frontiers in Education

TYPE Original Research
PUBLISHED 26 June 2026
DOI 10.3389/feduc.2026.1868753

Check for updates

OPEN ACCESS

EDITED BY
Nuri Türk,
Siirt University, Türkiye

REVIEWED BY
Konstantinos Mastrothanasis,
Open University of Cyprus, Cyprus
Wahyu Eko Pujianto,
Airlangga University, Indonesia

*CORRESPONDENCE
Mustafa Baloglu
baloglu@hotmail.com

RECEIVED 29 April 2026
REVISED 13 May 2026
ACCEPTED 25 May 2026
PUBLISHED 26 June 2026

CITATION
Gül YE, Arpaci I, Adsız R, Erdem N and Baloglu M (2026) Moderating effect of post-earthquake trauma: motivation, resilience and self-efficacy in academic grit.
Front. Educ. 11:1868753.
doi: 10.3389/feduc.2026.1868753

COPYRIGHT
© 2026 Gül, Arpaci, Adsız, Erdem and Baloglu. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Moderating effect of post-earthquake trauma: motivation, resilience and self-efficacy in academic grit

Yavuz Ercan Gül[1], Ibrahim Arpaci[2,3], Remzi Adsız[4], Nuri Erdem[5] and Mustafa Baloglu[6]*

[1]Faculty of Humanities, Department of Educational Sciences, Kyrgyz Turkish Manas University, Bishkek, Kyrgyzstan, [2]Department of Computer Engineering, Faculty of Engineering, Bursa Uludag University, Bursa, Türkiye, [3]Department of Computer Science and Engineering, College of Informatics, Korea University, Seoul, Republic of Korea, [4]Department of Educational Sciences, Faculty of Education, Hakkari University, Hakkari, Türkiye, [5]Department of Geomatics Engineering, Osmaniye Korkut Ata University, Osmaniye, Türkiye, [6]Department of Special and Gifted Education, College of Education, United Arab Emirates University, Abu Dhabi, United Arab Emirates

Introduction: This study examined whether and how post-earthquake trauma moderates the associations between intrinsic motivation, resilience, self-efficacy, and academic grit.
Methods: Data were collected from 1,007 high school survivors of the 2023 Kahramanmaraş earthquakes in Adıyaman and Osmaniye. Multigroup structural equation modeling compared structural paths across low-, medium-, and high-trauma groups, with FIML estimation and bootstrap confidence intervals.
Results: At low trauma, intrinsic motivation, self-efficacy, and resilience were all positively associated with academic grit. At moderate trauma, intrinsic motivation and self-efficacy remained significant but resilience did not. At high trauma, intrinsic motivation and self-efficacy stayed positive, whereas resilience showed a significant negative association.
Discussion: Post-earthquake trauma is associated with differential structural patterns. The negative resilience association at high trauma underscores the need for direct psychosocial support, alongside interventions strengthening self-efficacy and intrinsic motivation.

KEYWORDS
academic grit, motivation, post-earthquake trauma, resilience, self-efficacy

1 Introduction

The US National Earthquake Information Center (USGS, 2023) reports that there are about 20,000 earthquakes annually worldwide, with an average of 55 earthquakes per day. The number of earthquakes with a magnitude of 7 or greater on the Richter scale is 16 per year. Approximately two million people lost their lives in the twentieth century, when only earthquakes with more than a thousand casualties were considered (Başoğlu et al., 2002).

Unpredictable, destructive disasters, such as earthquakes, can cause mass fatalities; have physical, emotional, and social effects; and leave survivors with post-traumatic stress disorder for many years (Başoğlu et al., 2002; Pratt et al., 2019). Trauma is one of the psychological disorders caused by earthquakes that negatively affects an individual's quality of life. It disrupts the physical and psychological structure of the

individual, with symptoms including involuntary memories of the earthquake, attempts to eliminate these memories, high levels of arousal, and negative changes in mind and cognition (American Psychiatric Association, 2013). Because experiencing natural disasters results in anxiety and stress, and affects people deeply (Gerstner et al., 2020), this stress and anxiety can turn into a serious mental health problem over time (Demirchyan et al., 2022).

Trauma can also cause permanent problems in students who are still in the process of physical and psychological development. Trauma can impede this development by disrupting the critical processes underlying the neurological basis of learning (Bethell et al., 2014). Students exposed to trauma are harmed academically, socio-emotionally, and psychologically (Schafer, 2024). This may be because emotions used to suppress trauma negatively affect cognitive development (Conte and Schuerman, 1987) and traumatized children use the energy required for academic studies to suppress trauma (Shanok et al., 1989).

Traumatic exposure also negatively affects learning. Studies suggest that problems in achievement (Rusmini et al., 2020), classroom behavior (Hamad et al., 2023), and attention in class (Delaney-Black et al., 2002) are major negative consequences of trauma. Earthquakes can also affect students' quality of life and cause a decrease in their academic achievement. In Ceyhan and Ceyhan (2007), life quality and academic achievement of earthquake-related trauma-exposed students were lower than those of students not exposed to earthquakes.

One way to deal with the negative effects of earthquakes is by improving a person's resilience, which provides great benefits to individuals affected by earthquakes and helps them cope with the difficulties they face. Okan and Şahin (2023) found that resilience was effective in coping with post-earthquake difficulties among earthquake victims in Turkiye. Polat et al. (2023) argued that, regardless of the degree of negative effects of earthquakes, individuals can increase their general self-efficacy by recognizing that they will continue to live in the face of this unexpected event. For students, coping with the negative effects of earthquakes requires increased self-efficacy, intrinsic motivation, academic grit, and resilience (Kc et al., 2019).

The urgency of the present study is grounded in the temporal dynamics of post-disaster recovery in earthquake-affected regions. Three years after the February 2023 Kahramanmaraş earthquakes, affected adolescents are now navigating critical academic transition periods, including university entrance examinations, vocational decisions, and the consolidation of post-secondary trajectories, while psychological recovery remains incomplete for many survivors. Empirical evidence from prior earthquakes indicates that posttraumatic symptomatology may persist for years and continue to shape educational outcomes long after the acute phase has ended (Demirchyan et al., 2022). Without a clear understanding of how trauma exposure reshapes the motivational pathways underlying academic persistence, school-based interventions risk being designed around general resilience-building assumptions that may not fit the developmental and psychological realities of affected students. Examining these pathways at this specific post-disaster window is therefore not only theoretically informative but also practically necessary for designing evidence-based educational and psychosocial support in earthquake-prone settings.

We conducted the current study with high school students who experienced the recent earthquake in Turkiye, a magnitude of 7.7, in Kahramanmaraş, which was felt by approximately 13.5 million people and resulted in more than 50,000 people losing their lives. This study focused on post-earthquake trauma, academic grit, self-efficacy, resilience, and intrinsic motivation among earthquake surviving students. It aims to contribute empirically to the scientific and theoretical studies on the last great earthquake, known as the Kahramanmaraş earthquake.

1.1 Theoretical background

1.1.1 Post-earthquake trauma

Whether or not a situation is traumatic depends on the excessive stress that exceeds the coping power of the individual. According to Pearlman and Saakvitne (1995), trauma is "a threat to one's life, physical integrity, or mental health". Allen (1995), on the other hand, divides trauma into two categories: Objective and subjective; trauma, objectively, is the extent to which an individual experiences trauma, the more one believes that they are in danger, and subjectively, intense emotion and absolute helplessness. Therefore, earthquakes can have consequences for people who experience them, causing them to feel emotionally, cognitively, and physically overwhelmed beyond their ability to cope. Such situations can be defined as post-earthquake trauma.

1.1.2 Academic grit, intrinsic motivation, self-efficacy, and resilience

Grit involves the successful completion of a task without giving in to difficulties and problems, persistence, stability, and patience (Wheatley, 2010). According to Duckworth (2016), it is related to courage, which involves working hard towards challenging goals and continuing efforts despite failures and setbacks. Academic grit refers to the ability to continue academic activities without giving up or succumbing to difficulties and obstacles (Oluremi, 2014). Academic grit has been linked to academic success (Hodge et al., 2018). Success itself is influenced by courage and consistency in achieving long-term goals (Gat et al., 2021).

Another crucial factor in academic success is motivation, which underscores the importance of resilience against academic pressure (Temel et al., 2023). Intrinsic motivation has a significant effect on persistence and work performance (Vallerand, 2007). An intrinsically motivated individual does not distinguish between the continuation of an action and its benefits. There is a perceptual fusion between an action and its purpose in a person's mind (Fishbach and Woolley, 2022). Intrinsic motivation compels people to continually act and adapt to their environments (Larson and Rusk, 2011). This type of motivation is closely related to work performance and learning where intrinsically motivated individuals think more strategically and creatively, tackle challenges, and are better at experiential learning (Ryan and Deci, 2000b).

Self-efficacy is the belief in one's ability to perform a task successfully (Bandura, 1977). It is one of the strongest

motivational determinants of how well an individual can perform. It can be assessed in general but is also based on a specific task (e.g., physical activity) or domain (e.g., education, health, and work) (Farmer et al., 2021). Self-efficacy affects the level of persistence in a task when faced with difficulties (Bandura, 1997).

