Original Paper

Investigation of the relationships between academic hardiness and passion for studies with undergraduates’ affect and happiness

Kamtsios Spiridon

Received: 2 December 2021 / Accepted: 7 September 2022 / Published online: 20 September 2022
© The Author(s) 2022

Abstract
Personality variables contribute to the development of passion for studies leading undergraduates to different affective experiences. Academic hardiness, an affective personality trait, may have effect on undergraduates’ passion for studies. The purpose of the study (which uses a quantitative methodological approach) was twofold: (a) to examine the psychometric properties of Passion scale in Greek undergraduates and (b) to investigate the role of Academic Hardiness 3Cs in the Harmonious (HP) and Obsessive (OP) passion. A convenience sample of 293 undergraduates completed the following scales: (a) Passion scale, (b) Oxford Happiness Questionnaire, (c) The Positive and Negative Affect schedule, and (d) The revised Academic Hardiness scale. Initially, results from exploratory and confirmatory factor analyses provided support for the two-factor passion scale. Moreover, results from SEM analyses revealed that control and challenge were positively related to HP, whereas commitment was positively related to both HP and OP. A negative relationship was found between control and OP. OP was positively related with negative affect, which, in turn, was negatively related with undergraduates’ happiness. On the contrary, HP was positively related with positive affect, which, in turn, was positively related with happiness. Findings of the study are discussed, focusing on the adaptive nature of academic hardiness and harmonious passion in academic settings.

Keywords Academic hardiness · Harmonious and obsessive passion · Undergraduates

Research in educational psychology has dealt with providing a better knowledge of learning processes from both cognitive and behavioral perspectives. From this point of view, psychology theories provide evidence for students’ learning, thinking,
interests, motivation, affect, etc. One of these theories, Self Determination Theory (Deci and Ryan 2000; Niemic and Ryan 2009), focuses on reasons which individuals choose to get involved with an activity. Their choice varies along a self-determination continuum. In this continuum, amotivation and intrinsic motivation are the extremities (Deci and Ryan 2000; Sarebo, Hapvari, Gulli, Kristiansen 2009). Intrinsic motivation is determined as a state of motivation that drives a person to engage in an activity for the inherent enjoyment and/or interest in the activity rather than for attaining external contingencies (Ryan and Deci 2000; Su and Chen 2010). Intrinsic motivation is maintained by the satisfaction of the need for autonomy (Niemiec and Ryan 2009). This internalization of intrinsic motivation is crucial for effective academic and psychological functioning among students at all educational levels (Niemic and Ryan, 2009; Ryan and Deci 2000).

When internalization is autonomous, individuals consider tasks which they are involved in as important, absorb them into identity of their own will, and therefore fully turn them into their own (Marsh et al. 2013; Zhao et al. 2015). On the contrary, when internalization is controlled, individuals are obligated to identify with these tasks, and thus their behaviors may either be partially internalized in the identity or remain external (Marsh et al. 2013). On the basis of this theoretical approach, Vallerand et al. (2003) introduced the Dualistic Model of Passion, a motivational process which underlies people’s involvement in various activities.

The dualistic model of Passion (DMP; Vallerand 2012; Lopez and Vallerand, 2020) determines passion as a strong inclination toward an activity that is important, that people like (or even love), value, and engage in on a regular basis, and is self-defining (Lopez and Vallerand 2020). This definition reveals that activity valuation, time and energy expenditure, and liking for the task are all associated with engagement in activities (Mageau and Vallerand 2007). These activities come to be so self-defining that they represent central features of one’s identity (Vallerand et al., 2003).

The model proposes the existence of two types of passion: harmonious passion (HP) and obsessive passion (OP). The two types of passion differ in terms of how the passionate activity is internalized into a person’s identity (Mageau, and Vallerand 2007) (in an autonomous or a controlled way) (Deci and Ryan 2000): Harmonious passion (which results from an autonomous internalization) (Lopez and Vallerand 2020) refers to a motivational force that leads people to voluntarily engage in the activity and to personally endorse the importance of their activity engagement (Mageau and Vallerand 2007). People consciously internalize the experience into their identity and the activity remains under their control (Lopez and Vallerand 2020; Ruis-Alfonso and Leon 2016). Obsessive passion (which results from a controlled internalization) is associated with the experience of a loss of control with regard to the beloved activity. With OP, individuals’ engagement in the activity conflicts with other life activities (Vallerand et al. 2003; Vallerand, 2012) and is not fully positive, as the activity is out of their control (Lopez and Vallerand 2020). OP leads to maladaptive outcomes. Individuals experience negative feelings and internalizing experiences in an uncontrolled way (Vallerand et al. 2003; Ruis-Alfonso and Leon 2016).
Passion, positive–negative affect, and well-being

The dualistic model of passion revealed that many of the effects of passion on outcomes are mediated by positive or negative affect (Fredrickson 2001; Verner-Filion and Vallerand 2016). This means that harmonious and obsessive passion leads the person to engage in an activity in a different way. As a consequence, the individual experiences different affective experiences which can facilitate different effects on psychological well-being (Vallerand 2012). Research has shown that HP for an activity leads to repeated experiences of positive affect (Rousseau and Vallerand 2008). With HP, engagement is made in such a way that one participates in the activity with an openness to experience the activity, fully committed as a person, in a non-defensive manner (Vallerand 2012). Such a state leads individuals to derive positive affect from positive events without dwelling on negative outcomes and its potentially negative effects on oneself and their well-being (Vallerand 2012). In university settings, positive affect has been associated with adaptive outcomes (Verner-Filion and Vallerand 2016) such as students’ performance, engagement, happiness, and low levels of emotional distress (Vallerand 2012; Verner-Filion and Vallerand 2016). On the contrary, OP engagement orients individuals toward adopting more defense mechanisms during their involvement in an activity preventing one from fully experiencing positive affect (Vallerand 2012). As a result, individuals mainly experience negative affect such as stress or sadness. In undergraduates, negative affect was negatively related to indicators of adjustment (Vallerand 2012) and, in turn, predicts maladaptive outcomes (Verner-Filion and Vallerand 2016) that undermined psychological well-being (Rousseau and Vallerand 2008).

Passion and personality characteristics

Most recently, there is an increasing interest in the relation between personality variables and passion (Vallerand, Chichokian, and Paquette, 2020). Studies revealed that personality variables/characteristics underlay the distinction between OP and HP and highlighted the more positive/adaptive nature and consequences of HP in comparison with OP. Trait characteristics such as openness to experience, conscientiousness, and extraversion traits were positively related to HP (Dalpe, Demers, Verner, Filion, and Vallerand 2019; Balon, Lecoq and Riwe 2013). On the contrary, agreeableness and neuroticism were positively related to OP. In the same line of research, Verner-Filion and Vallerand (2016) proposed that self-oriented perfectionism, the more adaptive form of perfectionism, predicted mostly HP for ones’ studies. Moreover, Vallerand et al. (2007) revealed that an “autonomous orientation” personality (Balon et al. 2013) (e.g., It has a tendency toward volitional engagement in action) (Deci and Ryan 1985) would entail “autonomous” internalization style and would further lead to the emergence of a harmonious passion (Balon et al. 2013; Vallerand et al., 2007).
On the contrary, people that are oriented or regulated by the environment (i.e., controlled) feel like pawns to external force (Balon et al. 2013; Gagne 2007). This “controlled” personality orientation would facilitate “controlled” internalization style and would lead to OP for an activity (Balon et al. 2013; Vallerand 2007).

