turn, might lead to engagement through a higher level of task involvement (Kahn, 1990).

In addition to the predictive value of personal resources (i.e., self-efficacy, hope, and optimism) for study engagement, it is assumed that positive emotions are positively related to personal resources as well as to study engagement.

Positive emotions and engagement

B&B theory (Fredrickson, 1998, 2001) posits that positive emotions signal the presence of optimal well-being. In addition, positive emotions not only make people feel good at a particular time, but these emotions may also predict future well-being (Fredrickson & Joiner, 2002). Thus, positive emotions also *produce* well-being. That is, positive emotions 'broaden' thought–action repertoires by inducing exploratory behaviors that create learning opportunities and goal achievement, and help to 'build' enduring (personal) resources. Thus, by experiencing positive emotions, people will enhance their personal resources, which in turn may lead to a more enduring positive state of well-being. This study focuses specifically on the latter assumption which is referred to as the 'build

hypothesis'. This hypothesis was previously confirmed in a study of Frederickson, Cohn, Coffey, Pek, and Finkel (2008) in which the effect of a loving-kindness intervention, using mindfulness meditation, was evaluated. Results showed that the intervention caused an increase in daily experiences of positive emotions over time, which in turn built several personal resources (e.g., mindfulness, purpose in life). In turn, these increased personal resources predicted enhanced life satisfaction over time.

As stated, the well-being measure that is used in this study is study engagement. This construct is of a somewhat different nature than life satisfaction, which has mostly been used in the context of the B&B theory. The first reason why we decided to use study engagement as our focal well-being measure is that we wanted to apply the B&B theory to a study setting. Therefore, we chose a measure that is context-specific as it refers to study as opposed to life in general. Second, engagement has been recognized as an active (instead of passive like satisfaction) measure of well-being and – as such – it is often used in (organizational) psychology (e.g., Schaufeli & Bakker, 2004). That is, engagement is characterized by activation, whereas satisfaction is characterized by satiation. Furthermore, positive emotions have been linked previously to engagement in both survey and experimental studies (Salanova, Llorens, & Schaufeli, in press). An explanation for the effect of positive emotions on engagement is that positive emotions facilitate approach behavior which prompts individuals to be engaged in particular activities (Cacioppo, Gardner, & Berntson, 1999).

All in all, based on theorizing and on the results of empirical studies, it seems plausible to expect that positive emotions together with the synergetic potential of self-efficacy, hope, and optimism are powerful predictors of engagement. Therefore, this study was aimed at investigating whether students' positive emotions are related to increased levels of personal resources and study engagement over time. Furthermore, it was expected that a longitudinal relationship existed between personal resources and study engagement. This way, this study is aimed at integrating two major theories in the domain of positive psychology, namely B&B theory and COR theory.

Reciprocal relationships: gain cycles

Although the B&B theory posits an initiating role of positive emotions in the enhancement of personal resources and well-being, the *cognitive mediation theory* of emotions specifies the relationship between emotions and well-being in a different way (Weiss & Cropanzano, 1996). Namely, this alternative theory states that personal resources lie at the core of experiencing more positive emotions and ultimately lead to a more enduring state of well-being therefore posing a mediating role of positive emotions. Indeed, in a study among Spanish secondary school teachers, positive emotions mediated the positive relationship between self-efficacy and engagement (Salanova et al., in press). Consequently, it seems somewhat simplistic to propose exclusively one-directional relationships between resources and well-being, and not to take reciprocal causation into account. In fact, recent studies provide empirical evidence for both reversed causation as well as reciprocal relationships (gain cycles) between positive emotions and personal resources with regard to well-being (see for an overview Salanova, Schaufeli, Xanthopoulou, & Bakker, 2010). For example, a gain cycle of job resources (e.g., autonomy, supervisory coaching), personal resources (e.g., self-efficacy, optimism), and work engagement was found by Xanthopoulou et al. (2009). Moreover, positive emotions, self-efficacy, and activity engagement appeared to be reciprocally related among Spanish secondary school teachers (Salanova et al., in press). Additionally, it seems that self-efficacy may precede, as well as follow, engagement (Llorens, Schaufeli, Bakker, & Salanova, 2007). This finding suggests the existence of a gain cycle in which self-efficacy and engagement are positively related to each other, which is in line with SCT theory (Bandura, 2001). Finally, Hakanen, Perhoniemi, and Toppinen-Tanner (2008) studied a sample of Finnish dentists and found a gain cycle of job resources, engagement, personal initiative, and innovativeness. Hence, the studies mentioned above, support the notion of a motivational gain cycle in which people experience more positive emotions and (job or personal) resources, and in turn more engagement, and vice versa.