Resilience is the ability to endure or retrieve from challenging conditions. Resilience and robustness have their origins in physics and mathematics. Physics describes resilience as the ability of a stretched object to return to its original size and shape following deformation. Psychology refers to it as the ability to overcome or cope with adversity and, thus, experience positive outcomes in the face of an unpleasant situation/event (Vella and Pai, 2019). Researchers have emphasized the critical importance of resilience as a factor affecting academic success and performance (e.g., Demir, 2023).

1.2 Research model and hypotheses

We investigated the moderating role of post-earthquake trauma in the associations between self-efficacy, intrinsic motivation, resilience, and academic grit. First, we examined the association between resilience and academic grit. Second, we investigated the associations between intrinsic motivation and academic grit, and between self-efficacy and academic grit. In addition, the moderating effect of post-earthquake trauma on the relationships among resilience, intrinsic motivation, self-efficacy, and academic grit was examined. The study model is illustrated in Figure 1.

Studies have examined the relationship between intrinsic motivation and reward-seeking (e.g., Deci et al., 1999), risk-taking and creativity (e.g., Dewett, 2007), extrinsic motivation (e.g., Lee et al., 2012), and self-efficacy and academic achievement/motivation (e.g., Alivernini and Lucidi, 2011). No research has been conducted on the relationships among intrinsic motivation, self-efficacy, and academic grit; however, intrinsic motivation contributes to learning outcomes (Chen, 2018), academic engagement, and achievement (e.g., Credé et al., 2017). Within SDT, intrinsic motivation represents the prototypical form of autonomous motivation that arises when the basic psychological needs of autonomy and competence are satisfied (Ryan and Deci, 2000b). Autonomous motivation, in turn, has been consistently linked to higher quality engagement, deeper learning, and greater persistence in long-term goals (Vansteenkiste et al., 2020). Because academic grit is conceptualized as sustained passion and perseverance toward long-term goals (Duckworth et al., 2007), SDT predicts that students experiencing intrinsic motivation should be more likely to maintain effort across time and challenges. Therefore, we hypothesized a positive association between intrinsic motivation and academic grit (Hypothesis 1).

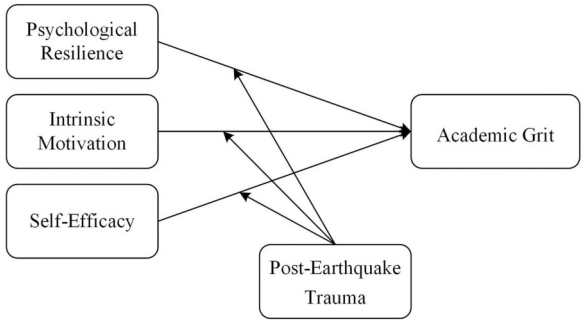


FIGURE 1
Hypothetical model.

Associations between resilience and perseverance/motivation (e.g., Sonkur, 2021; Yıldız and Kardaş, 2021), depressive symptoms/happiness/satisfaction (e.g., Ulukan, 2020), job satisfaction/occupational burnout (Gönen, 2020), coping/optimism (Yalım, 2007), and positive emotions (Tugade et al., 2004) have been evidenced in the literature. Resilience is one of the main factors for success, both academically and socially in schools (Demir, 2023). Many risk factors surrounding students in school environments can trigger a chain of negative outcomes; however, resilience protects students from these negative situations and provides positive connections that result in positive outcomes (Daniel and Wassell, 2002). Studies have provided empirical evidence of a significant positive relationship between resilience and academic achievement (e.g., Ateş and Sağar, 2022; Demir, 2023). From a Conservation of Resources (COR) perspective (Hobfoll, 1989), resilience can be conceptualized as a key psychological resource that supports adaptive functioning by allowing individuals to invest energy in long-term goal pursuit despite setbacks. Within SDT, resilience further supports the satisfaction of basic psychological needs by enabling persistence in the face of need-thwarting circumstances. Because academic grit requires sustained effort across difficulties, students with greater psychological resources should demonstrate higher levels of grit. Therefore, we hypothesized a positive association between resilience and academic grit (Hypothesis 2).

Positive associations between self-efficacy and resilience have also been evidenced (e.g., Özkan and Akça, 2022), including satisfaction (Durak, 2021), embarrassment (Baldwin et al., 2006), stress (Jerusalem and Schwarzer, 1992), social support (Kelly et al., 1991), anxiety (Wang and Liu, 2000), and academic motivation (Schunk, 1991). Self-efficacy prepares skills and attitudes that encourage student achievement and attainment (Alhadabi and Karpinski, 2020). Because self-efficacy is closely related to self-regulatory learning strategies (Honicke and Broadbent, 2016), research has shown empirical evidence of significant positive associations between self-efficacy and academic achievement (e.g., Alhadabi and Karpinski, 2020; Mata, 2020; Neroni et al., 2022). SDT identifies competence as one of the three basic psychological needs essential to autonomous functioning (Ryan and Deci, 2000b). Self-efficacy operationalizes competence within the academic domain, capturing students' beliefs about their capacity to succeed at academic tasks (Bandura, 1997). When the competence need is satisfied, students are expected to engage more deeply, persist longer, and recover more readily from setbacks—qualities that are central to academic grit. Self-efficacy thus provides the perceived agency through which intrinsic motivation can be sustained over time. Thus, we hypothesized a positive association between self-efficacy and academic grit (Hypothesis 3).

Beyond these direct associations, we expected the strength and direction of the structural pathways linking intrinsic motivation,

resilience, and self-efficacy to academic grit to differ across levels of post-earthquake trauma exposure. Conservation of Resources Theory provides a clear theoretical basis for this expectation: severe and prolonged stressors progressively deplete psychological resources, and once a critical threshold of resource loss is crossed, individuals enter loss spirals in which previously protective resources become unavailable to sustain adaptive functioning (Hobfoll, 1989, 2001). In the context of post-earthquake adversity, this implies that students experiencing high levels of trauma exposure should show systematically weaker—or qualitatively different—motivational pathways to academic grit compared with their less affected peers. Specifically, the typically protective role of resilience may be compromised under high-trauma conditions, and the strength of motivational and self-efficacy pathways may attenuate as psychological resources are depleted. Accordingly, we hypothesized that post-earthquake trauma moderates the structural relationships among intrinsic motivation, resilience, self-efficacy, and academic grit, such that these relationships differ in magnitude and/or direction across low-, medium-, and high-trauma groups (Hypothesis 4).

2 Integrated theoretical framework

This study is guided by two theoretical perspectives. One of them, Self-Determination Theory (SDT; Ryan and Deci, 2000b, 2017), explains how motivational pathways operate when psychological resources are adequate. According to SDT, meeting the needs for autonomy and competence produces autonomous regulation that supports sustained commitment to long-term goals (Niemiec and Ryan, 2009; Reeve, 2012). In this study, intrinsic motivation reflects autonomous regulation resulting from the fulfillment of the need for autonomy (Vansteenkiste et al., 2020). Although self-efficacy was originally formulated by Bandura (1997), given the conceptual and empirical convergence between the two constructs, it is considered here as the domain-specific operationalization of perceived competence within SDT (Sweet et al., 2012). Academic grit is the expected behavioral outcome when both needs are reasonably met (Duckworth et al., 2007). This positioning bases Hypotheses 1 and 3 on the SDT need-satisfaction mechanism.

The concept of resilience is primarily expressed as a fundamental psychological resource in Conservation of Resources Theory (COR) (Hobfoll, 1989; Hobfoll et al., 2018). Its secondary role is to act as a buffer, protecting autonomous engagement under mild adversity (Skinner et al., 2013). In cases of severe trauma, some COR mechanisms are expected to reorganize these pathways. One is defensive resource conservation, redirecting remaining resources towards acute self-protection instead of long-term academic goals, which corresponds to the desperation principle in Hobfoll et al. (2018). Another is that once a critical exhaustion threshold is exceeded, the continued investment of remaining resources in long-term goals accelerates further losses and creates self-reinforcing exhaustion cycles (Hobfoll et al., 2018). Considering these mechanisms together, it is predicted that under severe trauma, the resilience–grit pathway will not only weaken but reverse. This is because the very source that normally supports goal-seeking is compromised. In such a situation, self-efficacy, as a domain-specific belief in competence, is expected to retain some of its protective function throughout the levels of trauma, rather than being a depleted resource. Intrinsic motivation, in the form of internally generated autonomous regulation, would be the most robust path. These differently formulated predictions base Hypothesis 4 on defined COR mechanisms.

TABLE 1 Descriptive statistics.

Variable	Category	*f*	%
Gender	Girl	547	54.3
	Boy	455	45.2
City	Osmaniye	599	59.5
	Adıyaman	408	40.5
Residence location	In the house where I was caught in the earthquake	777	77.2
	Container/Tent City	83	8.2
	Relatives' house	16	1.6
	We moved to another house	131	13.0
Earthquake experience	I was trapped under debris	55	5.5
	I lost a relative in the earthquake	468	46.5
	I survived the earthquake with injuries	20	2.0
	I have relatives injured in the earthquake	186	18.5
	I was not injured in the earthquake	276	27.4

3 Method

3.1 Sample

The study population comprised 39,200 high school students enrolled in 5 schools in the downtown area of Osmaniye and 10 schools in the downtown area of Adıyaman, which were severely affected by the 7.7-magnitude earthquake that occurred at 04:17 on 02/06/2023 (Hussain et al., 2023). Adolescence represents a developmentally critical period for the formation of academic identity and long-term goal commitment, and adolescent survivors of the 2023 Kahramanmaraş earthquakes continue to show measurable psychological consequences well beyond the acute phase (Gümüş Şekerci et al., 2024; Kaplan et al., 2026). We excluded primary or middle school students from the sample because we assumed they would have difficulty responding to the study package. We did not include college students mainly because many left these provinces immediately after the earthquake. Therefore, we collected data from high school students who were assumed to both understand the research package and live in the affected cities.

