

Rethinking Associations between Distal Factors and Learning: Attachment, Approaches to Learning and the Mediating Role of Academic Emotions

Christos Rentzios*, Evangelia Karagiannopoulou

Department of Psychology, University of Ioannina, Ioannina, Greece
Email: *chrentzios@uoi.gr, *rentziosch@hotmail.com, ekaragia@uoi.gr

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Abstract

The present study belongs to a new strand of research in learning in higher education focusing on distal and emotional factors that contribute to learning. The purpose of the study was to explore the mediating role of academic emotions in the relationship between adult attachment styles and approaches to learning. The sample consists of 527 Greek university students (72 were men and 455 were women) attending a fourth-year full degree program. They completed the following questionnaires: The Experiences in Close Relationships-Relationship Structure Questionnaire, the Achievement Emotions Questionnaire, and the Approaches to Learning and Studying Inventory. Results revealed the mediating role of academic emotions in the relationship between both types of attachment and approaches to learning. Avoidant and anxious individuals seem to keep the same pattern of behavior in their studying as they do in their interpersonal relationships. It is suggested that attachment can function as an innate emotion regulation system that modulates students' emotions. Findings are discussed in the context of recent literature. Future implications for higher education students regarding close relationships are also discussed.

Keywords

Attachment Styles, Academic Emotions, Approaches to Learning, University Students

1. Introduction

The rising academic demands and the highly competitive context are likely to

raise a range of emotions among university students, which may have an impact on academic performance and success (Pekrun & Stephens, 2010). Despite these, most researchers have focused their studies only on single emotions and within specific settings e.g. test anxiety (Zeidner, 2014), while the variety of other emotions has been largely neglected. In recent decades, however, scholars have acknowledged that emotions can no longer be ignored in studies regarding learning (Postareff et al., 2017; Trigwell et al., 2012).

At the same time, emotions seem to play a pivotal role in shaping relationships with other people. In particular, emotion is considered to be an essential component of close relationships, both positive and negative (Bowlby, 1980; Mikulincer & Shaver, 2005). Most recently, a study revealed the importance of interpersonal closeness (student-teacher relationship quality) and students' emotions (Goetz et al., 2021), broadening the scope of the relative research area in learning and educational environments. They clearly emphasize the importance of relationship quality between academic emotions and learning environment. In this strand of research, contemporary studies point out a few associations on the way we relate to others (attachment styles) and how this influences motivation and self-regulation (Blalock et al., 2015; Orehek et al., 2017). Moreover, different attachment styles may involve various ways of regulating emotions (Fraley et al., 2006).

Individual differences in attachment styles and whether these differences affect learning through learning-related emotions remains an important research question. Attachment could act as an emotion regulation mechanism (Mikulincer et al., 2003; Mikulincer & Shaver, 2016) that can regulate academic emotions affecting students' approaches to learning. Thus, the purpose of the current study is to explore the role of academic emotions in the relationship between adult attachment styles and approaches to learning.

2. Theoretical Background

2.1. Adult Attachment Styles

Bowlby's attachment theory (Bowlby, 1988) posits that human beings are born with an innate biological system—the attachment system, that has evolved through the years and is necessary for them to survive to reproductive age (Simpson & Rholes, 2017). This attachment system keeps them in proximity with significant others (e.g. caregiver), providing security and emotion regulation in times of need (e.g. threat, anxiety, or distress). Research suggests that this attachment system continues to hold sway during adulthood and to influence individual's behavior and perception (Hazan & Shaver, 1987; Fraley & Roisman, 2019). Furthermore, recent meta-analyses suggest that adult attachment styles have higher degree of stability than they have in childhood (Fraley & Hudson, 2017). In short, the term “adult attachment style” refers to a constellation of expectations, knowledge and insecurities that people hold about their close relationships and themselves (Fraley & Roisman, 2019). A wealth body of research reveals that at-

attachment orientation has a major impact on interpersonal functioning and mental health (Mikulincer & Shaver, 2016), as well as in self-regulation, goal achievement and exploration (Hofmann et al., 2015; Martin et al., 2010; Orehek et al., 2017).

Contemporary literature conceptualizes adult attachment styles in two continuous dimensions; that is, attachment avoidance and attachment anxiety. Secure attachment style is reflected by low scores on both dimensions. The former style, avoidance-related, results in deactivating strategies and behaviors. These include appraisals that seeking support from significant others is unfruitful and the best way to deal with problems is by creating emotional distance from them (Mikulincer et al., 2003). This results in distancing/deactivating coping strategies in which avoidant individuals suppress negative thoughts and emotions to promote autonomy (Simpson & Rholes, 2017). The later, anxiety-related, results in hyperactivating strategies and refers to a lack of attachment security, a strong need for closeness along with constant worries about relationships and fear of rejection (Mikulincer et al., 2003; Shaver & Mikulincer, 2011). Individuals with elevated attachment anxiety are inclined to up-regulate their emotions, maintaining in this way high levels of negative emotions (Mikulincer et al., 2003). Few studies have indicated associations between attachment styles, aspects of learning and academic achievement. For example, adult attachment orientations significantly predicted constructive thinking in a sample of college students, linking attachment-related experiences with cognitive processes of everyday problems (Lopez, 1996). In addition, a number of studies reveal that students' attachment quality may function as a crucial factor in academic achievement (Beauchamp et al., 2016; Fass & Tubman, 2002). Besides, higher levels of either attachment anxiety or avoidance seem to have an impact on students' final grades and in their exam-related stress (Berry & Kingswell, 2012; Kurland & Siegel, 2016). In a similar vein, a recent study has shown that those who have secure attachments will have positive academic outcomes (e.g. good grades), when the reasons for studying integrate the interests of significant others, whereas, those who tend to avoid close relationships, the involvement of important others in their academic goals may become a hindrance (Gore & Rogers, 2010).

