RESEARCH ARTICLE

Turkish adaptation of the Dark Future Scale: Longitudinal associations between future anxiety, self-compassion, academic self-efficacy, and test anxiety among college students

Osman Hatun[a] (ID) İbrahim Demirci[a] (ID)

[a] Sinop University, Sinop, Türkiye.

ABSTRACT

Studies on test anxiety frequently focus on risk factors, whereas the associations between future anxiety, test anxiety, and the protective factors that may mediate this relationship have rarely been studied. Although cross-sectional studies have explored the connections between these variables, their combined investigation within a longitudinal framework remains scarce, leaving an important gap in the literature. The aim of this research was to examine the psychometric properties of the Dark Future Scale (Study 1), and to examine whether self-compassion and academic self-efficacy mediate the longitudinal association between future anxiety and test anxiety among college students (Study 2). The Study 1 participants were 393 (Mean = 22.25, SD = 3.43) and Study 2 participants were 169 (Mean = 20.84, SD = 2.31) college students. The results showed that the Dark Future Scale met the criteria for validity and reliability. Structural equation modeling was employed to test the longitudinal mediation across two waves. The results revealed that self-compassion and academic self-efficacy serve as longitudinal mediators in the link between future anxiety and test anxiety. In conclusion, self-compassion and academic self-efficacy may mediate the link between future anxiety and test anxiety by reducing the negative effect of future anxiety.

Demand for education has increased because of social and economic advances, and movements for educational democratization. In the modern world, high-quality education and performance are regarded as critical to achieve living high standards (Chankseliani et al., 2021). Exams have become mandatory due to demand for quality education, competition in education, and the need to assess students' academic progress. Like students in many other countries, students in Turkey face numerous exams, from primary school to higher education, and even after graduation, to participate in the labor market (Sarı et al., 2018). Turkish students must take the Higher Education Institutions Exam (Yükseköğretim Kurumları Sınavı - YKS) to gain university admission. This is a highly competitive, multi-stage standardized test. After entering university, students in certain programs must pass various exams, such as midterms, final exams, and make-up exams, to successfully complete their courses. Additionally, they must pass extra qualification exams, such as the Public Personnel Selection Examination (KPSS) for civil service positions or the Academic Personnel and Graduate Education Entrance Exam (ALES) for those pursuing graduate studies. These high-stakes exams contribute to increased academic pressure and test anxiety among students. Students feel enormous pressure to achieve high test scores

because these are regarded as critical for academic and career success. However, the prioritization of frequent exams and highest scores in modern societies causes test anxiety in many students (Lee, 2009).

Test anxiety is prevalent among students (King et al., 2024). Research indicates that the prevalence of high-test anxiety ranges from 22% (Thomas et al., 2018) to 40% (Cizek & Burg, 2006). Test anxiety is linked to lower academic achievement, negative attitudes towards school and dropping out, and harming career decisions (Schnell et al., 2015; Sideeg, 2015). Numerous studies have sought to identify the antecedents of test anxiety as a means of reducing it (Nie et al., 2011; Zeidner, 2007). The present paper investigates test anxiety in terms of its association to future anxiety, self-compassion, and academic self-efficacy. In the context of the current study, it is essential to understand how future anxiety and test anxiety influence college students' academic performance and career expectations. Elevated levels of future anxiety and test anxiety may not only hinder students' immediate academic performance but also undermine their confidence in shaping and pursuing long-term career goals. This research focuses on how self-compassion and academic self-efficacy, as emotional regulatory mechanisms, influence these anxieties. Self-compassion may alleviate the pressure of test anxiety by helping students be more understanding toward themselves. Academic self-efficacy, in turn, can enhance students' confidence in their academic abilities, enabling them to approach examinations with greater preparation and motivation. This study may guide future initiatives to reduce future anxiety and test anxiety.

Future Anxiety and Test Anxiety

Anticipatory stress about future events, evaluations, and examinations may contribute to the development of test anxiety—a specific form of anxiety related to assessments—when examining its association with future anxiety (Zeidner & Matthews, 2010). High levels of anxiety reduce academic success (Brumariu et al., 2023) and are associated with pessimism and despair about the future (Bagana et al., 2011; Zaleski, 1996). This is important because expectations about the future can determine an individual's current emotions, thoughts, and behaviors. Future anxiety can be defined as having negative thoughts and feelings about the future, expecting that life will get worse, and being hopeless about the future (Zaleski et al., 2019). Emotions have various time orientations. For example, regret is more concerned about the past in that people feel regret because they previously acted or did not act in a certain way (Gilovich, & Medvec, 1995). On the other hand, emotions like fear and anxiety are oriented towards the future. For example, people feel fearful because they think that something bad will happen to them later. However, whereas fear has a known cause in the future (Zaleski et al., 2019), anxiety contains ambiguity. Future anxiety is the fear that bad things will happen, and that the future will include negative and dangerous changes (Zaleski, 1996). Future anxiety can lead to worries about one's academic performance, career prospects, and other future-oriented concerns. This can make it harder for an individual to focus on the present task and perform well on exams. Therefore, Individuals with a negative future outlook or heightened future anxiety may be more likely to expect exam failure and experience elevated test anxiety.