Present study

The objective of this study is twofold: (1) to investigate whether positive emotions predict students' future experience of personal resources (self-efficacy, hope, and optimism), and whether positive emotions and personal resources predict future study engagement, and (2) to test whether positive emotions, personal resources, and study engagement are reciprocally related. Based on the line of reasoning laid out in the preceding paragraphs, the following hypotheses are formulated:

Hypothesis 1a: positive emotions at Time 1 (T1) are positively related to personal resources (self-efficacy, hope, and optimism) at Time 2 (T2), and; *Hypothesis 1b*: T1 positive emotions are positively related to study engagement at T2, and; *Hypothesis 1c*: T1 personal resources are positively related to study engagement at T2.

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Hypothesis 2: Positive emotions, personal resources (self-efficacy, hope, and optimism), and study engagement are reciprocally related. It is hypothesized that, personal resources (self-efficacy, hope, and optimism) at T1 also have a lagged positive effect on positive emotions at T2 (*Hypothesis 2a*), and that study engagement at T1 has a lagged positive effect on personal resources (self-efficacy, hope, and optimism) at T2 (*Hypothesis 2b*).

Method

Participants and procedure

The study sample consisted of 403 Dutch university students who were recruited by means of leaflets in the university cafeteria. They voluntarily participated in the study in which they were asked to fill out an online questionnaire, asking them about their emotions in the last couple of weeks, their personal resources, and their study engagement. Four weeks later, they were asked to fill out the same questionnaire again. This time lag of 4 weeks is in line with the recommendations by Daniels and Guppy (1994), who state that a time lag of a month between two measurements is suitable to explore the relationships among study variables regarding well-being. They state that 1 month provides a time-interval that on the one hand is long enough to allow well-being to change, but on the other hand is short enough to allow some stability in the lives of the participants. Participants who took part in both measurements received course credits in return. Twelve participants were excluded from data analysis because of missing or incomplete data, leaving a total of 391 participants. Of these participants, 16.1% were male students. Participants' mean age was 20.90 years (SD = 2.00).

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Measures

Positive emotions

Positive emotions were measured with a shortened 12-item Dutch version (Schaufeli & Van Rhenen, 2006) of the Job-related Affective Well-being Scale (Van Katwyk, Fox, Spector, & Kelloway, 2000). For the purpose of this study, the scale instruction was adjusted to students by substituting 'work' by 'studies'. Two types of positive emotions were distinguished: (a) *positive active emotions* of which an example of an item is: 'The last couple of weeks I felt inspired', and (b) *positive non-active emotions* of which an example of an item is 'The last couple of weeks I felt relaxed'. All items were scored on a five-point Likert scale (1 = never and 5 = always).

Personal resources

Three different types of personal resources were measured: (a) *academic self-efficacy* (translated from the six-item scale of Midgley et al., 2000). A sample item is: 'Even if the task is hard, I can learn it', (b) *study-related hope* (study-adjusted version based on the six-item scale of Snyder et al., 1996). A sample item is: 'Right now I see myself as being pretty successful', and (c) *study-related optimism* (study-adjusted version based on the Life Orientation Test of Scheier & Carver, 1985; shortened into a six-item scale by Luthans, Avolio, Avey, & Norman, 2007) of which an example item is: 'With respect to my study, I always look on the bright side'. All items were scored on a five-point Likert scale (1 = strongly disagree and 5 = strongly agree).

