Academic Performance as a Function of Approaches to Studying and Affect in Studying

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Abstract

Based on the model of approaches to studying and the control-process model of self-regulation of behavior, it was hypothesized that students' strategic approaches to studying and positive affect in studying would be positively associated with grades, whereas students' surface approach to studying and negative affect in studying would be negatively associated with grades. A sample of 406 students completed a questionnaire pack and their end-of-semester and past semester grades were recorded. Regression analyses controlling for past semester performance and evaluation anxiety showed that positive affect predicted better examination grades, coursework grades and GPA, negative affect measured in the second half of a semester predicted worse examination grades and GPA, whereas approaches to studying did not predict academic performance. The implications of the findings are outlined.

Keywords: Academic Performance; Approaches to Studying; Evaluation Anxiety; Negative Affect; Positive Affect; Undergraduate University Students.

Introduction

Intellectual ability (Gottfredson, 2002) and past academic performance (Zeegers, 2004) are considered to be the best predictors of success in higher education. Nevertheless, intelligence as measured by IQ tests was found to account for about half the variance in academic performance, leaving the remaining half to be explained by other individual differences and environmental factors (Chamorro-Premuzic & Furnham, 2004). The present study examines the effects that individual differences in students' approaches to studying and affect experienced while studying have on their academic performance.

Approaches to Studying and Academic Performance

The theory of approaches to studying was first developed as a two-factor, deep-surface learning model (Marton & Säljö, 1976a, 1976b) that was based on the idea of qualitative individual differences in information processing. Entwistle, Hanley and Ratcliffe (1979) expanded the theory by introducing a strategic approach to studying, making it a three-factor model. Deep approach to studying is characterised by deep interpretation and analysis of new information that the learner finds interesting and of particular personal meaning. Surface approach to studying is characterised by rote learning, which does not require in-depth understanding and consists of reproduction of the study material often combined with fear of assessment failure. Lastly, strategic approach to studying is characterized by a student's target-oriented attitude toward comprehension of new information with a concern to achieve the best possible results through organisation of one's learning environment and time management.

Some studies reported positive relationships between deep approach to studying and academic performance (e.g., Brodersen, 2007; Zeegers, 2004), while others failed to establish this link (e.g., Diseth & Martinsen, 2003; Minbashian, Huon, & Bird, 2004); possible explanations for the lack of association between a deep approach and performance are that

students who adopt a deep approach tend to study less (Kember et al., 1995), and a deep approach is more fruitful in senior years (Entwistle, Tait, & McCune, 2000). Most of the studies reported negative relationships between surface approach to studying and academic performance (e.g., Brodersen, 2007; Zeegers, 2004), while some found no relationship (e.g., Beckwith, 1991b; Cassidy & Eachus, 2000). Finally, all studies reported positive relationships between strategic approach to studying and academic performance (e.g., Brodersen, 2007; Diseth & Martinsen, 2003). Based on past empirical research it is hypothesized that:

> *(H1) (a) Strategic approaches to studying will be positively associated with academic performance, whereas (b) surface approach to studying will be negatively associated with academic performance.*

Affect in Studying and Academic Performance

Affect refers to one's feelings and moods that can be positive or negative (Russell & Carroll, 1999). Research showed that negative emotions are maladaptive when experienced in non life-threatening situations in that they narrow attentional focus and reduce cognitive performance, particularly working memory (Christodoulou et al., 2009). Research showed that positive emotions are adaptive in that they expand attentional focus (Rowe, Hirsh, & Anderson, 2007), improve working memory and problem solving (Ashby, Isen, & Turken, 1999), and enhance learning (Tremblay, Gardner, & Heipel, 2000).

The present study takes the perspective of the *control-process model* of self-regulation of intentional behavior (Carver & Scheier, 1990, 2000) in order to explain how positive affect and negative affect influence students' learning and academic performance. The model proposes that an individual will keep trying to accomplish a desired goal as long as the rate of progress toward the goal is acceptable. Affect is a function that is used to monitor the rate of progress in accordance to one's desired rate. If the progress of discrepancy

reduction is in line with the reference value, then a person will experience neutral affect. Positive affect will be experienced when progress is faster than expected, whereas negative affect will be experienced when progress is slower than expected.