We calculated the required sample size based on the Yamane formula (Yamane, 1967) (Adıyaman = 20,900; Osmaniye = 18,300; total = 39,200 high school students) with a 95% confidence interval. We added 10% to the sample size to account for unreachable students. According to Yamane's formula, the sample size required to represent the population was 396. The

study sample included 1,007 high school students (Osmaniye = 599 and Adıyaman = 408). Of the participants, 547 (54.3%) were girls, and 455 (45.2%) were boys. Table 1 presents the sample's descriptive statistics (Table 1).

Schools were selected via stratified purposive sampling based on Ministry of Education enrollment data, ensuring representation across both provinces (Osmaniye and Adıyaman) and across central and peripheral school districts. Within each selected school, students were recruited through convenience sampling during regular class periods, with the cooperation of school administrators and classroom teachers. Participation was voluntary, and students who declined or were absent on the day of data collection were not included. Of the 1,007 students, missing data were observed on gender ($n = 5$), earthquake experience ($n = 2$), and trauma classification ($n = 1$). Missingness rates were below 0.5% on any single variable, and Little's MCAR test indicated that the data were missing completely at random. Missing data were handled via Full Information Maximum Likelihood (FIML) estimation in AMOS, which uses all available information without imputing values or excluding cases listwise (Enders, 2010).

3.2 Instruments

3.2.1 The post-earthquake trauma scale

This is a 5-point Likert scale where scores range from 20 to 100, with higher scores indicating higher trauma levels (Tanhan and Kayri, 2013). The scale consists of 20 items across 5 sub-dimensions (cognitive structure, behavioral problems, emotional, emotional limitation, and sleep problems). The internal consistency coefficients varied between .61 and .75. In this study, Cronbach's alpha for the total scale was 0.863. The mean score in this study was 52.89 (SD = 18.38). Because Tanhan and Kayri (2013) did not propose specific cut-off values for clinical classification, participants were grouped using a tertile split based on their total trauma scores within the present sample, yielding low-level ($n = 190$), medium-level ($n = 631$), and high-level ($n = 185$) trauma groups. We adopted this approach because it is sample-anchored, transparent, and widely used when an established clinical threshold is unavailable; it also yields group sizes adequate for multigroup SEM estimation. We acknowledge that any categorization of a continuous variable reduces information and that alternative cut-off schemes might yield somewhat different group boundaries; this issue is revisited in the Limitations section.

3.2.2 The academic grit scale

The scale was originally developed by Clark and Malecki (2019) and adapted to Turkish by Sağkal et al. (2020). It is a 5-point Likert scale with 10 items under a single factor. Higher scores indicate higher levels of academic grit. Scale's reliability coefficient (Cronbach's alpha) is 0.92 and test-retest reliability is 0.90. In this study, Cronbach's alpha was calculated to be 0.912.

3.2.3 General self-efficacy scale

The scale was developed by Schwarzer and Jerusalem (1995) and adapted to Turkish Aypay (2010). It is a 4-point Likert-type scale with 10 items in a single dimension. The internal consistency coefficient of the scale is 0.83. The test-retest reliability coefficient for the scale was 0.80. In this study, Cronbach's alpha was 0.885.

3.2.4 The resilience scale

Smith et al. (2008) developed the scale to assess resilience and Doğan (2015) adapted it to Turkish. The scale is a 6-item self-report measurement tool that uses a 5-point Likert scale. The internal consistency coefficient of the original scale is 0.91; the test-retest reliability is 0.69. The internal consistency coefficient of the Turkish version of the scale is 0.83. In this study, Cronbach's alpha was 0.767. Following the original scale construction (Smith et al., 2008), items 2, 4, and 6 were reverse-coded prior to analysis to align with the unidimensional resilience construct. Confirmatory factor analyses revealed method effects associated with the negatively-worded items (PS2, PS4, and PS6), consistent with prior psychometric evaluations of the Brief Resilience Scale in adolescent and post-disaster samples (Chmitorz et al., 2018; Rodríguez-Rey et al., 2016). Following established practice, correlated error terms were specified among these three items to account for wording-induced shared variance while preserving the unidimensional latent structure proposed by Smith et al. (2008).

3.2.5 The intrinsic motivation scale

Kuvaas and Dysvik (2009) developed the scale and Aral et al. (2022) adapted it to the Turkish culture. The scale is designed on a 5-point Likert scale, with higher scores indicating higher intrinsic motivation. The scale consists of one dimension and four items. The internal consistency coefficient of the scale is 0.85 and the composite reliability (CR) is 0.84. In this study, Cronbach's alpha was 0.770.

3.3 Ethical consideration

The study was approved by the Scientific Research and Publication Ethics Committee of Kyrgyz Turkish Manas University in December 2023 (Approval No. R.30.2023/BAYEK-18592). The study was conducted in accordance with the Declaration of Helsinki, and informed consent was obtained from all participants involved in the study.

3.4 Measurement invariance and multigroup analysis

Before comparing structural path coefficients across trauma groups, we tested measurement invariance using a hierarchical sequence of multigroup confirmatory factor analyses in AMOS (Putnick and Bornstein, 2016; Vandenberg and Lance, 2000). Four nested models were estimated and compared: (a) configural invariance, in which the factor structure was constrained to be identical across the three trauma groups but all parameters were freely estimated; (b) metric (weak) invariance, in which factor loadings were additionally

constrained to be equal across groups; (c) scalar (strong) invariance, in which item intercepts were also constrained equal; and (d) strict invariance, in which residual variances were further constrained. Following Cheung and Rensvold (2002), we used ΔCFI < .010 as the primary criterion for accepting the more restrictive model, supplemented by the chi-square difference test. Establishing at least metric invariance is a prerequisite for meaningful comparison of structural path coefficients across groups, while partial scalar invariance is sufficient for cross-group regression-based comparisons (Putnick and Bornstein, 2016).

To test whether trauma severity moderates the structural relationships, we then conducted a path-equality test by comparing a structural-weights model (in which the three regression paths from intrinsic motivation, resilience, and self-efficacy to academic grit were constrained equal across groups) with the corresponding scalar-invariance baseline. A statistically significant chi-square difference ($\Delta\chi^2$) indicates that the path coefficients differ across trauma groups, providing direct statistical evidence of moderation that complements the group-specific coefficients reported in Table 2.

To complement the FIML-based path estimates and to address the precision of effects across trauma groups, bias-corrected percentile bootstrap 95% confidence intervals were derived for each standardized path coefficient using 2,000 resamples in AMOS (Efron and Tibshirani, 1993). Because bootstrap procedures require complete data, this analysis was conducted on the listwise-complete subset; bootstrap-based standardized estimates were substantively comparable to the FIML-based estimates reported in Table 2, indicating that the structural pathways are robust to the missing-data treatment.

4 Results

4.1 Common method bias

As this study relied heavily on self-reported data, the potential for common method bias was explored. Following Podsakoff and Organ (1986), we conducted an analysis using Harman's single-factor test for the study constructs. The results confirmed that the first factor explained 11.973% of the total variance, providing evidence that common method bias was not present, thereby reducing the potential risk of bias.

4.2 Reliability and validity

The results of the normality tests showed kurtosis ranging from −1.527 to 0.296 (SE = 0.154) and skewness ranging from −0.695 to 1.711 (SE = 0.077), indicating that the data fit a normal distribution. We investigated measurement reliability by Cronbach's α coefficients, which showed that each construct exhibited satisfactory internal consistency. Information on the validity and reliability is presented in Table 3.

We conducted confirmatory factor analysis using AMOS to investigate the validity of the measurement models. Model fit indices assessed the overall fit of the models. Table 4 shows that all the measures had an acceptable fit with the data.

Furthermore, to assess discriminant validity, the heterotrait-monotrait ratio was used. Henseler et al. (2015) suggest that a ratio below 0.90 be considered an indicator of discriminant validity. Table 5 confirms that the variables demonstrate discriminant validity.

Although Table 5 includes interaction terms (Trauma × Self-efficacy, Trauma × Resilience, Trauma × Intrinsic Motivation), these were generated as auxiliary product-indicator variables during preliminary analyses to inspect potential collinearity and discriminant validity prior to the main analysis. The HTMT ratios for these interaction terms remained well below the.90 threshold (range = .016–.461), confirming that they did not introduce discriminant validity concerns. The moderating role of post-earthquake trauma was ultimately tested through the multigroup SEM approach reported in Tables 2, 6, rather than via interaction terms in a single combined model. We preferred the multigroup approach because it permits group-specific estimation of all structural paths simultaneously and provides a

TABLE 2 Multi-group analysis results with bootstrap confidence intervals.

