

Responsibility of learning: a cross-cultural examination of the relationship of grit, motivational belief and self-regulation among college students in the US, UAE and Turkey

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Abstract The present study explored the relationship between grit, motivational beliefs and self-regulation among undergraduate students in the United States, the United Arab Emirates and Turkey. These factors place the responsibility of learning on the students, rather than the educational environment. As most studies continue to focus on Western, educated, industrialised, rich and democratic populations, the current investigation adds to the extant knowledge of non-cognitive factors in student learning by focusing on international samples in three different cultural contexts to determine if indeed these factors are related in diverse educational environments. Grit significantly predicted the other non-cognitive factors in each of the contexts studied. There was also a positive relationship between the two constructs representing motivational beliefs, namely, self-efficacy and task value, in each of the contexts studied. The relationship between the constructs, however, differed with respect to self-regulation behaviours in the three cultural contexts represented in the study. Possible explanations for these differences are discussed.

Keywords Grit · International education · Motivational beliefs · Self-regulation · Student learning

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Introduction and literature review

Grit, motivational beliefs and self-regulation have been noted as essential components of academic success. These factors place the responsibility for learning on the shoulders of students themselves and they can be considered proactive rather than reactive strategies because they focus on student initiative, perseverance and adaptive behaviours. The current study examined these factors in order to provide a model of their inter-relations. As the majority of social science research continues to rely on the experiences and attitudes of Western, educated, industrialized, rich and democratic (WEIRD) populations (Henrich et al. 2010), the present study attempted to address the gap by investigating these factors among undergraduate students in Turkey, the UAE and the US. Thus, the participants in each sample, including the US sample, were from outside the WEIRD demographic framework.

Grit

Grit is defined as a non-cognitive trait that sustains consistent effort in achieving long-term goals despite setbacks and failures. Studies have shown a positive relationship between grit and academic success, including educational achievement, GPA and retention in military training (Duckworth et al. 2007; Duckworth and Quinn 2009). Grittier individuals might choose a cost–benefit relationship in academic achievement by utilising less enjoyable, but perhaps more rewarding, methods of studying or achievement (Duckworth et al. 2011). Grit has also been linked to the characteristics associated with high conscientiousness and low neuroticism within the Big Five Personality model (Duckworth and Quinn 2009; McCrae and Costa 1987) with the facet of perseverance being particularly important to academic success (Credé et al. 2016). Bowman et al. (2015) found that perseverance of effort predicted greater GPA, adjustment to college, college satisfaction, belongingness, faculty–student relationships and intent to persist with current major. Thus, empirical evidence suggests that persistent effort over time is a critical marker of university students' academic success and achievement.

International studies on grit and academic success in different contexts (doctoral-granting university versus regional college; citizen versus non-citizen) are consistent with research conducted in the US. For example, Jin and Kim (2017) found that grit mediated subjective well-being, was strongly related to both autonomy and need for competency, and decreased depressive symptoms among Korean adults. Pina-Watson et al. (2015) found that grit predicted academic motivation among Latino students. Grit was also higher among citizen and non-citizen Latino first-generation students than in the mostly White original grit study (O'Neal et al. 2016). Another researcher noted that positive relationships with teachers and parents were correlated with higher persistence, consistency and overall grit among Filipino students (Datu 2017). A recent neuroscience study revealed that, among Chinese students in Chendgu, grit and academic performance were associated with low-frequency fluctuations (LFFs) at a resting state in the dorsomedial prefrontal cortex (PFC) regions associated with behaviour performance, goal-directed action, task management and planning, and cognitive control (Wang et al. 2017). One study involving Turkish university students revealed that grit was positively associated with metacognition, both of which are strong predictors for academic success (Arslan et al. 2013). Although grit is a trait predictive of academic success, it is part of a complex personality construct coupled with motivational beliefs and self-regulation that could allow individuals to interpret stressors as

challenges that they can control in sight of their goals and values (January 2016; Wang et al. 2017).

Motivational beliefs

Motivation is an internal aspect of learning that promotes goal-oriented behaviour. Two components of motivation that are the focus of the present study are self-efficacy and task value.

Self-efficacy

Bandura (1977) theorised that motivation is affected by the beliefs that students hold regarding their competency and ability to succeed. Social learning theory holds that self-efficacy—believing that you can be successful—is a powerful motivational tool for student success. The most influential factor on self-efficacy is the prior experience of achievement; however other factors, such as verbal persuasion (being reminded of one's ability) and vicarious experiences (seeing others perform successfully) can also enhance self-efficacy (Schultz and Schultz 2017).

Task value

Using expectancy-value theory, Eccles and Wigfield (2002) emphasised the importance of task value on motivational processes. When students believe that the tasks they are performing are important, interesting and useful, they spend more time and effort on the activities, thereby improving their chances of success. Even when they are low in self-efficacy, students are more likely to engage and persist in completing activities that they feel are valuable (Schunk and Zimmerman 2007). Additionally, if students are interested in the activities, they are more likely spend effort on learning and understanding the materials presented (Pintrich and De Groot 1990; Wolters et al. 1996).

