Psychol Stud (July–September 2023) 68(3):359–373
https://doi.org/10.1007/s12646-023-00729-3

RESEARCH IN PROGRESS

The Interplay of Academic Hardiness, Passion for Studies and Affective Experiences in Undergraduates' Happiness and GPA Scores: a Person-Oriented Approach

Spiridon Kamtsios[1]

Received: 14 April 2022 / Accepted: 11 April 2023 / Published online: 16 June 2023

Abstract The purpose of the study was to investigate undergraduates' profiles, taking into account personality traits (academic hardiness and test anxiety), motivational factors (passion for studies) and affective experiences (positive and negative affect). The study explored differences in outcomes such as happiness and grade point average (GPA) scores among student profiles. The sample comprised of 293 undergraduates, studying in a social science department. Participants completed the following scales: (a) Revised Academic Hardiness Scale (RAHS), (b) Test Anxiety Inventory (TAI), (c) Passion scale, (d) Positive and Negative Affect scale (PANAS), (e) Oxford Happiness Questionnaire (OHQ). Academic achievement was measured using students' GPA. Results from hierarchical cluster analysis (which was used for clustering undergraduates into homogenous groups) revealed three profiles: (a) hardy, passionate and non-anxious undergraduates, emotionally positive, (b) anxious-committed, mid-passionate undergraduates, experiencing low positive and mid-negative affect and (c) low hardy, unpassionate and mid-anxious undergraduates, experiencing both positive and negative affect. These profiles were differentially related to student happiness and GPA scores. Hardy, passionate and non-anxious with positive affect undergraduates reported the highest GPA and happiness scores. Results of the study are discussed, practical implications, limitations and future research directions are presented.

Keywords Hardiness · Passion for studies · Test anxiety · Affect · Undergraduates

Introduction

There is a growing body of research in higher education concerning the contribution of personality characteristics/traits on undergraduates' study success (Postareff et al., 2017) and academic progress (Karagiannopoulou et al., 2020; Lindblom-Ylänne et al., 2017), approaches to learning and students' experiences of the learning environment (Parpala et al., 2010), students' self-regulation (Heikkila et al., 2011) and students' academic emotions (Niculescu et al., 2015; Pekrun et al., 2014). Research revealed that individual variables/personality traits, motivational and affective factors have a further effect on students' achievement and well-being-happiness[1] (Asikainen et al., 2022; Lindblom-Ylänne et al., 2017; Postareff et al., 2017; Rytkonen et al., 2012). The latter variables seem important for undergraduates' lives. Academic achievement shapes a person's life chances (Steinmayr et al., 2016) whereas well-being is known as an indicator of students' mental health (Hernandez-Turrano et al., 2020). Based on this theoretical line of thinking, the present study explored the contribution of personality traits, namely psychological hardiness (hence on hardiness) (Kobasa et al., 1982; Maddi, 2005, 2006) and test anxiety (Zuckerman & Spielberger, 2015), motivational factors, namely passion for studies (Vallerand, 2012) and affective experiences (positive and negative affect) (Merz et al., 2013) to students' achievement and well-being-happiness (Hills & Argyle, 2002).

[1] In the existing literature, psychological well-being was measured with different ways (e.g., happiness, life satisfaction etc.) (Vallerand et al., 2012).

✉ Spiridon Kamtsios
skamtsios@uoi.gr; spiroskam@gmail.com

[1] Department of Psychology, University of Ioannina, University Campus, 45110 Ioannina, Greece

Psychological Hardiness

Undergraduates' academic success and well-being are influenced not only by their cognitive abilities and content knowledge (Limeri et al., 2020), but also by non-cognitive factors, such as personality traits and affective experiences, which enables undergraduates to study successfully and graduate in a timely manner (Lindblom-Ylänne et al., 2017), to maintain a volitional mindset (Dewitte & Lens, 2000), to regulate their learning processes (Lindblom-Ylänne, 2004), and to manage effectively the effects of daily stressful academic demands (Dwyer & Cummings, 2001; Ervasti et al., 2019; Galindo-Dominguez et al., 2021; Rodotham, 2008). A personality characteristic which leads undergraduates to further opportunities for personal growth and success through positive educational experiences, affecting students' adaptation (Kamtsios & Karagiannoulou, 2020), academic success, task engagement (Duckworth et al., 2007; Maddi et al., 2011), happiness (Atashzar & Afsharinia, 2018; Yaprak et al., 2018) and students' psychological adjustment (Kamtsios & Bartone, 2021) is hardiness. Hardiness mediates the effects of daily stress and expresses a general quality of an individual to consider changes as a normal and interesting part of life (Kobasa et al., 1982; Maddi, 2005, 2006).

The concept of hardiness has been introduced in research in the field of educational psychology, providing a framework for understanding how students may react to academic challenges, setbacks and demands (Benishek et al., 2001, 2005; Cole et al., 2004; Kamtsios & Karagiannopoulou, 2013; Soheili et al., 2020). More specifically, some students appraise that a particular academic demand may be an opportunity and motive for learning, whereas others may think of it as something threatening that will not promote and reinforce their learning. In this line of thinking Stein and Bartone (2020) introduced in hardiness literature the hardiness mindset approach. Based on Dweck's (1999) theoretical approach concerning the degree to which intelligence is a stable trait, termed "mindset" and Crum's et al. (2013) approach determining whether the nature of stress itself is more or less enhancing or debilitating, the hardiness mindset can affect students' reactions to difficulties and setbacks and their success in dealing with them. In other words, the hardiness mindset approach one adopts may be a crucial factor in determining whether university stressful situations and demands will have enhancing or debilitating effects for undergraduates. Based in this theoretical approach, different hardiness mindsets (e.g., academic demands and setbacks are debilitating vs. academic demands and setbacks are enhancing) will be associated with different academic outcomes.

More specifically, if one holds an enhancing hardiness mindset, he/she may enjoy variety and may tend to use change and disruptions in academic life as interesting opportunities to learn and grow (commitment); he/she may have a strong belief that he/she can influence outcomes in his/her life and he/she is willing to make choices and accept responsibilities for those choices (control). Moreover, he/she may have the motivation and drive to achieve academically, despite competing demands that may exist (challenge) (Creed et al., 2013; Maddi, 2006; Sheard & Golby, 2007; Stein & Bartone, 2020). These characteristics represent an academic hardy personality. Academic hardiness 3Cs (commitment, control and challenge) have been found to be correlated with students' performance (higher grade point average-GPA) (Eschleman et al., 2010; Kamtsios & Karagiannopoulou, 2015; Sheard et al., 2007), students' task/learning orientation (Kamtsios & Karagiannopoulou, 2016), students' learning self-efficacy (Wong et al., 2019), sense of belonging to school (Abdollahi et al., 2018), positive affective experiences (Kamtsios & Karagiannopoulou, 2020), higher happiness scores (Atashzar & Afsharinia, 2018; Kamtsios, 2022), lower academic anxiety (Jia et al., 2021) and students' achievement motivation (Busato et al., 2000). In sum, hardiness, and academic hardiness attitudes (commitment, control, and challenge -3Cs) via activating problem-focused coping strategies in stressful academic situations, lead individuals to consider these situations in a more optimistic view (Maddi et al., 2011; Stein & Bartone, 2020). In such a way, academic hardiness can mitigate the negative effects on mental health under stressful conditions, promoting undergraduates' well-being/happiness (Eschleman et al., 2010; Maddi, 2002).

Test Anxiety

Undergraduates' test anxiety is considered an important predictor of students' achievement, learning and well-being (Huntley et al., 2019; Steinmayr et al., 2016). Current research evaluates academic pressures by using test anxiety as an indicator of excessive perceived academic pressures (Putwain et al., 2021a). Test anxiety is a multidimensional construct (Putwain et al., 2021b; Spielberger & Vagg, 1995); a situational specific personality trait (Sarason, & Sarason, 1990) that includes cognitive (worry) and affective-physiological (emotionality) components (Huntley et al., 2019; Spielberger & Vagg, 1995). Undergraduates vary with regard to the disposition to experience these components in academic settings and this variation influences students' achievement, academic development and well-being-happiness.

Worry refers to the cognitive component of test anxiety (Spielberger & Vagg, 1995) such as self-criticism, negative thoughts, negative derogatory self-statements related to failure (Spielberger & Vagg, 1995; Zeidner, 2007). Emotionality refers to the affective physiological component of test anxiety (e.g., nervousness, tension). Empirical studies

confirmed that worry has performance-hindering effects (Mocklinghoff et al., 2021; Putwain et al., 2021a) and is associated with performance reduction (Spielberger & Vagg, 1995), whereas emotionality has been found to have little impact on students' academic achievement (Deffenbacher, 1998). Additionally, the existing literature on the well-being-happiness of young people demonstrated that is a negative relationship between test anxiety and students' well-being-happiness (Herzer et al., 2014). High test anxiety could potentially lower well-being-happiness directly via worry about failing tests and examinations, and indirectly through tainting the positive element of academic life (Putwain et al., 2021b), having a negative impact on students' welfare (Warren et al., 1996).

