RESEARCH ARTICLE

Exploring relationships between academic hardiness, academic stressors and achievement in university undergraduates

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The article reports results from the validation of the "Undergraduates Stressors Questionnaire" and the relationship between academic stressors and academic hardiness in university undergraduates. In the first study (study 1), 845 undergraduates completed the "Undergraduates Stressor Questionnaire". Both exploratory and confirmatory factor analysis results provided support for the 7-factor solution, which explained 61.6% of the total variance. Scale scores showed adequate internal consistency. The results of study 1 indicated that undergraduates are subject to numerous academic stressors such as lack of leisure time, academic performance, fear of failure, academic overload, finance, competition between students, and relationships with university faculty. In study 2, 478 undergraduates completed the "Undergraduates Stressor Questionnaire" and the "Revised Academic Hardiness Scale". The study indicates that students are less hardy in terms of commitment and challenge across the years of study and provides evidence for the moderating role of academic hardiness on students' daily university stressors. The study also revealed that "low academic hardiness" students reported higher stress. The findings are discussed in the context of the recent literature.

Keywords: stressors, academic hardiness, undergraduates.

Academic stress among higher education students has been a topic of interest for many years and has recently been attracted the interest of a range of studies focusing on the links between stress and students' performance (Heikkila, Lanka, Niemine, & Niemivitra, 2012). Interest in stress among college students is related to the recognition that excessive stress is harmful to academic performance and may lead to dropping out. Strenuous academic pressure and limited social and personal time can add to the normal stress of life and begin to have a negative effect on a person.

Earlier studies amongst higher education students have focused on subject areas with a strong vocational element such as nursing students, social work students and psychology students (Robotham, 2008). These studies demonstrate that college students experience high stress at predictable times each semester and have classified stressors into three main categories: academic pressures, social issues and financial problems. Some other studies mentioned sources of stress among undergraduates such as inter personal relationships related stressors, work-family conflicts related stressors, organizational working environment related stressors, profession prospects related stressors and academic training stressors (Chan, Lai, Ko, & Boet, 2000). Other studies demonstrate that the most common stressors for undergraduates were fear of failure (Schafer, 1996; Tyrrel, 1992), striving to meet assessment deadlines (Misra et al., 2000), feel overwhelmed by their workload (Reisberg, 2000), finding the motivation to study (Tyrrel, 1992), concerns about academic

ability (Tyrrel, 1992), stressors related to examinations and time management[1] (Robotham, 2008). These stressors[2], related to university students, are associated with the negative consequences to the mental, emotional and physical health and can affect students' grades, health and personal adjustment. High levels of stress may also have a negative impact on students' learning ability, may diminish a students' sense of worth and might affect their academic achievement (Niemi & Vainiomaki, 1999).

A key role for higher education students in relation to stress is the provision of appropriate recourses to enable individuals to deal effectively with stress. Keeping in mind that there are great individual differences in how we react to stress, individual characteristics such as coping style and stress management strategies, motivation and personality dispositions all contribute to how we respond to a stressor (Lazarus, 1991; Lazarus & Folkman, 1984). Coping[3] can involve attempts to make changes to the environment, or attempts to make changes to the meaning that the event(s) involved has for the individual (Lazarus, 1991). Stress management also can be used to help the students filter out some of the stress they have by changing their behavior. Effective coping with daily stressors can mediate the impact of university related stressors and is associated with positive behavioral and emotional adjustment (Pincus & Friedman, 2004). The thematic area of coping and stress management enforced in 1979 by Kobasa introduced the concept of hardiness. This personality characteristic, derived from existential psychology, express a general quality of an individual to regard stressful life events as amenable, and to consider changes as a normal and interesting part of life (Kobasa, Maddi, & Kahn, 1982).

Hardiness has been conceptualized as a combination of three attitudes (3Cs): commitment, control, and challenge (Maddi, Khoshaba, Jensen, Carter, Lu, & Harvey, 2002; Maddi, & Kobasa, 1984). If you are strong in commitment, you believe it is important to remain involved with the events and people around you, no matter how stressful things become. It seems like a waste of time to withdraw into alienation and isolation. If you are strong in control, you want to continue to have an influence on the outcomes going around you, no matter how difficult this becomes. It seems like a mistake to let yourself slip into powerlessness and passivity. If you are strong in challenge, you see stresses as a normal part of living, and an opportunity to learn, develop and grow in wisdom. These 3Cs of hardy attitudes provide the courage and the motivation to do the hard work of turning stressful circumstances from potential disasters into growth opportunities. As such, hardiness is a pathway to resilience under stress (Maddi, 2005, 2006).

Given evidence that psychological hardiness helps insulate individuals from the effects of stress, questions naturally arise regarding its generalizability across contexts and its influence on outcomes other than health (Cole, Field, & Harris 2004). Recently the concept of hardiness has been introduced in research in the field of education, in an attempt to ascertain which might be the positive impact that hardiness may have in academic settings (Benishek & Lopez, 2001; Kamtsios & Karagiannopoulou, 2011, 2013a). Benishek and Lopez (2001) have formulated the meaning of "Academic Hardiness" (Benishek & Lopez, 2001; Benishek, Feldman, Shipon, Mecham, & Lopez,

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[1] It is not the management of time itself that causes stress, but the individual's perception of control over time that is the source of student stress. Individual who felt themselves to be in control of their time experienced less tension.

[2] Stressor is any relationship between the person and the environment that is appraised by the person as taxing the relationship can result in either a beneficial or a harmful outcome (Lazarus, 1991).