Self-regulation

Self-regulation is the process of monitoring and steering one's learning through the use of metacognitive strategies and managing effort in performing academic tasks (Pintrich and De Groot 1990). Students choose behaviours and strategies that help them to participate in learning by initiating and persevering through task completion (Zimmerman 2008). The use of metacognitive strategies is strongly associated with students' beliefs about their capabilities. Students who are more confident about their capabilities are more likely to use self-regulatory strategies (Pintrich 1999). Likewise, students who are highly motivated tend to be more persistent to succeed when their task is difficult or uninteresting (Pintrich and De Groot 1990). Thus, students who are higher in self-regulation tend to be more academically motivated (Pintrich 2003). Therefore, there is an interactive and reciprocal relation between motivation and self-regulation (Pintrich 1999).

Self-regulation is strongly tied with the use of cognitive strategies (Garcia and Pintrich 1994). However, using cognitive strategies (i.e. rehearsal) without accompanied self-regulatory strategies (i.e. goal setting) does not appear to improve academic success (Paris et al. 1983; Pressley 1986). Therefore, apart from the use of cognitive strategies, it is crucial to know when and how we should implement those cognitive strategies in the light

of self-regulation. Because there are various self-regulatory learning strategies, students could choose different strategies to attend to different goals (Pintrich 1989), and implementing these self-regulatory learning strategies can either be part of conscious thinking (Garner and Alexander 1989; Paris et al. 1983) or a more automatic process like a habit (Borkowski et al. 1989).

Because self-regulation is seen as a malleable trait (Zimmerman 1989), the quantity and the quality of using self-regulatory strategies are affected by several psychological and contextual factors such as motivation, time and the physical environment (Zimmerman 1998). Studies investigating the relation between self-regulatory learning and success showed that successful students are better at processing new information, making associations between new and prior information, goal setting, determining task strategies and seeking help when needed, yet teachers do not often prepare students to learn on their own (Zimmerman 2002). Cross-cultural studies suggest that, if courses are integrated by self-regulatory learning strategies, students' achievement in the particular course significantly increases (Albaili 1998; Arseven 2016). One of these studies demonstrated that Turkish college students who received English instruction that was integrated by self-regulatory learning strategies from their teacher significantly increased their achievement in the course (Vardar and Arsal 2014). Again, in a study that was conducted in Turkey, after an eight-week intervention program about self-regulatory strategies, the experimental group's academic success and motivation significantly increased relative to a control group (Önemli and Yöndem 2012). Thus incorporating self-regulatory learning strategies have been shown to benefit student outcomes in university courses. Moreover, students who adopted a learning goal orientation tended to engage in deeper self-regulatory strategies, such as making connections between new information and prior knowledge and monitoring their learning, whereas students who adopted a performance goal orientation tended to engage in more superficial self-regulatory strategies such as rehearsal and memorising new information (Kong and Hau 1996; Miller et al. 1993).

Contexts of higher education in Turkey and the UAE

In order to investigate the factors involved in student learning in different regions of the world, it is important to consider the influence of the contexts within which higher education institutions operate and the impact of globalisation. Collectivism and individualism are aspects of culture that are often used to examine differences in Western and Eastern societies. Given that Turkey is geographically on the seat of both Europe and Asia, the cultural experience tends to reflect both. Within the UAE, as 80% of the population is expatriate, the flavour of the country is inherently international. Although Hofstede's Cultural Comparison model indicates that the orientation of both countries is collectivist (Turkey received a score of 37 and the UAE received a score of 25), the representation of diverse worldviews has implications for the cultural practices of people, thus making Hofstede's orientations more difficult to apply at face value. For example, individualism could be more representative of younger, urban populations than older, rural ones. Additionally, although the values and personal constructions of self in Turkey have become more individualistic since the 1990s, this has not necessarily translated into a decrease in collectivist traits such as relatedness and emotional interdependency. As a result, both independence and interdependence are characteristic of Turkish university students (Aygün and İmamoğlu 2002). Within the UAE, Al-Esia and Skok (2014) found that Emiratis can fluctuate between collectivism and individualism depending on the social context. Collectivism

was more reflective of interactions with other locals or those with whom they had strong social bonds. In interactions with foreign co-workers, UAE Arabs tended to show more individualistic behaviours. Thus, cultural dimensions of Turkey and the UAE are represented by both individualism and collectivism.