Test anxiety, an intense emotional reaction, is among the most stressful aspects of students' lives (Hyseni et al., 2018). Test anxiety is a form of performance anxiety characterized by excessive stress and worry in response to taking tests or undergoing evaluation (McDonald, 2001). According to Zeidner (2007), test anxiety involves phenomenological, physiological, and behavioral responses to testing, accompanied by concerns about failure or negative outcomes. Although a certain level of anxiety is necessary to motivate learning and ensure success, high levels of test anxiety may reduce success. It can impair an individual's performance on tests or exams and may also affect their academic or professional performance (Onwayed, 2005).

The underlying mechanisms of the relationship between future anxiety and test anxiety can be understood in terms of self-compassion and self-efficacy. Sujadi (2022) stated that self-compassion reduces academic anxiety, and that being less self-critical and perceiving mistakes as tolerable can help alleviate it. Rabei et al. (2020) reported that lower self-efficacy is linked to higher future anxiety, indicating that doubts about coping with academic demands may intensify concerns about future performance.

The Role of Self-compassion and Self-efficacy

Self-compassion and academic self-efficacy are two important factors that may mediate the association between future anxiety and test anxiety. Self-compassion is defined as an individual's capacity to respond with

kindness and understanding toward themselves in the face of difficult situations (Neff, 2011). Neff (2003a) argues that self-compassion comprises three components: showing kindness and understanding toward oneself in the face of inadequacy, failure, and distress (self-kindness); being aware of these difficult experiences and accepting them as they are (mindfulness); and seeing one's experiences as common to all humans without being judgmental about inadequacy, failure, and sorrow (common humanity). Self-compassion implies being aware of negative emotions, thoughts, and experiences, while accepting them as common experiences to humanity rather than ignoring them (Neff & Dahm, 2015). Self-compassion enables individuals to manage unrealistic negative cognitions and self-critical evaluations arising from challenging experiences (Enns & Cox, 2002). Previous studies have demonstrated that self-compassion serves as a protective factor for mental health, promoting psychological well-being (Neff & Faso, 2015; Neff et al., 2007) while reducing vulnerability to test anxiety (Haukaas et al., 2018; Tang, 2019). By fostering a nonjudgmental stance toward personal setbacks and framing mistakes as opportunities for growth, self-compassion may buffer students against test stress and enhance their academic performance.

Self-efficacy is the belief in one's capacity to succeed in tasks and manage life challenges (Bandura, 1997). High self-efficacy fosters motivation, perseverance, and effective coping with challenges, reflecting confidence in personal resources rather than innate ability. Self-efficacy involves trusting in one's resources rather than giftedness. That is, the actions of an individual with high self-efficacy are more influenced by his/her belief in their competency to complete the task than their real abilities. Consequently, individuals who possess the competence to solve a problem but have low self-efficacy are less likely to activate and utilize their abilities effectively. Level of self-efficacy determines how much effort an individual puts into a task, and the stability of their actions despite the difficulties (Bandura, 1993). Apart from supporting well-being (Bandura, 2006), self-efficacy is closely associated with academic performance (Jamshidi et al., 2017; Nie et al., 2011; Schnell et al., 2015). As a key predictor of academic achievement (Bandura, 1997; Schnell et al., 2015), academic self-efficacy may also serve a protective role by reducing students' susceptibility to test anxiety (Hoffman, 2010; Nie et al., 2011; Schnell et al., 2015). Individuals with high academic self-efficacy are more likely to feel confident in their ability to perform well on exams, which in turn may lower their test anxiety.

The Present Study

People who experience future anxiety may experience higher test anxiety. In this regard, practices that help people with high future anxiety may also help them cope with test anxiety. This is because individuals with high future anxiety tend to be hopeless and pessimistic about the future (Zaleski, 1996; Zaleski et al., 2019), making them more prone to experiencing test anxiety. Test anxiety is also negatively correlated with indicators of psychological well-being, such as self-efficacy (Hoffman, 2010; Nie et al., 2011; Onyeizugbo, 2010) and self-compassion (Haukaas et al., 2018; Tang, 2019). Self-compassion has positive association with optimism, hope, and self-efficacy (Neff, 2003b; Neff & Faso, 2015; Neff et al., 2007) and negative association with anxiety, rumination, fear of failure (MacBeth & Gumley, 2012; Neff, 2003b; Neff et al., 2005), and test anxiety (Haukaas et al., 2018; Tang, 2019). In educational contexts, academic self-efficacy has been shown to enhance academic achievement (Bandura, 1997; Schnell et al., 2015) and reduce test anxiety (Hoffman, 2010; Jamshidi et al., 2017; Nie et al., 2011; Onyeizugbo, 2010; Schnell et al., 2015). These findings suggest that self-compassion and academic self-efficacy are important factors in reducing test anxiety.