[3] The dimensions of coping most often considered in both theory and empirical studies are problem solving (including approach and problem focused strategies), seeking support (including instrumental as well as emotional support from others), avoidance (including efforts to disengage from the stressor), distraction (including a variety of alternative pleasurable activities) and emotion regulation (Eschenbeck, Dreger, Tasbadam, Lohaous, & Kohmann, 2012; Compas et al., 2001)

2005), providing a framework for understanding how students (high school students and university undergraduates) may react to academic challenges. Kamtsios and Karagiannopoulou (2013a,b) explored the "Dimensions of Academic Hardiness"[4], bringing into the literature additional aspects of academic hardiness in late elementary school children (10-12 years) that have not identified in the past. These dimensions reflect the different ways in which late elementary school children try to cope with school failure (Kamtsios & Karagianopoulou, 2013b).

Benishek et al. (2005) tried a correspondence between the hardiness attitudes and forms of behaviors that concern learning and performance in university undergraduates. The components of academic hardiness were defined as follows: commitment concerned students' reported willingness to expend consistent effort and to engage in personal sacrifices in order to achieve academic excellence, irrespective of the content or demands of individual courses, instructors or personal interests. Challenge was defined as students' purposeful efforts to seek out difficult academic coursework and experiences to justify such actions as inherently for personal living. Control was defined as students' beliefs that they possessed in the capacity to achieve desired educational outcomes from personal effort and through effective emotional self-regulation in the face of academic stresses and disappointments (Benishek et al., 2005)

This conceptualization guided to the development of the initial version of the Academic Hardiness Scale (Benishek & Lopez, 2001), followed by a "Revised Academic Hardiness Scale" (RAHS) (Benishek et al., 2005). The RAHS has been used in research with late elementary school children (Kamtsios & Karagiannopoulou, 2011), high school children and undergraduates (Goligtly, 2007; Karimi & Venkatesan, 2009; Kinder, 2008; Benishek et al., 2005). Academic Hardiness has been found to be correlated with higher grade point average scores (GPA) in undergraduates (Sheard & Golby, 2007; Kamtsios & Karagiannopoulou, 2014). Undergraduates with high hardy academic attitudes show an action pattern of coping with stressful circumstances in the university (e.g. examinations, meeting course work deadline) by facing them, and striving to turn them from potential disasters into opportunities for self (Sheard & Golby, 2007). A such academic hardiness attitudes, in relation with psychological hardiness construct, may be a buffer between university related stressors and university students' academic performance, as it negatively associated with academic stress (Hysrad, Eid, Laberg, Johnsen, & Bartone, 2009). Given evidence that university education is challenging and stressful, research had been published on the effects of hardiness on students stressors whereas there are few studies about the key role of academic hardiness in mediating undergraduates' university stressors.

Based on the academic hardiness theory, and our review of the literature, we had a number of hypotheses. Conceptually, the aim of study 1 was to identify sources of stress among Greek university students, to develop and validate a survey instrument to measure undergraduate's sources of stress and evaluate its psychometric properties; namely, its factor structure and its reliability. In doing so in Study 1 we use standard instrument development procedures (Clark & Watson, 1995; DeVellis, 2003) to develop a psychometrically robust and conceptually sound measure for the stressors reported by Greek university students.

Our primary focus in study 2 was to recognize differences between "high" and "low" academic hardiness undergraduates in terms of stressors and GPA. Our second hypothesis suggests that there were differences in academic hardiness and in stressors reported by students in different years of study

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[4] The "Dimensions of Academic Hardiness" reported by Kamtsios and Karagiannopoulou (2013a,b) are: 1. Commitment: comparing oneself with the peers and acceptance from the peers, 2. Control-awareness: use of effective coping strategies, 3. Commitment: adults' acceptance (parents and teacher), 4. Commitment: Knowledge utility, 5. Control-awareness: attempt to avoid unpleasant feelings, 6. Commitment: regulating priority to learning vs enjoyment, 7. Challenge: dealing positively with hard subjects, 8. Commitment: looking for help contributing to learning, 9. Challenge: dealing with failure in a constructive way.

STUDY 1 - METHOD

Phase 1: Item generation and content validity.

The purpose of phase 1 was to develop an extensive battery of items that reflected the most common stressors reported by undergraduates. Items of the stressors questionnaire were derived: (a) from a review of literature on the subject and (b) from a discussion with experts in the field of academic stress. In addition to items from previous studies we generated items out of undergraduates' answers to an open-ended question focused on the most stressful situations they experienced in the course of their studies[5] (Karagiannopoulou & Kamtsios, 2011). In that way we provide a greater inside into the students' perceptions of particular events as stressors in higher education. We also had a group of 50 subjects keep a week long diary of unpleasant occurrences. From this material and after personal short interviews with college students we created a list of over 40 items. At last, we developed a battery of 50 items. A panel of experts on academic stressors established the face validity, the content and the cultural appropriateness of the questionnaire. Any change was based on their suggestions. The first version of the questionnaire was administered for a field test to a small sample of undergraduate students ($n = 20$) (the target population of the study is undergraduates) who examined it for appropriateness of the questions, clarity, language suitability and wording. Minor changes were made at this point. The confirmation of common comprehension of items from all students that participated constituted a first important element of internal reliability of the scale (Byrne, 2001).