International higher education is also influenced by the economic contribution of multiple players in the academic domain which often brings with it the exchange of cultural influences. Historically, a number of factors have contributed to a push–pull migratory pattern for students in higher education with rich industrialised countries being the overwhelming recipients—a phenomenon that has been associated with the brain drain of human capital within developing nations (Straubhaar 2000). The reputation and perceived higher quality of education in industrialised nations, political instability in the home countries, and employer preferences for Western degrees are often cited as factors (Wilkins et al. 2012). Within the UAE, this has elevated the importance of Western, especially American, conceptualisations of higher education such that local universities are often marketed as following an ‘American-style’ education. As English has become the lingua franca of higher education in the region, the emphasis on using English for academic purposes has made a mark on students’ ability to be successful in university courses. As a result, many UAE nationals take part in English foundation programs in order to achieve the prerequisite language ability to move on to undergraduate coursework (Wilkins 2010). The UAE also hosts a number of international branch campuses of foreign universities, with American, British and Australian universities leading this trend. Unlike many UAE government universities, international programs are generally co-educational and do not have guaranteed admission or full scholarships for Emirati students. However, as a result of having both public and private options for higher education in the country, the UAE has more supply than demand (Wilkins 2010).

The same does not hold true for higher education in Turkey where demand greatly outweighs supply in higher quality institutions. The national university entrance examination was created as a selection tool to manage admissions to higher education institutions in Turkey. The entrance examination is given once a year and applicants are placed in the departments and universities of their choice based on their placement score, which includes examination results as well as the students’ cumulative high school GPAs. The latter is also weighted by the standing of the high school in the placement examination. Medical and engineering programs usually require top scores, whereas open-university programs admit students with lower placement scores. In fact, distance education in Turkey is one of the largest in the world, serving about 15% of students each year. In the history of Turkish higher education, only a small percentage of applicants were able to obtain a place in Turkish undergraduate programs, thus making university admissions highly competitive. Because the success rate of first-time test takers was slightly lower, applicants often ended up taking the entrance examination numerous times before they were placed in a university program (Dayioğlu and Türüt-Aşık 2007). Currently Turkey has 184 universities in 2017, almost the half of them established in the last decade. In Turkey, the competition for high-quality higher education still continues. As a result, private tutoring to help high school students prepare for the examinations is a widespread phenomenon in Turkey (Tansel and Bircan Bodur 2005). The costs of these specialised preparatory programs are often high, thus limiting the admissions prospects of students from lower economic backgrounds.

Aims of the study

The aims of the study were:

1. To validate the questionnaires used in the study through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).
2. To examine differences in student responsibility for learning among students in the US, UAE, and Turkey

In order to address these questions, the following hypotheses were tested:

H1 UAE, Turkey and US students' grit is significantly related to task value.

H2 UAE, Turkey and US students' grit is significantly associated with self-efficacy.

H3 UAE, Turkey and US students' grit is significantly linked to self-regulation.

H4 UAE, Turkey and US students' task value is significantly linked to self-regulation.

H5 UAE, Turkey and US students' self-efficacy is significantly associated with self-regulation.

H6 UAE, Turkey and US students' self-efficacy is significantly associated with task value.

Figure 1 depicts the research model for our study.

Method

Participants

The present study was conducted with 327 college students from three countries (n=94 USA, n=109 UAE, n=124 Turkey). Table 1 contains demographic information about the

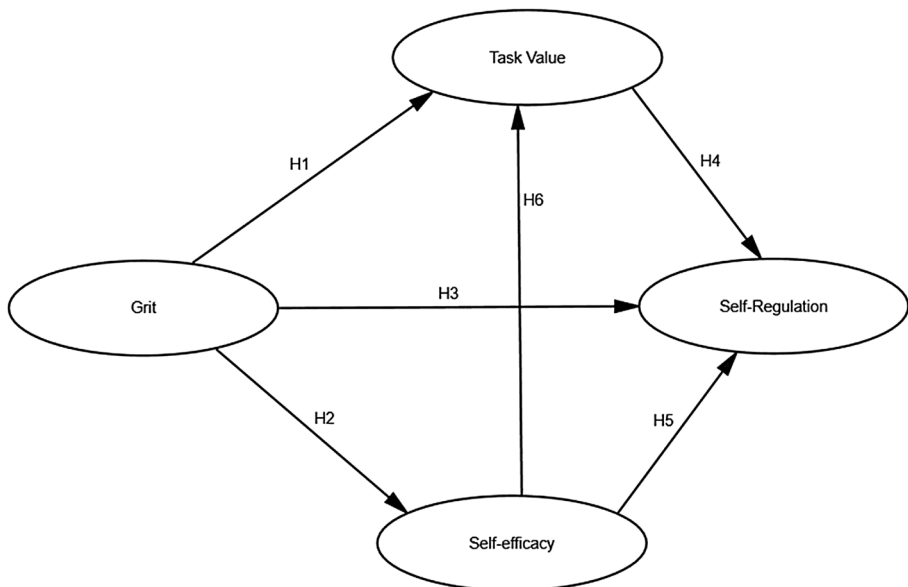


Fig. 1 Research model of the study

Table 1 Gender and ages of participants

Gender	UAE	Turkey	USA	Total
Males	24	41	22	87
Females	85	83	72	240
Age (years)	18–26	18–25	18–57	

participants (gender and age). The US sample was obtained from an urban university designated as a minority-serving institution where students are mainly from low- to middle-socioeconomic groups. The samples from Turkey and the UAE were also obtained from urban universities but, unlike the US samples, students from Turkey and the UAE represented higher socioeconomic groups. The Turkish university is also one of the top-ranked universities.