Passion for Studies

Passion can be seen as a strong inclination toward an activity that one, at least likes, highly values, invest time and energy in on a regular basis, and that is part of one's identity (Vallerand, 2012, 2020). Passionate activities come to be so self-defining that they represent central features of one's identity. The dualistic model of passion (DMP) proposes that there are two types of passion, harmonious passion (HP) and obsessive passion (OP). These types can be distinguished in terms of how the passionate activity internalized into one's identity, in a controlled or an autonomous fashion (Vallerand et al., 2003). A controlled internalization (values and regulations associated with the activity are internalized partially in the self or completely outside the integrating self) (Vallerand, 2012; Vallerand et al., 2003) originates from intra/or interpersonal pressure typically because certain contingencies are attached to the activity (e.g., feelings of social acceptance, self-esteem) (Vallerand, 2012).

HP results from an autonomous internalization. People voluntarily engage in the activity (Mageau & Vallerand, 2007) with a mindful and non-defensive mindset (Vallerand et al., 2003). The activity remains under their control (Lopez, & Vallerand, 2020, 2020; Ruis-Alfonso, & Leon, 2016) and they are able to fully focus on the "task at hand" and experience positive outcomes (e.g., positive affect, happiness) (Vallerand et al., 2003).

Passion is present in educational settings (Ruis-Alfonso, & Leon, 2016; Vallernad et al., 2003) producing significant outcomes, such as psychological well-being (Ruis-Alfonso, & Leon, 2016; St-Louis et al., 2018). More specifically, research has shown that HP for studying positively contributed to students' happiness, vitality, life satisfaction and repeated experiences of positive affect (Russeau et al., 2008; St-Louis et al., 2018; Verner-Filion et al., 2020). Moreover, HP for studies was positively increased energy (vigor and intensity) during engagement in educational activities (Vallerand et al., 2020), predictive performance through adaptive mastery goals (Vallerand et al., 2020).

In addition, OP for studies was negatively related or unrelated to students' happiness and vitality (St-Louis et al., 2018) leading to the absence of flow and positive affect, undermined psychological well-being (Vallerand et al., 2020). However, research revealed that OP for one's studies positively predicted increases in intensity and vigor during engagement in educational activities (Stoeber et al., 2011; Vallerand et al., 2020), predicted performance approach goals and performance avoidance goals.

Moreover, recent literature reveals that different affective experiences can facilitate different effects on psychological well-being (Vallerand, 2012). In university settings, positive affect has been associated with adaptive outcomes (Verner-Filion & Vallerand, 2016), such as students' happiness, low levels of stress and achievement (Vallerand, 2012; Verner-Filion & Vallerand, 2016), whereas negative affect was negatively related to indicators of adjustment (Vallerand, 2012) and, in turn, predicts maladaptive outcomes (Verner-Filion & Vallerand, 2016) that undermined psychological well-being (Rousseau & Vallerand, 2008).

The different variables introduced explain in different ways and in the "light" of different theoretical approaches, issues related to university studies, such as undergraduates' study success (which is usually evaluated by using grade point average) (Assikainen et al., 2022; Karagiannopoulou et al., 2019) and students' psychological well-being (which was measured with different ways, e.g., happiness, life satisfaction etc.) (Vallerand, 2012), predicting adaptive outcomes (Verner-Filion & Vallerand, 2016). However, the interplay between trait personality characteristics, motivational factors and affective experiences and their impact on students GPA and well-being (happiness) has not been extensively examined, highlighting the way in which these constructs are interrelated. Such information could be particularly important for this population group, "called" upon to meet the special requirements of academic life and adapt to them in an effective way, in order to achieve personal development and future professional success.

In doing so, the present study used a person-oriented approach to:

(a) explore different combinations of students' personality trait characteristics (3Cs and test anxiety), motivational factors (passion for studies) and affective experiences (positive and negative affect) and
(b) identify their contribution to students' GPA and happiness

The study's hypotheses were as follows:

(a) The first hypothesis (H1) was that the 3Cs, both anxiety's trait dimensions (worry and emotionality), HP and OP and positive and negative affect are related to each other.
(b) The second hypothesis (H2) was that qualitatively different undergraduates' profiles on the study's variables would identify, differentiated students into three clusters.
(c) The third hypothesis (H3) was that the three different profiles would differ in terms of students' GPA and happiness scores.

A person-oriented approach would provide a deeper understanding (Lindblom-Ylänne et al., 2017) of the factors related to students' GPA and students' happiness. This would enable the building of a broader "picture" of undergraduates with specific characteristics in a theoretical manner, which can result from the interaction of different variables and different factors which then, may contribute to adaptive outcomes.

There is a large body of research in higher education using person-oriented approach in order to explore types of clusters based on validated inventories. These studies have adopted different variants of cluster analysis and they have identified different combinations of undergraduates' profiles based on learning variables (Karagiannopoulou & Milienos, 2013; Parpala et al., 2010; Vanthournout et al., 2013), cognitive and affective variables (Asikainen et al., 2022; Heikkila et al., 2011; Kamtsios et al., 2020; Karagiannopoulou et al., 2020). The majority of the aforementioned studies had suggested three to four students' profiles.

Methodology

Participants

The sampling strategy adopted in the research concerns the choice of convenience sampling. The sample of the study consists of 293 undergraduates (35 males-11.9% and 257 females-87.7%), studying in a Psychology department. The sample of the study was randomly selected in the context of students' participation in the educational psychology and sports & exercise psychology courses lectures.

Procedure

Prior to the lectures, the students anonymously completed the questionnaires in their classrooms, yielding a response rate of over 98%. Questionnaires took approximately 20–25 min to complete. Participants were informed about the purpose of the study and completed a consent form before the distribution of the questionnaires. All participants voluntarily participated in the research. All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Measures

To meet the purposes of the study the following measures were used:

(a) Revised Academic Hardiness Scale (RAHS)

The 40-item RAHS (with responses on a 4-point Likert scale) (Benishek et al., 2005) was used. The scale assesses undergraduates' cognitive, behavioral and affective beliefs and reactions relating to the three academic hardiness factors-3Cs: commitment, control and challenge. Commitment was measured by 13 items (e.g., "Work hard for grades"), control by 16 items (e.g., "Become less motivated to study when I do not get grades I want right away") and challenge by 11 items (e.g., Difficult classes are the best way to improve knowledge"). Current research reported accepted to high internal reliability coefficients for the 3Cs (Abdollahi et al., 2018; Abdollahi et al., 2020; Creed et al., 2013; Kamtsios & Karagiannopoulou, 2020, Karagiannopoulou & Kamtsios, 2016). The scale has been used in various studies in a sample range of elementary school students and undergraduates and its factorial validity has been confirmed (Creed et al., 2013; Kamtsios & Karagiannopoulou, 2011; Karagiannopoulou & Kamtsios, 2016; Weigold et al., 2015).

(b) Test Anxiety Inventory (TAI)

The Test Anxiety Inventory (Spielberger, 1980) comprises 16 items, rated on a 5-point Likert scale. TAI forming an 8-item worry subscale (e.g., "The harder I worked at taking the test, the more confused I got") and an 8-item emotionality subscale (e.g., "I'll start feeling uneasy just before getting my test scores back"). Participants responded on a 5-point Likert scale how frequently one experiences specific symptoms of anxiety, before, during and after examination. Previous studies with Greek undergraduates have confirmed the psychometric properties of the scale (Metallidou et al., 2007; Papantoniou et al., 2011).

(c) Passion Scale

The Passion Scale (Vallerand et al., 2003) was used to evaluate undergraduates' passion for their studies. Participants answered the twelve items of the scale on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). The scale designed to evaluate the two passion subscales: (a)

Harmonious passion (HP) (6-items: e.g., "My studies are well integrated in my life") and (b) Obsessive passion (OP) (6 items: e.g., "I have almost an obsessive feeling of my studies"). Previous research has displayed passion scale's high levels of reliability and validity (Vallerand, 2012; Verner-Filion et al., 2016, 2020). Earlier research with Greek undergraduates confirmed the psychometric properties of the scale (Kamtsios, 2021).

(d) The Positive and Negative Affect Scale (PANAS).

The Positive and Negative Affect Scale (PANAS) (Merz et al., 2013) was used to indicate the extent to which participants experienced specific feelings and emotions during the previous week. The scale consists of two sub-scales: (a) Positive affect (10 items: e.g., "Happy", "Inspired") and (b) Negative affect (10 items: e.g., "embarrassed", "upset"). Participants responded on a 5-point Likert scale, ranging from 1 (= very slightly or not at all) to 5 (= extremely) to measure the extent to which the affect has been experienced. Previous research has provided validity evidence based on the original orthogonal two-factor internal structure of the PANAS (Galinha et al., 2013; Tran, 2013; Tuccitto et al., 2010; Watson et al., 1988).

(e) Oxford Happiness Questionnaire (OHQ) (Hills & Argyle, 2002)

Oxford Happiness Questionnaire consists of 29 items, using a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree). The scale is used for assessment of personal happiness as a broader unidimensional construct (Hills & Argyle, 2002; Medveder et al., 2016), with acceptable psychometric properties (α-Cronbach > 0.90). Examples of items include: "I laugh a lot", "Life is good".