#	Path	β	B	S.E.	t	p	95% CI [LL, UL]
Low-level Trauma	Intrinsic Motivation → Academic Grit	.394	.457	.100	4.583	***	[.163, .495]
	Resilience → Academic Grit	.211	.156	.054	2.889	.004**	[-.025, .423]
	Self-efficacy → Academic Grit	.398	.445	.084	5.318	***	[.097, .501]
Medium-level Trauma	Intrinsic Motivation → Academic Grit	.502	.896	.124	7.246	***	[.406, .564]
	Resilience → Academic Grit	-.029	-.028	.040	-.696	.487	[-.158, .068]
	Self-efficacy → Academic Grit	.267	.427	.069	6.225	***	[.159, .371]
High-level Trauma	Intrinsic Motivation → Academic Grit	.481	.428	.086	4.976	***	[.235, .603]
	Resilience → Academic Grit	-.282	-.301	.099	−3.033	.002**	[-.679, -.099]
	Self-efficacy → Academic Grit	.189	.315	.131	2.404	.016*	[.114, .592]

Standardized regression coefficients (β) and *p*-values are reported for each path within each trauma group, based on the AMOS multigroup analysis. The path-equality test [$\Delta\chi^2(18) = 56.41$, $p < .001$; see Table 6] provides the formal statistical test of moderation across groups. 95% confidence intervals were derived using bias-corrected percentile bootstrap with 2,000 resamples on the listwise-complete subset, as bootstrap procedures require complete data; bootstrap-based standardized estimates were substantively comparable to the FIML-based estimates.

*$p < 0.05$.

**$p < 0.01$.

***$p < 0.001$.

TABLE 3 Construct reliability.

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Academic grit	0.912	0.917	0.927	0.562
Intrinsic motivation	0.770	0.807	0.854	0.600
Resilience	0.767	0.741	0.846	0.646
Self-efficacy	0.885	0.890	0.906	0.492

TABLE 4 Measurement models.

Construct	CMIN/DF	NFI	IFI	TLI	CFI	RMSEA
Academic grit	3.790	0.927	0.945	0.929	0.945	0.053
Intrinsic motivation	1.275	0.998	0.999	0.999	0.999	0.017
Resilience	1.716	0.997	0.999	0.990	0.999	0.027
Self-efficacy	3.339	0.915	0.939	0.903	0.938	0.048

TABLE 5 Hetero trait-mono trait matrix.

Variable	1	2	3	4	5	6	7
1. Academic Grit							
2. Intrinsic Motivation	0.577						
3. Resilience	0.247	0.311					
4. Self-efficacy	0.386	0.302	0.539				
5. Trauma level	0.053	0.135	0.286	0.035			
6. Trauma level × Self-efficacy	0.127	0.085	0.075	0.042	0.102		
7. Trauma level × Resilience	0.187	0.133	0.024	0.069	0.016	0.461	
8. Trauma level × Intrinsic Motivation	0.022	0.062	0.132	0.050	0.083	0.300	0.258

direct test of moderation through the path-equality model comparison reported in Table 6 [$\Delta\chi^2(18) = 56.41$, $p < .001$].

4.3 Hypothesis testing

We evaluated the proposed hypotheses by performing a multigroup analysis using covariance-based structural equation modeling in SPSS AMOS. Table 2 shows how the level of post-earthquake trauma (i.e., low, medium, and high) is associated with differential patterns linking these factors to academic grit. Intrinsic motivation in the low-level trauma group is significantly positively associated with academic grit ($\beta = 0.394$, $t = 4.583$, $p < 0.001$). Resilience is significantly positively associated with academic grit ($\beta = 0.211$, $t = 2.889$, $p = 0.004$). Self-efficacy shows a significant positive association with academic grit ($\beta = 0.398$, $t = 5.318$, $p < 0.001$).

In the moderate trauma group, intrinsic motivation is strongly positively associated with academic grit ($\beta = 0.502$, $t = 7.246$, $p < 0.001$). Resilience shows a negative but non-significant

TABLE 6 Measurement invariance and test of moderation across trauma groups.

Model	χ^2	df	CFI	RMSEA	ΔCFI	$\Delta\chi^2$ (Δdf)	Decision
Configural	2,531.44	1,197	.925	.029	–	–	Baseline
Metric	2,674.34	1,249	.916	.030	−.009	142.90 (52)*	Supported
Scalar	3,000.01	1,309	.899	.032	−.017	325.68 (60)*	Partial
Structural weights	3,056.42	1,327	.896	.032	−.003	56.41 (18)*	Paths differ

Configural = no across-group constraints; Metric = factor loadings constrained equal across groups; Scalar = loadings + intercepts constrained equal; Structural weights = scalar baseline plus the three regression paths (intrinsic motivation, resilience, self-efficacy → academic grit) constrained equal across groups. The Structural-weights vs. Scalar comparison provides the test of moderation.

*$p < .001$.

association with academic grit ($\beta = -0.029$, $t = -0.696$, $p = 0.487$). Self-efficacy is significantly positively associated with academic grit ($\beta = 0.267$, $t = 6.225$, $p < 0.001$).

In the high trauma group, intrinsic motivation is strongly positively associated with academic grit ($\beta = 0.481$, $t = 4.976$, $p < 0.001$). Resilience shows a significant negative association with academic grit ($\beta = -0.282$, $t = -3.033$, $p = 0.002$). Self-efficacy shows a positive association with academic grit ($\beta = 0.189$, $t = 2.404$, $p = 0.016$). The proposed factors explained 36%, 32%, and 35% of the variance in academic grit in the low, moderate, and high trauma groups, respectively (Table 2).

In summary, intrinsic motivation was positively and significantly associated with academic grit in all three trauma groups, suggesting a robust link between intrinsic motivation and academic grit within the model. Resilience showed a positive and significant association with academic grit at low trauma levels, but a negative and significant association at high trauma levels, with no significant association at the medium trauma level. This pattern suggests that the resilience–grit relationship may operate differently in high-trauma conditions, where alternative mechanisms may be activated. Self-efficacy was positively and significantly associated with academic grit at all three trauma levels, although the magnitude of this association was stronger at the low trauma level.

These results help us understand how the level of post-earthquake trauma is associated with differential patterns linking intrinsic motivation, resilience, and self-efficacy to academic grit. The negative association between resilience and academic grit, especially at high trauma levels, highlights the importance of post-traumatic psychological support.

4.4 Measurement invariance and test of moderation

To establish the comparability of the measurement model across trauma groups, we conducted a hierarchical sequence of multigroup confirmatory factor analyses (Low $n = 190$, Medium $n = 631$, High $n = 185$). As shown in Table 6, configural invariance was established ($\chi^2 = 2{,}531.44$, df = 1,197, CFI = .925, RMSEA = .029), indicating that the four-factor structure was replicated across trauma groups. Metric invariance, in which factor loadings were constrained equal across groups, was supported (ΔCFI = −.009, below the.010 threshold), justifying the comparison of factor loadings across groups. Although full scalar invariance was not achieved (ΔCFI = −.017), partial scalar invariance is sufficient for cross-group comparison of structural path coefficients. Strict invariance was not supported (ΔCFI = −.025), but this level of equivalence is not required for the present moderation analysis.

To formally test whether post-earthquake trauma moderates the structural relationships, we compared a structural-weights model (in which the three regression paths from intrinsic motivation, resilience, and self-efficacy to academic grit were constrained to be equal across the three trauma groups) with the corresponding scalar-invariance baseline. The chi-square difference test indicated that constraining the structural paths to equality across trauma groups significantly worsened model fit, $\Delta\chi^2(18) = 56.41$, $p < .001$, ΔCFI = −.003. This result provides direct statistical evidence that the relationships among intrinsic motivation, resilience, self-efficacy, and academic grit differ across trauma groups, supporting the moderating role of post-earthquake trauma and complementing the group-specific path coefficients reported in Table 2.

5 Discussion

We investigated the levels of post-earthquake trauma, academic grit, self-efficacy, resilience, and intrinsic motivation in high school students who experienced an earthquake in Turkiye in 2023. Statistical analyses showed that intrinsic motivation was positively associated with academic grit at post-earthquake trauma levels. These results support the hypothesis that there is a positive relationship between intrinsic motivation and academic grit.

We interpret these findings within the integrated SDT–COR framework outlined earlier. Two questions guide the discussion: how do the observed associations among intrinsic motivation, resilience, self-efficacy, and academic grit relate to the predictions of Self-Determination Theory; and how does post-earthquake trauma, understood through Conservation of Resources Theory, alter those associations? The overall pattern of results, including the $\Delta\chi^2(18) = 56.41$ path-equality test and the ANOVA on absolute resilience scores, is consistent with the theoretical expectation that motivational resources operate as SDT predicts under low-stress conditions but become depleted and reorganized as trauma exposure increases.

Intrinsic motivation, which does not require external conditions to encourage behavior and is driven solely by satisfaction with an activity (Ryan and Deci, 2000a), had a positive effect on learning outcomes (Lepper et al., 2005). Conversely Self-efficacy affects the level of persistence in a task when faced with difficulties intrinsic motivation has been positively associated with factors such as academic engagement (Yamauchi, 2002) and creativity (Yesuf et al., 2023), which increased work performance. Consistent with the hypothesized model, high levels of anxiety and trauma can potentially affect students' academic grit (Godoy et al., 2021). Wu et al. (2022) found that 9th and 12th-grade students with high intrinsic courage had higher academic grit. Oclaret (2021) concluded that intrinsic motivation positively affects students' academic performance. Individuals with high intrinsic motivation do not deviate from their path, regardless of the number of difficulties they face, and can surpass their gifted peers who show lower intrinsic motivation (Duckworth et al., 2007).