Instruments

Four questionnaires were administered in each country. In Turkey, students completed a Turkish version of grit, motivational and self-regulation questionnaires. In the UAE, questionnaires were in both Arabic and English. Students in the USA completed the English-only questionnaire. The instrument was composed of 12 items for Grit and 8 items each for Task value, Self-efficacy and Self-regulation. The items were constructed using a Likert-scale format with participants responding to each statement on a five-point scale ranging from *strongly disagree* (1) to *strongly agree* (5). Table 2 shows the wording of items adapted from various published sources.

Results

Descriptive statistics

Descriptive statistics for the constructs for the three countries are shown in Table 3. The mean scores were above the mid-point of 3.00, ranging from 3.12 to 4.12, indicating an overall positive response to the items in the study. All the standard deviations (SD) were less than 1.00, indicating that the item scores were around the mean. The data were examined for multivariate normality, multicollinearity and outliers before assessing the factor structure of the responses, as recommended by Tabachnick and Fidell (2007). The bivariate correlations, tolerance and variance inflation values indicated that neither bivariate nor multivariate multicollinearity was present. Because maximum likelihood estimation assumes multivariate normality of the observed variables, the data were examined with respect to univariate and multivariate normality (Teo and Lee 2012).

All items showed a skewness or kurtosis value less than the cut-offs recommended by Kline (2011), supporting the univariate normality in the items. The value of Mardia's coefficient (a standard measure of multivariate normality) obtained in this study, using AMOS 22, satisfied the recommendation by Raykov and Marcoulides (2011). Therefore the requirement of multivariate normality was satisfied and therefore the data were considered adequate for structural equation modeling analysis.

Table 2 Constructs and corresponding items

Construct	Item
Grit (adapted from Duckworth et al. 2007)	
Grit1	I have overcome setbacks to conquer an important challenge
Grit4	Setbacks don't discourage me
Grit6	I am a hard worker
Grit9	I finish whatever I begin
Grit10	I have achieved a goal that took years of work
Grit12	I am diligent
Grit2	New ideas and projects sometimes distract me from previous ones
Grit3	My interests change from year to year
Grit5	I have been obsessed with a certain idea or project for a short time but later lost interest
Grit7	I often set a goal but later choose to pursue a different one
Grit8	I have difficulty maintaining my focus on projects that take more than a few months to complete
Grit11	I become interested in new pursuits every few months
Self-efficacy (SE) (adapted from Velayutham et al. 2011)	
SelfEffic1	I can master the skills that are taught
SelfEffic2	I can figure out how to do difficult work
SelfEffic3	Even if the subject is hard, I can learn it
SelfEffic4	I can complete difficult work if I try
SelfEffic5	I will receive good grades
SelfEffic6	I can learn the work we do in class
SelfEffic7	I can understand the content taught
SelfEffic8	I am good at the subject
Self-regulation (SR) (adapted from Velayutham et al. 2011)	
SelfReg1	Even when tasks are uninteresting, I keep working
SelfReg2	I work hard even if I do not like what I am doing
SelfReg3	I continue working even if there are better things to do
SelfReg4	I concentrate so that I won't miss important points
SelfReg5	I finish my work and assignments on time
SelfReg6	I don't give up even when the work is difficult
SelfReg7	I concentrate in class
SelfReg8	I keep working until I finish what I am supposed to do
Task value (TV) (adapted from Velayutham et al. 2011)	
TaskVal1	What I learn can be used in my daily life
TaskVal2	What I learn is interesting
TaskVal3	What I learn is useful for me to know
TaskVal4	What I learn is helpful to me
TaskVal5	What I learn is relevant to me
TaskVal6	What I learn is of practical value
TaskVal7	What I learn satisfies my curiosity
TaskVal8	What I learn encourages me to think

Table 3 Descriptive statistics for the constructs

Construct	UAE				Turkey				USA			
	M	SD	Skewness	Kurtosis	M	SD	Skewness	Kurtosis	M	SD	Skewness	Kurtosis
Grit	3.17	0.28	-0.30	0.97	3.12	0.56	0.19	0.10	3.35	0.26	-0.35	0.44
TV	3.73	0.71	-0.14	-0.19	3.85	0.62	-0.86	3.38	3.96	0.68	-0.98	2.68
SR	3.70	0.57	-0.39	0.38	3.28	0.64	-0.50	0.98	3.84	0.53	0.03	0.12
SE	4.04	0.52	-0.09	0.09	3.98	0.50	0.08	0.68	4.12	0.48	0.03	-0.31