On the subject of research efforts regarding associations between personality characteristics and passion, research suggests that personality contributes to the development of HP and OP. Recent research revealed that personality characteristics must be taken into account when studying the development of passion and how both types of passion contribute to a meaningful existence (Dalpe et al. 2019). However, given that passion seems to appear as a process likely to develop in everyone (Balon et al. 2013), the question on other personality characteristics, as passion antecedents, in further affecting the development of both types of passion, remains open. Empirical studies suggest continuing the identification of variables within the academic context relating to passion, attempting to identify which variables influence the development of passion (Ruis-Alfonso and Leon 2016). In this line of thinking, future research to explore associations between particular distal antecedents, proximal antecedents, passion, positive and negative affect, and well-being is needed. For example, academic hardiness (Benishek et al. 2005), which is an affective personality trait that involves student motivation and aspects of psychological hardiness (Kamtsios and Karagiannopoulou 2020), may affect the two types of passion separately. Academic hardiness and passion are two psychological concepts which have been extensively studied in psychological research, but no study has examined the relationship between them.

**Psychological and academic hardiness**

Psychological hardiness is a personality trait (Maddi 2006; Soderstrom et al. 2000), that emphasizes the importance of involvement rather than isolation, control rather than powerlessness, and challenge rather than threat (Maddi 2005). Hardiness can foster a person’s engagement with a task, leading to excellence in performance (Kardum et al. 2012; Maddi 2005) and influencing effective coping (Maddi 2005) and physical and mental health (Kardum et al. 2012; Maddi, 2006). Recent research discussed psychological hardiness in the field of educational psychology, introducing the concept of academic hardiness (Benishek et al. 2005; Kamtsios and Karagiannopoulou 2013a, 2020) in an attempt to ascertain what the positive impact that hardiness may have in academic settings might be (Karagiannopoulou and Kamtsios 2016; Kamtsios and Karagiannopoulou 2013b). A range of studies has proven psychological and academic hardiness relation with students’ performance (Kamtsios and Karagiannopoulou 2015; Sheard and Golby 2007), students’ task/learning orientation or ego/performance orientation (Kamtsios and Karagiannopoulou 2016), students’ academic stress (Abdollahi et al. 2019; Hystad et al. 2009; Kamtsios and Karagiannopoulou 2015) and mathematics anxiety (Karimi and Venkatesan 2009), students’ achievement motivation (Busato et al., 2000) and positive attitudes to university (Maddi et al. 2011), students’ learning self-efficacy (Wong et al. 2019), math efficacy (Benishek and Lopez 2001) and sense of belonging to school (Abdollahi...
et al. 2018; Høignaard et al. 2015), and students’ academic emotions (Kamtsios and Karagiannopoulou 2020).

The majority of the aforementioned researchers developed links between hardiness and academic hardiness attitudes and forms of behaviors that concern learning, academic performance, and academic adaptive outcomes (Karagiannopoulou and Kamtsios 2016), which, in turn, may lead to further opportunities for personal growth and success (Abdollahi et al. 2019) through positive educational experiences. Possible links between the two types of passion and academic hardiness 3Cs can be identified based on the idiosyncratic elements of these two psychological concepts. Given the fact that the concept of passion is associated with a kind of persistent involvement (Vallerand et al. 2003), and that it predicts a “deliberate” practice motivated by the aim of improving performance (Balon et al. 2013; Vallerand et al. 2003), it is hypothesized it would be positively correlated with academic hardiness 3Cs. Passion is a motivational construct (Vallerand 2012), whereas academic hardiness theory was partially based in Dweck’s and Leggett’s (1988) theory of academic motivation. Later research on academic hardiness recognized clearly motivational orientations in students’ learning, as students’ orientations to mastery and performance goals are noted (Kamtsios and Karagiannopoulou 2016). Passion can be characterized by a persistent involvement toward tasks, whereas commitment (one of the academic hardiness 3Cs) entails the tendency to be constantly involved in learning activities as well as inner interest in things and tasks (Benishek et al. 2005). Moreover, passion for studies is experienced toward a specific activity (studies), whereas the nature of academic hardiness 3Cs reflects student’s engagement in studying/learning environments. Furthermore, passion entails a deep love for the activity one is passionate about, whereas commitment concerned students’ reported willingness to engage in personal sacrifices, irrespective of the content or demands, in order to achieve academic excellence (Benishek et al. 2005).

In the light of the above suggestions that emphasize the importance of the idiosyncratic elements of passion and academic hardiness, the present study is a first attempt toward the investigation of the relationship between academic hardiness 3Cs and passion variables. We assume that we can have a better view of a different personality trait that can be respectively associated with the one or the other type of passion and how both types of passion are associated with positive and negative affect and undergraduates’ happiness.

### Aims of the study

The purpose of the current study is twofold:

(a) To validate a cross-cultural adaptation of the “Passion Scale” (factor structure, internal consistency, convergent validity) in Greek undergraduates.

(b) To explore, using structural equation modeling (SEM), three models that may explain the relationships among academic hardiness attitudes (3Cs), passion subscales, positive and negative affect, and happiness in an undergraduates’ sample. To our knowledge, few studies have examined the influence of personal
characteristics on harmonious and obsessive passion in a general population sample and there are no studies in an undergraduates’ sample. The outcomes assessed were positive and negative affect, which in turn predict happiness.

In the first model, academic hardiness attitudes appear as a presage factor. This lies on studies reporting that personality factors were proposed to influence passion (Daple et al. 2019). It was hypothesized that commitment, control, and challenge would be positively related to harmonious passion which, in turn, would positively be associated with positive affect, which leads to happiness. On the contrary, it was hypothesized that control and challenge would be negatively related to obsessive passion, which, in turn, would be positively related to negative affect and then negatively related to happiness.

In the second model, the hypothesized relationships between the variables of the study were the same. However, in the second model, the direct effect of control on positive and negative affect was hypothesized, draws on studies reporting that control skills may be viewed as a personal coping mechanism or as an individual level protective factor in coping with life demands (Rosenbaum 2000), predicting increased positive affect (Hamana et al. 2013). Moreover, a third model was tested in which it was hypothesized that passion variables as well as academic hardiness attitudes mediated in the relationship between PANAS subscales and happiness.