Assessment of university stressors and stress levels in college students is a topic often examined by researchers. Our literature review revealed a number of university/college stressors questionnaires[6] such as: "Student Life Stress Inventory" (Gadzella, 1994), "Academic Stress Scale" (Kohn & Frazer, 1986), "Scale for Assessing Academic Stress" (Sinha, Sharma, & Mahendrak, 2001), "The College Undergraduate Stress Scale" (Remer, & Mackin, 1998), "The Undergraduate Stress Questionnaire" (Cranball, Preisler, & Aussprung, 1992), "The Students Stress Survey" (Ross, Niebling & Heckert, 1999), "The Chronic Life Stress Survey" (Towbes & Cohen, 1996) "The Psychology Students Stress Questionnaire" (Cahir & Morris, 1991). A different body of research has focused in studies of stress in medical students such as "Medicine Students Stress Questionnaire" (Yosoff, Rahim, & Yaacob, 2010), "The Dental Environmental Stress Questionnaire" (Grandy, Westerman, Mitchell, & Lupo, 1984).

These questionnaires representing interpersonal sources of stress, environmental sources of stress, intrapersonal sources (e.g. result from internal sources, such as, changes in eating or sleeping habits), together with academic and financial sources of stress. Some others aimed to identify types of stress that different subgroups of students (e.g. according to the field of study, race-ethnicity) considered most pernicious and some of them are life events checklists (mainly adaptations of Holmes and Rahe's Social Readjustment Rating Scale), designed to measure stress among undergraduates. Nonetheless little research has been conducted on the assessment and identification of the stressors specific to educational and achievement settings.

We decided to create the "Undergraduates Stressors Questionnaire" (this questionnaire assessing mainly academic and financial stressors during graduate training) even there are different scales that measure stressors in undergraduates because different samples may respond differently to the different subscales of various university/life events stressors questionnaire and different

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[5] Academic stressors (e.g. passing the exams, semester's grades, organization of their studies) were reported as the most detrimental by two hundred and nine undergraduate students.

[6] A table summarizing the key features of the questionnaires measuring stressors in undergraduates is appeared in Appendix A

samples have different reactions to their perceived stressors (DeDeyn, 2008). Stress can be common globally on a regular basis among university students. Nevertheless, reports suggest that the university environments are different (Pierceall & Kim, 2007; Dill & Henley, 1998) and some stressful events are rated differently by different student populations from different academic environments (Clements & Turpin, 1996; Ross, Niebling & Heckert, 1999). Chang and Lu (2007) report that academic institutions have different work setting, curriculum differences and therefore one would expect the differences in symptoms, causes and consequences of stress. As a result some stressors might be obscured by values and/or constraints of a culture and, therefore, considered unimportant or even unacknowledged by the individual experiencing it in a particular university environment (Lazarus & DeLongis, 1983). The stress of different groups may be over-or underestimated, depending on the extent to which a stressors questionnaire represents life areas. To respond to this problem several researchers have developed life/stress events questionnaires with particular samples in mind (Cranball et al., 1992). One should access the population for which life events schedule is intended and have them generate stressor items (Cranball et al., 1992).

In addition, adaptation of an existing instrument to another culture and/or language is a strenuous and ongoing process (Tsigilis, Koustelios, & Grammatikololoulos, 2009). An instrument is not transferable to different contexts unless its scores have both temporal and ecological generalizability. Temporal generalizability refers to the need for age and developmental levels to be taken into consideration when constructing the validity of an instrument and addresses whether or not the participant's age and developmental levels are appropriate for the instrument. Ecological generalizability refers to creating an instrument that can span across age groups, gender, social-economic groups, and geographical locations (Phillips & Silverman, 2012). This ensures that the participants' environmental conditions are not going to alter their responses to the instrument. Adapting the original instrument will ensure that the scores will fit the appropriate audience, which will satisfy ecological generalizability. If the sample of a research has not the same characteristics, is not at the same geographical location and has not the same experiences of the university life, it is impossible to know whether an instrument would produce reliable and valid scores for a new context (Phillips & Silverman, 2012), as the items represented the events experiences by the population for whom the questionnaire was designed.

Participants.   A convenience sample of 845 undergraduates (256 boys and 589 girls[7]), studying in a Social Science Department, participated in study 1. The students anonymously completed the questionnaire in their classes prior to lectures[8]. The purpose of the study was communicated well in advance to the students, and student participated voluntarily in the research.

Measure.   The 50-item "Undergraduates Stressors Questionnaire" was administered to the students' sample. Students were asked to assess the questionnaire items as "not stressful", "stressful to some extent", "quite stressful" and "very stressful", on a four-point Likert scale. A high score on the 4-option Likert-scale indicated that the aspect being assessed by the question was perceived as very stressful by the students.

Data analysis.   Both CFA and EFA are recommended for scale development (Netemeyer, Bearden & Sharma, 2003). In order to perform both EFA and CFA, the sample was randomly divided into two equal subsamples using SPSS version 20. The two samples did not differ significantly on age ($t_{(845)} = 2.01$, p=.80), gender ($x^2 = .805$, $p = .395$) and total scores on the Undergraduates Stressors Questionnaire ($t_{(845)} = 3.15$, $p = .77$). Initially, the Kaiser-Meyer-Olkin's

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[7] In Greece the gender ratio in social sciences schools is overwhelmingly in favor of women.

[8] The students follow a traditional lecture-based system and tuition is free for the students.

measure (KMO) for sampling adequacy (acceptable level >.50; Kaiser, 1970) and Bartlett's test of sphericity (Bartlett, 1950) were calculated to verify the appropriateness of both CFA and EFA. The KMO was .92 and Bartlett's test of sphericity was statistically significant (11.071, $p < .05$) supporting the factorability of the correlation matrices.