TV task value, SR self-regulation, SE self-efficacy

Factor structure

To examine the internal structure of the 12-item grit, 8-item self-efficacy, 8-item self-regulation and 8-item task value scales, principal component analysis followed by varimax rotation was used. Table 4 provides the factor loadings. The two criteria used for retaining any item were that it must have a factor loading of at least 0.40 with its own scale and less than 0.40 with each of the four scales. Item analysis indicated that all the 36 items loaded above 0.40 on their own scale and no other scale. The total variance accounted for by these four scales was 46.46%. The eigenvalues for the four scales were 9.61 for grit, 3.54 for self-efficacy, 2.49 for self-regulation and 1.93 for task value.

Convergent validity

Three procedures proposed by Fornell and Larcker (1981) to assess the convergent validity of measurement items in relation to their constructs are as follows:

- item reliability of each measure
- composite reliability of each construct
- average variance extracted.

As recommended by Hair et al. (2010), an item is significant if its factor loading is greater than 0.50. It can be seen in Table 3 that the factors loadings of all the items ranged from 0.54 to 0.89. Also, the eigenvalues of all the constructs were more than 1.00 with the four components, explaining a total of 46.46% of the variance. Thus, the convergent validity was satisfactory at the item level.

Cronbach's alpha coefficient was used to assess the composite reliability of each construct. DeVellis (2003) recommended that the reliability coefficient for a scale should be above 0.70. Table 5 shows that all alpha coefficients for the constructs ranged from 0.78 to 0.91. A measure of the average variance extracted (AVE) for each factor was the final criterion for convergent validity. AVE measures the amount of variance captured by the construct in relation to the amount of variance attributable to measurement error (Teo et al. 2008). A minimum value of 0.50 for AVE is recommended by Fornell and Larcker (1981) and Nunnally and Bernstein (1994). AVE values for all the constructs were above 0.50 (Table 5), therefore all the three criteria of convergent validity were satisfied.

Discriminant validity

Discriminant validity assesses the degree to which the constructs are different. Barclay et al. (1995) suggested that discriminant validity is present when the variance shared between a construct and any other construct in the model is less than the variance that construct shares with its measures. As shown in Table 6, the square root of the AVE is larger than the inter-construct correlation. Therefore discriminant validity was achieved.

Model fit

The research model in this study (Fig. 1) was tested by using structural equation modeling using AMOS 22.0 (Arbuckle 2007) using comparative fit index (CFI), Tucker–Lewis index

Table 4 Results for principal component analysis

Item	Factor loadings			
	Grit	Self-efficacy	Self-regulation	Task value
Grit1	0.72	0.12	-0.02	-0.20
Grit4	0.60	-0.06	0.05	0.15
Grit6	0.79	0.09	0.08	0.05
Grit9	0.79	0.02	-0.01	0.03
Grit10	0.69	0.05	0.13	-0.04
Grit12	0.78	0.14	0.07	-0.15
Grit2	0.71	0.00	0.03	-0.26
Grit3	0.77	0.01	0.02	-0.06
Grit5	0.70	0.01	-0.00	0.13
Grit7	0.60	0.06	-0.05	0.44
Grit8	0.62	-0.07	0.07	0.42
Grit11	0.75	0.03	-0.16	-0.14
SelfEffic1	0.32	0.73	0.15	0.03
SelfEffic2	0.24	0.87	-0.01	0.17
SelfEffic3	0.30	0.72	0.01	0.24
SelfEffic4	0.26	0.83	0.01	0.19
SelfEffic5	0.22	0.79	0.00	-0.04
SelfEffic6	0.27	0.78	0.02	0.15
SelfEffic7	0.31	0.80	-0.11	0.14
SelfEffic8	0.26	0.76	-0.07	0.14
SelfReg1	0.06	0.28	0.81	-0.23
SelfReg2	-0.03	0.32	0.82	-0.27
SelfReg3	0.05	0.26	0.65	-0.28
SelfReg4	0.12	0.02	0.75	-0.01
SelfReg5	-0.07	-0.05	0.54	-0.02
SelfReg6	0.08	-0.04	0.70	0.01
SelfReg7	0.04	0.11	0.80	-0.07
SelfReg8	0.09	0.08	0.67	-0.09
TaskVal1	0.05	0.03	0.08	0.84
TaskVal2	0.21	0.04	-0.01	0.82
TaskVal3	0.21	0.06	0.01	0.81
TaskVal4	0.21	0.05	0.00	0.79
TaskVal5	0.12	0.07	-0.08	0.89
TaskVal6	0.14	0.05	0.01	0.80
TaskVal7	0.21	0.08	-0.01	0.88
TaskVal8	0.30	0.04	-0.07	0.80
Eigenvalue	9.61	3.54	2.49	1.93
% variance explained	26.69	9.84	6.91	5.35