The aforementioned studies reveal evidence of the pivotal role of attachment style in a highly demanding and emotional environment, such as university (Beauchamp et al., 2016; Christie et al., 2008). However, it remains unexplored whether attachment styles can influence learning through academic emotions.

2.2. Academic Emotions

Academic emotions refer to emotions that arise during learning and achievement situations, including discrete emotions such as enjoyment, anxiety, boredom and hopelessness (Pekrun et al., 2011). These emotions are in the core of Pekrun's Control Value Theory (CVT; Pekrun, 2018), who argues that they could directly affect students' achievement through motivational mechanisms,

self-regulation and learning strategies (Pekrun, 2006).

According to CVT, academic emotions can be elicited during different academic settings such as attending a classroom (classroom-related emotions), during learning (learning-related emotions) and taking exams (exams-related emotions) (Pekrun, 2006; Pekrun et al., 2010; Sharp et al., 2018). These emotions can be differentiated by valence (positive versus negative emotions), object focus (activity versus outcome) or level of activation (activating versus deactivating emotions) (Pekrun et al., 2007). In the present study, the focus is on learning-related emotions of enjoyment (positive, activating), anxiety (negative, activating), boredom (negative, deactivating) and hopelessness (negative, deactivating) during learning. The reasons for selecting these emotions are threefold. Firstly, three of these emotions (enjoyment, anxiety and boredom) are frequently experienced by university students in achievement settings (Respondek et al., 2017; Pekrun et al., 2002). Secondly, hopelessness seems to be an important emotion in predicting performance in the academic context (Niculescu et al., 2015). Thirdly, all these four emotions are considered as the prime emotions related to academic achievement (Pekrun et al., 2011; Niculescu et al., 2016). In general, positive emotions tend to have a positive impact on students' achievement and success, by strengthening learning strategies and motivation (Goetz et al., 2012), while negative emotions usually undermine motivation and interest, cause irrelevant thinking and reduce the cognitive resources for task performance (Daniels et al., 2009; Trigwell et al., 2012). However, these associations are not always in the expected directions. For instance, positive emotions could lead to the adoption of superficial learning strategies, while some negative emotions may even boost learning (Pekrun et al., 2002; Goetz et al., 2006). For these reasons, the research should be expanded and investigate more factors that could contribute to the relationship between emotions and learning. Moreover, it would be wise to explore discrete academic emotions in undergraduates' learning, rather than examining general positive and negative emotions, in order to shed light on a more detailed manner.

Enjoyment is considered to be a positive activating emotion that is classified as an activity emotion (Pekrun, 2018). When a student's personal goals and learning task are in congruence, then they experience the academic emotion of enjoyment (Linnenbrink, 2007). Moreover, during enjoyment student considers the learning situation as positively valued and controllable (Camacho-Morles et al., 2021). The academic emotion of enjoyment has been found to positively predict students' academic performance (Daniels et al., 2009). Anxiety is thought to be a negative activating emotion that is also ranked as an activity emotion (Pekrun, 2018), and is frequently reported among university students (Pekrun & Stephens, 2010). The academic emotion of anxiety is experienced when a student values negatively an achievement situation whereas they have a moderate control over it. In general, anxiety may impair students' task-irrelevant thinking and consequently, performance, but it could induce motivation to study harder, faci-

litating overall success, especially in individuals who are more resilient in particular emotion (Pekrun & Stephens, 2012). Boredom, a negative, deactivating emotion is also classified as an activity emotion (Pekrun, 2018). A student may experience boredom when there are no specific goals, or when the student's personal goals and the given task don't match, and finally, when a learning activity isn't valued as a positive one or negative one (Pekrun, 2011). Moreover, the lack of control and value over activity may lead to an increase of boredom (Niculescu et al., 2016). The emotion of boredom goes hand in hand with negative feelings, lack of interest and stimulation and superficial approaches to learning (Pekrun et al., 2010; Sharp et al., 2018). Hopelessness, a devastated emotion, has received scant attention, although, its detrimental effects on academic achievement have been documented in recent studies (Niculescu et al., 2015; Pekrun & Stephens, 2012). Hopelessness is considered as a negative deactivating emotion that is triggered when a student is in complete lack of control over an academic activity and at the same time they value quite high the particular task (Pekrun & Perry, 2014).

So, given the clear impact of academic emotions on learning outcomes, our study scope is directed at investigating distal and antecedents variables of these emotions that have not been previously studied in tandem.

2.3. Student Approaches to Learning

In the last decades, students' experience of learning in order to promote optimal learning has been in the heart of research in higher education, revealing a student-focused perspective (Entwistle & Ramsden, 1983). The "student approaches to learning" tradition consists of one of the main frameworks for comprehending learning in higher education (Entwistle, 2018).

Approaches to learning depict the different ways students go about learning and they emerge from students' perceptions of their academic activities that are influenced by their personal characteristics (Biggs, 1987). Approaches are categorized in three distinct types: deep, surface and organised approach (Marton & Säljö, 1997; Entwistle, McCune & Walker, 2001). During deep approach, the motivation is intrinsic; the student is engaged with the new knowledge, seeking personal meaning and understanding. The deep approach is positively associated with academic achievement and study success (Richardson et al., 2012), although, these associations have not been significant in all cases (Herrmann et al., 2017). During surface approach, the motivation is mainly extrinsic to the task; the student is focused on rote learning, usually memorizing fragmented parts of the given knowledge, while investing the minimum effort. Recent studies have revealed the negative association between the surface approach to learning and academic achievement (Chamorro-Premuzic et al., 2007; Karagiannopoulou & Milienos, 2015). However, the surface approach in specific demanding learning contexts may actually function as an effective coping mechanism (Kember, 2004). The third approach, the strategic, is considered as an approach to study-

ing, organizing time and effort and is similar as a concept to self-regulation (Lindblom-Ylänne et al., 2019; Postareff et al., 2017). Most recent studies have revealed the beneficial effect of strategic approach on academic achievement (Herrmann et al., 2017; Richardson et al., 2012).