The main purpose of the present study is to examine the longitudinal associations between future anxiety, self-compassion, academic self-efficacy, and test anxiety. In line with this purpose, we conducted a two-stage research. First, we translated the Dark Future Scale (DFS; Zaleski et al., 2019) to Turkish, and investigated its psychometric features (Study 1). The DFS has previously been adapted into Persian (Torfayeh et al., 2020), Italian (Jannini et al., 2022), Arabic (Karam et al., 2024), and Turkish (Yakın & Şen, 2023; Yıldırım et al., 2023; Ergün et al., 2024). Yıldırım et al. (2023) included a broad age range (18–68 years) in their adaptation study, while Ergün et al. (2024) focused on employees and participants primarily over the age of 30. Meanwhile, Yakın and Şen (2023) collected data from students at private universities.

College students can be vulnerable to future anxiety due to academic pressures, career expectations, and life transitions. Studies showed that first-year students often experience significant drops in their psychological

and social well-being, which can lead to heightened anxiety during this crucial time (Henshaw et al., 2023). The academic environment itself may significantly contribute to students' anxiety. Research has shown that stress related to academic performance and the pressure to secure future employment can lead to higher anxiety among college students (Clabaugh et al., 2021; Wan, 2024). Moreover, the uncertainty surrounding career prospects, especially in a competitive job market, adds another layer of stress that may affect students' well-being (Belle et al., 2021). Therefore, college students may experience significant anxiety about their future while simultaneously struggling with the demands of their education. Consequently, an adaptation study targeting college students and emerging adults may offer valuable insights into the scale's psychometric properties.

Second, we tested whether self-compassion and academic self-efficacy longitudinally mediate the relationship between future anxiety and test anxiety among college students (Study 2). This study was conducted to address the lack of research on the combined roles of future anxiety, self-compassion, academic self-efficacy, and test anxiety. Furthermore, examining these variables through a longitudinal design is particularly important, as it allows for a clearer understanding of the causal links among them. Such an approach provides more robust insights into the factors that contribute to students' test anxiety. This study can contribute to educational psychology literature in terms of providing new knowledge and practices for reducing college students' test anxiety and future anxiety, and to guide the planning of these practices.

Study 1

Study 1 aimed to investigate the psychometric properties of the DFS using Explanatory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), item response theory (IRT), and reliability analyses.

Method

Participants and procedure

The participants were two groups of Turkish university students selected via convenience sampling. The first group comprised 348 participants (71% female) with an average age of 21.56 years (SD = 3.05), although 23 participants did not disclose their age. A total of 77 students (22.1%) were enrolled in Social Studies Education, 59 (17%) in Literature, 43 (12.4%) in History, 39 (11.2%) in Science Education, 35 (10.1%) in Mathematics, 35 (10.1%) in Counseling and Guidance, 29 (8.3%) in Turkish Language Education, and 31 (8.9%) in other departments. To investigate the test-retest reliability of the Dark Future Scale, data were collected from a second group of 45 (58% female) participants. The average age of this group was 22.95 years (SD = 3.81).

Before collecting the data, permission was obtained from Dr. Zaleski to adapt the Dark Future Scale into Turkish. Then ethical approval was obtained from the University's Human Research Ethics Committee. All participants were informed about the study's purpose and that their personal information would be kept confidential, the data would only be used for research purposes, they could leave the study at any time, and their participation was entirely voluntary. After the informed consents had been obtained from the participants, data collection forms were distributed. Helsinki Declaration guidelines were followed at every stage of the research.

Translation process

Back-translate method was used in the translation process of DFS into Turkish. The DFS was first translated from English to Turkish by four academicians; Then, three experts from the field of psychological counseling discussed the English and Turkish forms and made the necessary arrangements in terms of meaning and grammar, and the Turkish form was obtained. Later, two independent experts back-translated the Turkish version into English. Finally, the researchers compared the original form of the DFS, the Turkish translation, and the back-translation form, and decided on the final Turkish form of the scale.

Measures

Dark Future Scale (DFS). Zaleski et al. (1996) initially developed the 29-item Future Anxiety Scale to assess individuals' tendency to view the future with anxiety. However, to allow for quicker completion of the scale, Zaleski and colleagues (2019) developed a short version consisting of 5 items in one dimension. Participants responded on a 7-point Likert scale (0 = decidedly false; 6 = decidedly true). CFA indicated that the scale demonstrated good model fit, and its reliability coefficient was calculated as .88 (Zaleski et al., 2019). In the present study, the DFS was adapted to Turkish, and the scale demonstrated good reliability (α = .84; ω = .84).