Phase 2: Factorial validity of the 50-item questionnaire

The purpose of phase 2 was to examine the factor structure and the reliability of the "Undergraduates Stressors Questionnaire". Within this evaluation phase several different approaches to refining the "Undergraduates Stressors Questionnaire" and reducing the number of items were employed: principal components analysis and common factor analysis (using maximum likelihood method[9]) to investigate the relationships among items and reliability analysis to describe item-level measurement error. The use of factor analysis procedures is an important step in test construction and validation procedures (Clark & Watson, 1995). Our decision was to use the two most commonly known and studied factor extraction methods (Worthington & Whittaker, 2006), principal components analysis (PCA) and common factor analysis (FA) (such as maximum likelihood method-ML), although we had been aware that there were distinct purposes of each technique. The purpose of PCA is to reduce the number of items while retaining as much of the original item variance as possible. The purpose of FA is to understand the latent factors or constructs that account for the shared variance among items (Costello & Osborn, 2005; Kahn, 2006; Worthington & Whittaker, 2006). Although there has been a protracted debate over the preferred use of PCA versus FA, as exploratory procedures, which has yet to be resolved (Gorsuch, 2003, citied in Worthington & Whittaker, 2006), we believe that the results of our factor analysis in the 50-item questionnaire would be more acute and valid if both methods produce similar results. In that way our analysis will confirm various statistical theorists who point out that there are almost no differences between PCA and FA (Arrindell & van der Ende, 1985; Guadagnoli & Velicer, 1988; Schonemann, 1990; Steiger, 1990; Velicer & Jackson, 1990, cited in Costello & Osborn, 2005).

To determine the number of factors to retain, five criteria were used according to Benishek and Lopez (2001) and Pett, Lackey and Sullivan (2003) suggestions: 1. Factor structure coefficients of 0.40 or greater were considered to be significant and used to interpret factors (Stevens, 1992), 2. Examination of the scree-plot, 3. Factors with eigenvalues greater than 1.0, 4. The presence of correlation with other resulting factor, and 5. The conceptual meaningfulness of the factors.

STUDY 1 – RESULTS

Results from Principal Components Analysis

Initially with the use of a series of exploratory factor analyses (EFA) we intended to reduce the number of the "Undergraduates Stressors Questionnaire" items. Also we used internal consistency analyses to indicate which individual items should be eliminated. Internal consistency was evaluated by computing coefficient α for each scale, split half for each factor as well as item-total correlations. After inspection of these values in conjunction with the PCA, several scales' $α_s$ were increased by eliminate one or more items. After a series of EFA, with several different approaches, the results from PCA (using varimax rotational criteria to simplify identification of the components)

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[9] We use maximum likelihood method (ML) instead of principal axis-factoring because ML approaches are relatively equal in their capacities to extract the correct model (Worthington & Whittaker, 2006).

revealed seven factors with eigenvalues exceeding 1.00. The number of factors (seven) was also confirmed with the visual inspection of the scree plot indicated a sudden drop in the scree beginning with the seventh factor. All item loadings exceed .40. The seven factors that emerged from the factor analysis accounted for 61.6% of the total variance. From the initial 50 items, 21 items did not cluster with any meaningful factors or their loadings were less than .30. These items were removed from the analysis. The final version of the questionnaire in this phase of the research contains 29 items and their factor structure coefficients is presented in Table 1.

Results from common factor analysis (using maximum likelihood method) revealed similar results with principal components analysis. The seven factors were labeled as follows: factor 1-lack of leisure time, factor 2-academic performance (grades), factor 3-fear of failure, factor 4-academic overload, factor 5-finances, factor 6-competition between students and factor 7-relationships with university faculty.

TABLE 1
Factor pattern coefficients for the seven factor promax solution for Undergraduates
Stressors Questionnaire, using principal components analysis

Questions		Factors							
		1	2	3	4	5	6	7	h^2
35	… I do not have time to do my hobby	.74							.72
36	….My everyday program is too busy	.72							.69
55	...I do not have enough time to enjoy myself	.71							.61
56	….The university demands influence my personal life	.71							.64
93	...I do not have time to rest	.69							.62
67	…I get low marks for a long period of time		.81						.66
66	...I consider myself to be an unsuccessful student		.76						.65
31	...I am in conflict with my parents due to my university marks		.74						.63
40	...I think that I cannot cope with my academic demands in order to graduate		.68						.64
106	…I am afraid failing in the exams			.77					.64
68	...I am concerned about my test results			.75					.67
53	...I am anxious about my marks in the exams			.73					.67
58	...I think that I am very worried about the marks I am going to get this semester			.73					.62
25	…The number of university papers we have to deliver is very big				.73				.69
51	..The workload, in terms of the university papers, is very demanding				.72				.64
30	…The deadline, regarding the delivery of the university papers, is very strict				.72				.66
48	…The papers that some teachers demand are difficult to do/complete				.70				.67
112	...I have many financial obligations					.77			.64
115	...I have to cope with my financial obligations					.71			.66
116	…I have financial problems					.70			.55
114	…I work during the period of my studies					.65			.57
94	...There is competition among university students						.79		.71
103	…I think that there is a very competitive atmosphere among the undergraduate students in the academic community						.76		.65
37	...There is a big competition concerning the exam works						.72		.46
86	…I work with students that are non-cooperative						.48		.66
96	…The university bureaucratic procedures take too much time to complete							.75	.59
109	…The relation between the university department and its students does not fulfill the necessary requirements							.70	.61
44	…We sometimes need extra material or books that are not available							.50	.32
47	...There are not particular or sufficient guidelines to certain topics/matters on behalf of the university department							.42	.36

KMO = .89
Bartlett test of Sphericity= 5715.52, $p < .001$

Notes: factor 1: lack of leisure time, factor 2: academic performance (grades), factor 3:fear of failure, factor 4:academic overload, factor 5:finances, factor 6:competition between students, factor 7:relationships with university faculty.