Based on the *control-process model*, positive affect in studying should be an indicator of satisfactory progress in learning, whereas negative affect should be an indicator of unsatisfactory progress. Moreover, based on research on the consequences of affect to the scope attention and the capacity of working memory, positive affect in studying should foster learning, whereas negative affect should hinder learning. Therefore, it is hypothesized that:

> *(H2) (a) Positive affect in studying will be positively associated with academic performance, whereas (b) negative affect in studying will be negatively associated with academic performance.*

Semester Phase as Moderator

The *control-process model* predicts that the experience of high levels of positive affect results in temporary "coasting", which is a way of putting oneself closer to the reference value of progress; coasting continues until the reference value becomes more ambitious. On the other hand, the experience of high levels of negative affect results in extra effort put to reduce the discrepancy; over-effort continues until the reference value becomes more modest, and may eventually result in withdrawal and goal abandonment.

The present study examines students' affect in the first and second halves of a semester. Based on the *control-process model*, the positive affect students experience in the first half of a semester indicates that learning progress is faster than desired and may lead a student to reduce effort and engage in coasting. If coasting occurs, positive affect in the second half of a semester may represent contentment with past learning progress rather than emotions signalling current learning progress. In turn, coasting can weaken the relationship

between positive affect and academic performance in the second half of a semester. Therefore, it was hypothesized that:

> *(H3) Semester phase will moderate the positive association between positive affect in studying and academic performance in such a way that the association will be stronger for positive affect measured in the first half of a semester.*

Based on the *control-process model*, the negative affect students experience in studying indicates insufficient learning progress. Negative affect should become a better indicator of insufficient learning progress as a student exerts greater effort in learning. Students typically put more effort into studying as the end of a semester approaches. Insofar as progress is not made despite the increased effort, negative affect will become a more valid signal of poor learning progress. In turn, increased effort can strengthen the relationship between negative affect and academic performance in the second half of a semester. Therefore, it was hypothesized that:

> *(H4) Semester phase will moderate the negative association between negative affect in studying and academic performance in such a way that the association will be stronger if negative affect is measured in the second half of a semester.*

Aims of the Study

This study tests whether affect in studying predicts academic performance over and beyond approaches to studying, and whether semester phase moderates the relationships between affect and performance. The test controls for past academic performance, which is universally considered the best predictor of academic performance, and evaluation anxiety (an individual's need to avoid evaluative situations where one's performance can be negatively evaluated or judged by others; e.g., Geen, 1991), which is a potential confounder of negative affect.

Method

Participants

An opportunity sample of 406 undergraduate students from a London University took part in this research. The data collection was conducted as online survey throughout the semesters of the academic year 2009-2010. In each semester data collection took place from week 1 to week 12, which was the last week of formal teaching. The invitation letter and briefing was sent to students' university e-mail addresses providing the hyperlink to the online survey. Participants were divided into those who participated in the first 6 weeks of a semester and those who participated in the remaining 6 weeks.

The Time 1 sub-sample consisted of 185 students of whom 48 (25.9%) were males and 137 (74.1%) were females, with age ranging from 18 to 51 (M = 24.3, SD = 6.1), of whom 78 (42.2%) were from the Faculty of Life Science, 62 (33.5%) were from the Business School, 27 (14.6%) were from the Faculty of Social Science and Humanities, 7 (3.8%) were from the Faculty of Law and International Relations, and 11 (5.9%) withheld that information. There were 101 (54.6%) Whites, 28 (15.1%) Blacks, 7 (3.8%) Indians, 6 (3.3%) Asians, 10 (5.4%) participants of mixed ethnicity, 26 (14.1%) participants from other ethnic backgrounds, and 7 (3.8%) participants who withheld information about their ethnicity.