(f) Undergraduates' achievement.

Undergraduates' general point average (GPA) was collected through students' self-report for their GPA they have received, based on the marks they had gotten thus far. GPA is one of the most studied variables in educational psychology (Asikainen et al., 2022; Kuncel et al., 2005; Wagerman, & Funder, 2007). Even this procedure of collecting data about students' academic achievement has some limitations (Cole et al., 2010; Dickinson et al., 2016), this is the only way to get such information, as assess to the students' official grades for research purposes is not allowed.

Data Analyses

Initially, the latent structure of the instruments used in this research was assessed by confirmatory factor analysis (CFA), using the following fit indices: comparative fit index (CFI), goodness-of-fit index (GFI), normed fit index (NFI) and root mean square error approximation (RMSEA) with 90% confidence interval. Moreover, descriptive statistics, correlations between the study's variables and Cronbach's reliability coefficients were examined. Further, cluster analysis (Everitt et al., 2011) was used in order to classify participants according to their responses to RAHS, TAI, harmonious and obsessive passion, positive and negative affect. The hierarchical (Ward's method) cluster analysis followed by non-hierarchical (two-step) cluster analytic procedure was used for classifying participants into homogenous groups. The two-step procedure can be applied to identify the most distinct set of profiles (Hair et al., 1998), as this procedure revealed good performance and is a recommended method when all variables are continuous (Bacher et al., 2004). Study variables were continuous and given that RAHS, TAI, harmonious and obsessive passion, positive and negative affect were measured using different scale metrics, these scales were standardized prior to the analysis, using z-scores transformations.

After determining the number of clusters, a multivariate analysis of variance (MANOVA) was carried out, in order to explore differences between cluster membership (treated as the independent variable) and students' happiness and GPA scores (treated as the dependent variables). Partial eta squatted (n_p^2) was used as the effect size index. Moreover, discriminant analysis (as a post hoc procedure) was used to better interpret MANOVA's results. Discriminant function analysis is an appropriate way to investigate the nature of the relationships that have occurred from MANOVA (Field, 2013; Warne, 2014).

Results

Initially, the psychometric properties (validity and reliability) of the questionnaires used in this research were examined. Results from confirmatory factor analysis verified the factor structure of the instruments and can be found in Table 1. All indices were found in acceptable value ranges (i.e., the RMSEA values are quite low while the CFI and GFI present high values), verified the latent structure of the questionnaires. Similar to previous studies, Cronbach's alpha coefficients for all study's variables were moderate to high (Table 2).

Furthermore, descriptive statistics were calculated for all study variables (see Table 1). Pearson correlations coefficients among the 3Cs, two passion subscales, two test anxiety subscales, positive and negative affect, happiness, and GPA can be found in Table 2. As expected, commitment, control and challenge were positively correlated with harmonious passion ($r = 0.546$, $r = 0.394$ and

Table 1 Confirmatory factor analysis results

	Questionnaires	x^2	CFI	GFI	NFI	RMSEA
1	Revised academic hardiness scale	324,82 $p<0.001$	0.90	0.91	0.88	0.06 [LO.05, HI.06]
2	Test anxiety inventory	157,83 $p<0.001$	0.96	0.96	0.91	0.05 [LO.03, HI.06]
3	Passion scale	153,1 $p<0.001$	0.92	0.92	0.90	0.05 [LO.04, HI.06]
4	PANAS	288,4 $p<0.001$	0.92	0.90	0.88	0.05 [LO.04, HI.06]
5	Oxford happiness questionnaire	543,86 $p<0.001$	0.94	0.92	0.89	0.04 [LO.04, HI.05]

$r=0.327$, respectively) and with positive affect ($r=0.283$, $r=0.371$, and $r=0.131$, respectively). Moreover, commitment and challenge were positively correlated with happiness ($r=0.328$ and $r=0.138$, respectively). In the same direction were the correlations between harmonious passion and positive affect with happiness ($r=0.473$ and $r=0.655$, respectively). Commitment, challenge and harmonious passion were the only variables with a statistically significant correlation with GPA ($r=0.293$, $r=0.158$ and $r=0.249$, respectively), whereas the correlations between worry and GPA were negative ($r=-0.186$). Furthermore, control, challenge and harmonious passion seem to have negative correlations with worry, emotionality, and negative affect.

Cluster Analysis Results-Undergraduates' Profiles

Initially, a two-step cluster analysis (using the squared Euclidean distance as a similarity measure and BIC/AIC as a clustering criterion) was performed. This analysis provided a three-cluster solution. In order to verify and confirm the validity of this three-cluster solution, a hierarchical cluster analysis was run and the derived dendrogram supported the estimated number of clusters. Moreover, the three-cluster solution was further verified by conducting a K-means cluster analysis in which it was specified that the sample of the study to be divided into three clusters. Results from K-means cluster analysis revealed almost similar profiles than those generated from hierarchical cluster analysis. Furthermore, an one-way ANOVA statistical test and Bonferroni post-hoc tests showed differences in the study variables among the three clusters. All the variables revealed statistically significant differences between clusters (see Table 3).

The first cluster, labeled "*hardy, passionate and non-anxious undergraduates, emotionally positive*", was the largest (numerically) of the profiles, constituted 50.51% of the total sample ($n=148$). In this cluster the 3Cs scores (commitment, control and challenge) were rather high and the worry and emotionality scores were the lowest of all the clusters. Students also had the highest scores on harmonious passion and on positive affect. At the same time students' scores on obsessive passion and negative affect were the lowest of the three clusters.

The second cluster comprised 58 students (19.79% of the study's sample). This cluster was labeled "*anxious-committed, mid-passionate undergraduates, experiencing low positive and mid-negative affect*". As shown in Table 2, students had the highest scores on worry and emotionality and the lowest scores on commitment, positive and negative affect. Moreover, students in this cluster had the second highest scores on commitment and harmonious passion.

Students in cluster 3, labeled "*low hardy, un-passionate and mid-anxious undergraduates, experiencing both positive and negative affect*" ($n=86$), had the lowest means on commitment, harmonious passion and challenge (although there was no significant difference with students in cluster 2). Besides, students in cluster 3 had the second lowest means on control, worry, emotionality, positive and negative affect.

Profile Effects on Undergraduates' Happiness and GPA

A multivariate analysis of variance (MANOVA) was used to determine the effect of cluster membership on undergraduates' happiness and GPA. A 3 (cluster membership) by 2 (happiness and GPA) MANOVA indicated a significant multivariate effect, Wilk's $\lambda=0.739$, $F_{(2,289)}=23.52$, $p<0.001$, $n_p^2=0.140$ (Tables 4 and 5). More specifically, univariate tests revealed significant differences between clusters in undergraduates' happiness scores ($F_{(2,289}=40.65$, $p<0.001$, $n_p^2=0.22$) and GPA ($F_{(2,289)}=8.56$, $p<0.001$, $n_p^2=0.056$). Post hoc tests with Bonferroni correction showed: (a) differences between clusters in undergraduates' happiness scores; students in cluster 1 had the highest scores compared with students to the other two clusters, (b) significant differences in GPA were observed between clusters; students in cluster 1 had the highest GPA compared to the other two clusters ($p<0.001$) (Fig. 1).

Moreover, a descriptive discriminant analysis (DDA) was conducted, as a post hoc strategy to MANOVA, that takes into account the complex relationships among multiple dependent variables (Barton et al., 2016). DDA creates a set of uncorrelated linear equations that together model the differences among groups (Warne, 2014) and strongly recommended (Field, 2013). DDA identifies which dependent variables contribute the most to separating predictor groups (Yu & Chick, 2009) and which groups were different from each other (Barton et al., 2016). Results from DDA analysis revealed that the two discriminant functions are statistically

Table 2 Descriptive statistics (M & SD), Cronbach's α and Pearson Correlation Coefficients of 3Cs, Worry and Emotionality, Harmonious and Obsessive Passion, Positive and Negative Affect with Happiness and GPA (grades)

		M	*SD*	1	2	3	4	5	6	7	8	9	10	11	α-Cronbach
1	Commitment	2.94	0.44		0.260**	0.134**	−0.145**	0.031	0.546**	0.331**	0.283**	−0.086	0.328**	0.293**	0.80
2	Control	2.73	0.47			0.301**	−0.623**	−0.554**	0.394**	−0.004	0.371**	−0.469**	0.512	0.063	0.82
3	Challenge	2.42	0.55				−0.222**	−0.231**	0.327**	0.108	0.131*	−0.169**	0.138*	0.158*	0.81
4	Worry	2.19	0.75					0.779**	−0.330**	0.054	−0.176**	0.523**	−0.359**	−0.186**	0.85
5	Emotionality	2.45	0.84						−0.171**	0.090	−0.076	0.473**	−0.234**	−0.016	0.90
6	Harmonious passion	5.33	1.05							0.366**	0.448**	−0.212**	0.473**	0.249**	0.82
7	Obsessive passion	3.39	1.05								0.163**	0.154**	0.049	0.084	0.78
8	Positive affect	28.97	5.27									−0.025	0.655**	0.055	0.76
9	Negative affect	16.71	6.07										−0.421**	−0.034	0.77
10	Happiness	2.56	0.41											.059	0.90
11	GPA	7.14	1.14												

significant (Wilks' Lambda = 0.208, $p < 0.001$, Wilks' Lambda = 0.649, $p < 0.001$, respectively) (Table 6). This means that both functions contribute to the classification of participants. As it can be seen on Table 6 (see structure matrix-function), the first function explains the 79.6% of the variance. This function is mainly affected by positive affect, harmonious passion, commitment, control, and challenge. The second function, which explains 20.4% of the variance, is mainly affected by negative affect, obsessive passion, worry, and emotionality. Furthermore, from Table 7 (classification results), it can be seem that all participants have been correctly classified into homogenous groups, on the basis of their responses to the questionnaires (92.4%, 90.1% and 93%, respectively). The plot of canonical discriminant functions (see Fig. 2) provided support for the cluster membership.