Study engagement

Study engagement was assessed by means of the Utrecht Work Engagement Scale – student version that consists of three subscales (UWES-SS; Schaufeli, Salanova, González-Romá, & Bakker, 2002): (a) *vigor* (6 items); a sample item is 'When I'm doing my work as a student, I feel bursting with energy', (b) *dedication* (6 items); a sample item is 'I find my studies full of meaning and purpose', and (c) *absorption* (5 items); a sample item is 'Time flies when I am studying'. All items were scored on a seven-point Likert scale (0 = never, 6 = always/every day).

All study variables appeared to have satisfactory internal consistencies at both measurement times; the values of Cronbach's alpha coefficients ranged from 0.71 to 0.86 (Table 1).

Data analyses

Means, standard deviations, Cronbach's alpha coefficients, and bivariate correlations were computed for every study variable on both T1 and T2. Next, a Harman's single-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) was conducted which means that a measurement model including all scales was tested on T1 data by means of confirmatory factor analysis (CFA) implemented by the AMOS software program (Arbuckle, 2005). Finally, structural equation modeling (SEM), also by the AMOS program, was used to establish the relationships between the study variables. Zapf, Dormann, and Frese (1996) argue that reciprocal relationships can be determined by means of SEM when all study variables are measured at both time points. The reason for this is that, when investigating cross-lagged paths, such a full-panel model enables us to control for both the variance explained by the T1 measurement of that same construct as well as the variances explained by the other study variables at T2. First, the *stability model* (Model 1; M1) was tested without cross-lagged structural paths but with temporal stabilities and synchronous correlations. Temporal stabilities were specified as correlations

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Table 1. Means, standard deviations, correlations, and Cronbach's alpha coefficients of the research variables on Time 1 and Time 2 ($N = 391$).

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Positive active emotions T1	3.36	0.79	0.79	1.000															
2. Positive active emotions T2	3.40	0.74	0.76	0.39**	1.000														
3. Positive non-active emotions T1	3.89	0.74	0.77	0.62**	0.31**	1.000													
4. Positive non-active emotions T2	3.87	0.68	0.71	0.33**	0.62**	0.40**	1.000												
5. Self-efficacy T1	3.68	0.54	0.80	0.26**	0.08	0.28**	0.12*	1.000											
6. Self-efficacy T2	3.66	0.50	0.79	0.26**	0.18**	0.26**	0.15**	0.72**	1.000										
7. Hope T1	4.44	0.60	0.82	0.38**	0.31**	0.39**	0.33**	0.50**	0.47**	1.000									
8. Hope T2	4.52	0.61	0.82	0.31**	0.35**	0.31**	0.29**	0.45**	0.59**	0.67**	1.000								
9. Optimism T1	4.53	0.59	0.71	0.39**	0.26**	0.40**	0.30**	0.47**	0.46**	0.70**	0.58**	1.000							
10. Optimism T2	4.51	0.62	0.73	0.29**	0.32**	0.28**	0.30**	0.38**	0.49**	0.60**	0.69**	0.70**	1.000						
11. Vigor T1	3.13	0.89	0.81	0.28**	0.19**	0.23**	0.10*	0.44**	0.40**	0.53**	0.46**	0.43**	0.45**	1.000					
12. Vigor T2	3.10	0.90	0.81	0.26**	0.23**	0.22**	0.11*	0.35**	0.39**	0.46**	0.54**	0.39**	0.47**	0.77**	1.000				
13. Dedication T1	3.77	0.94	0.85	0.18**	0.11*	0.20**	0.08	0.25**	0.22**	0.40**	0.37**	0.40**	0.35**	0.61**	0.51**	1.000			
14. Dedication T2	3.72	0.95	0.86	0.15**	0.17**	0.19*	0.11*	0.16**	0.21**	0.32**	0.39**	0.32**	0.39**	0.49**	0.62**	0.75**	1.000		
15. Absorption T1	2.96	1.02	0.85	0.26**	0.17**	0.20**	0.09	0.32**	0.31**	0.38**	0.39**	0.31**	0.33**	0.80**	0.66**	0.66**	0.56**	1.000	
16. Absorption T2	2.94	1.04	0.86	0.19**	0.17**	0.14**	0.03	0.28**	0.33**	0.27**	0.40**	0.29**	0.36**	0.62**	0.78**	0.56**	0.71**	0.74**	1.000

Notes: M = mean; SD = standard deviation; α = Cronbach's alpha.
**$p < 0.01$; *$p < 0.05$.