Reliability

The internal consistency of the overall questionnaire was .90. The Cronbach's alpha for the seven factors ranged from .61 to .86. The average item-total correlation was .49 and ranged from .35 to .78. As a result the questionnaire was judged to be internally consistent and therefore reliable. The numbers of items, means, eigenvalues, percent of total variance, α-Cronbach and split half are presented in Table 2.

TABLE 2
Number of items, means, eigenvalues and % of total variance, α-cronbach and split-half of the Undergraduates Stressors Questionnaire

Factors	Number of items	M (SD)	Eigenvalues	% of the total variance	α-cronbach	split-half
1	5	2.26 [.75]	3.00	10.91	.86	.85
2	4	2.03 [.82]	2.89	10.51	.83	.81
3	4	2.76 [.78]	2.63	9.56	.84	.81
4	4	2.48 [.72]	2.26	8.22	.83	.81
5	4	2.76 [.70]	2.18	7.93	.72	.68
6	4	2.21 [.73]	2.23	8.12	.74	.73
7	4	2.85 [.62]	1.74	6.35	.61	.52

Results from Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted using the EOS 6.1 statistical package (Bentler, 2004). CFA was carried out for the purpose of validating and confirming the goodness of fit of the "Undergraduates Stressors Questionnaire". The CFA measurement model was developed based on the factor loadings from the exploratory approach. Because data appeared to be fairly univariately and multivariately normaly distributed (Mardia's coefficient=1.2) maximum likelihood (ML) estimation was used to address the possibility of non-nornal distribution (Cantoni & Ronchetti, 2006) and to estimate the models parameters and the fit indices. ML has been found to produce more accurate fit indices and less biased parameters than generalized squares estimation (Olsson, Foss, Troye, & Howell, 2000).

Both absolute and incremental fit 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 & Bentler, 1998), including normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), goodness of fit index (GFI), adjust goodness of fit index (AGFI), standardized root mean squared residual (SRMR), root mean square error of approximation (RMSEA). A RMSEA value of less than .06 and a SRMR value of less than .08 indicate a good fit (Hu & Bentler, 1999). CFI values of .90 and .93 represent an acceptable and a good fit respectively (Byrne, 1994; Hayle & Panter, 1995).

Using criteria recommended by Hu and Bentler (1999), examination of the fit indices indicated that the model provided a good fit to the data (CFI = .92, GFI = .91, AGFI = .91, NFI = .84, NNFI = .89, RMSEA = .05, SRMR = .06). These findings suggest that the factorial validity of the "Undergraduates Stressors Questionnaire" is supported.

STUDY 2 - METHOD

Participants

A convenience sample of 478 undergraduates (66 boys and 412 girls[10]), studying in a Social Science Department, participated in study 2. All participants were explained the purpose of the study. It was emphasized that the participation was voluntary and that they should feel free to ask any question they wished. First year students did not participate in the study; participants should have experienced a great deal of the academic culture/context in order to be able to answer questions, included in the scales, about the ways they cope with academic demands and everyday student life.

Measures

(a) Academic Hardiness was assessed using the RAHS (Benishek et al., 2005). The RAHS is a self-report questionnaire of 40 items. Participants rated each item on a 4-point Likert scale: 1 = absolutely disagree, 2 = disagree, 3 = agree, 4 = absolutely agree. The RAHS includes 3 scales: (a) commitment (e.g. "Work hard in the class even if bored"), (b) control (e.g. "I'm able to push away negative thoughts when not performing well in class") and (c) challenge (e.g. "Enjoy the challenge of difficult class"). Thirteen items are negatively formulated and thus reversed-scored. The RAHS has been used in previous studies with Greek late elementary school children (Kamtsios & Karagiannopoulou, 2011) and Greek undergraduates; a previous study has explored its factorial structure (Kamtsios & Karagiannopoulou, 2014)

(b) The version of "Undergraduates Stressors Questionnaire", presented in study 1.

(c) Students' achievement was measured by a self-report question (self-evaluation) in which students were asked to give the grade point average (GPA) on the basis of the modules they had already attended. GPA as a measure of academic performance is widely used; it has been used in many educational studies and studies focused on personality and academic achievement, as a criterion variable (Karagiannopoulou & Milienos, 2013, 2014; Hysrad et al., 2009; Wagerman & Funder, 2007). To check the accuracy of students' answer, they were also asked to answer a question about how they evaluated themselves objectively based on the marks, grades and comments they had been given in the course of their studies (self evaluation) (see Entwistle, 2009). Answers were ranged from 1 (badly) to 9 (very well). The high correlation we found between grade point average and self evaluation ($r = .79$) provides an indication of reliable answers

Data analysis

Descriptive statistics were used for the means and standard deviations of the scales (RAHS & Undergraduates Stressors Questionnaire) and their subscales. The reliability of the scales and the subscales were established by the computation of the Cronbach alpha values. One-way ANOVA was performed to identify differences in academic hardiness reported by students in different years of study. Furthermore, using the median scores on the total Academic Hardiness score, a two (2) (median split – operationally defines here as high vs. low academic hardiness) X 7 (stressors) X GPA multivariate analysis of variance (MANOVA) was carried out. Total hardiness, score served

[10] In Greece the gender ration in social sciences schools is overwhelmingly in favor of women.

as the independent variable while GPA and the seven stressors subgroups served as the multivariate dependent variables. The partial eta-square (η^2) statistically estimated the effect size associated with each statistical difference.