Only recently, approaches to learning have been studied along with academic emotions (Rentzios et al., 2019; Trigwell et al., 2012). Students who feel positive emotions during their studies may prompt a deep approach to learning, while those who experience negative emotions during learning may adopt a more surface approach (Trigwell et al., 2012). Although the results of the aforementioned studies are in the expected directions, (Postareff et al., 2017) carefully indicate the complex “web” of associations among academic emotions, approaches to learning and study success. In this line of thinking, few studies suggest that personality traits involving emotional facets are associated with approaches to learning (Chamorro-Premuzic et al., 2007; Von Stumm & Furnham, 2012). The examination of the relationship between academic emotions and approaches to learning through individual traits could possibly shed light on this complex “web” of associations. Contemporary literature on adult attachment clearly suggests that the way we relate to others has impact on motivation and self-regulation e.g. (Blalock et al., 2015; Orehek et al., 2017), aspects that impact learning. To our knowledge, there is no study that has assessed the relationship among attachment styles, academic emotions and approaches to learning. Therefore, we assume that attachment styles may act as catalysts for different types of academic emotions that in turn will influence approaches to learning.

2.4. Rationale of the Study

Recent literature suggests that distal individual characteristics may influence students’ academic emotions (King & Gaerlan, 2014; Sander & de la Fuente, 2020). Furthermore, (Moreau et al., 2019) clearly point out that overemphasizing the role of malleable cognitive-psychological factors instead of examining the impact of stable characteristics too, leads to a “false picture of real learning” and study success. In this line of thinking, attachment style may function as a distal antecedent, influencing students’ emotions, which in turn, may have an impact on approaches to learning. Thus, this study utilizes the Control-Value Theory of Achievement Emotions (Pekrun & Perry, 2014) as a theoretical framework and posits attachment styles as distal factors, academic emotions as mediators and approaches to learning as outcomes. As (Pekrun et al., 2007) wrote: “...control and value appraisals are proximal determinants of these emotions...more distal individual antecedents should affect these emotions by influencing control and value appraisals in the first place” (p. 16). Whether students are influenced in their learning, by the way they associate with others, remains a research question. As a result, this study is particularly interested in how adult attachment style, a distal characteristic, is associated with the experience of different types of academic emotions and how they in turn, influence different approaches to learning.

3. Methodology

3.1. Participants and Procedure

Employing a convenient sampling method, the sample consisted of 527 Greek university undergraduates, attending a fourth-year full degree program at the University of Ioannina in Western Greece. The participants were from two departments, social sciences and primary education, of whom 72 were men (13.5%) and 455 were women (86.3%). In Greece, there is a great unbalance between women and men in Social Sciences and Education departments (Eurostat, 2018). The age mean for the total sample was $M = 20.5$ years, with the 93% of the sample to be under the age of 22 years old. In terms of years of study, 136 (25.8%) were first-year students, 139 (26.4%) were second-year students, 95 (18%) were third-year students, 157 (29.8%) were fourth-year or higher students.

Regarding procedure, all ethical protocols were taken into account. Students anonymously and voluntarily completed the questionnaires in their classes before or during an ordinary lecture, the completion of which lasted approximately 30 minutes on average. Prior to the administration, a written consent form was obtained from all participants. The purpose and the aims of the study were also explicitly stated. Besides, the teacher and the students were informed about their contribution to the study in a previous meeting from the researchers. The data were collected during the 2019 winter semester. After this, all questionnaires were transferred, encoded and analyzed with SPSS 23.

3.2. Instruments

3.2.1. Demographics

A short demographic questionnaire was filled out in order to collect some basic information about the students' gender, age, department and year of study.

3.2.2. Adult Attachment Style

To measure adult attachment styles the ECR-RS (The Experiences in Close Relationships-Relationship Structure Questionnaire) (Fraley et al., 2011) was administered. The ECR-RS is comprised of 9 items formulated in a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree) and assesses two adult attachment dimensions, namely avoidance (items from 1 - 6) and anxiety (items from 7 - 9). Example statements for the avoidant style are: "I talk things over with this person" and for the anxious type is "I'm afraid that this person may abandon me". High scores on the avoidance dimension reflect people who prefer emotional distance to others, while high scores on anxious dimension represent people who tend to worry about their close relationships. According to the constructors of the scale, its implementation may also work for different types of close relationships or for general attachment styles (Fraley et al., 2015). Moreover, students at this age begin to explore their identities and tend to shift their attachment needs from parents to peers and romantic partners (Chopik et al., 2017; Fraley & Davis, 1997). Thus, for the study's purpose, we measure people's general attachment styles. The ECR-RS is a short form of the Experiences to

Close Relationships-Revised Scale (ERC-R) (Fraley et al., 2000) that has been translated and adapted in the Greek language by (Tsagarakis et al., 2007). The reliability for the two subscales were $\alpha = 0.85$ (Avoidance) and $\alpha = 0.86$ (Anxiety), respectively.

3.2.3. Academic Emotions

The discrete academic emotions of enjoyment, anxiety, boredom and hopelessness were each measured with the four learning-related scales of the Achievement Emotions Questionnaire (Pekrun et al., 2011). Students answered on a five-point Likert scale (1 = Strongly disagree to 5 = Strongly agree) about items that referred to emotions that are experienced before, during, or after studying for a course. The enjoyment scale (10 items, e.g. “I enjoy dealing with the course material”), the anxiety scale (11 items, e.g. “I worry whether I’m able to cope with all my work”), the boredom scale (11 items, e.g. “Studying for my course bores me”), and the hopelessness scale (11 items, e.g. “I feel so helpless that I can’t give my studies my full efforts”). High scores on each emotion represent that the emotion is being experienced more strongly. The Cronbach’s alpha for this study was 0.79 for the academic emotion of Enjoyment, 0.82 for the academic emotion of Anxiety, 0.92 for the academic emotion of Boredom and, 0.90 for the academic emotion of Hopelessness.