Data analysis

The normality assumption was first checked through skewness and kurtosis values, which should fall within the ranges of ± 1.5 for an acceptable normal distribution (Tabachnick & Fidell, 2013). In our study, the skewness values for the variables ranged between -1.44 and -0.27, and the kurtosis values ranged between -1.13 and 1.17 (Table 3).

For adapting the DFS into Turkish, EFA and CFA were performed to test its structural validity. For EFA, the scale's suitability for factor analysis was first assessed using the Kaiser-Meyer-Olkin (KMO) measure and Barlett Sphericity Test (BST). The KMO value should be above .60 while the BST should be significant (Pullant, 2001). Item factor loadings above .40 are accepted as very good (Tabachnick & Fidell, 2013). CFA was conducted to assess the structural validity of the DFS. In line with Kline's (2015) recommendations, following fit indices were evaluated to assess the model fit of the DFS. RMSEA and SRMR values below .08 indicate acceptable fit (Schumaker & Lomax, 2004), while CFI and TLI values above .90 are also considered acceptable (Bentler & Bonnett, 1980; Hair et al., 2014; Kline, 2015). Additionally, AIC and ECVI values were calculated, with lower values indicating better model fit (Browne & Cudeck, 1993).

After conducting the EFA and CFA, IRT was employed to further assess the scale's validity. A graded response model (GRM) was applied for the IRT analysis using the 7-point Likert-type scale. IRT is a method that represents each item with its characteristic curve and allows for interpretation based on specific value ranges (Baker, 2001). The Boundary Characteristic Curve (BCC), which shows the items' response characteristics, was examined, and item discrimination (α) and item difficulty scores (b) were calculated. An alpha (α) value above 1 indicates that an item is highly discriminative (Baker, 2001, p. 34). A high b parameter suggests that the item is more suitable for individuals with high DFS scores, whereas a low b parameter indicates better suitability for individuals with low DFS scores (Baker, 2001). Corrected item–total correlations were calculated for the item analysis. To assess the DFS' reliability, Cronbach's α, McDonald's ω, and the test–retest reliability coefficient were calculated (Tabachnick & Fidell, 2013). The data were analyzed using IBM SPSS Statistics for descriptive statistics and EFA, JASP 0.16.1 for reliability analyses, Stata for item response theory analysis, AMOS Graphics for confirmatory factor analysis.

Results

Psychometric characteristics of the DFS

The validity and reliability of the scale were tested by randomly dividing the sample of 348 participants into two equal halves (N=174) to conduct the EFA and CFA. Different perspectives have been proposed regarding the minimum sample size required for factor analysis. Some studies suggest that at least 100 participants may be sufficient (Ferguson & Cox, 1993; Kline, 1994), while others recommend that the sample size should be approximately ten times the number of items or parameters in the scale (Iacobucci, 2010; Jöreskog & Sörbom, 1996; Kline, 1994). Therefore, the sample size was considered adequate for factor analyses.

EFA results

Firstly, EFA was performed to examine the underlying structure of the DFS. KMO measure of sampling adequacy was .75, indicating that the sample size was suitable for factor analysis, and BST was significant (χ^2 = 367.785, df = 10, p < .001), confirming that the correlation matrix was appropriate for factor extraction. The analysis revealed a one-factor solution for the 5-item scale, with an eigenvalue of 2.97, which accounted for 59.48% of the total variance. The item factor loadings of varied between .58 and .86 (Table 1).

Table 1. EFA results for DFS factor structure and factor loadings

Items	Loadings
1	.589
2	.819
3	.868
4	.800
5	.750
Eigenvalues	2.97
Explained total variance	59.48

701

CFA results

CFA was performed using the maximum likelihood estimation method to avaluate the unidimensional structure of the DFS. The fit indexes did not indicate acceptable values for the one-dimensional model ($\chi2$ (5, N = 174) = 20,957, $\chi2$ / df = 4.191, p < .001, CFI = .95, TLI = .91, SRMR = .048, RMSEA = .136, 90% CI [.078 - .199], AIC = 40,957, ECVI = .237). The first model's modification indexes were examined, and fourth and fifth items were corrected. After a covariance relation was formed between the fourth and fifth items, the second model exhibited acceptable fitness, with lower AIC and ECVI values ($\chi2$ (4, N = 174) = 6.80, $\chi2$ / df = 1.52, p = .193, CFI = .99, TLI = .99, SRMR = .026, RMSEA = .055, 90% CI [.000 - .137], AIC = 28.08, ECVI = .162). The scale item factor loadings varied between .63 and .84. Additionally, the average variance extracted (AVE) was calculated to assess convergent validity, with values above .50 considered acceptable (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). The AVE value of the DFS was calculated as .52. The scale's factor structure and factor loadings are presented in Figure 1.