STUDY 2 RESULTS

Descriptive Statistics

The means, standard deviations and internal consistencies of the Greek version of the RAHS and the "Undergraduates Stressors Questionnaire" and their subscales are presented in Table 3. Internal consistency coefficients (Cronbach's alphas) are satisfactory for the two constructs and their subscales.

Table 3
Internal reliability of the scales and the subscales

Construct	Items	*M* [*SD*]	Cronbach alpha
Greek version of the R.A.H.S	38		.79
Subscales			
Commitment	17	2.92 [.38]	.82
Control	10	2.73 [.38]	.80
Challenge	11	2.07 [.34]	.77
Construct			
Undergraduates Stressors Questionnaire	29		.90
Subscales			
Lack of leisure time	5	2.26 [.75]	.87
Academic performance (grades)	4	2.03 [.82]	.83
Fear of failure	4	2.76 [.78]	.85
Academic overload	4	2.48 [.72]	.84
Finances	4	2.76 [.70]	.72
Competition between students	4	2.21 [.72]	.75
Relationships with univeristy faculty	4	2.85 [.62]	.63

Differences in academic hardiness and stressors reported by students in different years of study. One-way ANOVA' results indicated that second year students scored higher in commitment, challenge and in the total academic hardiness score, comparing to their third and fourth year counterparts (Table 4). Table 4 also shows that students' commitment, challenge and academic hardiness tend to reduce through the years of study (second, third and fourth). Concerning the students' stressors, year three students reported higher stress due to financial problems, comparing to the year four counterparts.

Table 4
Differences through years of study in commitment, control, challenge, academic hardiness and stressors

	Year 2 (N=107)	Year 3 (N=110)	Year 4 (N=261)	F	p
	M [SD]	M [SD]	M [SD]		
Commitment	3.02 [.36][1,2]	2.90 [.34][1]	2.90 [.39][2]	4.49	.012
Control	2.74 [.34]	2.78 [.38]	2.71 [.40]	1.33	.26
Challenge	2.15 [.33][2]	2.15 [.32][3]	2.01 [.34][2,3]	7.69	.001
Total Academic Hardiness	2.64 [.19][2]	2.60 [.22]	2.54 [.26][2]	6.70	.001
Lack of leisure time	2.26 [.81]	2.20 [.78]	2.27 [.72]	.202	.81
Academic performance	2.07 [.90]	2.06 [.82]	2.00 [.78]	.406	.66
Fear of failure	2.80 [.83]	2.73 [.77]	2.75 [.77]	.207	.81
Academic overload	2.58 [.81]	2.44 [.76]	2.46 [.68]	1.34	.26
Finances	2.84 [.66][2]	2.85 [.74][3]	2.68 [.69][2,3]	3.31	.03
Competition between students	2.32 [.74]	2.12 [.73]	2.22 [.73]	1.98	.13
Relationships with university faculty	2.91 [.66]	2.85 [.62]	2.83 [.61]	.71	.48
Total Stressors Scores	2.54 [.54]	2.47 [.48]	2.46 [.48]	1.09	.33

Note: 1= Differences between 2nd and 3rd year;
2= Differences between 2nd and 4rth year
3= Differences between 3rd and 4rth year

Differences between students with high and low scores in academic hardiness in terms of stressors and GPA. A one-way MANOVA of GPA and stressors by total academic hardiness score indicated a significant multivariate effect, Wilks' λ=.92, $F_{(1,450)}$ = 4.76, $p < .001$, η^2=.079. Undergraduates in the "low" academic hardiness subgroup (i.e., score 2.56) reported higher stress due to the lack of leisure time: $F_{(1,450)}$ = 14.20, $p < .010$, η^2=.031, higher stress because of their academic performance (grades): $F_{(1,450)}$ = 5.61, $p = .018$, η^2=.012, higher stress because of fear of failure: $F_{(1,450)}$ = 7.85, $p = .005$, $\eta^2 = .017$, higher stress because of academic overload: $F_{(1,450)}$ = 12.76, $p = .000$, $\eta^2 = .028$ and they have the lower GPA $F_{(1,450)}$ = 24.19, $p < .001$, $\eta^2 = .051$. Means and standard deviations of the variables are presented in table 5.

Table 5
Means and standard deviations of academic stressors and GPA by academic hardiness
subgroup

Stressors	Total Academic Hardiness (Mdn=2.56)	
	≤2.56 (N=215)	>2.56 (N=237)
	(Low academic hardiness subgroup)	(High academic hardiness subgroup)
1 Lack of leisure time	2.32 [72]*	2.20 [.78]*
2 Academic performance (grades)	2.20 [.76]*	1.91 [.84]*
3 Fear of failure	2.82 [.77]*	2.10 [.79]*
4 Academic overload	2.48 [.71]*	2.01 [.74]*
5 Finances	2.74 [.71]	2.80 [.70]
6 Competition between students	2.23 [.68]	2.21 [.78]
7 Relationships with university faculty	2.88 [.61]	2.85 [.64]
8 GPA	6.84 [1.18]*	8.36 [1.03]*

* Statistically significant differences between students in low and high
academic hardiness subgroups
Note: Mdn= median