3.2.4. Approaches to Learning

In order to measure approaches to learning the Finish version of the Approaches to Learning and Studying Inventory (ALSI) (Parpala et al., 2013) was implemented. The questionnaire consists of 16 items that forming three approaches to learning: the deep approach (8 items, e.g. “I look at evidence carefully to reach my own conclusion about what I’m studying”), the surface approach (4 items, e.g. “Often I have to learn over and over things that don’t really make sense to me”) and the strategic approach (4 items, e.g. “I organize my study time carefully to make the best use of it”). Respondents answered each item on a five-point Likert scale (1 = Strongly disagree to 5 = Strongly agree). High scores on each subscale reflect students’ preference with each approach. The inventory has been translated into the Greek population and used in studies showing good psychometric properties (Karagiannopoulou et al., 2014; Rentzios et al., 2019). In the present study internal consistency reliability was 0.74 for the Deep approach, 0.75 for the Surface approach and, 0.82 for the Strategic approach.

3.3. Data Analysis

The analysis of the dataset was performed using SPSS 23.0. In order to run the basic analysis, confirmatory analyses were implemented for assessing the psychometric properties of the instruments used in the study, along with the computation of Cronbach’s alpha. Pearson correlations coefficients among attachment styles, academic emotions and approaches to learning were also computed. Some preliminary data checks were conducted in order to examine missing val-

ues and outliers.

The hypothesis that the academic emotions (enjoyment, anxiety, boredom and hopelessness) would have a mediating effect on the relationship between attachment styles (avoidant and anxious) and approaches to learning (deep, surface and strategic) was explored using the PROCESS tool V3.5, model 4 (Hayes, 2018). Each subscale modelled separately. The analyses were based on 5000 bootstrapped samples, using bias-corrected 95% confidence intervals. The use of the bootstrap approach overcomes the widely used casual steps of (Baron & Kenny, 1986) and the (Sobel, 1982) test (Preacher & Hayes, 2004; Shrout & Bolger, 2002; Zhao, et al., 2010). The indirect effect was considered statistically significant if the CI did not include “zero” (Hayes, 2009). Furthermore, several scholars (Hayes, 2018; Rucker et al., 2011; Zhao et al., 2010) argued that a significant indirect effect is the sole criterion for establishing mediation, even in the absence of direct effect. In this line of research, the mediation of this study was tested within the theoretical framework suggested by (Zhao et al., 2010). They discussed three types of mediation models: 1) a complementary-type mediation (similar to “partial mediation” in (Baron & Kenny, 1986)’s categorization), whereas both the indirect and direct effects are significant and pointing to the same direction; 2) a competitive-type mediation, where indirect and direct effects are significant but point in opposite directions; and 3) an indirect-only type mediation (similar to “full mediation” in (Baron & Kenny, 1986)’s categorization), wherein there is a significant indirect effect but non significant direct effect. This particular framework allows for more elaborated mediation analysis, taking also into account the types of competitive mediation and the indirect-only mediation, which may have an important theoretical meaning on the study’s variables (Zhao et al., 2010; Vainio & Daukantaitė, 2015).

All mediation analyses followed the hypothesized theoretical framework illustrated in **Figure 1**. The path represents the effect of the predictor (attachment style) on the mediator (academic emotions); the *b* path is the effect of the mediator (academic emotions) on the dependent variable (approaches to learning), controlling for the predictor; the indirect effect is the product of $a * b$. The *c* path (total effect) refers to the direct association between the predictor and the dependent variable; the c' path refers to the direct effect of the predictor variable on the dependent variable, after controlling for the proposed mediator.

4. Results

Results of Confirmatory factor analysis are shown in **Table 1**. The results indicate that the indices are found in an acceptable range of values (i.e. RMSEA and SRMR are small, whereas CFI, TLI are quite high) (Kline, 2016; Raykov & Marcoulides, 2012). Thus, the latent structure of the measures has been verified. Alpha reliabilities, standard deviations and means for instruments used in the present study are presented in **Table 2**. All Cronbach’s alpha were from medium to high levels and similar to previous studies.

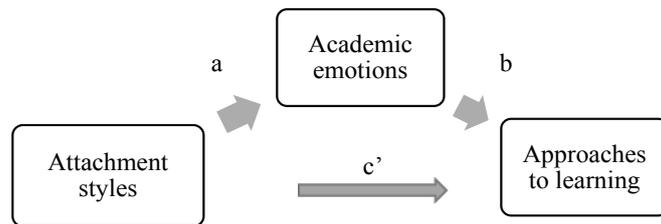


Figure 1. The hypothesized theoretical model of the indirect effect of attachment styles (i.e. avoidant and anxious) on approaches to learning (i.e. deep, surface and strategic) through academic emotions (i.e. enjoyment, anxiety, boredom and hopelessness).

Table 1. Confirmatory Factor Analysis on the instruments used in our study.

	χ^2/df	CFI	TLI	RMSEA (95% CI1)	SRMR
ECR-RS	21/97.362	0.965	0.940	0.083	0.057
Learning-related Academic Emotions	432/977	0.919	0.907	0.049	0.060
ALSI	97/194	0.956	0.945	0.044	0.047

Note. ¹95% Confidence Interval.

Table 2. Means, standard deviations and Cronbach's alpha.