Rotation method: Varimax with Kaiser normalisation

Bolded items indicate major factor loadings for each item

Table 5 Construct reliability and average variance extracted

Construct	Cronbach's alpha	Composite reliability	Average variance extracted
Grit	0.78	0.92	0.51
Self-efficacy	0.87	0.93	0.62
Self-regulation	0.83	0.90	0.52
Task value	0.91	0.95	0.69

Table 6 Inter-construct correlations and square root of average variance extracted

Scale	Grit	Self-efficacy	Self-regulation	Task value
Grit	(0.71)			
Self-efficacy	0.03	(0.79)		
Self-regulation	-0.39**	0.33**	(0.72)	
Task value	-0.05	0.49**	0.53**	(0.83)

** $p < .01$ Indicates the elements in bold and parentheses in the main diagonal are the square roots of AVE and the off-diagonal elements are the shared variance

Table 7 Fit indices for the research model

Model fit index	Recommended guidelines	Overall model	UAE	Turkey	USA
χ^2	Nonsignificant at $p < 0.05$	978.35	709.75	812.22	824.71
χ^2/df	< 0.5	1.76	1.28	1.46	1.5
CFI	≥ 0.90	0.93	0.92	0.91	0.90
TLI	≥ 0.90	0.92	0.91	0.90	0.91
RMSEA	≤ 0.06	0.05	0.05	0.06	0.06

(TLI) and root mean square error of approximation (RMSEA) (Kline 2011). According to Hu and Bentler (1999), to achieve an acceptable model fit, the TLI and CFI should be greater than or equal to 0.90 and RMSEA should be less than or equal to 0.06. All the values satisfied the recommended level of acceptable fit, but χ^2 did not. It has been noted by Hair et al. (2010) that, as the sample size increases, there is a greater tendency for the χ^2 to indicate significant difference. Hence, the ratio of χ^2 to its degree of freedom (χ^2/df) was used, with a ratio of five or less indicating an acceptable fit. The results of the model fit for the overall model and separately for UAE, Turkey and USA samples are shown in Table 7. The results indicate that the model for the three countries fits the data fairly well.

The resulting path coefficients of the proposed research model for the UAE, Turkey and US samples are shown in Figs. 2, 3 and 4. Hypotheses H1, H2, H3 and H6 were supported by the data, but H4 and H5 were not supported. The results show that grit was significantly related to task value ($\beta = 0.16, p < 0.01$), self-efficacy ($\beta = 0.17, p < 0.01$) and self-regulation ($\beta = 0.11, p < 0.05$) in all three samples, supporting hypotheses H1, H2 and H3. However, as task value was positively associated with self-regulation in only the US sample ($\beta = -0.29, p < 0.05$), hypothesis H4 holds true neither for the UAE ($\beta = -0.01, p > 0.05$) nor Turkey ($\beta = 0.10, p > 0.05$). Hypothesis H5 involving the relationship between self-efficacy and self-regulation was supported for the UAE sample