Hypotheses of the study

The main hypotheses of the study were as follows:

(a) Exploratory and confirmatory factor analyses should provide evidence and support on the two-factor structure of the Passion scale in Greek language. It was also hypothesized that α-Cronbach coefficient for the two Passion subscales would be high enough, supporting the psychometric properties of the scale

(b) Passion scale’s convergent validity would be supported from correlational analyses results between the two passion scales and passion presage factors-personality factors (academic hardiness attitudes-3Cs) and passion outcomes factors (positive and negative affect and happiness)

(c) A path from 3Cs to the two types of passion and then to positive and negative affect and happiness was hypothesized. Academic hardiness 3Cs (personality trait) are hypothesized to influence passion, which is more located at the contextual activity specific level (Dalpe et al., 2019). The existence of direct and indirect effects between the research variables is possible to exist.
Materials and methods

Participants

The research population concerns undergraduates. A convenience sample of 293 undergraduates, consisted of 11.9% \((n = 36)\) males and 87.7% \((n = 257)\) females, participated in the study. Participants were aged between 18 and 26 years \((M_{age} = 21.84, SD = 5.3)\), attending a social science department. Initially, the participants were informed about the purpose of the research and answers were given on how to complete the questionnaires. Undergraduates voluntarily chose to participate. The completion of the questionnaires lasted 15–20 min, with a response rate of over 95%. 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

In this research a quantitative methodological approach was adopted. To meet the purposes of the research the following questionnaires were used:

1. Passion Scale: Undergraduates’ passion for their studies was measured with the Passion Scale. Passion scale consists of 12 items. Participants answered the questions on a 7-point Likert scale, ranging from 1 (= strongly disagree), to 7 (= strongly agree). Passion scale is designed to measure harmonious passion (6 items, e.g.,: “My studies are in harmony with the other activities in my life”) and obsessive passion (6 items, e.g., “I have difficulties controlling my urge to do my studies”). Previous research supports the dualistic model of passion, as well showing strong reliability and validity of the Passion Scale (Vallerand et al. 2003; Verner-Filionn and Vallerand 2016).

2. Oxford Happiness Questionnaire (OHQ) (Hills and Argyle 2002): The 29-item OHQ is a widely used scale for assessment of personal happiness as a broader unidimensional construct (Hills and Argyle 2002; Medveder et al. 2016). Examples of items include “Life is rewarding,” “Find things amusing.” Participants responded on a 4-point Likert scale ranging from “strongly disagree” to “strongly agree.” Previous studies demonstrated acceptable psychometric properties \((\alpha\text{ Cronbach}>.90)\).

3. The Positive and Negative Affect Schedule (PANAS): PANAS is as a self-reported measure of affect (Merz et al. 2013). It consists of different words that describe emotions and feelings. PANAS comprised two different subscales: Positive affect and Negative affect. Positive affect (10 items; e.g.,: inspired, interested) refers to the propensity to experience positive emotions and interact with others positively, despite the challenges of life. Negative affect (10 items: e.g.,: upset, nervous) involves experiencing the world in a more negative way. Participants rated each item on a 5-point Likert scale \((1=\text{very slightly}\)
or not at all, to 5= extremely) to measure the extent to which the affect has been experienced. Previous research revealed adequate psychometric properties of the scale, with α Cronbach coefficient ranged from 0.86 to 0.91 (Joiner et al. 1997; Tran 2013; Watson, Clark and Tellegen 1988).

4. Revised Academic Hardiness Scale-RAHS (Benishek et al. 2005).

The RAHS (Benishek et al. 2005) is a 40-item self-report scale developed to assess students’ behavioral, affective, and cognitive reactions to general and challenging academic situations (Weigold et al., 2015). RAHS measures three dimensions of Academic Hardiness: Commitment (13 items, e.g., “Won’t go out with friends if I need to study”), Control (16 items, e.g., “Can stay calm and learn from mistakes”), and Challenge (11 items; e.g., “Enjoy the challenge of difficult classes”), on a 4-point Likert scale. Higher scores indicate higher levels of academic hardiness. The psychometric properties of the scale have been examined in a sample range of late elementary school children (Kamtsios and Karagiannopoulou 2011), college students (Weigold et al. 2015), and undergraduates (Creed et al. 2013; Kamtsios and Karagiannopoulou 2015; Karagiannopoulou and Kamtsios 2016). In the present study, Cronbach’s α coefficients were satisfactory for the three RAH subscales (Commitment, α=.80, Control, α=.82, Challenge, α=.81).

Data analyses

Data analyses began with the application of an exploratory factor analysis (EFA), (using axis factoring) in order to assess the factor structure of the Passion Scale, following Pett, Lackey and Sullivan (2003) suggestions. Consequently, a CFA model was conducted using AMOS 21. CFA was carried out for the purpose of validating and confirming the goodness of fit of the Passion Scale. The CFA measurement model was developed based on the factor loadings from the exploratory approach (Kamtsios and Karagiannopoulou, 2015). Both absolute and incremental indices were used to evaluate the model tested. Items were specified to load on only one factor each. Following recommended procedures, multiple fit indices were used to determine the appropriateness of the model (Hu and Bentler, 1998): the Comparative Fit Index (CFI), the Normed Fit Index (NFI), the Root Mean Squared Error of Approximation (RMSEA (with 90% confidence interval), the Akaike’s Information Criterion (AIC), and the Tucker-Lewis index (TLI). CFI c = values > 0.93 represents a good fit, whereas a RMSEA value of less than 0.06 indicates a good fit (Hu and Bentler 1999).

Moreover, reliability analysis was examined by computing Cronbach’s alpha for all subscales of the study’s variables. Furthermore, hypothesis B was examined by calculating Pearsons’ correlations between passion subscales and commitment, control, challenge, positive affect, negative affect, and happiness.

Finally, in order to examine the hypothesized mediation (direct and mediated) between academic hardiness attitudes, passion variables, PANAS subscales, and happiness, the techniques of Path Analysis were used (hypothesis C). In other words, the hypothesized model proposed the paths from academic hardiness to the two types of passion and then to outcomes (negative and positive affect and happiness).
This procedure tests a priori structures and relations between variables and are thus well suited to testing theoretical model such as this one in the present study, where specific paths are hypothesized (Parker and Martin, 2009). Maximum likelihood was used to estimate SEM model, bootstrapping was employed in all analyses, and several fit indices, such as CFI, GFI, NFI, RMSEA, and AIC, were used in order to evaluate the model.

**Results**

Initially, an EFA was performed in order to test hypothesis. Results from principal components analysis revealed two factors with eigenvalues greater than 1.00. The two factors (harmonious and obsessive passion) accounted for 54.45% of the total variance. Table 1 includes Passion scale items and their factor structure coefficients. Consequently, a CFA was run. CFA testing the 2-factor model showed that the model fit the data well, $\chi^2 = 153.1$, $p < 0.001$, CFI = 0.92, GFI = 0.92, NFI = 0.90, RMSEA = 0.089 (LO = 0.07, HI = 0.09), AIC = 217.10. As it can be seen, most of the indices are found in acceptable range of values; thus, the latent structure of the instrument has been verified. Confirmatory factor analysis results on Passion scale with parameters estimates are presented in Fig. 1. Aligned with

| Factor pattern coefficients for the two-factor promax solution for the “Passion Scale,” using principal components analysis |
|---------------------------------------------------------------|
| No. | Items                                                                 | Factor loadings h² |
|-----|------------------------------------------------------------------------|--------------------|
|     |                                                                        | 1                  | 2                  |
| 10  | My studies are in harmony with the other activities in my life         | 0.80               | 0.62               |
| 1   | My studies are in harmony with other things that are part of me        | 0.73               | 0.54               |
| 3   | The new things that I discover with my studies allow me to appreciate it even more | 0.69               | 0.55               |
| 8   | My studies allow me to live a variety of experiences                   | 0.69               | 0.51               |
| 12  | My studies are well integrated in my life                              | 0.61               | 0.43               |
| 5   | My studies reflect the qualities I like about myself                   | 0.58               | 0.46               |
| 6   | My studies are the only thing that really turns me on                  | 0.83               | 0.74               |
| 7   | If I could, I would only do my studies                                 | 0.82               | 0.67               |
| 11  | I have the impression that my studies control me                       | 0.77               | 0.61               |
| 4   | I have almost an obsessive feeling for my studies                      | 0.63               | 0.49               |
| 9   | My studies are so exciting that I sometimes lose control over them     | 0.48               | 0.53               |
| 2   | I have difficulties controlling my urge to do my studies              | 0.40               | 0.34               |

K.M.O. = .838
Bartlett test of sphericity = 1382.61, $p < .001$
Eigenvalues
Total variance explained: 54.45
α-Cronbach

Factor 1 = Harmonious passion, Factor 2 = Obsessive passion
hypothesis A, Cronbach’s α for Harmonious Passion was 0.82 and for Obsessive Passion was 0.78. Item-total correlation was ranged between 0.25 and 0.74. As a result, the questionnaire was judged to be internally consistent and therefore reliable. Statistical description of the Passion scale (mean, SD, corrected item-total correlation, item skewness and kurtosis) is presented in Table 2.