Variables	Mean	SD	Cronbach's α
Avoidant	11.40	5.25	0.851
Anxious	6.11	3.62	0.861
Enjoyment	33.00	5.15	0.785
Anxiety	28.26	7.43	0.824
Boredom	25.14	8.99	0.922
Hopelessness	20.46	8.01	0.903
Deep	27.58	3.90	0.744
Surface	9.21	2.69	0.749
Strategic	11.78	2.86	0.824

Pearson r correlation among all variables can be found in **Table 3**. All variables correlated in the expected directions. Indicatively, avoidant style was significantly positively correlated with anxious style ($r = 0.280^{**}$, $p < 0.001$), boredom ($r = 0.100^*$, $p = 0.022$) and hopelessness ($r = 0.134^{**}$, $p = 0.005$); negatively correlated with enjoyment ($r = -0.176^{**}$, $p < 0.001$), deep approach ($r = -0.123^{**}$, $p = 0.005$) and strategic approach ($r = -0.176^{**}$, $p < 0.001$). Anxious style was significantly positively correlated with avoidant style ($r = 0.280^{**}$, $p < 0.001$), with anxiety ($r = 0.180^{**}$, $p < 0.001$), with boredom ($r = 0.188^{**}$, $p < 0.001$), with hopelessness ($r = 0.265^{**}$, $p < 0.001$) and with surface approach ($r = 0.195^{**}$, $p < 0.001$); negatively correlated with enjoyment ($r = -0.121^{**}$, $p = 0.005$), with deep approach ($r = -0.090^*$, $p = 0.040$) and with strategic approach ($r = -0.091^*$, $p = 0.038$). The highest correlations were found between academic emotions and approaches to learning (**Table 3**).

Table 3. Pearson correlation coefficient among avoidant style, anxious style, enjoyment, anxiety, boredom, hopelessness, deep approach, surface approach and strategic approach.

	Avoidant	Anxious	Enjoyment	Anxiety	Boredom	Hopelessness	Deep	Surface	Strategic
Avoidant	1	0.280**	-0.176**	-0.0014	0.100*	0.134**	-0.123**	0.0065	-0.176**
Anxious		1	-0.121**	0.180**	0.188**	0.265**	-0.090*	0.195**	-0.091*
Enjoyment			1	-0.297**	-0.578**	-0.441**	0.573**	-0.333**	0.343**
Anxiety				1	0.541**	0.715**	-0.155**	0.529**	-0.129**
Boredom					1	0.667**	-0.373**	0.492**	-0.387**
Hopelessness						1	-0.313**	0.516**	-0.295**
Deep							1	-0.194**	0.299**
Surface								1	-0.128**
Strategic									1

Note. * $p < 0.05$ ** $p < 0.01$.

In order to explore the mediating effect of the four learning-related emotions between attachment styles and approaches to learning, a mediation analysis was carried out, using PROCESS tool V3.5 (Hayes, 2018). Moreover, the use of two effect size measures, the mediation ratio (Pm) (Ditlevsen et al., 2005), and the Rm (Sobel, 1982) were calculated. The former (Pm) refers to the ratio of indirect effect to the total effect and the later (Rm) represents the ratio of the indirect effect to the direct effect. Although, almost all effect sizes have several limitations (Preacher & Kelly, 2011), the two measures, within the framework of (Zhao et al. 2010), offer a clear interpretation of the magnitude of the mediation, especially for simple mediation models. Separate analyses were conducted including attachment styles (avoidant and anxious) as predictors, the four learning-related emotions (enjoyment, anxiety, boredom and hopelessness) as mediators and approaches to learning (deep, surface and organised approach) as dependent variables (Table 4). All mediations reported are significant. Only the academic emotion of anxiety did not mediate the relationship between avoidant type and approaches to learning.

4.1. Mediation Analysis Results: The Mediating Role of Academic Emotions between Avoidant Style and Deep Approach to Learning

The indirect effect of avoidant style on deep approach through enjoyment was statistically significant and negative [$ab = -0.10$, BCI (-0.1537, -0.0454)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of avoidant style on deep approach through boredom was statistically significant and negative [$ab = -0.04$, BCI (-0.0732, -0.0035)]. Both the indirect and direct (c' : $B = -0.0844$) effects are significant and pointing to the same direction. In this case, a complementary mediation has occurred (Zhao et al., 2010). The indirect

Table 4. Summary of mediation analyses for the prediction of approaches to learning.

Predictor	Mediator	Dependent	Beta coefficients				Pm	Rm
			c	a	b	c'		
Avoidant Style	Enjoyment	Deep Approach	-0.1230	-0.1756	0.5701	-0.0229	Indirect only	Indirect only
	Boredom		-0.1230	0.1055	-0.3659	-0.0844	31.4%	45.7%
	Hopelessness		-0.1230	0.1302	-0.3032	-0.0836	32.1%	47.2%
Avoidant Style	Enjoyment	Surface Approach	0.0652	-0.1756	-0.3315	0.0070	Indirect only	Indirect only
	Boredom		0.0652	0.1055	0.4898	0.0135	Indirect only	Indirect only
	Hopelessness		0.0652	0.1302	0.5161	-0.0020	Indirect only	Indirect only
Avoidant Style	Enjoyment	Strategic Approach	-0.1758	-0.1756	0.3215	-0.1193	32.1%	47.3%
	Boredom		-0.1758	0.1055	-0.3720	-0.1365	22.3%	28.8%
	Hopelessness		-0.1758	0.1302	-0.2761	-0.1398	20.4%	25.7%
Anxious Style	Enjoyment	Deep Approach	-0.0899	-0.1209	0.5716	-0.0208	Indirect only	Indirect only
	Anxiety		-0.0895	0.1805	-0.1455	-0.0633	Indirect only	Indirect only
	Boredom		-0.0899	0.1944	-0.3714	-0.0177	Indirect only	Indirect only
	Hopelessness		-0.0899	0.2623	-0.3119	-0.0081	Indirect only	Indirect only
Anxious Style	Enjoyment	Surface Approach	0.1946	-0.1209	-0.3138	0.1566	19.5%	24.2%
	Anxiety		0.1945	0.1805	0.5100	0.1024	47.3%	89.9%
	Boredom		0.1946	0.1944	0.4712	0.1030	47.1%	88.9%
	Hopelessness		0.1946	0.2623	0.4991	0.0636	Indirect only	Indirect only
Anxious Style	Enjoyment	Strategic Approach	-0.0908	-0.1209	0.3364	-0.0501	Indirect only	Indirect only
	Anxiety		-0.0922	0.1805	-0.1150	-0.0715	Indirect only	Indirect only
	Boredom		-0.0908	0.1944	-0.3832	-0.0163	Indirect only	Indirect only
	Hopelessness		-0.0908	0.2623	-0.2905	-0.0146	Indirect only	Indirect only