Another important finding of this study is that resilience operated as a protective psychological resource at low and medium trauma levels, but its function changed under high trauma exposure. From a Conservation of Resources perspective, this pattern is what we would expect when accumulated stressors deplete a resource faster than it can be replenished (Hobfoll, 1989). Specifically, resilience was positively associated with academic grit at low trauma levels and negatively associated with academic grit at high trauma levels. Previous studies suggest that resilience will be high in children with severe socioeconomic conditions or high trauma levels (Masten, 2001). This study found that resilience may decrease with high

trauma levels. It may be thought that researchers' interchangeable use of terms such as resilience and recovery in studies in the literature may have caused this confusion (McFarlane and Yehuda, 1996). Bonanno et al. (2006) revealed that research on resilience often uses small samples, which limits generalizability; therefore, systematic research involving a randomly selected sample representative of a larger population is needed. In addition, resilience, the ability of individuals to adapt to life, assimilate, survive, and recover after traumatic events (Abbasi and Nasir, 2023; Jiang et al., 2021), may decrease at high trauma levels that may occur when individuals lose their relatives and are severely injured in earthquake disasters (Dodgen, 2019). Therefore, the significant negative association between resilience and academic grit at high trauma levels may be attributed to a decrease in resilience with an increase in trauma levels.

The young people who made up the sample in this study were trying to gain an identity and personality (Uysal and Yenal, 2014). They experienced a terrible earthquake. A study conducted among young people in South Korea (Kim and Oh, 2019) found a positive relationship between resilience and post-traumatic growth consistent with the findings of this study. Therefore, the significant negative associations of resilience at high trauma levels suggest that resilience decreases at high trauma levels.

To formally examine whether absolute resilience levels also varied with trauma exposure, we conducted a one-way ANOVA. The results revealed significant differences across trauma groups, $F(2, 1{,}003) = 75.54$, $p < .001$, with mean resilience progressively declining from the low- ($M = 3.52$, $SD = 0.73$) to medium- ($M = 2.98$, $SD = 0.84$) and high-trauma groups ($M = 2.46$, $SD = 0.90$). Tukey HSD *post hoc* comparisons indicated that all pairwise differences were statistically significant (all $ps < .001$). The mean difference between the low- and high-trauma groups was particularly substantial [Mdiff = 1.06, 95% CI (0.86, 1.26)]. These findings provide direct empirical support for the interpretation that resilience itself, not merely its association with academic grit, is depleted under conditions of severe trauma exposure, consistent with the resource-depletion mechanism predicted by Conservation of Resources Theory (Hobfoll, 1989).

The final finding of this study is that self-efficacy was positively and significantly associated with academic grit across all three trauma groups, in line with the third hypothesis. Within SDT, this finding is consistent with the role of competence as a basic psychological need that supports autonomous engagement (Ryan and Deci, 2000b) Self-efficacy beliefs operationalize perceived competence in the academic domain (Bandura, 1997), and their stability across trauma groups suggests that perceived competence remains a relatively durable psychological resource even when other resources are depleted. Ouweneel et al. (2013) indicated that individuals with high self-efficacy exhibit lower stress and anxiety in academic environments, which has a positive effect on their academic grit. Honicke and Broadbent (2016) found a positive relationship between self-efficacy and academic performance in their study. Correa-Rojas et al. (2024) indicated that self-efficacy has a positive and significant effect on academic grit. Prior studies suggest that self-efficacy positively affects academic grit (Sagone and Indiana, 2023; Sulca and Quiroz, 2021; Tang and Zhu, 2024). Therefore, the results of previous studies overlap with those of the present study. Self-efficacy was significantly positively associated with academic grit across all three trauma levels. The positive association of a non-cognitive trait such as self-efficacy on academic grit at the trauma level is an important finding of this study because non-cognitive variables in achieving academic goals tend to develop during adolescence (Zhang et al., 2024).

Adolescence is a period of rapid physical, emotional, and psychological development, and the mental health problems experienced during this period continue into adulthood (Kieling et al., 2011; Moksnes et al., 2010). Therefore, it is important for students' self-efficacy to be high during adolescence in traumatic situations. In addition, it is known that the psychological care that individuals will receive after traumatic events improves them, makes them more resilient, and prevents the development of mental illnesses (Abbasi and Nasir, 2023).

5.1 Theoretical and practical implications

Taken together, the findings have two theoretical implications. First, the integrated SDT–COR framework offers a more complete account of post-trauma motivational dynamics than either theory alone. SDT explains why intrinsic motivation, perceived competence, and resilience predict academic grit when basic psychological needs are reasonably supported. COR Theory explains why these relationships weaken or reverse once trauma exposure crosses the threshold at which psychological resources can no longer be replenished. The path-equality test [$\Delta\chi^2(18) = 56.41$, $p < .001$] and the ANOVA on absolute resilience scores [$F(2, 1{,}003) = 75.54$, $p < .001$] provide convergent evidence for both claims. Second, the finding that the negative resilience–grit association at high trauma exposure is accompanied by a substantial absolute decrease in resilience itself extends the literature on post-traumatic adaptation. Rather than reflecting an isolated statistical anomaly, the negative path indicates that under severe stressors, the resource that ordinarily supports goal pursuit has itself been compromised.

For practice, the results suggest that post-disaster academic interventions should not assume that resilience-building alone will be sufficient for students with high trauma exposure. The COR perspective implies that direct resource restoration, such as psychological first aid, mental health support, and stable academic routines, must precede or accompany efforts to strengthen resilience. Two recent intervention studies illustrate concrete approaches. Demirci et al. (2024) implemented an early-term, eight-session psychoeducational program with adolescents two months after the 6 February 2023 earthquakes in Turkey, and reported reductions in PTSD, depression, and anxiety symptoms together with improved coping. The intervention targeted the same population examined in the present study. Mastrothanasis et al. (2025) used a different format, a school-based participatory drama program, to strengthen community resilience and psychosocial well-being in children exposed to a public health emergency. The two studies indicate that both clinical and arts-based formats can be embedded in school routines to address resource depletion among trauma-exposed students. The stability of the self-efficacy–grit pathway across trauma groups also has practical

value: targeted interventions that build domain-specific competence beliefs may remain effective even when broader resilience has been depleted.

Three policy implications follow from the findings. Because motivational pathways differed across trauma groups [$\Delta\chi^2(18) = 56.41$, $p < .001$], school guidance services in earthquake-affected regions should screen students with a brief trauma measure (e.g., the Post-earthquake Trauma Scale) and stratify support accordingly, rather than offering uniform programming. Because absolute resilience declined sharply in the high-trauma group ($M = 2.46$) and the resilience-grit association reversed direction, resilience-building should not be the first-line intervention for severely trauma-exposed students; direct resource restoration through psychological first aid, clinical mental-health support, and stable academic routines should come first or run in parallel. Because self-efficacy remained positively associated with academic grit across all trauma levels ($\beta = 0.189$ even at high trauma), teacher in-service training should prioritize competence-supportive practices such as mastery experiences and autonomy-supportive instruction (Niemiec and Ryan, 2009; Reeve, 2012).

This study has some limitations that should be considered. First, there are limitations in establishing causal relationships between the study variables owing to the cross-sectional design adopted. Future studies should focus on the temporal dynamics of the limited causal relationships identified in this study and examine them longitudinally to draw causal inferences. Second, given the variability in results across studies, attributable to factors such as cultural differences, age groups, and academic departments, researchers should replicate these findings using different samples. Finally, when testing post-earthquake trauma as a moderating variable, it should be acknowledged that confounding factors such as career goals, economic conditions, and regional differences in Turkiye may also affect the relationships among the variables.

Several additional limitations should also be acknowledged. The data are based exclusively on student self-reports, which raises the possibility of common-method variance and social desirability effects. Although Harman's single-factor test indicated that no single factor accounted for the majority of variance, future research would benefit from multi-source data, such as teacher ratings, parent reports, or behavioural observations. Second, no objective indicator of academic performance, such as grade point average or standardized test scores, was available; the present analysis is therefore restricted to perceived grit rather than to documented academic outcomes. Linking the structural model to school records in subsequent studies would strengthen the practical interpretation of the findings. Third, post-earthquake trauma was assessed retrospectively and operationalized through a tertile-based categorization (low, medium, high) for multigroup analysis. While this approach allowed clear comparison of structural pathways across groups, it does not capture potentially nonlinear effects of trauma severity, and a different cut-off scheme might yield somewhat different patterns. Future studies could complement this approach with continuous moderation analyses or person-centred methods such as latent profile analysis. Finally, the sample was drawn from two adjacent earthquake-affected provinces in Turkey (Adıyaman and Osmaniye); the extent to which the SDT–COR pattern observed here generalizes to other disaster contexts, age groups, or educational systems remains an open empirical question.

Data availability statement

The research data files supporting the conclusions of this article are publicly available in the Mendeley Data repository: https://data.mendeley.com/datasets/gwfm3wrmn7/1 (DOI: 10.17632/gwfm3wrmn7.1).