The psychometric properties of the other instruments used in this research RAHS, PANAS, and happiness scale have already been explored in previous studies in Greek undergraduates (Kamtsios and Karagiannopoulou 2015; Karagiannopoulou and Kamtsios 2016; Moraitou and Efklides 2009; Papantoniou, Moraitou, Dimou, and Katsadima 2010; Nani et al. 2017) and their factor structure has been confirmed.

Table 3 depicts correlational analysis results between passion subscales and passion antecedents’ factors. Commitment, $r = 0.54$, Control, $r = 0.39$, and

![Confirmatory Factor Analysis model](image_url)
| No. | Passion scale items                                                                 | Mean | SD    | Corrected item-total | Item Skewness | Item Kurtosis |
|-----|-------------------------------------------------------------------------------------|------|-------|-----------------------|---------------|---------------|
| 1   | My studies are in harmony with the other activities in my life                       | 5.01 | 1.48  | 0.49                  | −68           | −11           |
| 2   | I have difficulties controlling my urge to do my studies                              | 3.01 | 1.84  | 0.25                  | 0.58          | −81           |
| 3   | The new things that I discover with my studies allow me to appreciate it even more    | 5.73 | 1.36  | 0.65                  | −42           | 1.15          |
| 4   | I have almost an obsessive feeling for my studies                                    | 3.28 | 1.72  | 0.65                  | 0.28          | −72           |
| 5   | My studies reflect the qualities I like about myself                                  | 5.01 | 1.46  | 0.63                  | −67           | 0.09          |
| 6   | My studies are the only thing that really turns me on                                 | 3.45 | 1.87  | 0.74                  | 0.19          | −1.19         |
| 7   | If I could, I would only do my studies                                               | 2.87 | 1.87  | 0.60                  | 0.65          | −73           |
| 8   | My studies allow me to live a variety of experiences                                 | 5.32 | 1.56  | 0.62                  | 0.54          | 0.34          |
| 9   | My studies are so exciting that I sometimes lose control over them                    | 4.1  | 1.65  | 0.71                  | 0.12          | −73           |
| 10  | My studies are in harmony with other things that are part of me                       | 4.84 | 1.54  | 0.62                  | 0.52          | −36           |
| 11  | I have the impression that my studies control me                                      | 3.67 | 1.95  | 0.65                  | 0.13          | −76           |
| 12  | My studies are well integrated in my life                                             | 6.06 | 1.26  | 0.59                  | −72           | 0.64          |
Challenge, $r = 0.33$ were positively related with harmonious passion. There was also a positive correlation between commitment and obsessive passion ($r = 0.33$).

Moreover, there is a strong positive correlation of happiness and positive affect with harmonious passion ($r = 0.47$ and $r = 0.44$, respectively) and a negative correlation of negative affect with harmonious passion ($r = -0.21$). This is not the case with obsessive passion. Obsessive passion was positively correlated with negative affect ($r = 0.15$) and negatively with happiness ($r = -0.41$) (Table 4).

### Examination of the proposed model

To test the hypothesized relationships between the study’s variables, a structural equation model was run to explore which of the three four-stage models provide the best statistical fit to the data. In the first model, every variable is directly affected only by the variables of the previous stage: (a) academic hardiness attitudes predicted both passion subscales, (b) harmonious passion predicted positive and negative affect, (c) obsessive passion predicted negative affect, and (d) positive and negative affect predicted happiness. In the second model, the direct effect of control on positive and negative affect is also examined. In the third model, the mediated role of passion variables and academic hardiness attitudes was tested.

All independent variables of the model and the error variables (on the same stage) are hypothetical potentially correlated. Table 5 depicts the fit of the three models.

| Variables       | 1     | 2     | 3     | 4     | 5     | M     | SD   |
|-----------------|-------|-------|-------|-------|-------|-------|------|
| Harmonious passion | 0.36** | 0.54** | 0.39** | 0.33** | 5.33  | 1.05  |
| Obsessive passion    | 0.33** | −0.004 | 0.10  | 3.39  | 1.05  |
| Commitment           | 0.26** | 0.13*  | 2.94  | 0.44  |
| Control              | 0.30** | 2.73   | 0.47  |
| Challenge            | 2.41   | 0.55   |

*Correlation is significant at the 0.05 level

**Correlation is significant at the 0.01 level

### Table 4 Correlation between passion subscales and passion outcomes’ factors

| Variables       | 1     | 2     | 3     | 4     | 5     | M     | SD   |
|-----------------|-------|-------|-------|-------|-------|-------|------|
| Harmonious passion | 0.36** | 0.47** | 0.44** | −0.21** | 5.33  | 1.05  |
| Obsessive passion    | 0.045 | 0.16*  | 0.15*  | 3.39  | 1.05  |
| Happiness           | 0.65** | −0.41** | 2.56  | .41   |
| Positive affect      | −0.02 | 28.97 | 5.27  |
| Negative affect      | 16.71 | 6.07   |
Model 2 reveals a better fit than the first model (Table 5). Model 2 has the largest values for NFI, CFI, TLI and the smaller for RMSEA and AIC. Moreover, fit indices of model 2 are in an acceptable level. Results from the model revealed that Commitment ($\beta = 0.46, p < 0.001$), Control ($\beta = 0.21, p < 0.001$), and Challenge ($\beta = 0.20, p < 0.001$) were positively related to harmonious passion. Subsequently, harmonious passion was positively related to positive affect ($\beta = 0.35, p < 0.001$), which, in turn, related positively to happiness ($\beta = 0.64, p < 0.001$). Additionally, harmonious passion was negatively related to negative affect ($\beta = -0.11, p < 0.001$). On the contrary, control ($\beta = -0.12, p = 0.04$) and challenge ($\beta = -0.10, p = 0.03$) were negatively related to obsessive passion. Furthermore, obsessive passion was positively related to negative affect ($\beta = 0.18, p = 0.008$), which in turn negatively related to happiness ($\beta = -0.40, p < 0.001$). Additionally, Fig. 2 illustrates the positive indirect effect of control ($\beta = 0.23, p < 0.001$) on positive affect and the negative indirect effect of control on negative affect ($\beta = -0.42, p < 0.001$).

### Testing the indirect effects from 3Cs to PANAS subscales and happiness

Bias-corrected bootstrap method was used to test the indirect effects. The significance of indirect effects was calculated using 1000 bootstrap samples and the 95% bias-corrected confidence intervals (CIs) (Jung et al. 2019; Poi 2004).