**Figure 1.**CFA results for DFS factor structure and factor loadings
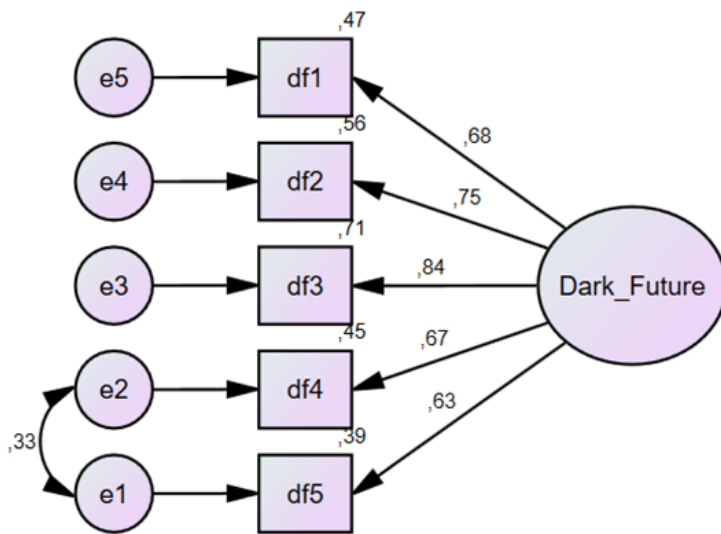
IRT results

As shown in Table 2, the item discrimination (α) values ranged from 1.41 to 3.32, indicating that, according to Baker's (2001) standards, all items exhibit high discriminative power. Table 2 also includes the item difficulty values (b), while the boundary characteristic curves (BCC) are displayed in Figure 2. Most items demonstrated an S-shaped curve

Table 2. IRT estimates

Items	α	b_1	b_2	b_3	b_4	b_5	b_6
df1	1.41	-2.33	-1.35	-0.93	-0.21	0.55	1.41
df2	2.41	-2.01	-1.28	-0.85	-0.50	0.16	1.27
df3	3.32	-1.34	-.0.82	-0.50	-0.04	0.47	1.06
df4	2.01	-1.97	-1.30	-0.94	-0.53	0.10	1.84
df5	2.03	-2.26	-1.71	-1.42	-1.13	-0.64	0.20

Figure 2.DFS boundary characteristics curve (BCC)