DISCUSSION

The aim of study 1 of the present research was to develop a survey instrument to measure academic stressors for Greek undergraduate students. The creation of the initial item pool and the technical item refinement procedures followed the steps of the psychometric literature (Byrne, 1994; Clark & Watson, 1995; Costello & Osborne, 2005). Both EFA and CFA were used to investigate the structure of items underline responses to the "Undergraduates Stressors Questionnaire". Results provided preliminary support for the 7-factor structure of the questionnaire. The 7-factor solution was chosen because it resulted in the most robust factor structure with stronger item loadings and factor internal consistency. The final scale contains 29 items. The number of items in each factor meets the minimum number of three items for best practice in factor analysis (Costello & Osborne, 2005; Velicer & Fava, 1998). The accepted to high internal consistency coefficients indicate that the survey instrument and its subscales are reliable. The results of study 1 and the factorial structure of the "Undergraduates University Stressors" questionnaire was consistent with the broader literature on students stress, as stressors related to university undergraduates were recognized; students are subject to these academic stressors that may adversely affect their physical and psychological health.

According to the results of study 1, the primary sources of stress in Greek university students are: lack of leisure time, academic performance (grades), fear of failure, academic overload, finances, competition between students and relationships with university faculty. These stressors are in line with the relevant literature and support previous studies concerning the university stressors (Abouserie, 1994; Fairbrother & Warn, 2003; Larson, 2006). Undergraduates are concerned about academic performance. For many students the pressure to perform well in the examinations or in a test is the most significant source of stress. This stressor makes academic environment very stressful. Students worry about getting a lower grade than they expect. Some students link their self-worth with grades. Students may start doubting their capability or competency in their future careers. Research has indicated that students often feel overwhelmed by workload (Reisberg, 2000). Coursework can be very demanding and the competition for earning top

marks can be very fierce. This competition among the course mates can pose stress to students (Fairbrother & Warn, 2003). A subject linked with academic performance and workload related stress is the fear of failure. This finding is consistent with the broader literature. Fear of failure has long been viewed as an important influence on achievement behavior (Cornay & Elliot, 2004). It is a multifaced form of avoidance motivation (McGregor & Elliot, 2005) and is associated with negative physical and mental health outcomes, defensive pessimism, self-handicapping and test anxiety (Wright, Pincus, Conroy, & Elliot, 2006).

Students also appeared concerned about financial responsibilities. Financial stress is one of the most common stressors in undergraduates (Pierce, Frane, Rusell & Cooper 1996). Greek students do not pay tuition fees but they have to cover the cost of living; financial problems are, not surprisingly, one of the stressors faced by Greek given the financial crisis. Previous studies have also pointed out that stress related to personal finances is perceived to be one of the most influential sources of psychological stress, because basic life activities are associated with personal financial recourses and their management (Pierce et al., 1996). Besides, lack of leisure time and time urgency to meet deadlines are recognized also as sources of stress. This finding is consistent with several other studies reported in the literature (Sgan-Cohen & Lowental, 1988). Also, students seem to strive hard to balance their leisure time and meet the university deadlines and generate stress along the way (Misra et al., 2000). Lack of time for leisure was associated with an overload due to the fact that students had requirements with no space time for other activities except those strictly inherent to the course curriculum. However, Nonis and Hubson (2006) suggest that it is not the management of time itself that causes stress, but the individual's perceptions of control over time that is the source of student stress.

These stressors are consistent with other studies reported in the literature, in which, from a methodological view point, have focused on a quantitative approach where participants complete a self-report inventory that claims to measure stressors (Kohn, Lafreniere, & Gurerich, 1990; Sarafino & Ewing, 1999; Spangler, Pekrum, Kraner, & Hofmann, 2002; Yosoff, Rahim, & Yaacob, 2010). Nonetheless, the same stressors may be perceived differently by different students, depending on their cultural background, personal traits, experiences and coping skills

The present study also indicates that students become less hardy in terms of commitment and challenge across the years of study. This is in line with previous research in Greek undergraduates (Kamtsios & Karagiannopoulou, 2014). Undergraduates at a later stage of their studies (4th years) reported less commitment to their work and less challenge comparing to younger students. Possibly, in the final year of studies exams loom and performance goals dominate over learning goals (Gow & Kember, 1990; Karagiannopoulou & Milienos, 2013). Greek students experience an exam oriented system that makes unlikely for them to treat failure in the exams as challenge (see Karagiannopoulou, 2006). Taking in mind that university students experience a variety of stress-related situations (Hysrad et al., 2009; Robotham, 2008; Struthers, Perry & Menec, 2000) in a competitive, pressurized and high work-load academic environment, one can hypothesize that such experiences have an adverse effect on students' commitment and challenge. Future studies focusing on relations between academic hardiness and students' experiences of the academic environment may illuminate such a suggestion.

The present study also provides evidence for the moderating role of academic hardiness on students' daily university stressors. More specific, students who scored high on academic hardiness appraised less harmful some of their daily stressors, such as lack of leisure time, fear of failure, academic overload and academic performance. This is not the case for students in the low academic hardiness subgroup. It can be suggested that students who scored high in academic hardiness appraised their initial experience positively, that is challenging but not threatening. These students may have the ability to manage the stressors created in demanding situations in the university by means of a more positive appraisal, as challenges rather than threats. Students who scored low in academic hardiness appraised their initial experience negatively, that is threatening. This finding

supports the suggestion that hardy academic attitudes provide the courage and the motivation to individuals to deal with stressful academic circumstances and turn them from potential disasters into opportunity and advantages (Maddi, 2005). Also, this finding is in line with hardiness and academic hardiness literature; the highest the hardiness level, the greater the effectiveness in dealing with stressors (Maddi, 2006; Maddi et al., 2002), and, as a result, the more rapid one's ability to cope effectively with daily stress. The findings of study 2 are consistent with previous research about the importance of hardiness for students' adjustment to university life (Lifton et al., 2000; Lifton et al., 2006) and imply the moderating role of hardiness on academic stress (Sheard & Golby, 2007). In correspondence with psychological hardiness, academic hardiness helps insulate undergraduates from the effects of university stressors and, in that way, may predicts future well being and performance.