The Time 2 sub-sample consisted of 221 students of whom 48 (21.7%) were males and 173 (78.3%) were females, with age ranging from 18 to 62 (M = 27.7, SD = 9.2), of whom 71 (32.1%) were from the Faculty of Life Science, 40 (18.1%) were from the Business School, 72 (32.5%) were from the Faculty of Social Science and Humanities, 18 (8.1%) were from the Faculty of Law and International Relations, and 20 (9%) withheld that information. There were 122 (55.2%) Whites, 31 (14%) Blacks, 7 (3.2%) Indians, 5 (2.3%) Asians, 12 (5.4%) participants of mixed ethnicity, 35 (15.8%) participants from other ethnic backgrounds, and 9 (4.1%) participants who withheld information about their ethnicity.

There was no mean difference between the two sub-samples in any of the study variables, which are described next.

Measures

Approaches and Study Skills Inventory for Students (ASSIST), Short 18-Item Form

The ASSIST Short 18-Item Form (Entwistle, 2008) is a self-reported questionnaire with six questions measuring each of the three domains of approaches to studying: deep (e.g., "When I'm working on a new topic, I try to see in my own mind how all the ideas fit together"), strategic (e.g., "I put a lot of effort into studying because I'm determined to do well"), and surface (e.g., "I concentrate on learning just those bits of information I have to know to pass"). Responses are recorded on a 4-point scale ranging from 1 (*Disagree*) to 4 (*Agree*). The scores for each scale are calculated by averaging the scores of their constituent items. The internal consistency of the scales ranges from .67 to .76 (Moneta & Spada, 2009).

International Positive and Negative Affect Schedule - Short Form (I-PANAS-SF)

The I-PANAS-SF (Thompson, 2007) is a list of ten adjectives, five measuring positive affect (e.g., "Attentive") and five measuring negative affect (e.g., "Nervous"), that were selected from the PANAS scales (Watson, Clark, & Tellegen, 1988) among those that behave more consistently across respondents from different cultures. The instructions used in this study were:"Please read the following adjectives in detail and think if you have those feelings. Please respond thinking of your current experience and behavior when you engage in study activities". Adjectives were scored on a five-point scale ranging from 1 (*None*) to 5 (*Very Much*). The scores for each scale are calculated by averaging the scores of their constituent items. The internal consistency of the scales is .74 for negative affect and .80 for positive affect (Thompson, 2007).

Evaluation Anxiety Scale (EVAN)

The EVAN (Thompson & Dinnel, 2001) is a 15-item self-reported questionnaire measuring individual levels of evaluation anxiety in students (e.g., "I get anxious just prior to receiving the result of a test on which I was not certain of my performance"). Responses are recorded on a 7-point scale ranging from 1 *(Not at all true of me*) to 7 *(Very true of me*). Scale scores are calculated by averaging its items. The internal consistency of the scale is.85 (Thompson & Dinnel, 2001).

Academic Performance

Students' grades (expressed in percentage points, with 40% representing the minimum passing grade) were retrieved from the university database for the current and previous semester. The individual examination grades and individual coursework grades were separately identified for each participant and a student's semester average was calculated separately for each of the two types of grades across all the modules taken in that semester. All students in this sample had their examinations at the end of a semester and the coursework submissions took place throughout the second half of a semester. Moreover, the overall performance in a semester was calculated as the Grade Point Average (GPA), which averaged grades from individual examinations, coursework, and presentations as well as group coursework and presentations.

Results

Data Description

Descriptive statistics of the study variables are presented in Table 1. Cronbach's alpha exceeded the .7 acceptable standard for all variables except surface approach to studying. The measures of academic performance were strongly intercorrelated, and the measures of past semester academic performance correlated fairly with the corresponding measures of end-of-semester academic performance, as expected. Consistent with hypothesis 1, strategic

approach to studying correlated positively with all measures of academic performance, and surface approach to studying correlated negatively with all of them; moreover, deep approach to studying was unrelated to academic performance. Consistent with hypothesis 2, positive affect correlated positively with all measures of academic performance, whereas negative affect correlated negatively with all of them. Finally, evaluation anxiety correlated negatively with all measures of academic performance, as expected.