f1

f2

f3

f4

f5
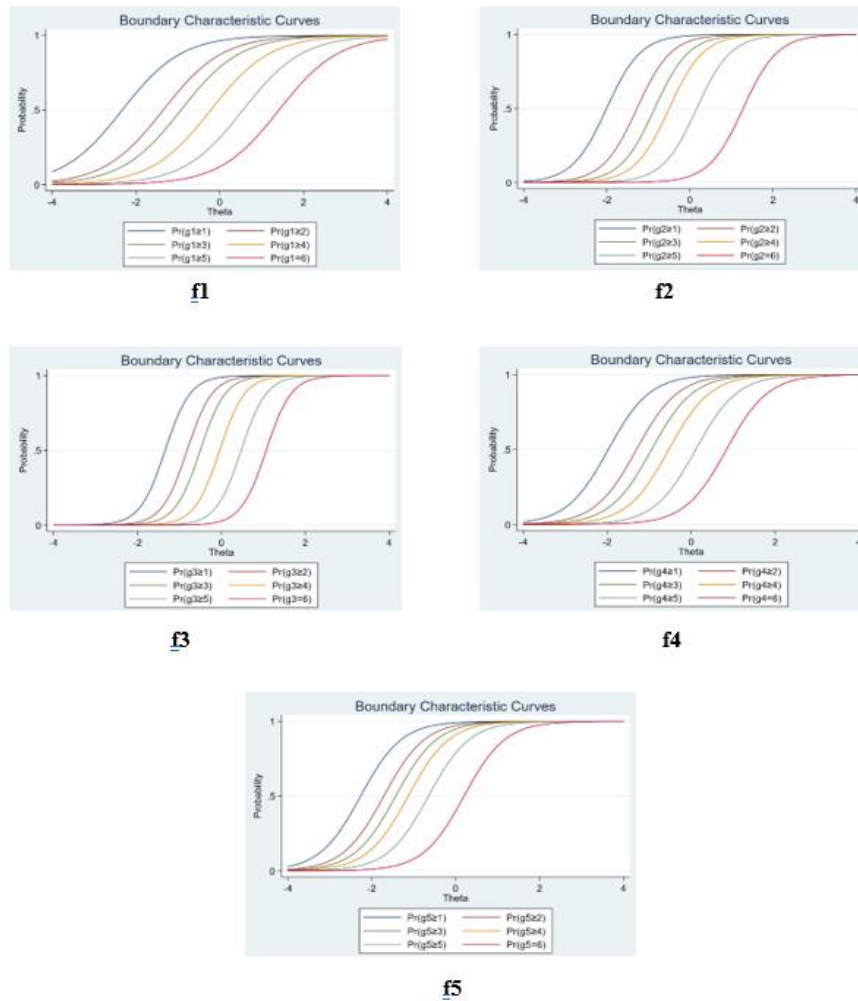
Item analysis and reliability

The internal consistency of the DFS was satisfactory, as both Cronbach's α and McDonald's ω were calculated at .84. Item–total correlations, corrected for overlap, ranged between .51 and .74 (see Table 3). In addition, a three-week test–retest procedure with 45 university students produced a reliability coefficient of .75.

Table 3. Item analysis and reliability coefficients

Scale	α	ω	Items	Mean	SD	Skewness	Kurtosis	CITC
			1	3.54	1.86	-0.36	-0.95	0.51
			2	3.80	1.75	-0.66	-0.61	0.69
Dark Future	.84	.84	3	3.33	1.97	-0.27	-1.13	0.74
			4	3.94	1.88	-0.69	-0.63	0.66
			5	4.70	1.69	-1.44	1.17	0.61

Note. α = Cronbach's alpha, ω = McDonald's omega, CITC = Corrected item total correlation, $N = 348$.

Study 2

Study 2 sought to confirm and expand on the findings of Study 1 and explore the long-term connections among test anxiety, academic self-efficacy, self-compassion, and future anxiety. Study 2 further examined the long-term mediation function of academic self-efficacy and self-compassion in the association between future anxiety and test anxiety.

Method

Participants and procedure

A longitudinal, two-wave dataset gathered through an online survey was used in Study 2. A total of 198 students participated at Time 1 (T1; November 2023, one week before the midterm exams), and 169 students participated at Time 2 (T2; January 2024, one week before the final exams). To match participants who completed the measures at T1 and T2, they were asked to provide a nickname and personal code in the online data collection form. After matching the data from both waves, the final sample comprised 169 participants, aged between 18 and 42 years (M = 20.84, SD = 2.31). Of the participants, 117 (69.23%) were female and 52 (30.77%) were male. Regarding income level, 48 participants (28.40%) reported low, 82 (48.52%) reported medium, and 39 (23.07%) reported high income. In terms of grade level, 51 (30.18%) were freshmen, 24 (14.20%) were sophomores, 56 (33.14%) were juniors, and 38 (22.49%) were seniors.

Ethical approval was obtained from the Humanitarian Research Ethics Committee. Data were gathered from volunteer participants in two waves using online Google Forms. The study announcement and the link to the data collection form were shared via the researchers' social media accounts and student WhatsApp group. The inclusion criteria were being a student, being at least 18 years old, participating voluntarily, and completing the measurement tools one week before the midterm and final exams. The online data collection form provided information about the study's aims, voluntary participation, and confidentiality. Participants were informed of their right to withdraw at any time, and informed consent was obtained electronically through the form.

Measures

Dark Future Scale (DFS)

The DFS (by Zaleski et al., 2019) is a unidimensional scale consisting of five items. Responses were given on a 7-point Likert scale ranging from 0 ("decidedly false") to 6 ("decidedly true"). CFA results indicated good model fit, and the scale demonstrated a reliability coefficient of .88 (Zaleski et al., 2019). For the adaptation of the DFS into Turkish, EFA and CFA were conducted in Study 1. The results of Study 1 indicated that the DFS' fit indices were at an acceptable level and that its reliability coefficient (α = .84) was good. In Study 2, CFA was performed again using data collected from 169 participants at Time 1. The results showed that the DFS demonstrated acceptable model fit (χ^2 = 10.22, df = 5, χ^2/df = 2.04, p = .069; CFI = .98; TLI = .96; SRMR = .035; RMSEA = .079, CI [.000 - .147]), with item factor loadings ranging from .55 to .86. The reliability coefficients for DFS in Study 2 were also at a good level (α T1 = .80, α T2 = .83).

Westside Test Anxiety Scale (WTAS)

WTAS (by Driscoll, 2007) was adapted to Turkish by Totan and Yavuz (2009). The WTAS consists of 11 items in one dimension. Participants responded on a 5-point Likert-type scale (1= never true; 5 = always true). CFA showed that the scale had good fit values, and the reliability coefficient was computed as .89 (Totan & Yavuz, 2009). In the present study, the reliability coefficient of the WTAS was at a good level (α T1 = .88, α T2 = .89).