Discussion

The purpose of the study was (a) to explore how personality traits (3Cs and test anxiety), motivational factors (passion for studies) and affective experiences are related to each other and (b) to examine different profiles among university students. Moreover, the study aims to investigate whether undergraduates with different profiles differ regarding their GPA and happiness scores.

Initially, the study's results revealed that all independent variables (3Cs, worry, emotionality, HP, OP, positive and negative affect) are intertwined (see Table 2). Commitment, control, and challenge were positively related to HP and positive affect. Further, worry was negatively related to 3Cs, HP and positive affect. The same pattern of results was found with emotionality, with the difference that no relation was found between emotionality, commitment, and OP. These results are in line with study's first hypothesis, as earlier studies have found that 3Cs are positively related to positive affect (Kamtsios, 2022; Kamtsios & Karagiannopoulou, 2020; Maddi et al., 2011) and negatively to test anxiety's dimensions (Glaser & Glaser, 1990; Maddi et al., 2011; Ringeisen & Buchwould, 2010). Moreover, the high positive correlations between academic hardiness 3CS, as personal strengths which penetrated by motivational dimensions (Busato et al., 2000; Kamtsios & Karagiannopoulou, 2016), with HP are in line with passion's existing literature concerning the relation between personality traits and passion (Vallerand et al., 2003).

Furthermore, results of the study identify three profiles among undergraduates that emphasize different components of the study's variables. Results demonstrate that 50% of study's participants (cluster 1) were display an adaptive, hardy motivational and affective profile, identified as hardy, passionate, and non-anxious undergraduates

Table 3 Mean values and standard deviations of the study's variables and the Fs of the multiple comparisons across the three clusters

Variables	Clusters			*F*	*p*
	Cluster 1 (*N* = 148, 50,51%)	Cluster 2 (*N* = 58, 19,79%)	Cluster 3 (*N* = 86, 29,35%)		
	M (SD)	M (SD)	M (SD)		
Commitment	3.10 [0.35][1,2]	2.75 [0.41][1,3]	2.52 [0.49][2,3]	13,04	< 0.001
Control	3.01 [33][1,2]	2.32 [0.32][1,3]	2.46 [0.47][2,3]	32,65	< 0.001
Challenge	2.60 [0.49][1,2]	2.29 [0.54][2]	2.20 [0.50][2]	4,25	0.015
Worry	1.74 [0.51][1,2]	2.87 [0.58][1,3]	2.43 [0.69][2,3]	31,59	< 0.001
Emotionality	2.00 [0.30][1,2]	3.20 [0.56][1,3]	2.48 [0.68][2,3]	19,9	< 0.001
Harmonious Passion	5.89 [0.70][1,2]	4.89 [0.70][1,3]	3.82 [0.63][2,3]	23,83	< 0.001
Obsessive Passion	3.01 [0.92][1,2]	3.53 [0.91][1]	3.56 [0.63][2]	4,83	0.009
Positive Affect	31.80 [3.6][1,2]	22.78 [4.5][1,3]	28.27 [3.8][2,3]	106,89	< 0.001
Negative Affect	14.26 [4.8][1,2]	20.79 [5.89][1,3]	24.09 [4.73][2,3]	249,5	< 0.001

1 = Differences between 1rst and 2nd cluster, 2 = Differences between 1rst and 3rd cluster and 3 = Differences between 2nd and 3rd cluster

Table 4 Univariate F values between the three clusters and GPA (grades) and Happiness as dependent variables

	Clusters			*F*	*p*	n_p^2
	Cluster 1	Cluster 2	Cluster 3			
	M [Sd]	M [Sd]	M [Sd]			
Grades (GPA)	7.32 [1.11][1]	7.11 [1.21][2]	6.53 [0.91][1,2]	8.56	< 0.001	0.056
Happiness	2.74 [0.30][1,3]	2.35 [0.44][3]	2.38 [39][1]	40.65	< 0.001	0.22

1 = Differences between Cluster 1 and Cluster 3, 2 = Differences between Cluster 2 and Cluster 3, 3 = Differences between Cluster 1 and Cluster 2

Table 5 The results of MANOVA with grades (GPA) and Happiness as dependent variables

Effect	Value	F	Error df	Sig	Partial n^2	Noncent parameter	Observed Power
Intercept							
Pillai's Trace	0.985	9540.96	288	0.000	0.985	19.081,92	1
Wilks' Lambda	0.015	9540.96	288	0.000	0.985	19.081,92	1
Hotelling's Trace	66.257	9540.96	288	0.000	0.985	19.081,92	1
Roy's Largest Rout	66.257	9540.96	288	0.000	0.985	19.081,92	1
Cluster							
Pillai's Trace	0.267	22.23	578	0.000	0.133	88.93	1
Wilks' Lambda	0.739	23.52	576	0.000	0.140	94.11	1
Hotelling's Trace	0.346	24.82	574	0.000	0.147	99.30	1
Roy's Largest Rout	0.323	46.64	289	0.000	0.244	93.28	1

with positive affect. However, results revealed that approximately 30% of the students (see cluster 3) showed a non-engaged (in their studies) profile, as their scores on 3Cs and both passion subscales differentiated from the other two profiles (they reported the lower scores), without seeming to show any concern for this situation (students in this cluster reported the lower scores on both test anxiety's subscales-worry and emotionality). These students seem to be detached from their studies without feeling anxious for their disinterest (Kamtsios & Karagiannopoulou, 2020). This may be an important finding (considering the percentage of undergraduates grouped with these characteristics) that may reveal a "dark side" of students' engagement in higher education (Salmela-Avo, & Sanna, 2017), which may also lead to the adoption of future behaviors related to the difficulty of completing their studies and obtaining a degree. This pattern of results suggests that different personality traits, such as 3Cs and test anxiety, different types of passion for studies (as motivational factors) and

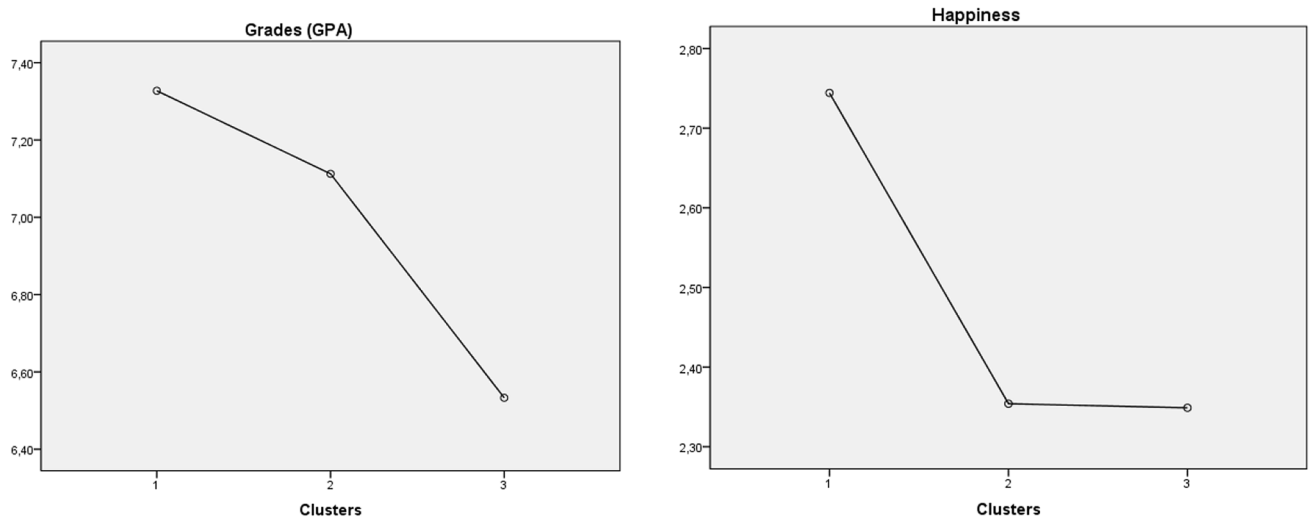

Fig. 1 Plots for differences between clusters on grades (GPA) and Happiness

Table 6 Discriminant analysis interpreting MANOVA's results

	Standardized Canonical Discriminant Function Coefficients		Structure Matrix	
	Function		Function	
	1	2	1	2
Positive affect	0.342	0.151	**0.367**	0.239
Negative affect	0.137	0.376	−0.234	**0.503**
Harmonious passion	0.407	0.555	**0.591**	0.533
Obsessive passion	0.066	0.126	0.145	**0.400**
Worry	−0.362	0.048	−0.571	**0.501**
Emotionality	−0.391	0.271	−0.462	**0.604**
Commitment	0.286	0.026	**0.329**	0.287
Control	−0.198	−0.422	**0.556**	−0.472
Challenge	0.232	0.231	**0.281**	0.150
eigenvalue	2.11	0.542		
% of the variance	79.6	20.4		
Wilks' Lambda				
Test of function(s)	Wilks' Lambda	Chi-square	df	sig
1 through 2	0.208	447.46	18	0.000
2	0.649	123.34	8	0.000

Table 7 Classification results

		Predicted group membership		
Ward method		1	2	3
%	1	92.4		
	2		90.1	
	3			93.0

different affective experiences, operate quite differently to affect undergraduates' achievement and happiness scores.