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between the corresponding constructs at T1 and T2. Model 1 estimates the total stability coefficient between T1 and T2 without specifying the variance in direct or indirect paths (Pitts, West, & Tein, 1996). Second, the fit of the stability model was compared to that of three more complex models: (a) the *causality model* (Model; M2), which is identical to Model 1 but includes additional cross-lagged structural paths from T1 positive emotions to T2 personal resources and to T2 study engagement, as well as from T1 personal resources to T2 study engagement; (b) the *reversed causality model* (Model 3; M3), which is also identical to M1, but includes additional cross-lagged structural paths from T1 study engagement to T2 personal resources and T2 positive emotions, as well as from T1 personal resources to T2 positive emotions; (c) the *reciprocal model* (Model 4; M4), which includes additional reciprocal relationships between positive emotions, personal resources, and study engagement and thus includes all paths of M2 and M3. In addition, the measurement errors of the corresponding observed variables collected at different time points were allowed to co-vary over time (e.g., a covariance is specified between the measurement error of hope at T1 and the measurement error of hope at T2). While generally in cross-sectional models measurement errors should not co-vary, in longitudinal measurement models, the measurement errors corresponding to the same indicator should be allowed to co-vary over time (McArdle & Bell, 2000; Pitts et al., 1996) in order to account for the systematic (method) variance that is associated with each specific indicator.

Maximum likelihood estimation methods were used and the input for each analysis was the covariance matrix of the items. The goodness-of-fit of the models was assessed using absolute and relative indices. The absolute goodness-of-fit indices calculated were the χ^2 goodness-of-fit statistic, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and the root mean square error of approximation (RMSEA). Because χ^2 is sensitive to sample size, the probability of rejecting a hypothesized model increases when sample size increases. To overcome this problem, the computation of relative goodness-of-fit indices is strongly recommended (Bentler, 1990). Three of such relative fit indices were computed: the Normed Fit Index (NFI), the Comparitive Fit Index (CFI), and the Incremental Fit Index (IFI).

Values smaller than 0.08 for the RMSEA are indicative of an acceptable fit, and values greater than 0.10 should lead to model rejection (Browne & Cudeck, 1993). For all other fit indices (i.e., GFI, AGFI, NFI, CFI, and IFI), values greater than 0.95 are considered as indicating a good fit (Hu & Bentler, 1999). Finally, we computed the Akaike information criterion (AIC; Akaike, 1987) to compare competing models because this index is particularly well-suited for the comparison of non-nested models that fit the same correlation matrix. A lower value of the AIC index indicates a better model fit.

Results

Preliminary analyses

Means, standard deviations, Cronbach's alpha coefficients, and bivariate correlations of all research variables are reported in Table 1. All alpha coefficients met the criterion of 0.70 (Nunnally & Bernstein, 1994). Furthermore, Table 1 shows that, in line with our expectations, positive active emotions as well as positive non-active emotions are positively related to the three personal resources (self-efficacy, hope, and optimism) and the three dimensions of study engagement (vigor, dedication, and absorption) within time at both T1 and T2. Moreover, with a few exceptions, all across-time correlations were positive and significant too.