Self-compassion Scale-Short Form (SCS-SF)

The Self-Compassion Scale (SCS), developed by Neff (2003b), consists of 26 items across six dimensions. Raes et al. (2011) created a short form (SCS-SF) with 12 items. Participants respond on a 5-point Likert-type scale ranging from 1 ("almost never") to 5 ("almost always"). The 12-item, two-factor structure of the SCS-SF (Factor 1: positive items; Factor 2: negative items) was adapted into Turkish by Akça (2014), yielding a reliability coefficient of .75. In the present study, the scale demonstrated good reliability (αT1 = .86, αT2 = .86).

Academic Self-efficacy Scale (ASES)

The ASES, developed by Jerusalem and Schwarzer (1981), is a unidimensional measure consisting of seven items. Participants respond on a 4-point Likert-type scale ranging from 1 ("does not describe me at all") to 4 ("describes me completely"). The Turkish adaptation of the ASES (Yılmaz et al., 2007) reported a reliability coefficient of .79. In the present study, the scale demonstrated good reliability (αT1 = .75, αT2 = .78).

Data analysis

The data were analyzed using IBM SPSS version 27 for descriptive statistics and correlation analysis, JASP 0.16.1 for reliability analyses, AMOS Graphics version 24 for CFA and longitudinal analyses. Descriptive statistics (M, SD), normality assumptions (skewness, kurtosis), and reliability coefficients (Cronbach's α, McDonald's ω) were calculated. Pearson correlations examined associations among variables. Later, structural equation modeling (SEM) tested whether self-compassion and academic self-efficacy longitudinally mediated the link between future anxiety and test anxiety. Model fit was evaluated using GFI, CFI, IFI, TLI, RMSEA, SRMR, AIC, and ECVI. Mediation was further tested with bootstrapping (5,000 resamples, 95% CI; Preacher & Hayes, 2008).

In the evaluation of single-factor scales, the parceling technique is often employed to reduce measurement error (Little et al., 2002). Parceling is recommended as it enhances model–data fit (Yang et al., 2010) and yields high reliability (Little et al., 2013). In this study, each of the unidimensional WTAS and ASES scales was divided into two parcels. However, since the single-factor Dark Future Scale consists of 5 items, it was not parceled (as it is recommended that each parcel contains at least 3 items; see Little et al., 2013), and the scale items were assigned as observed variables.

Results

The results of the preliminary analyses are presented in Table 4. Skewness and kurtosis values indicated that the data were normally distributed (Tabachnick & Fidell, 2013). Cronbach's alpha and McDonald's omega coefficients demonstrated acceptable reliability for all variables (Nunnally & Bernstein, 1994). Correlation analyses revealed that all variables were significantly related to each other at both T1 and T2. Future anxiety at T1 and T2 was significantly and negatively correlated with self-compassion and academic self-efficacy at both T1 and T2, and positively correlated with test anxiety at T1 and T2. Test anxiety at T1 and T2 was significantly and negatively associated with self-compassion and academic self-efficacy at both time points.

Table 4. Descriptive statistics, correlations, and reliabilities for the study variables on T1 and T2

| Variables	1	2	3	4	5	6	7	8
1. DF T1	—							
2. DF T2	.631**	—						
3. TA T1	.481**	.440**	—					
4. TA T2	.390**	.563**	.679**	—				
5. SC T1	-.425**	-.476**	-.463**	-.356**	—			
6. SC T2	-.385**	-.537**	-.411**	-.453**	.763**	—		
7. ASE T1	-.149	-.218*	-.427**	-.412**	.306**	.368**	—	
8. ASE T2	-.201*	-.218*	-.394**	-.440**	.184*	.339**	.713**	—
Mean	20.85	20.53	32.33	31.68	34.42	35.27	18.58	18.97
SD	5.41	5.37	8.13	7.99	7.89	8.07	3.09	3.27
Skewness	-.89	-1.09	.28	-.08	-.01	-.26	.05	-.02
Kurtosis	.68	1.04	-.43	-.38	.13	.68	.43	.16
Alpha	.800	.827	.885	.888	.860	.860	.752	.782
Omega	.806	.821	.890	.893	.879	.888	.754	.804

Note. DF = dark future, TA = test anxiety, SC = self-compassion, ASE = academic self-efficacy * p < .01, ** p < .001

Structural equation modeling

Prior to testing the hypothesized model, CFA was conducted at T1 and T2. The T1 measurement model showed good fit ($\chi 2$ = 68.02, df = 38, $\chi 2$/df = 1.79, GFI = .931, CFI = .957, TLI = .938, IFI = .958, RMSEA = .069, SRMR = .055). The T2 measurement model also demonstrated acceptable fit ($\chi 2$ = 92.32, df = 38, $\chi 2$/df = 2.43, GFI = .908, CFI = .932, TLI = .902, IFI = .934, RMSEA = .092, SRMR = .059).