Regarding the relation between commitment and positive affect, results revealed that significant indirect effects provided support for the mediating role of HP ($\beta = 0.165; 95\% \text{ CI} = 0.104$ to $0.234, p = 0.001$). Indirect effect also exists in the relation between commitment and happiness. This finding highlights the mediating role

![Fig. 2](image-url) Final model involving 3Cs, passion sub-factors, positive/negative affect, and happiness. The dashed lines indicate the relationships between the variables which in the model were found not to be statistically significant.

| Model | chi-square (df) | NFI | CFI | TLI | RMSEA | AIC |
|-------|----------------|-----|-----|-----|-------|-----|
| 1     | 104.007 (12)   | 0.85| 0.86| 0.87| 0.16  | 168.007 |
| 2     | 36.47 (11)     | 0.95| 0.96| 0.91| 0.06  | 102.47 |
| 3     | 159.04 (3)     | 0.78| 0.77| 0.78| 0.42  | 241.04 |
of HP and positive affect ($\beta=0.091$; 95% CI = 0.051 to 0.135, $p=0.002$). Similar results emerged regarding the relation between control and positive affect. Results of indirect effects present the mediating role of HP ($\beta=0.076$; 95% CI = 0.039 to 0.128, $p=0.001$). Indirect effect also provided support for the mediating role of HP and positive affect ($\beta=0.336$; 95% CI = 0.225 to 0.423, $p=0.002$) in the positive relation between control and happiness, thus providing support for the mediating role of HP and positive affect. Moreover, results revealed the presence of a positive significant indirect effect of challenge on positive affect through HP ($\beta=0.072$; 95% CI = 0.037 to 0.127, $p=0.001$) and an indirect effect of challenge on happiness through the combined effects of HP and positive affect ($\beta=0.043$; 95% CI = 0.019 to 0.075, $p=0.001$). These results demonstrate the mediating role of HP and positive affect in the relation between challenge and happiness (Fig. 2).

Discussion

A primary purpose of the research was to examine aspects of validity and reliability of Passion Scale in the context of Greek university studies. A second aim was to test a model involving academic hardiness attitudes (3Cs), passion subscales, positive/negative affect, and happiness. Findings of the study are as follows: (a) support the psychometric properties of the passion scale in a Greek undergraduate sample and (b) support earlier suggestions concerning positive and negative emotions and happiness as important outcomes of passion (harmonious), which may be affected by personality characteristics-academic hardiness 3Cs, as an individual trait proximal antecedent.

Psychometric properties of the Greek version of Passion scale

The study firstly aimed to provide evidence for the psychometric properties of the Greek version of the Passion scale, which is based on the dualistic model of passion (Vallerand 2012; Vallerand et al. 2003), in a Greek undergraduate sample. Initially, a translation process was conducted (from English to Greek and back to English), with no inconsistency between the two versions. In line with previous research (Balon et al. 2013; Lopez M and Vallerand 2020; Vallerand et al., 2012), confirmatory factor analysis (using multiple fit indices which were quite high and verified the latent structure of passion scale) supported the two-factor structure of the scale, as theoretically predicted.

Results of the study replicated the two-factor model originally proposed by Vallerand et al. (2003) and also observed in other versions (different languages) of the passion scale such as Brazilian (Peixoto, Nakano, Castillo, Oliverira and Balbinotti, 2019), Chinese (Zhao et al. 2015), Portuguese (Concalves et al. 2014), Spanish (Chamarro, Penelo, Fornieles, Oberst, Vallerand, and Fernandez-Castro, 2015), and other studies (Carbonneau, Vallerand, Fermet, and Guay 2008; LaFrieniere, Jowett, Vallerand and Carbonneau 2011; Marsh et al. 2013). Consistent with the
hypothesis of the study and similar to previous research results (Vallerand et al. 2012), high internal coefficients indicate that the passion scale and its sub-scores are reliable.

**Convergent validity in relation to (a) passion proximal antecedents and (b) passion outcomes**

Firstly, with respect to the correlations between the two passion subscales and passion outcomes, it can be seen that they were positive and negative. HP was positively related to happiness and positive affect. These correlations were stronger than those obtained with OP. HP also was negatively related to negative affect. These findings were to be expected based on the research on passion and its outcomes in the educational context, in which HP leads to a number of adaptive outcomes (Ruis-Alfonso and Lean 2016), which are connected with psychological adjustment indicators, such as well-being (Vallerand et al. 2012; Verner-Filion and Vallerand 2016).

Secondly, regarding the correlation between the two passion subscales and academic hardiness 3Cs (as passion proximal antecedents), it can be seen that commitment was positively correlated with both HP and OP. However, commitment’s correlation with HP was stronger than this with OP. In addition, HP was positively correlated with control and challenge. Moreover, OP was unrelated with control and challenge. This was to be expected as previous research revealed that links exist between personality trait and passion, and that the traits associated with HP vs OP differ considerably from one another (Balon et al. 2013).

**Direct effects of the study**

The second phase of the analyses of the study shows the direct effects of 3Cs on the two types of passion. Overall, concerning the associations between commitment, HP and OP, it is interesting that (according to results of the study) commitment, as a personality trait, may lead undergraduates to develop different types of passion and predetermine them to experience more or less adaptive outcomes.

Initially, results of the study suggest the direct effect of commitment on OP. Although commitment was perceived as a motivational construct, it does not always imply a love for an activity and internalizing to merge into one’s identity (Vallerand et al. 2003). Commitment may provide students with the motivation to engage in their learning activities (Cole et al. 2004; Kamtsios and Karagiannopoulou 2020; Wong et al. 2019) in an ego orientation manner (Busato et al. 2000; Kamtsios and Karagiannopoulou 2016), in their attempt to manage situations they encounter (Sheard and Golby 2007) like the ones students face regularly during their studies (e.g., academic pressures, assessment deadlines, fear of failure) (Misra et al. 2002), as they are unlikely to feel powerless (Maddi et al. 2011). Students live in a competitive academic environment (Rodotham 2008) and they are aware of the academic demands (Kamtsios and Karagiannopoulou 2020). Students’ commitment emphasizes the importance of involvement rather than isolation, even if they do not feel
fully “immersed” in their studies. These students may have as a priority to try to find the motivation to cope with university difficulties and demands in order to complete their studies. They may try to stay somehow organized with their studies (Kamtsios and Karagiannopoulou 2020) feeling either externally or internally pressured. These feelings of obligation on behalf of the participant (e.g., “have to”) may lead to OP as the internalization is controlled and thus undergraduates’ behaviors and values may either remain external or be only partially internalized in their identity (Marsh et al. 2013; Ryan and Deci 2000).

With OP, individuals are likely to remain engaged toward their studies. However, with OP engagement in the activity is derived from internal pressures (e.g., meeting assessment deadlines, completion in any way of the obligations arising from the studies) or/and from students’ social environment (external pressures, family, rewards etc.) (Verner-Filion et al. 2020). OP tends to trap undergraduates in negative cognitive processes (e.g., distraction, avoidance coping, rumination) as with OP engagement is more defensive (Vallerand 2012), which finally leaves “little room” for open-mindedness (Balon et al. 2013), positive affect and other adaptive outcomes. Results of the study confirmed this relationship. Findings of the study show that OP is positively associated with negative affect, which in turn is negatively related to students’ happiness. This relationship has been confirmed in previous research. In the educational settings, the absence of positive affect overtime undermined psychological well-being (Vallerand et al. 2020), preventing undergraduates to reach their optimal functioning (Fredrickson 2001).