Insert Table 1 about here

Hierarchical Regression Modeling

The hypotheses were tested using hierarchical regression, in which academic performance was the dependent variable, past academic performance and evaluation anxiety were the control variables, and approaches to studying and affect were the focal predictors. The regression models were fitted separately on examination grades, coursework grades, and GPA; for each of these models the corresponding past academic performance was used as control variable (e.g., past examination grades was the control variable for the model of examination grades). The control variables were entered as first block, the focal predictors were entered as second block together with semester phase (which was coded as 0 for the first half of a semester and 1 for the second half), and the interactions of positive affect and negative affect with semester phase were entered as third block.

Insert Table 2 about here

As shown in Table 2, Step 1 of the hierarchical regressions revealed that past academic performance and evaluation anxiety conjointly accounted for significant portions of

variance in all measures of academic performance. In particular, past academic performance predicted each measure of academic performance, whereas evaluation anxiety predicted only examination grades. Step 2 showed that approaches to studying and affect conjointly accounted for additional and significant portions of variance in all measures of academic performance. In particular, positive affect predicted all measures of academic performance, whereas negative affect and approaches to studying predicted none of them. As such, hypothesis 1 is not supported, whereas hypothesis 2 is supported only for positive affect. Step 3 showed that the interactions of affect and semester phase conjointly accounted for additional and significant portions of variance only in examination grades and GPA. In particular, only the interaction of negative affect and semester phase was significant for examination grades and GPA. The interaction plots in Figure 1 indicate that negative affect is negatively related to examination grades and GPA in the second half of a semester, whereas it is unrelated to both in the first half of a semester. As such, hypothesis 3 is not supported, whereas hypothesis 4 is supported for two measures of academic performance.

Insert Figure 1 about here

Mediation Analyses

The main finding of this study was that positive affect predicts all measures of academic performance. The positive affect that students experience while studying may be due to their past academic performance, as the correlations in Table 1 suggest. As such, it is possible that positive affect partially mediates the effect of past academic performance on academic performance. We tested this possibility using Hayes' (n.d.) *SPSS PROCESS* macro, Model 4, which provides bootstrap estimates with bias corrected confidence intervals of the indirect effects. In these analyses academic performance was the dependent variable, past

academic performance was the independent variable, positive affect was the mediator, and all other predictors of the Step 3 model were the covariates of the independent variable only. The indirect effect of past academic performance on academic performance through positive affect was positive and significant for GPA (.039; 95% CI: .010 to .088), examination grades (.033; 95% CI: .002 to .111), and coursework grades (.036; 95% CI: .010 to .080). However, these indirect effects accounted only for 5.8%, 5.7%, and 6.2%, in that order, of the total effects of past academic performance on academic performance. These findings suggest that the reinforcement process such that good past academic performance fosters positive affect, which in turn fosters good academic performance is weak.

Sensitivity analyses on faculty, ethnicity and nationality

In order to examine the extent to which subject area, ethnicity and nationality could affect the results the series of independent sample t-test was performed to identify

Discussion

The findings from hierarchical regression models indicate that (a) affect in studying is a better predictor of academic performance than approaches to studying are, (b) positive affect predicts better overall academic performance, and (c) negative affect in the second half of a semester predicts worse examination performance. The findings highlight the importance that student's emotions while studying have on their learning processes.

Approaches to Studying and Academic Performance

Among all the competing predictors, strategic approach to studying correlated most strongly with positive affect in studying, whereas surface approach to studying correlated most strongly with negative affect in studying. As such, an explanation for the failure of strategic approach to studying to predict academic performance is that positive affect in studying is a partially overlapping and better predictor. By the same token, an explanation for the failure of surface approach to studying to predict academic performance is that negative affect in studying is a partially overlapping and better predictor. In all, the findings of the

bivariate correlation analysis are in line with those of previous studies, whereas the findings of the regression analysis contradict previous studies in that the relationships between strategic and surface approach to studying, on one hand, and academic performance, on the other hand, vanished when controlling for affect.