The first profile represents hardy and passionate, non-anxious with positive affect students. The first profile seems to be an adaptive motivational and affective profile. High scores on 3Cs, harmonious passion and positive affect came along with low scores on both test-anxiety's sub-scales, obsessive passion, and negative affect. This profile has an association on students' achievement (students reported the highest GPA) and students' happiness. Such an adaptive profile is

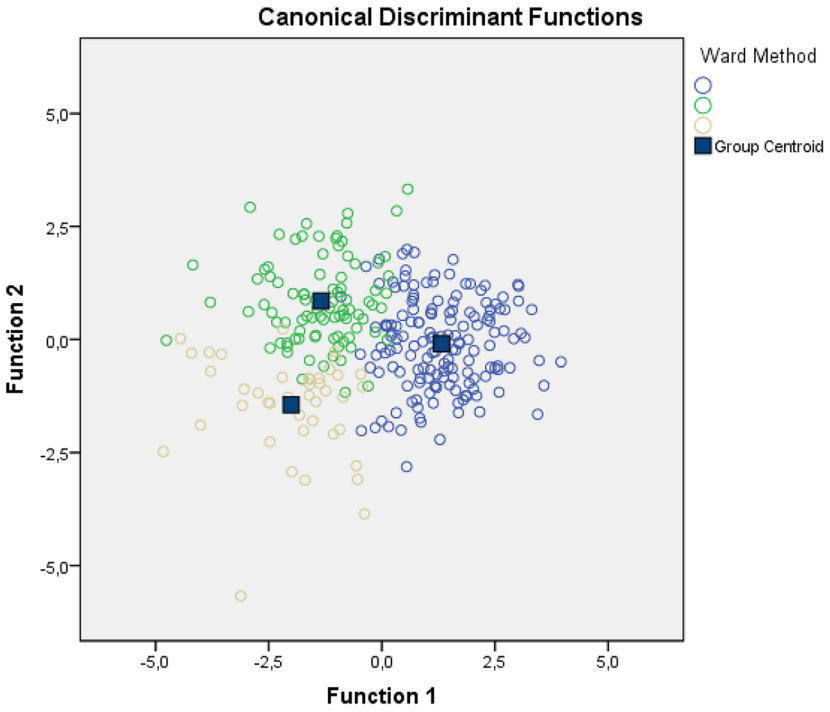

Fig. 2 The plot of the Canonical discriminant functions; cluster membership is observed

supported by studies suggesting associations between academic hardiness attitudes (Adbollahi et al., 2018; Kamtsios & Karagiannopoulou, 2013, 2020), test anxiety levels (Mocklinghoff et al., 2021), academic emotions (Kamtsios & Karagiannopoulou, 2020; Karagiannopoulou et al., 2020; Postareff et al., 2017) and passion (Vallerand, 2012; Verner-Filion et al., 2020) with academic achievement and students' well-being-happiness.

Such a profile may be exhibited by undergraduates with a strong growth mindset, a hardiness mindset. Students' high scores on commitment, control and challenge may reflect students' perceptions that academic stress is enhancing (Stein & Bartone, 2020), exerting a positive effect on their learning process. High 3Cs scores give undergraduates the opportunity to appraise potential stressful situations (e.g., tests, exams, daily academic demands, daily workload) as motivating and exciting, rather than threatening (Kamtsios & Karagiannopoulou, 2020). This finding is confirmed by their lower scores on both worry and emotionality sub-scales.

Moreover, high commitment scores came along with high HP scores. When undergraduates are passionate about their studies, they become much more committed to them (Stein & Bartone, 2020). This finding is confirmed by correlational analysis results in which a positive high correlation between HP and commitment was appeared. HP gives extra motivation to embrace studies more fully, leading to enhancing performance through the impact it had on adaptive cognitive processes, such as concentration and attention (Vallerand et al., 2003), deep learning strategies and epistemic curiosity toward the material to learn.

Furthermore, high commitment gives undergraduates a sense of accomplishment (Stein & Bartone, 2020), a willingness to deeply engaged with their studies (Sheard & Golby, 2007), which may be a powerful motivating force. Their sense that their studies are meaningful and worthwhile and their HP for them enables positive emotions. As a result, this adaptive profile is associated with higher GPA and happiness scores.

The second profile can be labeled as "anxious-committed, mid passionate undergraduates, experiencing low positive and mid negative affect". This profile comprises of students with the highest scores on both test anxiety's sub-scales (worry and emotionality) and mid scores on commitment and HP. Students' mid commitment scores may reflect a somehow consistent involvement (Benishek & Lopez, 2001) with their studies, which may be enhanced by their mid scores on HP (compared to the other two clusters). This might explain why students in the second cluster reported higher GPA compared with students in cluster three. Moreover, their mid-levels on control and challenge possible revealed that these undergraduates may still believe that university stressors and demands can act as a motive for them, and they are able to have control over the outcomes (Crowley et al., 2003). Although such a situation may reflect students' beliefs that they can succeed (Benishek et al., 2005; Kamtsios & Karagiannopoulou, 2020) through personal effort and involvement, their lower score on positive affect shows an emotionally maladaptive profile, whose effect reflected in students' lowest scores on happiness. Possibly, their highest levels of worry and emotionality have an

impact on undergraduates' life's (Mocklinhhoff et al., 2021), affecting learning outcomes (e.g., happiness and achievement). Their higher scores on both worry and emotionality may interfere with their cognitive processes and may associated with many adverse negative effects (Wadi et al., 2022). These test anxious undergraduates may be characterized by acquired attitudes that involve negative self-perceptions and expectations (Steinmayr et al., 2016), predisposing students to experience the lowest happiness scores.

The third profile represents students whose characteristics seem to be more difficult to interpret (compared to the other two profiles). Their highest score in OP means that values and regulations associated with undergraduates' studies are internalized partially in the self or completely outside the integrating self (Vallerand et al., 2003). Students in this cluster may feel the urge to partake in their studies because the activity (studies) is attached with contingencies; they will have to proceed with their studies. This may be reflected in their moderate worry and emotionality levels that may indicate that they are somehow aware of the academic demands (Kamtsios & Karagiannopoulou, 2020), for which they still have a belief that they can influence (see moderate levels of control). However, low scores on commitment and challenge do not provide students with the motivation to fully engage in their learning activities (Cole et al., 2004; Kamtsios & Karagiannopoulou, 2013) "highlighting" a debilitating hardiness mindset (Stein & Bartone, 2020). This "relaxed" and "at risk" students' profile also comprises students who seem to report the highest score on negative affect and the second highest score on positive affect. These students are probably in complete confusion about the demands of their studies and are "tossing and turning" between positive and negative emotions in an attempt to maintain an illusion about their abilities and their sense of control does not seem to reflect "reality". Their moderate scores on positive affect (compared with the other two clusters) possible supports the slightly higher happiness scores, compared with the students in the second cluster. These students may be unlikely to be motivated despite their moderate scores on positive affect, and they have the lowest GPA and low happiness scores, compared with students in the first cluster.

The present study brings together personality traits, motivational factors and affective experiences and their effect on students' achievement and happiness. These latter variables seem to be important for students' lives, mental health (Hernandez-Turrano et al., 2020; Steinmayr et al., 2016) and future progress in their studies (Busato et al., 2000). Results of the study, concerning the first cluster (see high happiness and GPA scores), shed light on previous findings reporting happiness as one of the most important human motives (Seligman et al., 2005), which seems to be associated with creative processes (see high GPA scores). The way all contextual factors, in the first cluster, interfere confirmed previous results regarding the interfere of happiness with affective states (Wilson & Gilbert, 2003), motivational factors (Peterson et al., 2005) and personality traits (Tilburg & Igou, 2019). Nevertheless, students in the second and in the third cluster demonstrated different profiles (than those in the first cluster). Especially, the combination of low scores on 3Cs and HP, high scores on OP and negative affect and mid scores on test anxiety's subscales (which reported from students in the third cluster) can be a "bad" combination for them, which does not determine the relationship amongst these variables with students' happiness and achievement. In this context, one could hypothesize that these students may be "at risk", presenting a maladaptive profile, similar with those students' profiles referred to previous research (Kamtsios & Karagiannopoulou, 2020; Karagiannopoulou et al., 2019, 2020).