Note¹: The Pm measure indicates the proportion of the indirect effect to the total effect and the Rm the ratio of the direct effect to the total effect. Note²: In the case of indirect-only mediation, there is no need to examine the Pm/Rm measure. All coefficients are standardized.

effect of avoidant style on deep approach through hopelessness was statistically significant and negative [$ab = -0.04$, BCI ($-0.0741, -0.0109$)]. Both the indirect and direct (c' : $B = -0.0836$) effects are significant and pointing to the same direction. In this case, a complementary mediation has occurred (Zhao et al., 2010).

4.2. Mediation Analysis Results: The Mediating Role of Academic Emotions between Avoidant Style and Surface Approach to Learning

The indirect effect of avoidant style on surface approach through enjoyment was statistically significant and positive [$ab = 0.06$, BCI ($0.0266, 0.0948$)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of avoidant style on surface approach through boredom was statistically significant

and positive [$ab = 0.05$, BCI (0.0059, 0.0982)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of avoidant style on surface approach through hopelessness was statistically significant and positive [$ab = 0.07$, BCI (0.0217, 0.1165)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010).

4.3. Mediation Analysis Results: The Mediating Role of Academic Emotions between Avoidant Style and Strategic Approach to Learning

The indirect effect of avoidant style on strategic approach through enjoyment was statistically significant and negative [$ab = -0.06$, BCI (-0.0904, -0.0253)]. Both the indirect and direct (c' : $B = -0.1193$) effects are significant and pointing to the same direction. In this case, a complementary mediation (partial mediation) has occurred (Zhao et al., 2010). The indirect effect of avoidant style on strategic approach through boredom was statistically significant and negative [$ab = -0.04$, BCI (-0.0766, -0.0047)]. Both the indirect and direct (c' : $B = -0.1758$) effects are significant and pointing to the same direction. In this case, a complementary mediation (partial mediation) has occurred (Zhao et al., 2010). The indirect effect of avoidant style on strategic approach through hopelessness was statistically significant and negative [$ab = -0.04$, BCI (-0.0674, -0.0102)]. Both the indirect and direct (c' : $B = -0.1398$) effects are significant and pointing to the same direction; a complementary mediation (partial) has occurred (Zhao et al., 2010).

4.4. Mediation Analysis Results: The Mediating Role of Academic Emotions between Anxious Style and Deep Approach to Learning

The indirect effect of anxious style on deep approach through enjoyment was statistically significant and negative [$ab = -0.07$, BCI (-0.1182, -0.0177)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on deep approach through anxiety was statistically significant and negative [$ab = -0.03$, BCI (-0.0481, -0.0087)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on deep approach through boredom was statistically significant and negative [$ab = -0.07$, BCI (-0.1100, -0.0372)]. In this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on deep approach through hopelessness was statistically significant and negative [$ab = -0.08$, BCI (-0.1175, -0.0498)]. Also in this case, where only the indirect effect is statistically significant, an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010).

4.5. Mediation Analysis Results: The Mediating Role of Academic Emotions between Anxious Style and Surface Approach to Learning

The indirect effect of anxious style on surface approach through enjoyment was statistically significant and positive [$ab = 0.04$, BCI (0.0102, 0.0692)]. Both the indirect and direct (c' : $B = 0.1156$) effects are significant and pointing to the same direction. In this case, a complementary mediation (partial mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on surface approach through anxiety was statistically significant and positive [$ab = 0.09$, BCI (0.0466, 0.1375)]. Both the indirect and direct (c' : $B = 0.1024$) effects are significant and pointing to the same direction. In this case, a complementary mediation (partial mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on surface approach through boredom was statistically significant and positive [$ab = 0.09$, BCI (0.0945, 0.1375)]. Both the indirect and direct (c' : $B = 0.1030$) effects are significant and pointing to the same direction; a complementary mediation (partial mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on surface approach through hopelessness was statistically significant and positive [$ab = 0.13$, BCI (0.0864, 0.1782)]. Only the indirect effect is significant; an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010).

4.6. Mediation Analysis Results: The Mediating Role of Academic Emotions between Anxious Style and Strategic Approach to Learning

The indirect effect of anxious style on strategic approach through enjoyment was statistically significant and negative [$ab = -0.04$, BCI (-0.0727, -0.0105)]. Only the indirect effect is significant; an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on strategic approach through anxiety was statistically significant and negative [$ab = -0.02$, BCI (-0.0402, -0.0050)]. Only the indirect effect is significant; an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on strategic approach through boredom was statistically significant and negative [$ab = -0.07$, BCI (-0.1120, -0.0407)]. Only the indirect effect is significant; an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010). The indirect effect of anxious style on strategic approach through hopelessness was statistically significant and negative [$ab = -0.08$, BCI (-0.1103, -0.0469)]. Only the indirect effect is significant; an indirect-only mediation (full mediation) has occurred (Zhao et al., 2010).