Affect in Studying and Academic Performance

Among all the self-reported variables used as predictors of academic performance, positive affect turned out to be the best predictor of overall academic performance, and negative affect measured in the second half of a semester turned out to be the best predictor of examination performance. Because the hierarchical regression models controlled for past academic performance, the findings rule out the alternative hypothesis that high-performing students enjoy studying and low-performing students do not. Moreover, the mediation analyses found that the indirect effect of past academic performance on academic performance through the mediation of positive affect is significant but small, implying that a reinforcement process is present but weak. As such, positive and negative affect predict academic performance independently of past academic performance.

The findings that positive affect in studying is a better predictor of performance than strategic approach to studying and that negative affect in studying is a better predictor of performance than surface approach to studying conjointly suggest that affect is a better indicator of learning progress than approaches to studying are. To put it simply, asking students “how do you feel when you are studying?” seems to provide more insight into learning progress, or lack thereof, than asking students “how do you study?”. These findings are consistent with the *control-process model* of self-regulation of intentional behavior (Carver & Scheier, 1990, 2000), which views positive affect and negative affect in an endeavour as guides for one’s intentional behavior.

However, the predictions drawn from the *control-process model* concerning the time dynamic of the effects of affect on academic performance were only partially supported. On one hand, semester phase moderated the relationship between negative affect and examination performance in such a way that negative affect in the first phase did not predict performance, whereas negative affect in the second phase predicted worse performance. On the other hand, semester phase did not moderate the relationships between positive affect and the three measures of academic performance; so that, the final inference is that positive affect predicts better overall academic performance no matter in which semester phase it is measured.

The failure to detect a coasting effect for positive affect can only be explained within the *control-process model* by assuming that some students recalibrated their achievement goals – making them more ambitious – all along the semester; so that, positive affect was for those students a valid indicator of learning progress both in the first and in the second phase of a semester. The failure to detect a coasting effect can also be explained by competing theories of emotions. The *broaden and build model* of positive emotions (Fredrickson, 2001) posits that positive emotions expand one's attention, cognitive efficiency and behavioral repertoires (broaden hypothesis). In a similar vein, the *control value theory* (Pekrun, 2006) posits that achievement emotions (that students experience in response to their engagement in a study activity, such as boredom or enjoyment) imply task focus and hence foster performance. The scale used in the present study to measure positive affect includes adjectives that are likely to measure positive achievement emotions. Based both on the broaden hypothesis and on the characterization of positive affect as a collective label for positive achievement emotions, one would expect positive affect in studying to foster learning progress and performance, and in doing so to offset the negative effect of coasting.

Potential Applications

Whether affect is an appropriate target for intervention depends on the theoretical explanation for the found associations between affect and academic performance. On one hand, the *control-process mo*del views affect just as an indicator of learning progress. As such, based uniquely on this model one should use affect as a warning signal and concentrate the intervention on facilitating learning through traditional educational practices, such as delivering well-organised lectures, providing real-life examples and guided tutorials. On the other hand, both the *broaden and build model* and the *control value theory* view positive affect as a causal factor of learning progress. As such, based on these theories, one should use affect both as a warning signal and as a target for intervention, through less traditional educational practices, such as infusing enthusiasm in students, challenging students intellectually, and providing encouraging supervisory support.

Limitations and Directions for Future Research

The findings of this study should be evaluated in the light of three key methodological limitations. First, a stronger test of semester phase as a moderator would require measuring affect longitudinally from the start to the end of a semester. Second, no measure of effort in studying – such as attendance and time devoted to studying – was gathered, and hence the present study could not discern whether affect only is an indicator of learning progress or also is a causal factor for it. Finally, as for any longitudinal study with a limited number of points in time, the findings can only be suggestive of causal relations. A longitudinal continuation of the study to include several consecutive semesters would allow testing whether the found relationships are stable over time.

Conclusions

Despite its limitations, the present study indicates for the first time that the positive and negative emotions student experience when engaged in study activities are linked prospectively to all facets of academic performance, and that the links stand after controlling

for approaches to studying, evaluation anxiety, and prior academic performance. As such, this study provides a preliminary indication of the importance that emotions play in learning and performing, and suggests that novel forms of educational intervention aimed at enhancing positive affect in studying and decreasing negative affect in studying might be effective in fostering learning and academic performance.