Limitations, Applications, and Future Research Directions

Despite study's results, the following limitations should be considered. First, the study was cross-sectional without allowing us to examine differences across the years of study in the university. A longitudinal study in the higher education context may provide changes in the study's variables over time. Second, the majority of the sample that participated was predominantly females, due to the overrepresentation of females in this particular department. Third, there is a need to replicate study's results among other groups of students from different university disciplines. Finally, although in the person-oriented approach the main theoretical and analytical unit is the specific pattern of operating factors (Bergmann et al., 1997), each person has an individual profile of characteristics, abilities and challenges that result from their developmental history (Woolfolk et al., 2006). This means that the clusters emerged in the study provide information about undergraduates on average (Raufelder et al., 2013), which does not allow for classification of differences between the individual scores of each group of students.

However, future studies should further explore these findings on longitudinal research, in order to confirm whether the same pattern of profiles can be detected. Such a suggestion may enhance our understanding for possible variations and changes in study's variables across the years of studying in the university, allowing educators and counsellors to design different interventions in order to provide support and counselling. Particular attention should be given to students at risk (Postareff et al., 2017) in the higher education context, who should be helped to develop an enhancing academic hardiness mindset "accompanied" with HP for studies in order for them to maintain both success and well-being throughout their study.

In terms of practical implications, the study's results suggest that students should develop an enhancing academic hardiness mindset, through an encouraging environment which supports students' personal strengths. This could be highly effective, making them more resilient in coping with stressful conditions (Stein & Bartone, 2020), pursuing their motivation and interest, and influencing their achievement and happiness.

Conclusion

The present study demonstrates a relation between academic hardiness, passion for studies, affective experiences, students' achievement, and happiness. The results of the study bring to the fore the associations between academic hardiness 3Cs and harmonious passion (HP), stressing the adaptive nature of academic hardiness and HP in academic settings. Moreover, the study highlighted the pivotal relationship between academic hardiness, harmonious passion and positive affect with undergraduates' achievement and happiness scores.

Acknowledgements Not applicable

Author Contributions The article was written by one author.

Funding Open access funding provided by HEAL-Link Greece. No funding was received.

Data Availability Data will be made available upon reasonable request for academic use and within the limitations provided informed consent by the corresponding author upon acceptance.

Declarations

Conflict of interest There are no competing interests.

Ethical Approval and Consent to Participate This study was performed in line with the principles of the Declaration of Helsinki. Informed consent was obtained from all individuals participants included in the study.

Consent for Publication I give my consent for the publication.

References

Abdollahi, A., Carlbring, P., Vaez, E., & Ghahfarokhi, A. (2018). Perfectionism and test anxiety among high school students: The moderating role of academic hardiness. *Current Psychology, 37*, 632–639. https://doi.org/10.1007/s12144-016-9550-z

Abdollahi, A., Oanahipour, S., Tofti, M., & Allen, K. (2020). Academic hardiness as a mediator for the relationship between school belonging and academic stress. *Psychology in the Schools, 57*(5), 823–832. https://doi.org/10.1002/pits.22339

Asikainen, H., Nieminen, J., Hasa, J., & Katajavuori, N. (2022). University students' interest and burnout profiles and their relation to approaches to learning and achievement. *Learning and Individual Differences, 93*, 102105. https://doi.org/10.1016/j.lindif.2021.102105

Atashzar, B., & Afsharinia, K. (2018). Effectiveness of the impact of hardiness on increased happiness and academic achievement of students in Kermanshah city (high school of medical sciences) for the academic year 2016–2017. *Journal of Clinical Research in Paramedical Sciences, 7*(1), e80288. https://doi.org/10.5812/jcrps.80288

Bacher, J., Wenzig, K., & Vogler, M. (2004). SPSS Two-Step Cluster–A first evaluation. *Work and Discussion paper* (pp. 1–30). Department of Sociology, Social Science Institute, Friedrich-Alexander-University.

Barton, M., Yeatts, P., Henson, R., & Martin, S. (2016). Moving beyond univariate post-hoc testing in exercise science: A primer on descriptive discriminant analysis. *Research Quarterly for Exercise and Sport, 87*(4), 365–375. https://doi.org/10.1080/02701367.2016.1213352

Benishek, L., Feldman, J., Shipon, W., Mecham, S., & Lopez, F. (2005). Development and evaluation of the revised Academic Hardiness Scale. *Journal of Career Assessment, 13*, 59–76. https://doi.org/10.1177/1069072704270274

Benishek, L., & Lopez, F. (2001). Development and initial validation of Academic Hardiness Scale. *Journal of Career Assessment, 9*, 333–352. https://doi.org/10.1177/106907270100900402

Bergmann, R., & Magnusson, D. (1997). A person-oriented approach in research on developments psychopathology. *Developmental Psychopathology, 9*(2), 291–319. https://doi.org/10.1017/S095457949700206X

Busato, V., Prins, J., Elshout, J., & Hamaker, C. (2000). Intellectual ability, learning style, personality achievement motivation and academic success of psychology students in higher education. *Personality and Individual Differences, 29*, 1057–1068. https://doi.org/10.1016/S0191-8869(99)00253-6

Cole, M., Field, H., & Harris, S. (2004). Student learning motivation and psychological hardiness: Interactive effects on students' reaction to a management class. *Academy of Management Learning & Education, 3*(1), 64–85. https://doi.org/10.5465/AMLE.2004.12436819

Cole, S., & Conyea, M. (2010). Accuracy of self-reported SAT and ACT test scores: Implications for research. *Research in Higher Education, 51*, 305–319. https://doi.org/10.1007/s11162-009-9160-9

Creed, P. A., Conlon, E. G., & Dhaliwal, K. (2013). Revisiting the academic hardiness scale: Revision and revalidation. *Journal of Career Assessment, 21*, 537–554. https://doi.org/10.1177/1069072712475285

Crowley, B., Hayslip, B., & Hobdy, J. (2003). Psychological hardiness and adjustment to life events in adulthood. *Journal of Adult Development, 10*(4), 237–248. https://doi.org/10.1023/A:1026007510134

Crum, A., Salovery, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology, 104*(4), 716–733. https://doi.org/10.1037/a0031201

Deffenbacher, L. (1998). Worry and emotionality in test anxiety. In I. Sarason (Ed.), *Test anxiety: Theory, research and applications* (pp. 11–124). Lawrence Erlbaum.

Dewitte, S., & Lens, W. (2000). Exploring volitional problems in academic procrastination. *International Journal of Educational Research, 33*, 733–750. https://doi.org/10.1016/S0883-0355(00)00047-1

Dickinson, E., & Adelson, J. (2016). Choosing among multiple achievement measures: Applying multi trait-multimethod confirmatory factor analysis to state assessment ACT, and student GPA data. *Journal of Advanced Academics, 27*, 4–22. https://doi.org/10.1177/1932202X15621905

Duckworth, L., Peterson, C., Matthews, D., & Kelly, R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Dweck, C. S. (1999). *Self-theories their role in Motivation*. Psychology Press.

Dwyer, A. L., & Cummings, L. (2001). Stress, self-efficacy, social support and coping strategies in university students. *Canadian Journal of Counselling, 35*(3), 208–220.

Ervasti, M., Kallio, J., Maattanen, I., Mantyjarvi, J., & Jokela, M. (2019). Influence of personality and differences in stress processing among Finnish students on internet to use a mobile stress management app. *JMIR Mental Health, 13*(6), e10039. https://doi.org/10.2196/10039

Eschleman, K. J., Bowling, N. A., & Alarcon, G. M. (2010). A meta-analytic examination of hardiness. *International Journal of Stress Management, 17*, 277–307. https://doi.org/10.1037/a0020476

Everitt, B. S., Landau, S., Leese, M., & Stahl, D. (2011). *Cluster analysis*. Wiley.

Field, A. (2013). *Discovering statistics using SPSS*. Sage Publications (pp. 616–618).

Galindo-Dominguez, H., & Jose-Bezanilla, M. (2021). The importance of personality and self-efficacy for stress management in higher education. *International Journal of Educational Psychology, 10*(3), 247–270. https://doi.org/10.17583/ijep.7870

Galinha, I., Pereira, C., & Estenes, F. (2013). Confirmatory factor analysis and temporal invariance of the positive and negative affect schedule. *Psychological Assessment, 26*(4), 671–679. https://doi.org/10.1590/S0102-79722013000400007

Glaser, K., & Glaser, R. (1990). Stress and immune function in humans. In R. Ader, L. Felter, & N. Cohen (Eds.), *Psychoneuroimmunology* (2nd ed., pp. 72–114). Academic.

Hair, J., Anderson, R., Tatham, R., & Black, W. (1998). *Multivariate data analysis* (5th ed.). Prentice Hall.