5. Discussion

The study explored the relationship between adult attachment styles (i.e. avoidant and anxious), academic emotions (i.e. enjoyment, anxiety, boredom and hopelessness) and approaches to learning (i.e. deep, surface and strategic). To our knowledge, this is the first study exploring interrelations between attach-

ment styles, specific academic emotions and approaches to learning, suggesting that distal antecedents may influence the way university students go about learning. Almost all learning-related emotions act as mediators in the relationship between attachment styles and approaches to learning. It is suggested that the effect of adult attachment styles on approaches to learning could be explained using the academic emotions of enjoyment, anxiety, boredom and hopelessness. Furthermore, it is proposed that adult attachment may act as an emotion regulation strategy through which students regulate their emotions towards approaches to learning. Attachment literature posits that attachment style is characterized as an innate emotion regulation system from which individuals can generate and regulate their emotions (Shaver et al., 2009; Mikulincer & Shaver, 2016).

The study cautiously suggests two patterns of associations between avoidant and anxious attachment style: 1) avoidant style complementary influences the deep and strategic approach through the academic emotions; and 2) anxious style complementary influences the surface approach through the academic emotions. Additionally, it must be noted that the learning-related anxiety does not contribute to any relationship between avoidant style and approaches to learning.

5.1. Avoidant Style and Learning

Avoidant attached students prefer to use the negative, deactivating learning-related emotions of boredom and hopelessness to approach the surface learning strategy. Possibly, these emotions act as another hypoactivation strategy that helps avoidant students maintain the attachment system deactivated. These individuals rely on deactivating strategies such as avoiding seeking support or keeping emotional distance from others just to have their attachment system inactive (Mikulincer et al., 2003). Meanwhile, they downplay the academic emotion of enjoyment. Avoidants experience positive emotions, like enjoyment, as destabilizing (Goodall, 2015); enjoyment during learning may bring close important others and this is something that avoidantly attached individuals do not wish. They mostly prefer to keep a more distal approach with significant others, avoid emotional proximity and usually do not share their emotions in risk of damaging their self-esteem (Mikulincer et al., 2003; Bowlby, 1982). Moreover, no direct association between avoidant style and surface approach was found. The surface approach to learning is usually associated with high levels of stress and anxiety (Spada & Moneta, 2014). It is possible that avoidant students do not prefer to interact directly with this particular approach which goes in tandem with anxiety, an emotion that most of the time is activating the attachment system. Students who worry about their studies or express fear of failure usually steer towards the surface approach to learning (Öhrstedt & Lindfors, 2016); avoidantly attached individuals usually prefer not to express their worries and fears widely.

With the exception of enjoyment, which indirectly mediates the relationship

between avoidant style and deep approach, the negative deactivating emotions of boredom and hopelessness complementary mediate the relationship between avoidant style and deep approach. This means that avoidants opt for the deep approach both directly and indirectly through these emotions. Boredom is experienced when a person doesn't value as positive or negative a learning activity or he has no control over it (Pekrun, 2011). Insecure individuals feel less control over their goals (i.e. learning task) (Hofmann et al., 2015) and thus experience boredom that results in less use of deep approach. Previous studies have confirmed the increase of boredom during lack of control over a learning situation (Niculescu et al., 2016). Similarly, hopelessness results from avoidants that seem to have lack of control over a learning task, while they value it quite high (Pekrun & Perry, 2014); this has a negative effect on deep approach.

In respect to the strategic approach, avoidant students partially (directly and indirectly) influence the strategic approach through enjoyment and the deactivating, negative emotions. Such students experience less learning-related enjoyment during studying and thus use less strategic approach. Attachment insecurity is usually associated with the minimization of positive emotions; insecurely attached individuals are missing out potential beneficial effects of positive emotions because they do not appraise positive experiences as meaningful (Gentzler et al., 2010). Rejection of positive emotions allows avoidants to keep their defenses high so as not to feel emotionally attached (Shaver & Mikulincer, 2008). Moreover, they tend to experience more boredom and hopelessness that in turn results in a low strategic approach. Boredom is usually associated negatively with the strategic approach (Sharp et al., 2018).

Furthermore the above mentioned indicate an interesting pattern; the avoidance dimension is related directly and indirectly to both deep and strategic approach. Avoidants are characterized by high levels of independence and that is why they are considered as self-reliant individuals (Wardecker et al., 2017); the deep and the strategic approach (an approach that is closely related to self-regulation) also require a level of autonomy and independence. It is possible that avoidants' effort to directly approach the adaptive learning strategies is a sign of seeking to engage in more effective ways during learning. In fact, sometimes avoidant people rely on more constructive emotion regulation strategies under certain conditions (Winterheld, 2016). For instance, it has been found that some avoidant strategies are sufficient for dealing with minor stressors, yet fail when stress persists (Shaver & Mikulincer, 2008).

Interestingly, the academic emotion of anxiety did not appear in any relationship with the avoidance dimension and approaches to learning. This particular negative activating emotion may hyperactivate the attachment system, something that avoidants, contrary to anxious, do not prefer. Most likely, avoidant students inhibit their learning-related anxiety within achievement domains in their effort to control it, "building" a defensive wall (Bowlby, 1982; Kogut, 2016). Hiding their learning-related anxiety possibly reflects their effort to maintain their self-esteem intact and thus, they tend to compensate for more

distal and emotionally detached relationships (Bowlby, 1988). Probably, this explains why learning-related anxiety doesn't appear in any relationship between avoidants and approaches to learning.

5.2. Anxious Style and Learning

In our study, students with anxious style use all four academic emotions to approach learning. More specifically, all three negative emotions (*i.e.* anxiety, boredom and hopelessness) mediate the relationship between anxious attachment style and learning approaches. Individuals who score high on attachment anxiety tend to intensify and exaggerate negative emotions in the relationships with important others (Shaver & Mikulincer, 2014). The same pattern seems to be detected in our study; students through negative emotions attempt to regulate their attachment anxiety that results in decreasing the deep and strategic approach, while at the same time the surface approach is enhanced. Probably, they up-regulate and maintain negative emotions at high levels (Mikulincer et al., 2003), because in this way they have learned to cope with competitive contexts. In fact, anxious individuals allow negative experiences or thoughts to intrude in future imaginary events (Goodall, 2015). It is possible that these kinds of hyper-activating strategies may work in a dual framework in learning context: on the one hand they prevent students from feeling secure and on the other hand they do not allow them to think creatively (Shaver & Mikulincer, 2008). In addition, anxious students experience less learning-related enjoyment that further results in weakening deep and strategic approach, while the surface approach is increasing.