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Table 1.

Means, standard deviations, Cronbach's alpha (in parentheses) and correlation coefficients of the study variables.

Variable	*X*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Academic Performance														
1. Examination Grades	57.7	17.1	(-)											
2. Coursework Grades	59.9	13.2	.647**	(-)										
3. Grade Point Average (GPA)	59.0	13.7	.862**	.891**	(-)									
Past Academic Performance														
4. Examination Grades	55.7	17.4	.581**	.531**	.577**	(-)								
5. Coursework Grades	60.8	10.3	.502**	.591**	.592**	.521**	(-)							
6. Grade Point Average (GPA)	58.4	12.1	.618**	.656**	.687**	.830**	.774**	(-)						
Approaches to studying														
7. Deep	3.0	.5	.048	.061	.042	-.057	.107	.029	(.72)					
8. Strategic	3.0	.6	.317**	.277**	.306**	.162*	.174**	.241**	.503**	(.80)				
9. Surface	2.3	.6	-.263**	-.245**	-.283**	-.252**	-.201**	-.249**	-.162**	-.354**	(.67)			
Affect in Studying														

10. Positive Affect	3.7	.8	.260**	.262**	.272**	.168*	.214**	.252**	.321**	.530**	-.315**	(.83)	
11. Negative Affect	2.1	.8	-.230**	-.160**	-.203**	-.177**	-.105	-.110	-.122*	-.264**	.454**	-.144**	(.80)
Evaluation Anxiety													
12. Evaluation Anxiety	4.1	1.0	-.151**	-.122*	-.144*	-.172*	-.126*	-.118	-.127*	-.230**	.422**	-.180**	.511**	(.83)

Notes. n = 406. "-" means that the corresponding statistic cannot be estimated. * $p < .05$ (1-tailed), ** $p < .01$ (1-tailed).

Table 2.

Standardized regression coefficients and coefficients of determination of the three-step hierarchical regressions of academic performance.

Predictor	*Dependent Variable*								
	Examination Grades			*Coursework Grades*			*Grade Point Average (GPA)*		
	Step 1	*Step 2*	*Step 3*	*Step 1*	*Step 2*	*Step 3*	*Step 1*	*Step 2*	*Step 3*
Past Academic Performance	.569**	.520**	.523**	.586**	.544**	.541**	.680**	.642**	.632**
Evaluation Anxiety	-.073**	-.008	-.008	-.037	-.011	-.007	-.054	-.001	.004
Semester Phase (1^{st} = 0, 2^{nd} = 1)	-	-.093	-.098	-	.002	.004	-	-.084	-.081
Deep Approach to Studying	-	-.115	-.071	-	-.082	-.072	-	-.043	-.028
Strategic Approach to Studying	-	.123	.092	-	.083	.078	-	.017	.011
Surface Approach to Studying	-	.067	.065	-	-.021	-.026	-	-.004	-.014
Positive Affect	-	.185*	.140	-	.165**	.160*	-	.154**	.143*
Negative Affect	-	-.134	-.212**	-	.020	-.005	-	-.062	-.100

Positive Affect X Semester Phase	-	-	-.091	-	-	-.014	-	-	-.028
Negative Affect X Semester Phase	-	-	-.187**	-	-	-.075	-	-	-.119*
R^2 *(Step 1)*	.343**	-	-	.351**	-	-	.475**	-	-
R^2 *Change (Step 2)*	-	.071**	-	-	.041*	-	-	.032*	-
R^2 *Change (Step 3)*	-	-	.030**	-	-	.005	-	-	.012*

Notes. n = 406. "-" means that the corresponding statistic cannot be estimated. * $p < .05$ (1-tailed), ** $p < .01$ (1-tailed).

Figure 1.

Interaction graphs of (a) examination grades and (b) Grade Point Average (GPA) as a function of negative affect in studying measured in the first and second half of a semester.