Ethics statement

The study was approved by the Scientific Research and Publication Ethics Committee of Kyrgyz Turkish Manas University in December 2023 (Approval No. R.30.2023/BAYEK-18592). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

YG: Investigation, Methodology, Conceptualization, Writing – review & editing, Writing – original draft, Data curation. IA: Writing – original draft, Formal analysis, Software, Methodology, Writing – review & editing. RA: Writing – original draft, Data curation, Investigation, Writing – review & editing. NE: Data curation, Writing – original draft, Writing – review & editing, Investigation. MB: Methodology, Writing – review & editing, Supervision, Writing – original draft, Project administration.

Funding

The author(s) declared that financial support was not received for this work and/or its publication.

Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declared that generative AI was used in the creation of this manuscript. The authors used Grammarly Pro to improve readability and grammatical clarity with caution.

Any alternative text (alt text) provided alongside figures in this article has been generated by Frontiers with the support of artificial intelligence and reasonable efforts have been made to ensure accuracy, including review by the authors wherever possible. If you identify any issues, please contact us.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Abbasi, N. u. H., and Nasir, S. (2023). Role of psychologists in creating resilience in victims of earthquake. *J. Prof. Appl. Psychol.* 4 (1), 1–4. doi: 10.52053/jpap.v4i1.161

Alhadabi, A, and Karpinski, A. C. (2020). Grit, self-efficacy, achievement orientation goals, and academic performance in university students. *Int. J. Adolesc. Youth* 25 (1), 519–535. doi: 10.1080/02673843.2019.1679202

Alivernini, F., and Lucidi, F. (2011). Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: a longitudinal study. *J. Educ. Res.* 104 (4), 241–252. doi: 10.1080/00220671003728062

Allen, J. G. (1995). *Coping with Trauma: A Guide to Self-understanding*. Washington, DC: American Psychiatric Press.

American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders*. Arlington, VA: American Psychiatric Association. doi: 10.1176/appi.books.9780890425596

Aral, N., Saraç, M., Bayram Arlı, N., and Aydemir Dev, M. (2022). İçsel motivasyon ölçeğinin türkçe geçerlilik ve güvenilirlik çalışması. *Bus. Econ. Res. J.* 13 (1), 59–73. doi: 10.20409/berj.2022.361

Ateş, B., and Sağar, M. E. (2022). Psikolojik danışman adaylarında akademik başarının yordayısıcı olarak psikolojik sağlamlık, bilişsel esneklik ve öz-yeterlik. *Erzincan Üniv. Eğit. Fak. Derg.* 24 (1), 1–9. doi: 10.17556/erziefd.894637

Aypay, A. (2010). Genel öz yeterlik ölçeği'nin (GÖYÖ) türkçe'ye uyarlama çalışması. *İnönü Üniv. Eğit. Fak. Derg.* 11 (2), 113–132.

Baldwin, K. M., Baldwin, J. R., and Ewald, T. (2006). The relationship among shame, guilt, and self-efficacy. *Am. J. Psychother.* 60 (1), 1–21. doi: 10.1176/appi.psychotherapy.2006.60.1.1

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychol. Rev.* 84 (2), 191–215. doi: 10.1037/0033-295X.84.2.191

Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. New York: W.H. Freeman.

Başoğlu, M., Şalcıoğlu, E., and Livanou, M. (2002). Traumatic stress responses in earthquake survivors in Turkey. *J. Trauma. Stress* 15 (4), 269–276. doi: 10.1023/A:1016241826589

Bethell, C. D., Newacheck, P., Hawes, E., and Halfon, N. (2014). Adverse childhood experiences: assessing the impact on health and school engagement and the mitigating tole of resilience. *Health. Aff.* 33 (12), 2106–2115. doi: 10.1377/hlthaff.2014.0914

Bonanno, G. A., Galea, S., Bucciarelli, A., and Vlahov, D. (2006). Psychological resilience after disaster. *Psychol. Sci.* 17 (3), 181–186. doi: 10.1111/j.1467-9280.2006.01682.x

Ceyhan, E., and Ceyhan, A. A. (2007). Earthquake survivors' quality of life and academic achievement six years after the earthquakes in Marmara, Turkey. *Disasters* 31 (4), 516–529. doi: 10.1111/j.1467-7717.2007.01023.x

Chen, C. (2018). "Grit, intrinsic motivation, and costly perseverance: their interactive influence in problem solving," in *National Conference on Undergraduate Research*, 765–773.

Cheung, G. W., and Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Struct. Equ. Model. Multidiscip. J.* 9 (2), 233–255. doi: 10.1207/S15328007SEM0902_5

Chmitorz, A., Wenzel, M., Stieglitz, R.-D., Kunzler, A., Bagusat, C., Helmreich, I., et al. (2018). Population-based validation of a German version of the brief resilience scale. *PLoS One* 13 (2), e0192761. doi: 10.1371/journal.pone.0192761

Clark, K. N., and Malecki, C. K. (2019). Academic grit scale: psychometric properties and associations with achievement and life satisfaction. *J. Sch. Psychol.* 72, 49–66. doi: 10.1016/j.jsp.2018.12.001

Conte, J. R., and Schuerman, J. R. (1987). The effects of sexual abuse on children. *J. Interpers. Violence* 2 (4), 380–390. doi: 10.1177/088626058700200404

Correa-Rojas, J., Grimaldo, M., Marcelo-Torres, E., Manzanares-Medina, E., and Ravelo-Contreras, E. L. (2024). Growth mindset, grit, and academic self-efficacy as determinants of academic performance in Peruvian university students. *Int. J. Educ. Psychol.* 13 (2), 124–142. doi: 10.17583/ijep.13115

Credé, M., Tynan, M. C., and Harms, P. D. (2017). Much ado about grit: a meta-analytic synthesis of the grit literature. *J. Pers. Soc. Psychol.* 113 (3), 492–511. doi: 10.1037/pspp0000102

Daniel, B., and Wassell, S. (2002). *Adolescence: Assessing and Promoting Resilience in Vulnerable Children*. London: Jessica Kingsley.

Deci, E. L., Koestner, R., and Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychol. Bull.* 125 (6), 627–668. doi: 10.1037/0033-2909.125.6.627

Delaney-Black, V., Covington, C., Ondersma, S. J., Nordstrom-Klee, B., Templin, T., Ager, J., et al. (2002). Violence exposure, trauma, and IQ and/or reading deficits among urban children. *Arch. Pediatr. Adolesc. Med.* 156 (3), 280. doi: 10.1001/archpedi.156.3.280

Demir, B. (2023). The mediating effect of academic resilience on the relationship between psychological resilience and academic achievement. *E-Int. J. Educ. Res.* doi: 10.19160/e-ijer.1253101

Demirchyan, A., Khachadourian, V., Armenian, H. K., and Goenjian, A. K. (2022). The course, trajectories and predictors of depression 23 years after the 1988 Spitak earthquake in Armenia: a prospective cohort study. *Psychiatry Res.* 313, 114640. doi: 10.1016/j.psychres.2022.114640

Demirci, H., Bilge, Y., Emiral, E., and Şen, S. (2024). Enhancing recovery in post-earthquake adolescents: examining the impact of a psychoeducational intervention on traumatic stress symptoms and coping strategies. *Curr. Psychol.*. doi: 10.1007/s12144-024-06333-6

Dewett, T. (2007). Linking intrinsic motivation, risk taking, and employee creativity in an R&D environment. *R&D Manag.* 37 (3), 197–208. doi: 10.1111/j.1467-9310.2007.00469.x

Dodgen, D. (2019). At-risk individuals, behavioral health, and community resilience: preparedness and response for vulnerable communities. *Am. J. Public Health* 109 (S4), S281–S282. doi: 10.2105/AJPH.2019.305296

Doğan, T. (2015). Kısa Psikolojik Sağlamlık Ölçeği'nin Türkçe uyarlaması: Geçerlik ve güvenirlik çalışması [Adaptation of the brief resilience scale into Turkish: a validity and reliability study]. *J. Happiness Well-Being*. 3 (1), 93–102.

Duckworth, A. (2016). *Grit: The Power of Passion and Grit*. New York: Scribner/Simon & Schuster.

Duckworth, A. L., Peterson, C., Matthews, M. D., and Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *J. Pers. Soc. Psychol.* 92 (6), 1087–1101. doi: 10.1037/0022-3514.92.6.1087

Durak, İ (2021). Psikolojik sağlamlık ile yaşam doyumu arasındaki ilişkide öz-yeterliğin aracı etkisi. *Elektron. Sos. Bil. Derg.* 20 (78), 1175–1190. doi: 10.17755/esosder.816639

Efron, B., and Tibshirani, R. J. (1993). *An introduction to the Bootstrap*. New York: Chapman & Hall.

Egeland, B., Carlson, E., and Sroufe, L. A. (1993). Resilience as process. *Dev. Psychopathol.* 5 (4), 517–528. doi: 10.1017/S0954579400006131

Enders, C. K. (2010). *Applied Missing Data Analysis*. New York: Guilford Press.