A Harman's single-factor test (Podsakoff et al., 2003) using CFAs on T1 data was computed to test whether the possible shortcoming of common method bias occurred and to distinguish among the constructs of positive emotions, personal resources, and study engagement. Two models were tested: (a) a one-factor measurement model which hypothesized that all three constructs loaded on a single latent factor; and (b) a three-factor oblique model which assumed that the factors were freely interrelated. Results showed that the one-factor model could not account for the variance in the model; the three-factor model fitted the data significantly better than the one-factor model ($\Delta\chi^2(3) = 425.89$, $p < 0.001$; $\Delta AIC = 419.89$). Even though the chi-square value of the three-factor model was significant ($\chi^2(17) = 77.45$, $p < 0.001$), the relative fit indices were all meeting the criteria for an acceptable fit: RMSEA = 0.09; GFI = 0.96; AGFI = 0.91; NFI = 0.95; CFI = 0.96; IFI = 0.96; AIC = 131.45. Taken together, these results suggest that positive emotions, personal resources, and study engagement are interrelated, yet *distinct* constructs.

Model test

Table 2 shows the fit indices of the four competing models.[1] As can be seen, the *causality model* (M2) fitted the data significantly better than the *stability model* (M1) ($\Delta\chi^2(3) = 73.00$, $p < 0.001$). This illustrates the relevance of cross-lagged paths from T1 positive emotions to T2 personal resources, and T2 study engagement, as well as from T1 personal resources to T2 study engagement. Furthermore, the fit of the *reversed causality model* (M3) is superior to that of the *stability model* (M1) as well ($\Delta\chi^2(3) = 79.25$, $p < 0.001$). This suggests that the model with the

Table 2. Fit indices of the five different models ($N = 391$).

Model	χ^2	df	RMSEA	GFI	AGFI	NFI	CFI	IFI	AIC	$\Delta\ \chi^2$	Δdf
M1: stability model	388.53***	87	0.09	0.89	0.83	0.91	0.93	0.93	518.53		
M2: causality model	315.53***	84	0.08	0.91	0.86	0.93	0.95	0.95	451.53	M2 − M1 = 73.00***	3
M3: reversed causality model	308.78***	84	0.08	0.92	0.86	0.93	0.95	0.95	444.78	M3 − M1 = 79.25***	3
M4: reciprocal model	199.60***	81	0.06	0.94	0.90	0.95	0.97	0.97	341.60	M4 − M1 = 188.93***	6
										M4 − M2 = 115.93***	3
										M4 − M3 = 109.18***	3
M5: final model	207.61***	87	0.06	0.94	0.91	0.95	0.97	0.97	337.61	M5 − M4 = 8.01 n.s.	6

Notes: χ^2 = chi-square statistic; df = degrees of freedom; RMSEA = root mean square error of approximation; GFI = goodness-of-fit index; AGFI = Adjusted Goodness-of-Fit Index; NFI = Normed Fit Index; CFI = Comparitive Fit Index; IFI = Incremental Fit Index; AIC = Akaike information criterion; n.s. = non-significant.
***$p < 0.001$.

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cross-lagged paths from T1 personal resources to T2 positive emotions, and from T1 study engagement to T2 personal resources and T2 positive emotions (i.e., M3), also has a better fit to the data than the model including solely temporal stabilities and synchronous correlations (i.e., M1). Finally, Table 2 shows that the *reciprocal model* (M4) fits the data significantly better than M1, M2, and M3. This indicates that the model that includes reciprocal relationships among positive emotions, personal resources, and study engagement is superior to all other alternative models.

Hypothesis 1a assumed that positive emotions at T1 are positively related to personal resources (self-efficacy, hope, and optimism) at T2, *Hypothesis 1b* stated that T1 positive emotions are positively related to T2 study engagement at T2, and *Hypothesis 1c* stated that T1 personal resources are positively related to study engagement at T2. The causality model (M2) includes these three relationships, of which two turned out to be significant. Both the standardized effects of T1 positive emotions on T2 personal resources ($\beta = 0.31$) and the standardized effect of T1 personal resources on T2 study engagement ($\beta = 0.45$) appeared to be significant. However, the lagged effect of T1 positive emotions on T2 study engagement was not significant at $p < 0.001$. So, positive emotions are positively related to personal resources, which in turn have a positive impact on study engagement. Thus, although *Hypothesis 1c* had to be rejected, *Hypotheses 1a* and *1b* are supported: it is demonstrated that T1 positive emotions lead to T2 personal resources, and that T1 personal resources lead to T2 study engagement.