Heikkila, A., Niemivirta, M., Nieminen, J., & Lonka, K. (2011). Interrelations among university students' approaches to learning, regulation of learning, and cognitive and attributional strategies: A person-oriented approach. *Higher Education, 61*, 513–529. https://doi.org/10.1007/s10734-010-9346-2

Hernandez-Turrano, D., Ibrayena, L., Sparks, J., Lim, N., Clement, A., Almukhambetova, A., Nutrayer, Y., & Muratkyzy, A. (2020). Mental health and well-being of university students: A bibliometric mapping of the literature. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2020.01226

Herzer, F., Wendt, J., & Hamm, O. (2014). Discriminating clinical from nonclinical manifestations of test anxiety: A validation study. *Behavior Therapy, 45*, 222–231. https://doi.org/10.1016/j.beth.2013.11.001

Hills, P., & Argyle, M. (2002). The Oxford happiness Questionnaire: A compact scale for the measurement of psychological well-being. *Personality and Individual Differences, 33*, 1073–1082. https://doi.org/10.1016/S0191-8869(01)00213-6

Huntley, D., Young, B., Temple, J., Longworth, M., Tudor-Smith, C., Jha, V., & Fisher, L. (2019). The efficacy of interventions for test-anxious student: A meta-analysis of randomized controlled trials. *Journal of Anxiety Disorders, 63*, 36–51. https://doi.org/10.1016/j.janxdis.2019.01.007

Jia, J., Wang, L., Xu, J., Lin, X., Zhang, B., & Jiang, O. (2021). Self-handicapping in Chinese medical students during the COVID-19 pandemic: The role of academic anxiety, procrastination and hardiness. *Frontiers in Psychology, 12*, 741821. https://doi.org/10.3389/fpsyg.2021.741821

Kamtsios, S. (2021). *An initial evaluation of the "Passion Scale" in Greek undergraduates*. Paper presented at the International Paris Conference on Social Sciences, -VI, Paris, July 9–11 (p.32).

Kamtsios, S. (2022). Investigation of the relationships between academic hardiness and passion for studies with undergraduates' affect and happiness. *Social Sciences*. https://doi.org/10.1007/s43545-022-00518-1

Kamtsios, S., & Bartone, P. (2021). Preliminary investigation of the psychometrics properties of the Hardiness-Resilience Gauge in a Greek undergraduates' sample. *Hellenic Journal of Psychology, 18*, 287–310. https://doi.org/10.26262/hjp.v18i3.8205

Kamtsios, S., & Karagiannopoulou, E. (2011). Psychometric characteristics of the "Academic Hardiness Scale" in a Greek sample: A pilot study. *Scientific Annals, School of Psychology, Aristotle University of Thessaloniki, 9*, 67–88.

Kamtsios, S., & Karagiannopoulou, E. (2013). Conceptualizing students' academic hardiness dimensions: A qualitative approach. *European Journal of Psychology of Education, 28*(3), 807–823. https://doi.org/10.1007/s10212-012-0141-6

Kamtsios, S., & Karagiannopoulou, E. (2020). Undergraduates' affective-learning profiles: Their effects on academic emotions and academic achievement. *Hellenic Journal of Psychology, 17*, 176–204. https://doi.org/10.26262/hjp.v17i2.7853

Kamtsios, S., & Karagianopoulou, E. (2015). Exploring relationships between academic hardiness and academic stressors in university undergraduates. *Journal of Applied Educational and Policy Research, 1*(1), 53–73.

Kamtsios, S., & Karagianopoulou, E. (2016). Validation of a newly developed instrument establishing links between motivation and academic hardiness. *Europe's Journal of Psychology, 12*(1), 29–48. https://doi.org/10.5964/ejop.v12i1.997

Karagiannopoulou, E., Milenios, F., Kamtsios, S., & Renzios, X. (2019). Do defense styles and approaches to learning 'fit together' in students' profiles? Differences between years of study. *Educational Psychology, 40*(5), 570–591. https://doi.org/10.1080/01443410.2019.1600661

Karagiannopoulou, E., & Milienos, F. S. (2013). Exploring the relationship between experienced students' preference for open and closed-book examinations, approaches to learning and achievement. *Education Research and Evaluation: An International Journal on Theory and Practice, 19*(4), 271–296. https://doi.org/10.1080/13803611.2013.765691

Karagiannopoulou, E., Milienos, F. S., & Renzios, X. (2020). Grouping learning approaches and emotional factors to predict students' academic progress. *International Journal of School & Educational Psychology*. https://doi.org/10.1080/21683603.2020.1832941

Karagianopoulou, E., & Kamtsios, S. (2016). Multi-dimensionality vs. unitary of academic hardiness: An under-explored issue…? *Learning and Individual Differences, 51*, 149–156. https://doi.org/10.1016/j.lindif.2016.08.008

Kobasa, S., Maddi, S., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology, 42*, 168–177. https://doi.org/10.1037/0022-3514.42.1.168

Kuncel, N., Crebe, M., & Thomas, L. (2005). The validity of self-reported grade point averages, class ranks and test scores: A meta-analysis and review of the literature. *Review of Educational Research, 75*, 63–82. https://doi.org/10.3102/00346543075001063

Limeri, L., Carter, N., Choe, J., Harper, H., Martin, H., Benton, A., & Dulan, E. (2020). Growing a growth mindset: Characterizing how and why undergraduates' students' mindsets change. *International Journal of Stem Education, 7*, 35. https://doi.org/10.1186/s40594-020-00227-2

Lindblom-Ylänne, S. (2004). Raising students' awareness of their approaches to study. *Innovations in Education and Teaching International, 41*(4), 405–422. https://doi.org/10.1080/14703290420002770 02

Lindblom-Ylänne, S., Haarala-Muhonen, A., Postareff, L., & Hailikari, T. (2017). Exploration of individual study paths of successful first-year students: An interview study. *European Journal of Psychology of Education, 32*, 687–701. https://doi.org/10.1007/s10212-016-0315-8

Lopez, M., & Vallerand, R. (2020). The role of passion, need satisfaction and conflict in athletes' perceptions of burnout. *Psychology of Sport and Exercise*. https://doi.org/10.1016/j.psychsport.2020.101674

Maddi, S. R. (2002). The story of hardiness: Twenty years of theorizing, research, and practice. *Consulting Psychology Journal: Practice and Research*, *54*(3), 173–185. https://doi.org/10.1037/1061-4087.54.3.173

Maddi, S. (2005). On hardiness and other pathways to resilience. *American Psychologist, 60*(3), 261–272. https://doi.org/10.1037/0003-066X.60.3.261

Maddi, S. (2006). Hardiness: The courage to grow from stresses. *The Journal of Positive Psychology, 1*(3), 160–168. https://doi.org/10.1080/17439760600619609

Maddi, S., Harvey, R., Khoshaba, D., Fazel, M., & Resurreccion, N. (2011). The relationship of hardiness and some other relevant variables to college performance. *Journal of Humanistic Psychology, 52*(2), 190–205. https://doi.org/10.1177/0022167811422497

Mageau, G., & Vallerand, R. (2007). The moderating effect of passion on the relation between activity engagement and positive affect. *Motivation and Emotion, 31*, 312–321. https://doi.org/10.1007/s11031-007-9071-z

Medveder, O., Siegert, R., Mohamed, A., Shepherd, D., Landhuis, E., & Krageloh, E. (2016). The Oxford happiness questionnaire: Transformation from an ordinal to an interval measure using Rasch analysis. *Journal of Happiness Studies, 18*(5), 1425–1443. https://doi.org/10.1007/s10902-016-9784-3

Merz, E., Malcarne, V., Ruesch, S., Ko, C., Emerson, M., Roma, V., & Sadler, G. (2013). Psychometric properties of the positive and negative affect schedule (PANAS) original and short forms in an African American community sample. *Journal of Affective Disorders, 151*(3), 942–949. https://doi.org/10.1016/j.jad.2013.08.011

Metallidou, P., & Vlachou, A. (2007). Motivational beliefs, cognitive engagement, and achievement in language and mathematics in elementary school children. *International Journal of Psychology, 42*(1), 2–15. https://doi.org/10.1080/00207590500411179

Mocklinghoff, S., Papoport, O., Heckel, C., Messerschmidt-Grand, C., & Ringeisen, T. (2021). Latent profiles of test anxiety: Considering its multi-faced structure. *Journal of Educational Research, 110*, 101882. https://doi.org/10.1016/j.ijer.2021.101882

Niculescu, A. C., Tempelaar, D., Dailey-Hebert, A., Segers, M., & Gijselaers, W. (2015). Exploring the antecedents of learning-related emotions and their relations with achievement outcomes. *Frontline Learning Research, 3*(1), 1–17.

Papantoniou, G., Moraitou, D., & Filippidou, D. (2011). Psychometric properties of the Greek version of the test anxiety inventory. *Psychology, 2*(3), 241–247. https://doi.org/10.4236/psych.2011.23038

Parpala, A., Lindblom-Ylanne, S., Komulainen, E., Litmanen, T., & Hirsto, L. (2010). Students' approaches to learning and their experiences of the teaching–learning environment in different disciplines. *British Journal of Educational Psychology, 80*, 269–282. https://doi.org/10.1348/000709909X476946

Pekrun, R., & Linnenbrink-Garcia, L. (2014). *International handbook of emotions in education*. Routledge.