It must be noted that the anxious style affects negatively through the four learning-related emotions the adaptive approaches to learning (deep and strategic approach). On the contrary, with the exception of hopelessness, anxious students affect partially and positively the surface approach to learning. This particular approach is often associated with high levels of anxiety (Spada & Moneta, 2014), an emotion that anxious individuals rely on in order to have the attachment system activated (Mikulincer & Shaver, 2012). Furthermore, students who adopt the surface approach express, stress, worries and fear of failure during their studies (Entwistle et al., 2000); worry and fear of failure are characteristics of anxiously attached individuals. It is possible that undergraduates with an anxious attachment style opt to adopt this approach in order to keep in their studies the same "anxious environment" that they have in their close relationships.

In addition, anxious students use learning-related emotions as a means to approach the adaptive learning strategies (deep and strategic). Research points out that anxious attached individuals exhibit an extensive and rapid spread of activation among negative emotions (Mikulincer & Shaver, 2019). They up-regulate these emotions in order to achieve their goals. Previous studies suggest that attachment-anxious people may have difficulties in differentiating between discrete emotions, due to the intensity of their reactions to demanding and threat-

ening events (Mallinckrodt & Wei, 2005). This may be the reason why they use all four learning-related emotions, unlike attachment-avoidants that seem to exclude academic anxiety during their studying. Probably, their need to approach the deep and strategic strategy requires all the available emotions to be invoked. On the contrary, avoidants suppress their academic anxiety and allow only the deactivating negative emotions of boredom and hopelessness to be experienced. It seems possible, therefore, that these undergraduates perceive the particular deactivating emotions of something that is not threatening. Learning-related boredom and hopelessness don't seem to evoke unwanted attachment needs; avoidantly attached individuals usually experience boredom and lack of interest, characteristics of these particular emotions (Mikulincer & Shaver, 2012).

Furthermore, our findings are in agreement with previous studies suggesting similar associations between academic emotions and approaches to learning (Rentzios et al., 2019; Trigwell et al., 2012). Indicatively, the positive emotion of enjoyment is correlated with deep and strategic approach, while the negative emotions of anxiety, boredom and hopelessness are positively associated with surface approach. A strong association between learning-related enjoyment and deep approach ($r = 0.573$) shows that when a student experiences enjoyment during learning, they opt for a deep approach (Postareff et al., 2017). On the contrary, anxiety, boredom and helplessness are highly correlated with surface approach ($r = 0.529$, $r = 0.492$, $r = 0.519$, respectively); in this case, when student experiences these negative emotions they adopt a more surface approach (Trigwell et al., 2012).

Overall, study's results are in line with contemporary research that underline the important role of more individual characteristics in students' learning (Karagiannopoulou et al., 2020; King & Gaerlan, 2014; Sander & de la Fuente, 2020). Adult attachment styles may function as internal motivators that influence goals and targets in one's life, going beyond important relationships (Blalock et al., 2015). In line with this, the present study supports previous research arguing that attachment styles influence more broad-based psychological functioning like self-regulation and autonomous exploration (Drake et al., 2014; Feeney & Van Vleet, 2010). Moreover, we add in the current literature the premise that the way in which university students relate to significant others may have an impact on the way they go about learning, when emotions come into play. Both insecure attachment styles are detrimental to the adaptive approaches to learning (deep and strategic approach), while they foster the surface approach. Nevertheless, avoidants steer towards the adaptive approaches more easily. Finally, the findings confirm Pekrun's CVT of achievement emotions (Pekrun, 2018) which suggests associations between distal variables and learning-related factors (Feeney & Van Vleet, 2010).

5.3. Limitations and Future Implications

Although results are promising, several limitations should be addressed in the present study. Firstly, female participants overwhelming the data sample; the

unbalanced gender ratio is typical for particular departments that the study took place (Eurostat, 2018). Nevertheless, caution must be taken when generalizing study's findings to other university disciplines. Longitudinal studies or studies with mixed methodological approaches should be considered in order to verify study's results. Future research should examine the other learning-related emotions (e.g. anger, shame, pride, hope) in order to seek out possible associations with attachment styles. In addition, other methodological approaches should be considered. For instance, the widely used Adult Attachment Interview could be implemented in conjunction with self-reported instruments to amplify the current results. Moreover, concepts that are closely related to attachment (i.e. mentalization and epistemic trust) should be taken into consideration in future research associated with learning environment. From the study perspective, it is important to raise the role of such personality traits in order to shed light on targeted interventions that may promote students' well being along with adaptive learning strategies (Ng & Vella-Brodrick, 2019; Camacho-Morles et al., 2021). Furthermore, higher education institutions should pay more attention towards students' close relationships with important others.

6. Conclusion

Some scholars highlight the importance of stable characteristics and how they in turn influence proximal psychological mechanisms that are related to learning (Hampson, 2012). Emphasizing distal factors and not only on cognitive-psychological variables may offer a more nuanced picture of learning and study success (Moreau et al., 2019). Besides, Kogut clearly posits that "the academic achievement domain may be analogical to the concept of exploration in infancy" (Kogut, 2016). Contemporary literature has highlighted the importance of exploration in adulthood connecting it with attachment styles. Significant others could serve as a secure/insecure base from which individuals can explore the environment (Orehek et al., 2017) in highly achievement contexts like universities. As such, academic settings such as universities should give extra caution to individual factors and undergraduates' emotions when considering how to improve and facilitate students' success.

Conflicts of Interest

The authors have declared that no competing interests exist.

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