According to *Hypothesis 2*, positive emotions, personal resources (self-efficacy, hope, and optimism), and study engagement are reciprocally related. More specifically, *Hypothesis 2a* predicted that T1 personal resources (self-efficacy, hope, and optimism) have a lagged positive effect on T2 positive emotions. The *reversed causality model* (M3) that included this relationship indicated a significant reversed causal effect of T1 personal resources on T2 positive emotions ($\beta = 0.43$, $p < 0.001$). Thus, our results confirm *Hypothesis 2a*, as personal resources at T1 are significantly, positively related to students' experience of positive emotions at T2. Moreover, a significant reversed causal effect of T1 study engagement on T2 personal resources was found ($\beta = 0.42$, $p < 0.001$). So, *Hypothesis 2b*, which stated that T1 study engagement has a lagged positive effect on the level of T2 personal resources, is confirmed as well. Finally, a non-significant reversed causal effect was found of T1 study engagement on T2 positive emotions.

So, both causal and reversed causal relationships exist simultaneously, which is confirmed by the model fit of the *reciprocal model* (M4). The *final model* (Model 5; M5), in which non-significant paths of M4 were excluded, is displayed in Figure 1. M5 explained 19% of variance in T2 positive emotions, 36% of variance in T2 personal resources, and 20% of variance in T2 study engagement. Note that for reasons of economy, Figure 1 only shows the latent factors, not the observed variables.

To summarize, our results confirmed the existence of reciprocal relations between the study variables: over time, positive emotions are positively related to personal resources and vice versa, and personal resources are positively related to study engagement and vice versa.

Discussion

The aim of this study was to test a structural model of a gain cycle, which was based on Fredrickson's (1998) B&B theory and Hobfoll's (1989) COR theory. More specifically, the objective of this study was twofold: (1) to investigate whether students' experience of positive emotions predict their future personal resources, (2) to investigate whether students' experience of positive emotions and personal resources

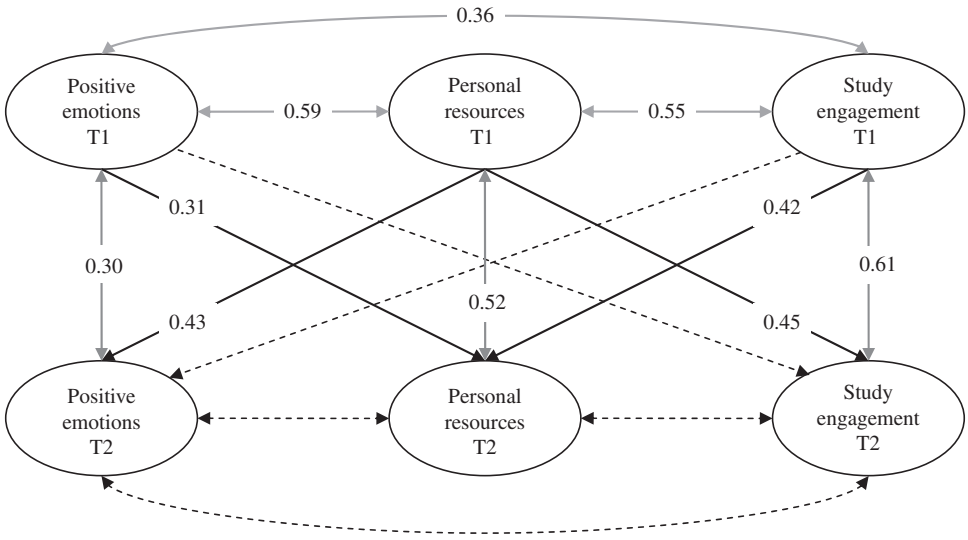

Figure 1. The final model (M5).
Notes: Solid black lines indicate standardized coefficients (all are significant at $p < 0.001$). Solid gray lines represent the (auto)correlations between factors and time points. The discontinuous lines are non-significant paths and correlations.