Peterson, C., Park, N., & Seligman, P. (2005). Orientations to happiness and life satisfaction: The full life vs. the empty life. *Journal of Happiness Studies, 6*, 25–41. https://doi.org/10.1007/s10902-004-1278-z

Postareff, L., Mattsson, M., Lindblom-Ylänne, S., & Hailikari, T. (2017). The complex relationship between emotions, approaches to learning, study success and study progress during the transition to university. *Higher Education, 73*, 441–457. https://doi.org/10.1007/s10734-016-0096-7

Putwain, W., Gallard, D., Beaumont, J., Lobever, K., & von der Embse, N. (2021a). Does test anxiety predispose poor school-related wellbeing and enhanced risk of emotion disorders? *Cognitive Therapy and Research, 45*, 1150–1162. https://doi.org/10.1007/s10608-021-10211-x

Putwain, W., von der Embse, P., Rainbird, C., & West, G. (2021b). The development and validation of a new multidimensional test anxiety scale. *European Journal of Psychological Assessment, 37*, 236–246. https://doi.org/10.1027/1015-5759/a000604

Raufelder, D., Jagenow, D., & Hoferichter, F. (2013). The person-oriented approach in the field of educational psychology. *Problems of Psychology in the 21st Century, 5*, 1–10.

Ringeisen, T., & Buchwald, P. (2010). Test anxiety and positive and negative emotional states during examination. *Cognition, Brain and Behavior, 4*, 431–447.

Rodotham, D. (2008). Stress among higher education students: Towards a research agenda. *Higher Education, 56*, 735–746. https://doi.org/10.1007/s10734-008-9137-1

Ruis-Alfonso, Z., & Leon, J. (2016). The role of passion in education: A systematic review. *Educational Research Review, 19*, 173–188. https://doi.org/10.1016/j.edurev.2016.09.001

Russeau, L., & Vallerand, J. (2008). An examination of the relationship between passion and subjective well-being in older adults. *International Journal of Aging and Human Development, 66*, 195–211. https://doi.org/10.2190/AG.66.3.b

Rytkonen, H., Parpala, A., Lindblom-Ylanne, S., Virtanen, V., & Postareff, L. (2012). Factors affecting bioscience students' academic achievement. *Instructional Science, 40*, 241–256. https://doi.org/10.1007/s11251-011-9176-3

Salmela-Avo, K., & Sanna, R. (2017). Study engagement and burnout profiles among finish higher education students. *Burnout Research, 7*, 21–28. https://doi.org/10.1016/j.burn.2017.11.001

Sarason, I., & Sarason, B. (1990). Test Anxiety. In: H. Leitenbeg, (ed.), *Handbook of Social and Evaluation Anxiety*. Springer.

Seligman, P., Steen, A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*, 410–421. https://doi.org/10.1037/0003-066X.60.5.410

Sheard, M., & Golby, J. (2007). Hardiness and undergraduate academic study: The moderating role of commitment. *Personality and Individual Differences, 43*, 579–588. https://doi.org/10.1016/j.paid.2007.01.006

Soheili, F., Hosseinian, S., & Abdollahi, A. (2020). Development and initial validation of the children's Hardiness scale. *Psychological Reports, 124*(4), 1932–1949. https://doi.org/10.1177/0033294120945175

Spielberger, C. D. (1980). *Test anxiety inventory: Preliminary professional manual*. Consulting Psychologists Press.

Spielberger, C. D., & Vagg, P. R. (1995). *Test anxiety: Theory, assessment and treatment*. Taylor & Francis.

Stein, S., & Bartone, P. (2020). *Hardiness: Making stress to work for you to achieve your life goals.* Wiley.

Steinmayr, R., Grede, J., McElvany, W., & Wirthnein, L. (2016). Subjective well-being, test anxiety, academic achievement: Testing for reciprocal effects. *Frontiers in Psychology, 6*, 1–13. https://doi.org/10.3389/fpsyg.2015.01994

St-Louis, C., Verner-Fikion, J., Bergeron, M., & Vallerand, R. (2018). Passion and mindfulness: Accessing adaptive self-processes. *The Journal of Positive Psychology, 13*(2), 155–164. https://doi.org/10.1080/17439760.2016.1245771

Stoeber, J., Childs, H., Hoyward, A., & Feast, R. (2011). Passion and motivation for studying: Predicting academic engagement and burnout in university students. *Educational Psychology, 31*(4), 513–528. https://doi.org/10.1080/01443410.2011.570251

Tilburg, W., & Igou, E. (2019). Dreaming of a brighter future: Anticipating happiness instills meaning in life. *Journal of Happiness Studies, 20*, 541–559. https://doi.org/10.1007/s10902-018-9960-8

Tran, V. (2013). Positive affect, negative affect scale. In M.D. Gellnanm J.R. Turner (eds.). *Encyclopedia of Behavioral Medicine*. Springer, New York.

Tuccitto, D., Giacobbi, J., & Leite, W. (2010). The internal structure of positive and negative affect: A confirmatory factor analysis of the PANAS. *Educational and Psychological Measurement, 70*(1), 125–141. https://doi.org/10.1177/0013164409344522

Vallerand, R. J. (2020). Passion in education: theory, research, and applications. In G., Liem, & D., McInerney (eds), *Educational Interventions: A Sociocultural Perspective*. Charlotte, NC: Information Age Publishing (pp. 115–147).

Vallerand, R. (2012). The role of passion in sustainable psychological well-being. *Psychology of Well-Being: Theory, Research and Practice, 2*(1), 1–21. https://doi.org/10.1186/2211-1522-2-1

Vallerand, R., Blanchard, C., Mageau, A., Koestner, R., Ratelle, F., Leonard, M., & Marsolais, J. (2003). Les passions de l'ame: On obsessive and harmonious passion. *Journal of Personality and Social Psychology, 85*, 756–767. https://doi.org/10.1037/0022-3514.85.4.756

Vanthournout, G., Coertjens, L., Gijbels, D., Donche, V., & Van Petegem, P. (2013). Assessing students' development in learning approaches according to initial learning profiles: A person-oriented perspective. *Studies in Educational Evaluation, 39*(1), 33–40. https://doi.org/10.1016/j.stueduc.2012.08.002

Verner-Filion, J., Schellenberg, B., Holding, A., & Koestner, R. (2020). Passion and grit in the pursuit of long-term personal goals in college students. *Learning and Individual Differences, 83–84*, 101939. https://doi.org/10.1016/j.lindif.2020.101939

Verner-Filion, J., & Vallerand, J. (2016). On the differential relationships involving perfectionism and academic adjustment: The mediating role of passion and affect. *Learning and Individual Differences, 50*, 103–111. https://doi.org/10.1016/j.lindif.2016.07.018

Wadi, M., Yusoff, M., Rahim, A., & Lah, N. (2022). Factors affecting test anxiety: a qualitative analysis of medical students' views. *BMC Psychology*. https://doi.org/10.1186/s40359-021-00715-2

Wagerman, A., & Funder, D. (2007). Acquaintance reports of personality and academic achievement: A case for conscientiousness. *Journal of Research in Personality, 41*, 221–229. https://doi.org/10.1016/j.jrp.2006.03.001

Warne, T. (2014). A primer on multivariate analysis of variance (MANOVA) for behavioral scientists. *Practical Assessment, Research and Evaluation, 19*(17), 1–10. https://doi.org/10.7275/sm63-7h70

Warren, K., Ollemdick, H., & King, J. (1996). Test anxiety in girls and boys: A clinical-developmental analysis. *Behavior Change, 13*, 157–170.

Watson, D., Clark, A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Weigold, I., Weigold, A., Kim, S., Drakeford, N., & Dykema, A. (2015). Assessment of the psychometric properties of the RAHS in college student samples. *Psychological Assessment, 28*(10), 1207–1219. https://doi.org/10.1037/pas0000255

Wilson, D., & Gilbert, J. (2003). Affecting forecasting. In M., Zanna (Ed.), *Advances in experimental social psychology* (vol. 35, pp. 345–411). San Diego, CA: Academic Press.

Wong, S., Liang, J., & Tsai, C. (2019). Uncovering Malaysian secondary school students' academic hardiness in science, conceptions of learning, and science learning self-efficacy: A structural equation modelling analysis. *Research in Science Education*. https://doi.org/10.1007/s11165-019-09908-7

Woolfolk, A., Winne, H., & Perry, E. (2006). *Educational Psychology*. Canada.

Yaprak, P., Cuclu, M., & Durhan, T. (2018). The happiness, hardiness, and humor styles of students with a bachelor's degree in sport sciences. *Behavioral Sciences, 8*(82), 1–21. https://doi.org/10.3390/bs8090082

Yu, A., & Chick, K. (2009). *A comparison of the two follow up analysis after multiple analysis of variance, analysis of variance, and descriptive discriminant analysis: a case study of the program effects on education-abroad programs*. Proceedings of the 2009 Northeastern Recreation research Symposium (pp. 235–240)

Zeidner, M. (2007). Test anxiety in educational contexts: Concepts, findings, and future directions. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education* (pp. 165–184). Elsevier Academic Press. https://doi.org/10.1016/B978-012372545-5/50011-3

Zuckerman, M., & Spielberger, C. (2015). *Emotions and anxiety: New concepts, methods and applications*. Taylor & Francis.