Moreover, the results of the study revealed the direct effect of commitment on HP. Commitment was positively associated with HP. This association was stronger than that between commitment and OP. One key point in this relation may reside in the specific characteristics of these two concepts. The commitment facet of hardiness is all about being actively involved and engaged in one’s activities and the surrounding world (Stein and Bartone 2020). Academic commitment, driven from a both psychological and motivational perspective (Benishek et al. 2005; Dweck and Legget 1988), may be exhibited by undergraduates becoming deeply engaged and “immersed” with their studies, seeing this as the best way to turn whatever they are experiencing into something that seems important, beneficial, and valuable (Sherd and Golby 2007). Highly committed students’ goals are to be deeply involved and to succeed in their studies, to achieve academic excellence and to restrict or restrain negative emotionality (Kamtsios and Karagiannopoulou 2020). Commitment entails an intrinsic interest in the activity (studies) (Maddi, 2006) and a dedication in studies (Maddi and Khoshaba 2005). In such a case, a mastery or task orientation is performed, associated with adaptive outcomes and positive academic emotions (Kamtsios and Karagiannopoulou 2020).

The correlation between commitment and HP supports the assumptions of the study. Committed undergraduates are deeply engaged in their studies (Sheard and Golby 2007), prioritizing those activities deemed most contributory to academic success (Maddi 2006). Their studies are high valued and meaningful. In this case, their genius interest may transform into HP. They may recognize the importance of being committed to what they do to succeed, and they are distinguished by intrinsic motivation to do “the best job.” Under these circumstances, their studies are likely
to be internalized, facilitating the development of HP. Commitment attitudes and HP enable undergraduates to focus on tasks and feel “immersed in” (Balon et al. 2013; Vallerand et al. 2003) leading to a number of adaptive outcomes such as positive affect and happiness.

Findings of the study also support the positive association between control and HP, while this is not the case with the association between control and OP. Control entails students’ beliefs that they have the ability to achieve desired educational outcomes from personal effort and through effective emotional and academic self-regulation (Benishek et al. 2005). Undergraduates want to continue to have an influence on the outcomes around them, no matter how difficult this becomes (Maddi 2005) and believe that they can exert an effect on outcomes (Maddi 2005, 2006). Their attitude presupposes autonomy. Autonomy refers to allowing individuals to make choices and self-initiated decisions (Vallerand et al. 2020; Ryan and Deci, 2017), as it seems like a mistake to slip into powerless-ness and passivity (Maddi 2005, 2006). Depending on the extent to which one’s social environment is autonomy, an autonomous internalization is likely to take place (Vallerand 2012). In such a case, control, as a personality trait, should help facilitate the on-going development of HP (as shown by the results of this study). Therefore, the activity (studies) remains under the control of the individual, and in harmony with other important life aspects (Seguin-Levesque et al. 2003; Veiner-Filion and Vallerand 2016). HP, in turn, leads to positive affect. Positive affect is adaptive because positive emotions broaden people’s thought-action repertoires and self, leading to higher levels of psychological well-being-happiness (Fredrickson 2001; Vallerand 2012). On the contrary, results of the present study imply a negative relationship between control and OP. Lack of control or controlling educational climates (Niemiec and Ryan 2009) reflect both external pressures on students and beliefs that motivation is better shaped through external and not internalized activities. Under such circumstances, OP takes place, and the positive affect that once accompanied learning is frequently replaced by negative affect, which, in turn, undermines undergraduates’ happiness (Niemiec and Ryan 2009).

Furthermore, this study indicates the relationship between challenge (as a personality trait) and HP. According to educational psychology orientations, academic challenge attitude comes along with adaptive students’ profiles (Kamtsios and Karagiannopoulou 2020). Challenge exists in motivated performance situations (i.e., situations self-relevant to the individual, goal-oriented situations) (Fonseca et al. 2014) and after the evaluations of task demands (i.e., familiarity, required effort) and personal resources (i.e., previous knowledge, personal skills) (Blascovich 2008; Fonseca et al. 2014). Students distinguished by challenge appraise their studies situations (e.g., exams, tests, deadlines) as motivating and exciting, and consider their studies as important, beneficial, and valuable (Sheard and Golby 2007). They are encouraged to be actively engaged in their study activities and shape their personal learning experiences (Holges 2004). From this perspective, students’ activity is intrinsically motivated. Students consider learning as their goal to be willing to challenge themselves and persist in the face of difficulty (Dweck and Leggett 1988; Grant and Dweck 2003). Students who have
the propensity to engage in activities due to genuine interest (an autonomous personality style) should be more likely to develop a HP (Vallerand et al. 2020). Their studies are meaningful and highly valued by them (Vallerand 2012).

**Indirect effects of the study**

The third phase of the analyses of the study shows the indirect effects of 3Cs on positive affect and on happiness. Findings of the study indicate that the relationship between commitment, control, and challenge with positive affect is mediated by HP. Moreover, findings reveal that the relationship between 3Cs with undergraduates’ happiness is mediated by both HP and positive affect. It is suggested that (a) the effect of academic hardiness 3Cs on undergraduates’ positive affect can best be explained using HP as a mediator and (b) the effect of academic hardiness 3Cs on undergraduates’ happiness can be explained using HP and positive affect as mediator.

When “hardy” undergraduates try to succeed in achieving the goals they have set and try to overcome obstacles and difficulties, they realize the value of engaging and persevering in an activity in order to succeed, have control over their actions, and consider all their involvement as challenging for themselves. Under these circumstances, they are occupied with positive feelings. Throughout this process, HP is a key motivational process leading students to actively engage in their studies (Verner-Filion and Vallerand 2016; Verner-Filion et al. 2020), providing access to adaptive self-processes, including positive affect (Russeau and Vallerand 2008). Furthermore, research revealed the indirect association of 3Cs with happiness through HP and positive affect. This association is high enough for control. Previous research has shown a positive association between hardiness and psychological well-being (Cole et al. 2004; Skomovovsky and Sudom 2011). Hardy individuals have an internal sense of personal mastery and can confront problems with confidence in their ability to implement affective solutions (Soderstrom et al. 2000). Control allows undergraduates to display more active efforts to find solutions and to engage in the activity, and sense of commitment allows them to remain mentally present in their studies and confront them (Florian et al. 1995). These characteristics were associated with happiness and individuals’ well-being.

In sum, taking into consideration the fact that academic hardiness 3Cs leads to HP, that HP leads undergraduates to regular engagement in their studies (Vallerand et al. 2003, 2007) and that positive affect predicts undergraduates’ happiness (Vallerand, 2012), results of the study suggest that having commitment, control, and challenge in academic environments can lead to HP. Having a HP can lead undergraduates to experience cumulative experiences of positive affect that should facilitate and sustain undergraduates’ happiness (Vallerand, 2012).