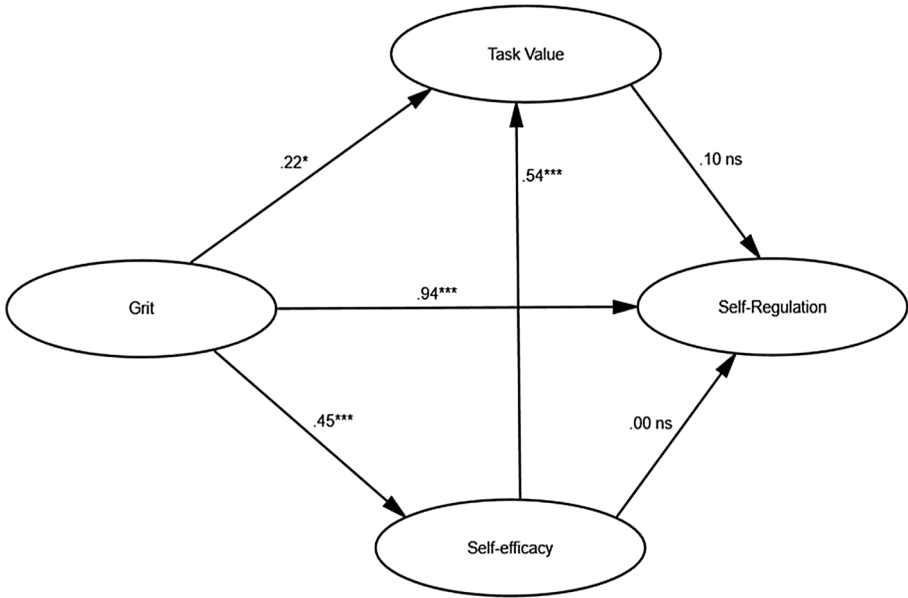


Fig. 2 Results for Turkey

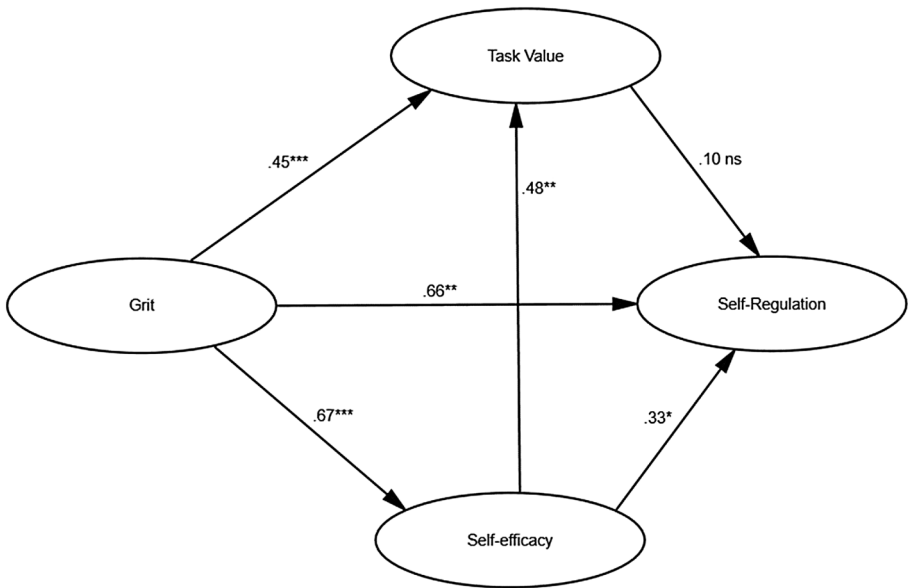


Fig. 3 Results for UAE

($\beta = 0.33, p < 0.05$), but neither for Turkey ($\beta = -0.00, p > 0.05$) nor the US sample ($\beta = -0.23, p > .05$). Hypothesis H6 involving the relationship between self-efficacy and

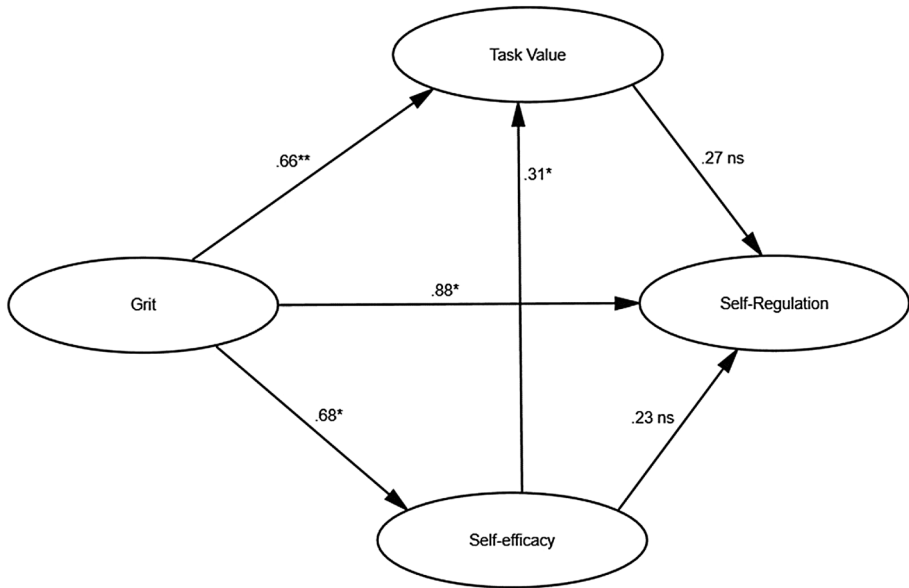


Fig. 4 Results for USA

Table 8 Hypothesis testing results

Hypothesis	Path	Overall model	UAE	Turkey	USA	Results
H1	Grit → TV	.16**	.45***	.22*	.66**	Supported
H2	Grit → SE	.17**	.67***	.45***	.68*	Supported
H3	Grit → SR	.11*	.66**	.94***	.88*	Supported
H4	TV → SR	.11 ^{ns}	.01 ^{ns}	.10 ^{ns}	.27*	Not supported
H5	SE → SR	.56***	.33*	.00 ^{ns}	.23 ^{ns}	Not supported
H6	SE → TV	.48***	.48**	.54***	.31*	Supported

*** $p < .001$; ** $p < .01$; * $p < .05$

ns (non-significant)

task value was supported in all three samples. The hypothesis testing results are also shown in Table 8.