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predict their future study engagement, and (3) to confirm the existence of reciprocal relationships between positive emotions, personal resources, and study engagement. In order to investigate these issues, a longitudinal (two-wave) questionnaire study among 391 Dutch university students was conducted with a 4-week interval.

Our results confirm the hypothesis derived from the B&B theory that positive emotions initiate the building of resources (build hypothesis). Moreover, these results support the assumption of COR theory that the availability of personal resources leads to well-being over time. Thus, this study demonstrates that, in addition to job resources, personal resources are indeed important in predicting study engagement. In this way, the underlying study confirms the findings of previous studies among employees, which were presented in the introduction section (i.e., Avey et al., 2010; Salanova et al., in press; Xanthopoulou et al., 2007). Moreover, our study successfully integrated the B&B theory and the COR theory in the sense that positive emotions are followed by personal resources and personal resource are, in their turn, followed by study engagement. The fact that a cross-lagged relationship was found between positive emotions and personal resources, as well as between personal resources study engagement, but not between positive emotions and study engagement, supports the notion of a possible mediating role of personal resources in the relationship between positive emotions and study engagement. Although this study did not confirm the direct relationship between positive emotions and engagement, as demonstrated by Schaufeli and Van Rhenen (2006) in their cross-sectional study, it did provide a better understanding on how positive emotions eventually could lead to engagement, namely, via boosting personal resources.

Finally, the results of this study imply that none of the constructs included in this research model can be considered as a single cause or consequence, as reciprocal causation seems to occur. So, none of the observed relationships should be interpreted in isolation, rather, the psychological process described in this study is of a dynamic nature. Accordingly, the results of this study support the notion that it is too simplistic to pose a specific order when it comes to psychological constructs (Llorens et al., 2007). The robustness of this interpretation is supported by similar reciprocal relationships that were found in previous studies, as mentioned in the introduction (e.g., Llorens et al., 2007; Salanova et al., in press; Xanthopoulou et al., 2009).

Limitations and future research directions

Although a three-wave study is needed to confirm the mediating role of personal resources in the positive relationship between positive emotions and study engagement, the design of this study enabled us to demonstrate reciprocal relations between our study variables (Taris, 2000). Namely, Zapf et al. (1996) state that when all study variables are incorporated at both time points, it is justified to verify causal, reversed, and reciprocal relationships between study variables (when using SEM) (see 'Method' section). Although its longitudinal design enables the investigation of relationships among the focal variables over time, the results of this study should be interpreted with caution.

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In the first place, we used solely self-report measures, which could have caused the results to be contaminated by common method variance. Furthermore, our study included no control variables. Although we conducted a Harman's single-factor test (Podsakoff et al., 2003) to control for common method bias, it cannot be ruled out that the associations among our variables are inflated by 'third variables', such as unmeasured personality factors or common method variance (cf. Podsakoff et al., 2003). Therefore, following the recommendation by Podsakoff et al., we conducted an additional analysis in which we extended our model with a latent factor, with all the indicators of the latent variables that were already included in our model as its indicator. In other respects, the model remained unchanged. In this way, it is possible to distinguish between variance reflecting the presence of this unmeasured common factor, and variance that reflects the processes of interest. Although the magnitude of the estimates changed somewhat, this additional analysis revealed that all cross-lagged effects remained significant and that the direction of these effects remained unchanged (results available from the first author). Thus, the cross-lagged effects reported in this study do not seem to result from common method variance or other unmeasured 'third' variables. Moreover, our final model is in line with current theories and with the results of previous empirical studies. Therefore, the model is likely to be a plausible representation of the relationships between the study variables. Nevertheless, for future research, it would be of added value to incorporate objective outcome variables, such as performance measures (i.e., exam grades) (Brown et al., 2008).