Overall, the study presents relations between trait characteristics (academic hardiness 3Cs), passion and passion outcomes within an educational context, taking into account previous research revealed that academic hardiness remains a concept for further investigation (Karagiannopoulou and Kamtsios 2016) and the fact that broad personality factors must be account when studying the development of passion.
The present study stresses the adaptive nature of academic hardiness attitudes and HP in academic settings. Aspects of academic hardiness seem to be significant and contribute to our understanding in undergraduates’ passion for their studies. This information may be important for academics and educators in order to try to enhance undergraduates’ 3Cs (through a range of micro and macro interventions) in their attempt to improve the quality of learning experiences (Karagiannopoulou and Kamtsios, 2016). Encouragement of undergraduates to develop and use academic hardiness 3Cs, as personal strengths, may lead to an increase in HP and, in turn, to adaptive outcomes, including positive affect and psychological well-being-happiness.

**Limitations**

The study has limitations that need to be pointed out. Although results of the study have provided initial evidence of the psychometric properties of the Passion scale in Greek undergraduates, further research to establish the validity of the scale is needed. The psychometric characteristics should be explored with larger samples to enhance the usefulness of the scale. Moreover, the study was based on a small convenience sample with main feature a high gender imbalance due to overrepresentation of females within the psychology department (this is typical for social sciences and psychology departments, see: Karagiannopoulou et al. 2020; Karagiannopoulou and Kamtsios 2016; Karagiannopoulou, Milienos, Kamtsio and Rentzios 2019). Furthermore, instead of a cross-sectional design used by the present study, a longitudinal design can be used to discover relationships between variables over time.

**Funding** Open access funding provided by HEAL-Link Greece. The author states that there was no financial support for the research.

**Data availability** Study’s dataset is available on reasonable request.

**Declarations**

**Conflict of interest** There is no conflict of interest.

**Ethical approval** All procedures performed in study involving human participants 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.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

**Consent for publication** Author, upon article acceptance, transfer copyright of the article to the Publisher.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission.
References

Abdollahi A, Carbring P, Vaez E, Ghafororoki SA (2018) Perfectionism and test anxiety among high school students: the moderating role of academic hardiness. Curr Psychol 37(3):632–639

Abdollahi A, Panahipour S, Tafti M, Allen K (2019) Academic hardiness as a mediator for the relationship between school belonging and academic stress. Psychol Sch 57(5):823–832

Balon S, Leroq J, Rime B (2013) Passion and personality: Is passionate behavior a function of personality? Revue Européenne De Psychologie Appliquée 63:59–65

Benishek L, Lopez F (2001) Development and initial validation of academic hardiness scale. J Career Assess 9:333–352

Benishek L, Feldman J, Shipon W, Mecham S, Lopez F (2005) Development and evaluation of the revised academic hardiness scale. J Career Assess 13:59–76

Blascovich J (2008) Challenge and threat. In: Elliot AJ (ed) Handbook of Approach and Avoidance Motivation. Psychology Press, New York, pp 431–445

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. Personal Individ Differ 29:1057–1068

Carbonneau N, Vallerand R, Fermet C, Guay F (2008) The role of passion for teaching in intrapersonal and interpersonal outcomes. J Educ Psychol 100(4):977–987

Chamarro A, Penelo E, Forniæles A, Oberst U, Vallerand R, Fernandez-Castro J (2015) Psychometric properties of the Spanish version of the Passion scale. Psicothema 27(4):402–409

Cole M, Field H, Harris S (2004) Student learning motivation and psychological hardiness: interactive effects on students’ reaction to a management class. Acad Manag Learn Educ 3(1):64–85

Concalves G, Orgambidez-Ramos A, Ferrao M, Parreira T (2014) Adaptation and initial validation of the passion scale in a Portuguese sample. Escritos De Psicologia 7(2):19–27

Creed PA, Conlon EG, Dhaliwal K (2013) Revisiting the academic hardiness scale: revision and revalidation. J Career Assess 21:537–554

Daple J, Demers M, Verner-Filior J, Vallerand R (2019) From personality to passion. the role of the Big Five factor. Personal Individ Differ 138:280–285

Deci EL, Ryan RM (1985) The general causality orientation scale: Self-determination in personality. J Res Pers 19:119–134

Deci EL, Ryan RM (2000) The “what” and “why” of goal pursuits: Human needs and the self-determination theory of behavior. Psychol Inq 11(4):227–268

Dweck CS, Leggett EL (1988) A social-cognitive approach to motivation and personality. Psychol Rev 95:256–273

Florian V, Mikulincer M, Taubman O (1995) Does hardiness contribute to mental health during a stressful real-life situation? the roles of appraisal and coping. J Pers Soc Psychol 68:687–695

Fonseca R, Blascovich J, Garcia-Marques T (2014) Challenge and threat motivation: effects on superficial and elaborative information processing. Front Psychol 5(1170):1–11

Fredrickson BL (2001) The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. Am Psychol 56:218–226

Gagne M (2007) The role of autonomy support and autonomy orientation on prosocial behavior engagement. Motiv Emot 27(3):199–223

Grant H, Dweck CS (2003) Clarifying achievement goals and their impact. J Pers Soc Psychol 85(3):541–553

Hamana L, Runci T, Schor K, Rosenbaum M (2013) Links between stress, positive and negative affect, and life satisfaction among teachers in special education. J Happiness Stud 14(731):751

Hills P, Argyle M (2002) The Oxford happiness Questionnaire: a compact scale for the measurement of psychological well-being. Personality Individ Differ 33:1073–1082