Farmer, H., Xu, H., and Dupre, M. E. (2021). "Self-efficacy," in *Encyclopedia of Gerontology and Population Aging*, eds S. L. Christenson, A. L. Reschly, and C. Wylie (Cham: Springer International Publishing), 4410–4413. doi: 10.1007/978-3-030-22009-9_1092

Fishbach, A., and Woolley, K. (2022). The structure of intrinsic motivation. *Annu. Rev. Organ. Psychol. Organ. Behav.* 9 (1), 339–363. doi: 10.1146/annurev-orgpsych-012420-091122

Gat, G., Sukmana, H. T., Kosasi, S., and Sulastri, K. (2021). "The influence of grit on students' academic achievement: mediated by online learning," in *2021 9th International Conference on Cyber and IT Service Management (CITSM)*, 1–6. doi: 10.1109/CITSM52892.2021.9587922

Gerstner, R. M. F., Lara-Lara, F., Vasconez, E., Viscor, G., Jarrin, J. D., and Ortiz-Prado, E. (2020). Earthquake-related stressors associated with suicidality, depression, anxiety and post-traumatic stress in adolescents from Muisne after the earthquake 2016 in Ecuador. *BMC Psychiatry* 20 (1), 347. doi: 10.1186/s12888-020-02759-x

Godoy, L. D., Falcoski, R., Incrocci, R. M., Versuti, F. M., and Padovan-Neto, F. E. (2021). The psychological impact of the COVID-19 pandemic in remote learning in higher education. *Educ. Sci.* 11 (9), 473. doi: 10.3390/educsci11090473

Gönen, T. (2020). *Özel Okullarda çalışan öğretmenlerin Psikolojik Sağlamlıkları ve iş Doyumlarının Mesleki Tükenmişlik Düzeylerine Etkisi: Mardin ili örneği*. Mersin: Çağ University.

Gümüş Şekerci, Y., Ayvazoğlu, G., and Çekiç, M. (2024). The effect of depression and hopelessness level on death anxiety in earthquake survivor students one year after the earthquake. *Omega (Westport)*. doi: 10.1177/00302228241295417

Hamad, H., Angelöw, A., and Psouni, E. (2023). Protocol for evaluation of effects of a psychoeducational trauma-informed intervention directed at schools. *Eur. J. Psychotraumatol.* 14 (2). doi: 10.1080/20008066.2023.2263322

Henseler, J., Ringle, C. M., and Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* 43 (1), 115–135. doi: 10.1007/s11747-014-0403-8

Hobfoll, S. E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *Am. Psychol.* 44 (3), 513–524. doi: 10.1037/0003-066X.44.3.513

Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: advancing conservation of resources theory. *Appl. Psychol.* 50 (3), 337–421. doi: 10.1111/1464-0597.00062

Hobfoll, S. E., Halbesleben, J., Neveu, J.-P., and Westman, M. (2018). Conservation of resources in the organizational context: the reality of resources and their consequences. *Annu. Rev. Organ. Psychol. Organ. Behav.* 5 (1), 103–128. doi: 10.1146/annurev-orgpsych-032117-104640

Hodge, B., Wright, B., and Bennett, P. (2018). The role of grit in determining engagement and academic outcomes for university students. *Res. High. Educ.* 59 (4), 448–460. doi: 10.1007/s11162-017-9474-y

Honicke, T., and Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: a systematic review. *Educ. Res. Rev.* 17, 63–84. doi: 10.1016/j.edurev.2015.11.002

Hussain, E., Kalaycıoğlu, S., Milliner, C. W. D., and Çakir, Z. (2023). Preconditioning the 2023 Kahramanmaraş (Türkiye) earthquake disaster. *Nat. Rev. Earth Environ.* 4 (5), 287–289. doi: 10.1038/s43017-023-00411-2

Jerusalem, M., and Schwarzer, R. (1992). "Self-efficacy as a resource factor in stress appraisal processes," in *Self-efficacy: Thought Control of Action*, ed. R. Schwarzer (Washington, DC: Hemisphere Publishing Corp.), 195–213.

Jiang, N., Cheng, J., Ni, Z., Ye, Y., Hu, R., and Jiang, X. (2021). Developing a new individual earthquake resilience questionnaire: a reliability and validity test. *PLoS One* 16 (1), e0245662. doi: 10.1371/journal.pone.0245662

Kaplan, V., Düken, M. E., Riad, A., and Alkasaby, M. (2026). Assessing the impact of a positive psychology school-based psychoeducation on the mental health of adolescents affected by the 2023 earthquake in Türkiye. *J. Adolesc.* doi: 10.1002/jad.70153

Kc, A., Gan, C. C. R., and Dwirahmadi, F. (2019). Breaking through barriers and building disaster mental resilience: a case study in the aftermath of the 2015 Nepal earthquakes. *Int. J. Environ. Res. Public Health* 16 (16). doi: 10.3390/ijerph16162964

Kelly, R. B., Zyzanski, S. J., and Alemagno, S. A. (1991). Prediction of motivation and behavior change following health promotion: role of health beliefs, social support, and self-efficacy. *Soc. Sci. Med.* 32 (3), 311–320. doi: 10.1016/0277-9536(91)90109-P

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., et al. (2011). Child and adolescent mental health worldwide: evidence for action. *Lancet* 378 (9801), 1515–1525. doi: 10.1016/S0140-6736(11)60827-1

Kim, I., and Oh, W.-O. (2019). Predictors of posttraumatic growth among university students who experienced a recent earthquake. *Issues Ment. Health Nurs.* 40 (2), 176–184. doi: 10.1080/01612840.2018.1471759

Kuvaas, B., and Dysvik, A. (2009). Perceived investment in employee development, intrinsic motivation and work performance. *Hum. Resour. Manag. J.* 19 (3), 217–236. doi: 10.1111/j.1748-8583.2009.00103.x

Larson, R. W., and Rusk, N. (2011). Intrinsic motivation and positive development. *Adv. Child Dev. Behav.* 41, 89–130. doi: 10.1016/B978-0-12-386492-5.00005-1

Lee, W., Reeve, J., Xue, Y., and Xiong, J. (2012). Neural differences between intrinsic reasons for doing versus extrinsic reasons for doing: an fMRI study. *Neurosci. Res.* 73 (1), 68–72. doi: 10.1016/j.neures.2012.02.010

Lepper, M. R., Corpus, J. H., and Iyengar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: age differences and academic correlates. *J. Educ. Psychol.* 97 (2), 184–196. doi: 10.1037/0022-0663.97.2.184

Masten, A. S. (2001). Ordinary magic: resilience processes in development. *Am. Psychol.* 56 (3), 227–238. doi: 10.1037/0003-066X.56.3.227

Mastrothanasis, K., Dumitru, C., Darie, N., Kladaki, M., Pikoulis, E., Sidiropoulou, A., et al. (2025). Participatory arts as emergency responses for strengthening community resilience and psychosocial support: a retrospective phenomenological inquiry. *Children* 12 (11), 1498. doi: 10.3390/children12111498

Mata, P. (2020). Grit and academic self-efficacy as predictors of senior high school academic performance. *J. Agric. Technol. Manag.* 23 (1), 35–42.

McFarlane, A. C., and Yehuda, R. (1996). "Resilience, vulnerability, and the course of posttraumatic reactions," in *Traumatic Stress*, eds. B. A. van der Kolk, A. C. McFarlane, and L. Weisaeth (New York: Guilford), 151–181.

Moksnes, U. K., Moljord, I. E. O., Espnes, G. A., and Byrne, D. G. (2010). The association between stress and emotional states in adolescents: the role of gender and self-esteem. *Pers. Individ. Dif.* 49 (5), 430–435. doi: 10.1016/j.paid.2010.04.012

Neroni, J., Meijs, C., Kirschner, P. A., Xu, K. M., and de Groot, R. H. M. (2022). Academic self-efficacy, self-esteem, and grit in higher online education: consistency of interests predicts academic success. *Soc. Psychol. Educ.* 25 (4), 951–975. doi: 10.1007/s11218-022-09696-5

Niemiec, C. P., and Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom. *Theory Res. Educ.* 7 (2), 133–144. doi: 10.1177/1477878509104318

Oclaret, V. N. (2021). *Impact of academic intrinsic motivation facets on students' academic performance*. (Master thesis). La Consolacion University Philippines. Available online at: https://www.coursehero.com/file/102880885/Impact-of-Academic-Intrinsic-Motivation-Facets-on-Students-Academic-Performancepdf/ (Accessed April 29, 2026).

Oluremi, O. A. (2014). Academic perseverance, class attendance and students' academic engagement: a correlational study. *Eur. J. Educ. Sci.* 01 (02). doi: 10.19044/ejes.v1no2a11

Okan, N., and Şahin, Y. (2023). Mental health during crisis: Development and evaluation of the post-disaster spiritual coping scale in Turkey. *J. Relig. Health*. 63, 1609–1622. doi: 10.1007/s10943-023-01959-5

Ouweneel, E., Schaufeli, W. B., Blanc, L., and M, P. (2013). Believe, and you will achieve: changes over time in self-efficacy, engagement, and performance. *Appl. Psychol. Health Well-Being* 5 (2), 225–247. doi: 10.1111/aphw.12008

Özkan, M., and Akça, F. (2022). The mediating role of gratitude in the relationship between self-efficacy and psychological resilience in elderly individuals: the case of Malatya. *Connectist*. (62), 123–142. doi: 10.26650/CONNECTIST2022-880148

Pearlman, L. A., and Saakvitne, K. W. (1995). *Trauma and the Therapist*. New York: Norton.