The time lag of 4 weeks between the two measurements has been deliberately chosen and is in line with Daniels and Guppy (1994), who argue that a time lag of a month between two measurements is quite suitable regarding studies on well-being and its predictors. They state that a time interval is needed that allows enough time for well-being to change, but is also short enough to allow some constancy in the lives of those sampled. Indeed, our results showed that our study variables were not highly stable. So, there is variance to be explained within the variables over time, which indicates that a time lag of 4 weeks is suitable to study the interrelationships between our study variables. However, the current time lag did not enable us to explore the day-to-day variability in positive emotions, personal resources, and engagement. Although it could be questioned whether engagement can be appropriately assessed on a daily basis, it would be interesting to conduct a diary study to measure fluctuations in momentary (positive) emotions more accurately.

Furthermore, because a relatively large proportion of the participants was female (83.9%), it can be questioned whether the results can be generalized to the whole student population and beyond. For instance, it would be interesting to see whether the results of this study can be replicated among younger students who are enrolled in compulsory education. It may be expected that these types of students experience less engagement in their studies because they did not deliberately choose their education like older (university) students did. Next to that, it could also be worthwhile to study a sample of employees in order to confirm whether (a combination of) positive emotions and personal resources predict employee engagement as well (and vice versa).

Finally, based on the B&B theory, which states that positive emotions are more important in the prediction of well-being and negative emotions in the prediction of ill-being (Fredrickson, 1998), we exclusively focused on positive emotions and their prediction of personal resources and study engagement (and vice versa). In an additional analysis, we controlled for the effect of negative emotions and it indeed appeared that negative emotions did not have a significant effect on either personal resources or the level of study engagement. However, Fredrickson and Losada (2005) uncovered the importance of the ratio between positive and negative emotions and its' predictive value for well-being. Therefore, a future study could investigate whether or not this ratio has a significant effect on personal resources and study engagement as well.

Conclusion

The results of this study, a two-wave study with a 4-week interval, showed that both positive emotions as well as personal resources like self-efficacy, hope, and optimism, can be considered predictors of study engagement. In turn, it was shown that work engagement influences these emotions and resources, thus constituting a gain cycle. The present findings advance our knowledge on the dynamic nature of the relationships among positive emotions, personal resources, and study engagement. By way of practical implication, focusing on enhancing positive emotions and personal resources among students would increase their study engagement. For example, training programs in which students set and plan to meet study-related goals could be implemented in order to induce a sense of positivity toward themselves, their studies, and the future (Schunk, 1991). Moreover, Sheldon and Lyubomirsky (2006) have shown in their studies that positive emotions can be enhanced among students when they are asked to make an effort to think about the many things in their lives that they are grateful for. Positive emotions also increased when they were asked to imagine themselves in the future, assuming everything has gone as well as it possibly could. Moreover, teachers can enhance positive emotions and personal

resources among their students by providing them with positive feedback and by giving them rewards like compliments (Weaver, 2006). Performing field research on this issue could shed some light on how to effectively design and carry out such programs. However, though more research is needed, the present findings can be considered a valuable addition to the current knowledge in the relatively new field of positive psychology.

Note

1. In line with the B&B theory, which explicitly focuses on the role of positive emotions, we did not incorporate negative emotions in our research model. However, as potentially negative emotions could also influence well-being (cf. Fredrickson & Losada, 2005), we constructed a model in which we added negative emotions as an additional variable that predicts personal resources and study engagement. It appeared that this model was not meeting the criteria for a good fit ($\chi^2(143) = 515.36$, $p < 0.001$, RMSEA = 0.10; GFI = 0.87; AGFI = 0.84; NFI = 0.84; CFI = 0.88; IFI = 0.88; AIC = 689.36). Moreover, the model showed that negative emotions (T1) had no significant negative relationship with either personal resources at T2 ($\beta = -0.03$) or work engagement at T2 ($\beta = -0.01$). The reversed causational relationships between personal resources at T1 and negative emotions at T2 ($\beta = 0.02$) and between study engagement at T1 and negative emotions at T2 ($\beta = 0.00$) turned out non-significant as well. Hence, our additional analyses justified the exclusion of negative emotions as predictor variable in our research model.

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