Høgaard R, Kovač V, Øverby N, Haugen T (2015) Academic self-efficacy mediates the effects of school psychological climate on academic performance. Sch Psychol Q 30(1):64–74
Holges B (2004) Designing to motivate: motivational techniques to incorporate in E-learning experiences. J Interact Online Learn 2(3):1–8
Hu L, Bentler M (1998) Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. Psychol Methods 3:424–453
Hu L, Bentler M (1999) Cut-off criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Model 6:1–55
Hystad S, Eid J, Laberg J, Johnsen B (2009) Academic stress and health: exploring the moderating role of personality hardness. Scandinavian J Educ Res 53(5):421–429
Joiner E, Sandin B, Chorot P, Loctau L, Marquina G (1997) Development and factor analytic validation of the PANAS among women in Spain. J Pers Assess 68:600–615
Jung R, Lee J, Gupta V, Cho C (2019) Comparison of bootstrap confidence interval methods for GSCA using a monte Carlo simulator. Front Psychol 10:2215
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 (2015) Exploring relationships between academic hardness, academic stressors and achievement in university undergraduates. J Appl Educ Policy Res 1(1):53–73
Kamtsios S, Karagiannopoulou E (2020) Undergraduates’ affective-learning profiles: their effects on academic emotions and academic achievement. Hell J Psychol 17:176–204
Kamtsios S, Karagiannopoulou E (2013a) Conceptualizing students’ academic hardness dimensions: A qualitative approach. Eur J Psychol Educ 28(3):807–823
Kamtsios S, Karagiannopoulou E (2013b) The development of a questionnaire on academic hardness for late elementary school children. Int J Educ Res 58:69–78
Kamtsios S, Karagiannopoulou E (2016) Validation of a newly developed instrument establishing links between motivation and academic hardness. Eur J Psychol 12(1):29–48
Karagiannopoulou E, Milienos M, Kamtsios S, Rentzios CH (2019) Do defense styles and approaches to learning ‘fit together’ in students’ profiles? differences between years of study. Educ Psychol 40(5):570–591
Karagiannopoulou E, Milienos M, Rentzios Ch (2020) Grouping learning approaches and emotional factors to predict students’ academic progress. Int J Sch Educ Psychol. https://doi.org/10.1080/21683603.2020.1832941
Karagiannopoulou E, Kamtsios S (2016) Multi-dimensionality vs. unitary of Academic Hardiness: an under-explored issue…? Learn Individ Differ 51:149–156
Kardum I, Knezeric J, Krapic N (2012) The structure of hardiness: Its measurement invariance across gender and relationships with personality traits and mental health outcomes. Psychol Top 21(3):487–507
Karimi A, Venkatesan S (2009) Mathematics anxiety, mathematics performance and academic hardness in high school students. Int J Educ Stud 1(1):33–37
LaFrieniere K, Jowett S, Vallerand J, Carbonneau N (2011) Passion for coaching and the quality of the coach-athlete relationship: The mediating role of coaching behaviors. Psychol Sport Exerc 12:144–152
Lopez M, Vallerand R (2020) The role of passion, need satisfaction and conflict in athletes’ perceptions of burnout. Psychol Sport Exerc 48:101674
Maddi S (2005) On hardiness and other pathways to resilience. Am Psychol 60(3):61–272
Maddi S (2006) Hardiness: the courage to grow from stresses. J Posit Psychol 1(3):160–168
Maddi S, Harvey R, Khoshaba D, Fazel M, Resurreccion N (2011) The relationship of hardness and some other relevant variables to college performance. J Human Psychol 52(2):190–205
Mageau G, Vallerand R (2007) The moderating effect of passion on the relation between activity engagement and positive affect. Motiv Emot 31:312–321
Marsh HW, Vallerand R, LaFreniere K, Parker P, Marin J, Carbonneau N, Jowett S, Bureau J, Fernet C, Guay F, Abduljabbar A (2013) Passion: does one scale fit all? Construct validity of the two-factor passion scale and psychometric invariance over different activities and languages. Psychol Assess 25:796–809
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. J Happiness Stud 18(5):1425–1443
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. J Affect Disord 151(3):942–949
Misra R, McKeen M, West S, Russo T (2002) Academic stress of college students: comparison of student and faculty perceptions. Coll Stud J 34(2):236–245
Moraitou D, Efklides A (2009) The Blank in the mind questionnaire (BIMQ). Eur J Psychol Assess 25:115–122
Nani S, Matsouka O, Tsitskari E, Averinos A (2017) The role of physical activity in life happiness of Greek drug abusers participating in a treatment program. Sport Sci Health 13:25–32
Niemic C, Ryan R (2009) Autonomy, competence and relatedness in the classroom: applying self-determination theory to educational practice. Theory Res Educ 7(2):133–144
Papantoniou G, Moraitou D, Dimou M, Katsadima E (2010) Psychometric properties of the Greek version of the action control scale. Int J Educ Psychol Assess 5:45–60
Parker PD, Martin AJ (2009) Coping and buoyancy in the workplace: understanding their effects on teachers’ work-related well-being and engagement. Teach Teach Educ 25:68–75
Peixoto E, Nakano T, Castillo R, Oliverira L, Balbinotti M (2019) Passion scale: psychometric properties and factorial invariance across exploratory structural equation modeling. Paideia 29:1–11
Pett MA, Lackey NR, Sullivan J (2003) Making sense of factor analysis: the use of factor analysis for instrument development in health care research. Sage, Thousand Oaks, CA
Philippe FL, Vallerand RJ, Houlefort N, Lavigne G, Donahue EG (2010) Passion for an activity and quality of interpersonal relationships: the mediating role of positive and negative emotions. J Pers Soc Psychol 98:917–932
Poi B (2004) From the help desk: some bootstrapping techniques. Strata J 4(3):312–328
Robotham D (2008) Stress among higher education students: Towards a research agenda. High Educ 56:735–746
Rosenbaum M (2000) The self-regulation of experience: Openness and construction. In: Dewe P, Leiter AM, Cox T (eds) Coping and health in organizations, Taylor and Francis, London, pp 51–67
Ruis-Alfonso Z, Leon J (2016) The role of passion in education: a systematic review. Educ Res Rev 19:173–188
Russeau L, Vallerand J (2008) An examination of the relationship between passion and subjective well-being in older adults. Int J Aging Hum Dev 66:195–211
Ryan RM, Deci E (2000) Intrinsic and extrinsic motivation: classic definitions and new directions. Contemp Educ Psychol 25:54–67
Sarebo O, Hapvari H, Gulli V, Kristiansen R (2009) The role of self-determination theory in explaining teachers’ motivation to continue to use e-learning technology. Comput Educ 53:1177–1187
Seguin-Levesque C, Laliberte ML, Pelletier LG, Vallerand RJ, Blanchard C (2003) Harmonious and obsessive passions for the Internet: their associations with couples’ relationships. J Appl Soc Psychol 33:197–221
Sheard M, Golby J (2007) Hardiness and undergraduate academic study: the moderating role of commitment. Personality Individ Differ 43:579–588
Skomovovsky A, Sudom K (2011) Role of hardiness in psychological well-being of Canadian forces officers candidates. Mil Med 176(1):7–12
Soderstrom M, Dolbier C, Leiferman J, Steinhardt M (2000) The relationship of hardness, coping strategies, and perceived stress to symptoms of illness. J Behav Med 23(3):311–328
Stein S, Bartone P (2020) Hardiness: making stress work for you to achieve your life goals. Wiley
Stevens J (1992) Applied multivariate statistics for the social sciences, 2nd edn. Lawrence Erlbaum, Hillsdale, NJ
Su H, Chen A (2010) A pedagogical understanding of the Self Determination Theory in Physical Education. Quest 62:364–384
Tran V (2013) Positive affect, negative affect scale. In: Gellman MD, Turner JR (eds) Encyclopedia of Behavioral Medicine. Springer, New York
Vallerand R (2012) The role of passion in sustainable psychological well-being. Psychol Well-Being 2(1):1–21
Vallerand R, Blanchard C, Mageau A, Koestner R, Ratelle F, Leonard M, Marsolais J (2003) Les passions de l’âme: on obsessive and harmonious passion. J Personal Soc Psychol 85:756–767
Vallerand R, Salary S, Mageau G, Elliot A, Denis P, Grouzet F, Blanchard C (2007) On the role of passion in performance. J Pers 75(3):505–534
Vallerand R, Chichekian T, Paquette V (2020) Passion in education: Cross cultural and applied perspectives. In: Lien G, McInerney D (eds) Educational interventions: a sociocultural perspective. Information Age Publishing, Charlotte
Verner-Filion J, Vallerand J (2016) On the differential relationships involving perfectionism and academic adjustment: The mediating role of passion and affect. Learn Individ Differ 50:103–113
Verner-Filion J, Schellenberg B, Holding A, Koestner R (2020) Passion and grit in the pursuit of long-term personal goals in college students. Learn Individ Differ 83–84:101939
Watson D, Clark A, Tellegen A (1988) Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol 54(6):1063–1070
Weigold I, Weigold A, Kim S, Drakeford N, Dykema A (2015) Assessment of the psychometric properties of the RAHS in college student samples. Psychol Assess 28(10):1207–1219
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. Res Sci Educ. https://doi.org/10.1007/s11165-019-09908-7
Zhao Y, St-Louis A, Vallerand R (2015) On the validation of the passion scale in Chinese. Psychol Well-Being 5(3):1–11