Podsakoff, P. M., and Organ, D. W. (1986). Self-Reports in organizational research: problems and prospects. *J. Manage.* 12 (4), 531–544. doi: 10.1177/014920638601200408

Polat, I., Anuk, D., Özkan, M., and Bahadır, G. (2023). Mental health in the aftermath of disasters; psychological effects, treatment approaches and coping. *J. Istanbul Fac. Med.* 86 (4), 393–401. doi: 10.26650/IUITFD.1322896

Pratt, M. M., Fitzsimmons, P., and Christian, B. (2019). After the earthquake: adult reflections on adolescent experiences of a natural disaster. *TEACH J. Christ. Educ.* 13 (2). doi: 10.55254/1835-1492.1426

Putnick, D. L., and Bornstein, M. H. (2016). Measurement invariance conventions and reporting: the state of the art and future directions for psychological research. *Dev. Rev.* 41, 71–90. doi: 10.1016/j.dr.2016.06.004

Reeve, J. (2012). "A self-determination theory perspective on student engagement," in *Handbook of Research on Student Engagement*, (New York: Springer US), 149–172. doi: 10.1007/978-1-4614-2018-7_7

Rodríguez-Rey, R., Alonso-Tapia, J., and Hernansaiz-Garrido, H. (2016). Reliability and validity of the brief resilience scale (BRS) Spanish version. *Psychol. Assess.* 28 (5), e101–e110. doi: 10.1037/pas0000191

Rusmini, R., Andrayani, L. W., and Hariawan, H. (2020). Post-earthquake quality of life among students. *Int. J. Public Health Sci.* 9 (2), 71. doi: 10.11591/ijphs.v9i2.20377

Ryan, R. M., and Deci, E. L. (2000a). Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp. Educ. Psychol.* 25 (1), 54–67. doi: 10.1006/ceps.1999.1020

Ryan, R. M., and Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol.* 55 (1), 68–78. doi: 10.1037/0003-066X.55.1.68

Ryan, R. M., and Deci, E. L. (2017). *Self-determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York: Guilford Publishing.

Sağkal, A., Soylu, Y., Pamukçu, B., and Özdemir, Y. (2020). Akademik azim Ölçeği'nin (AAÖ) Türkçe'ye uyarlanması: geçerlik ve güvenirlik çalışması. *Mehmet Akif Ersoy Üniv. Eğit. Fak. Derg.* 56 (1), 326–344.

Sagone, E., and Indiana, M. L. (2023). The roles of academic self-efficacy and intolerance of uncertainty on decisional procrastination in university students during the COVID-19 pandemic. *Educ. Sci.* 13 (5), 476. doi: 10.3390/educsci13050476

Schafer, E. (2024). Trauma in schools: a review of the impact of childhood trauma and assessment of a potential intervention. *OBM Integr. Complement. Med.* 09 (02), 1–40. doi: 10.21926/obm.icm.2402030

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educ. Psychol.* 26 (3–4), 207–231. doi: 10.1080/00461520.1991.9653133

Schwarzer, R., and Jerusalem, M. (1995). "Generalized self-efficacy scale," in *Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs*, eds. J. Weinman, S. Wright, and M. Johnston (Windsor: Nfer-Nelson), 35–37.

Shanok, R. S., Welton, S. J., and Lapidus, C. (1989). Group therapy for preschool children: a transdisciplinary school-based program. *Child Adolesc. Social. Work J.* 6 (1), 72–95. doi: 10.1007/BF00755712

Skinner, E., Pitzer, J., and Steele, J. (2013). Coping as part of motivational resilience in school. *Educ. Psychol. Meas.* 73 (5), 803–835. doi: 10.1177/0013164413485241

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., and Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *Int. J. Behav. Med.* 15 (3), 194–200. doi: 10.1080/10705500802222972

Sonkur, A. (2021). Okul yöneticileri ve öğretmenlerde azim ve psikolojik sağlamlığın rolü. *Milli Eğit. Derg.* 50 (230), 445–460. doi: 10.37669/milliegitim.677847

Sulca, R., and Quiroz, G. (2021). Autoeficacia académica y rendimiento escolar en adolescentes. *Balances* 9 (13), 55–59. Available online at: https://revistas.unas.edu.pe/index.php/Balances/article/view/250/241 (Accessed April 29, 2026).

Sweet, S. N., Fortier, M. S., Strachan, S. M., and Blanchard, C. M. (2012). Testing and integrating self-determination theory and self-efficacy theory in a physical activity context. *Can. Psychol.* 53 (4), 319–327. doi: 10.1037/a0030280

Tang, L., and Zhu, X. (2024). Academic self-efficacy, grit, and teacher support as predictors of psychological well-being of Chinese EFL students. *Front. Psychol.* 14. doi: 10.3389/fpsyg.2023.1332909

Tanhan, F., and Kayri, M. (2013). Deprem sonrası travma düzeyini belirleme ölçeğinin geçerlik ve güvenirlik çalışması. *Kuram Uygul. Eğit. Bil.* 13 (2), 1013–1025.

Temel, N., Temel, S., and Çevik Kansu, C. (2023). Examination of the relationship between academic grit and their academic success fourth grade students in primary school. *Int. Online J. Prim. Educ.* 12 (1), 42–60. doi: 10.55020/iojpe.1097470

Tugade, M. M., Fredrickson, B. L., and Barrett, L. F. (2004). Psychological resilience and positive emotional granularity: examining the benefits of positive emotions on coping and health. *J. Pers.* 72 (6), 1161–1190. doi: 10.1111/j.1467-6494.2004.00294.x

Ulukan, M. (2020). Öğretmenlerin mutluluk ile psikolojik sağlamlık düzeyleri arasındaki ilişkinin incelenmesi. *J. Int. Soc. Res.* 13 ((13/73) Sociology-Philosophy), 620–631. doi: 10.17719/jisr.10978

USGS, and UNEIC (2023). Why are we having so many earthquakes? Available online at: https://www.usgs.gov/faqs/why-are-we-having-so-many-earthquakes-has-naturally-occurring-earthquake-activity-been (Accessed April 29, 2026).

Uysal, N., and Yenal, K. (2014). Examining the general health status of nursing students. *SDU J. Health Sci. Inst.* 5 (1), 15–20.

Vallerand, R. J. (2007). "A hierarchical model of intrinsic and extrinsic motivation for sport and physical activity," in *Intrinsic Motivation and Self-Determination in Exercise and Sport*, eds. M. S. Hagger, and N. L. D. Chatzisarantis (Champaign, IL: Hum. Kinet), 255–279.

Vandenberg, R. J., and Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: suggestions, practices, and recommendations for organizational research. *Organ. Res. Methods* 3 (1), 4–70. doi: 10.1177/109442810031002

Vansteenkiste, M., Ryan, R. M., and Soenens, B. (2020). Basic psychological need theory: advancements, critical themes, and future directions. *Motiv. Emot.* 44 (1), 1–31. doi: 10.1007/s11031-019-09818-1

Vella, S.-L., and Pai, N. (2019). A theoretical review of psychological resilience: defining resilience and resilience research over the decades. *Arch. Med. Health Sci.* 7 (2), 233. doi: 10.4103/amhs.amhs_119_19

Wang, C., and Liu, Y. (2000). The relational study on general self-efficacy, trait anxiety, state anxiety, and test anxiety. *Chin. J. Clin. Psychol.* 8 (4), 229–230.

Wheatley, M. J. (2010). *Grit*. San Francisco, CA: Berrett-Kohler Publishers.

Wu, J., Qi, S., and Zhong, Y. (2022). Intrinsic motivation, need for cognition, grit, growth mindset and academic achievement in high school students: latent profiles and its predictive. *PsyArXiv*. arXiv:2210.04552. doi: 10.31234/osf.io/mheg7

Yalım, D. (2007). *Üniversite birinci sınıf öğrencilerinin uyumu: psikolojik sağlamlık, başa çıkma, iyimserlik ve cinsiyetin rolü*. (Master thesis).

Yamane, T. (1967). *Statistics, An Introductory Analysis*, 2nd Edn. New York: Harper and Row.

Yamauchi, H. (2002). An approach to the hierarchical model of motivation in a classroom: a reply to Rousseau and Vallerand. *Psychol. Rep.* 90 (1), 273–278. doi: 10.2466/pr0.2002.90.1.273

Yesuf, Y. M., Getahun, D. A., and Debas, A. T. (2023). Factors affecting "employees' creativity": the mediating role of intrinsic motivation. *J. Innov. Entrep.* 12 (1), 31. doi: 10.1186/s13731-023-00299-8

Yıldız, F. N. Y., and Kardaş, F. (2021). Ergenlerde akademik öz-yeterlik, içsel motivasyon, azim ve psikolojik dayanıklılığın iyi oluş ile ilişkisinin incelenmesi. *Yuzunci Yil Univ. Egit. Fak. Derg.* 18 (1), 1073–1099. doi: 10.33711/yyuefd.957391

Zhang, T., Park, D., Tsukayama, E., Duckworth, A. L., and Luo, L. (2024). Sparking virtuous cycles: a longitudinal study of subjective well-being and grit during early adolescence. *J. Youth Adolesc.* 53 (2), 331–342. doi: 10.1007/s10964-023-01862-y