Limitations and Conclusions

Although study 1 of this research generated a survey instrument that could be potentially used to measure undergraduates stressors and provide preliminary evidence for the initial factorial validity of the questionnaire, there are a number of limitations. This study was conducted on community college students within a single district; therefore, it is difficult to determine whether the same study at other institutions would generate similar results. Another limitation is that data were gathered during one semester only. Had the survey been collected at different times, the results might have been different. The present study also did not permit an evaluation of test-retest reliability, which would have given a more complete psychometric picture.

Despite these limitations, the newly developed scale demonstrates psychometrically sound measure of university stressors that is applicable to an academic setting. Results of the present study also support the notion that students high in commitment and in total academic hardiness score are likely to do better in terms of their academic performance. Findings of study 2 of this research suggest that academic hardiness moderates the effect of daily university stressors, and contributes to students' adjustment to university life. Nonetheless, the present findings, concerning academic hardiness, suggest that the notion (academic hardiness) and its characteristics may continue to be useful in understanding individual vulnerability to the adverse effects of stress and the positive impact may has in academic setting.

Implication for future research and practice

A number of directions for future work warrant comment. Further studies should investigate whether the results in this research emerge as a consistent finding or as an artifact of the present sample. Replication of study 1 with a large sample of students from different university departments would lend support to the current findings and to the psychometric qualities of the "Undergraduates Stressors Questionnaire". Replication also of study 2 is necessary with different samples to strengthen the generalizability of the findings. Likewise, further studies may wish to extend this research by, for example, investigating the relationships between academic hardiness and coping strategies or learning strategies and the subsequent effect on academic performance. Besides, academic hardiness may not be a general feature of personality, but rather a specific indication as how undergraduates react in particular circumstances (Kamtsios & Karagiannopoulou, 2014). A longitudinal study would indicate if academic hardiness is altering as students' progress through their studies in a particular academic context. Taking this into account, future studies should investigate the influence of academic context on students' academic hardiness testing the nature of this theoretical construct as state or trait variable.

Future research should also take account additional aspects of academic hardiness (Kamtsios & Karagiannopoulou, 2013a,b) which may be significant for students' ability to cope with the difficulties in the university environment. Future research will illuminate the nature of academic

hardiness qualities, the way in which they are interrelated and the dynamics of their utilization, which may contribute to undergraduates' coping skills and learning process (Kamtsios & Karagiannopoulou, 2013a).

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Appendix A
Key features of the questionnaires measuring stressors in undergraduates

Questionnaire	Description		Number of items	Reliability
	Use	Factors		
"Academic Stress Scale" (Kohn & Frazer, 1986)	Identify events which elicit academic stress	1. Final grades 2. Excessive homework 3. Term papers 4. Examinations 5. Studying for examinations	35 items	.92
"Undergraduates Stress Questionnaire" (Crandall et al., 1992)	Assess a list of stressful life events ranging from major life crisis to minor daily hassles.	1. "Minor" life events 2. "Major" life events	83 items	
"Sources of Stress among Psychology Undergraduates" (Tyrell, 1992)	To identify important sources and symptoms of stress	1. Fears of falling behind with coursework. 2. Finding the motivation to study [3. Time pressures 4. Financial worries 5. Concern about academic ability	60 items	.75
"Students Life Stress Inventory" (Gadzella, 1994)	Measuring students' stressors and reactions to stressors	(Stressors) 1. Frustrations 2. Conflicts 3. Pressures 4. Changes 5. Self-imposed (Reactions) 1. Physiological 2. Emotional 3. Behavioral 4. Cognitive	51 items	from .52 to .85
"The student Stress Survey" (Ross et al., 1999)	Identify multiple stressors in undergraduates	(Stressors) 1. Interpersonal 2. Intrapersonal 3. Academic 4. Environmental	40 irtems	from .75 to .82
"Scale for Assessing Academic Stress" (Sinha et al., 2001)	Developed to assess all possible major mediators of academic stress in terms of their presence or absence	(Expressions of academic stress) 1. Cognitive 2. Affective 3. Physical 4. Social-interpersonal 5. Motivational	30 items	.75

"Perceive Stress Scale" (Cohen et al., 1983) Adjusted for university students from Matheny et al. (2002) and Ocuru & Demir (2008)	A general appraisal instrument that measures the degree to which situations in one's life are appraised as stressful	1. Perceived helplessness 2. Perceives self efficacy	14 items	.80
"Undergraduates Sources of Stress Questionnaire" (Blackmore et al., 2013)	To assess sources of stress in undergraduate students	1. Academic demands 2. Financial issues 3. Personal issues	18 items	.78
"Undergraduates Stressors Questionnaire" (Kamtsios & Karagiannopoulou, 2015)	Assessment of academic university stressors	1. Lack of leisure time 2. Academic performance (grades) 3. Fear of failure 4. Academic overload 5. Finances 6. Competition between students 7. Relationships with university faculty	29 items	.90