Discussion and conclusion

The present study provides a model of inter-relationships between non-cognitive factors of student learning as they apply to undergraduate students in the US, the UAE and Turkey. Grit was the most robust of the motivators in this study as it significantly predicted task value, self-efficacy, and self-regulation in the three cultural contexts investigated. The findings support a myriad of studies on grit, indicating that persistence of effort in productive tasks is an important aspect of student motivation and should be emphasised in

international higher education institutions in an attempt to improve student learning and responsibility for success. Interventions that enable students to become grittier could be useful in high schools as part of college preparation efforts, but they might be even more effective if they are started earlier. Alan, Boneva and Ertac (2016), for example, implemented a randomised educational intervention with fourth graders in two elementary schools in Istanbul. Their study showed that students who received instruction using a grit-enhancing framework were significantly more likely to choose difficult tasks over easier ones and significantly more likely to re-attempt difficult tasks after initial failure. As a result, they not only set higher goals for themselves, but they were more likely to achieve those goals.

In the present study, self-efficacy was significantly related to task value in each of the three contexts. Thus, it appears that undergraduate students in the US, the UAE and Turkey connect their belief in their ability to perform a task with the value that they place on that task. This finding supports the general expectancy-value model of motivation (Eccles 1983) in which students who expect to do well on a task and who value the task are more likely to be successful at it. Thus, the model could be a useful construct for working with students in international higher education. As both self-efficacy and task value in the current study were defined from a general perspective rather than from the perspective of any particular discipline or domain, the results are reflective of a holistic approach to both constructs, rather than their application to specific academic subjects.

Differences in the cultural contexts of the current study were mainly found in the relationship between the sub-categories of motivational beliefs (self-efficacy and task value) and self-regulation. For example, self-efficacy was a significant predictor of self-regulation in the UAE sample. This supports the findings of Russell and Warner (2017) who note that self-efficacy is a stronger predictor of self-regulation among UAE undergraduates than goal setting. As task value and self-efficacy were shown to be related in the UAE sample, it is possible that many students in the UAE pursue degrees in areas that are not of personal interest to them because they are valued within the family or culture. Here the interconnectedness of individualism and collectivism within UAE society could be at work. This perspective is further supported by the finding that task value was not related to self-regulation among UAE participants. Thus, UAE students might pursue self-regulation behaviours when they feel that they are capable of being successful, regardless of whether or not they value the tasks themselves.

In the US sample as in the UAE sample, self-efficacy and task value were significantly related. However, among US participants, self-efficacy was not significantly related to self-regulation. This finding is contrary to existing research showing that self-efficacy influences regulatory behaviours among students (Pajares 2008; Schunk and Ertmer 2000; Zimmerman 2000). Because students in the US sample represented mainly low- to middle-socioeconomic groups, it is possible that self-efficacy and self-regulation are not related constructs within the experiences of lower-SES and minority students in American higher education. Instead, we found that task value was a significant predictor of self-regulation. It is possible, then, that the students in the present study could have felt capable in general and that their self-efficacy could be related to the value that they place on the tasks that they are learning, but it was only when they valued the tasks that they were learning did they choose to regulate their behaviours to achieve those tasks. The current model provides a starting point for further research on the interaction between these factors.

Interestingly, neither task value nor self-efficacy were significant predictors of self-regulation in the Turkey sample. This finding could be related to the influence of the entrance examination on student opportunities in higher education. Because academic pathways

are dependent on entrance examination scores, students in Turkey might not necessarily have to value the tasks they are learning in order to regulate their behaviours. Additionally, given the importance of interdependence within Turkish culture (Aygün and Imamoğlu 2002), a personal belief in one's ability to succeed could also be irrelevant to regulating academic behaviours. However, this is different from the UAE results in which self-efficacy did have a relationship with self-regulation. It is possible that the nature of interdependence varies within collectivist societies. Further research is needed to better understand how non-cognitive factors such as task value and self-efficacy might play a role in Turkish higher education systems as well as how these behaviours might be perceived differently within and across cultures.

The present study provided an exploratory model of the relationships between grit, motivational beliefs and self-regulation among undergraduate students in the US, the UAE and Turkey. Given that grit was the most influential of the constructs studied, educational interventions that improve grit in students are recommended in each of the contexts studied. Although task value and self-efficacy were also related in each of the samples, their relationship to self-regulation behaviours was different in each country. This is an important finding in that it underscores the necessity of being sensitive to the educational experiences of students in different regions of the world. Too often, educational research that is applicable within WEIRD populations is considered the best model of education for all students. The current study adds to the extant literature by providing insight into the various ways in which non-cognitive factors can be associated with student learning in three countries with different systems of higher education. Further research on how these factors are inter-related is needed to help international education efforts to best address the needs of students in diverse cultural contexts.

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