The proposed structural model was tested after validating the measurement model. We examined whether self-compassion and self-efficacy at T2 longitudinally mediate the link between dark future (future anxiety) at T1 and test anxiety at T2, using SEM (Model 1). The hypothesized model comprised four latent variables (dark future T1, self-compassion T2, academic self-efficacy T2, and test anxiety T2) and eleven observed variables. The results demonstared that the model fit was acceptable ($\chi 2$ = 76.39, df = 39, $\chi 2$/df = 1.96, GFI = .929, CFI = .942, TLI = .918, IFI = .944, RMSEA = .076, SRMR = .059, AIC = 130.39, ECVI = .776). Additionally, we tested whether self-compassion and self-efficacy at T2 mediated the link between test anxiety at T1 and dark future at T2 (Model 2). The results showed that the RMSEA fit index for Model 2 was above the acceptable threshold (χ^2 = 81.89, df = 39, χ^2/df = 2.10, GFI = .921, CFI = .943, TLI = .920, IFI = .944, RMSEA = .081, SRMR = .062, AIC = 135.89, ECVI = .809). Additionally, in Model 2, the paths from test anxiety and self-efficacy to dark future were not significant. When comparing the models, Model 1 demonstrated better fit in terms of χ^2/df, RMSEA, and SRMR indices, and had lower AIC and ECVI values. Figure 3 illustrates the standardized path coefficients for Model 1.

Figure 3. Structural equation modeling for the longitudinal mediation model. (Note. d1-d5= items of dark future, Factor1-2 = sub-dimentions of self-compassion, se_p1-se_p2 = parcels of academic self-efficacy, ta_p1-ta_p2= parcels of test anxiety)
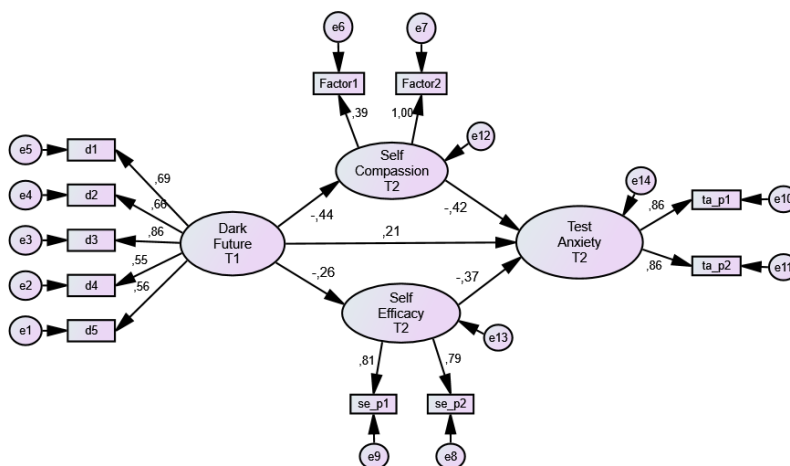
Furthermore, we performed a bootstrap analysis to evaluate the direct and indirect effects in the hypothesized model (see Table 5). The results indicated that T1 future anxiety significantly negatively predicted T2 self-compassion (β= -.436, bootstrapping CI = [-.744, -.188]) and T2 academic self-efficacy (β= -.265, bootstrapping CI = [-.458, -.051]), and significantly positively predicted T2 test anxiety (β= .206, bootstrapping CI = [.007, .400]). T2 test anxiety was significantly negatively predicted by T2 self-compassion (β= -.417, bootstrapping CI = [-.759, -.181]) and T2 academic self-efficacy (β= -.372, bootstrapping CI = [-.530, -.200]).

Regarding indirect effects, future anxiety indirectly predicted test anxiety via self-compassion and academic self-efficacy (β= .280, bootstrapping CI = [.116, .596]). The bootstrap analysis showed that all the direct-indirect effects were significant. These findings suggest that self-compassion and academic self-efficacy serve as protective mediators in the link between future anxiety and test anxiety, helping to buffer students against its negative effects.

Table 5. Standardized direct and indirect effects of longitudinal mediation model

Effects					Estimated	95% CI	
						Lower	Upper
Total effect							
DFS T1	→	WTAS T2			.487	.311	.636
Direct effects							
DFS T1	→	ASE T2			-.265	-.458	-.051
DFS T1	→	SC T2			-.436	-.747	-.188
DFS T1	→	WTAS T2			.206	.007	.400
ASE T2	→	WTAS T2			-.372	-.530	-.200
SC T2	→	WTAS T2			-.417	-.759	-.181
Indirect effect							
DFS T1	→	ASE T2 + SC T2	→	WTAS T2	.280	.116	.596

Note. DFS = Dark Future Scale, WTAS = Westside Test Anxiety Scale, SC = Self-Compassion Scale, ASE = Academic Self-Efficacy Scale CI= confidence interval

Discussion

The current study aimed to examine the longitudinal mediating roles of self-compassion and academic self-efficacy in the link between future anxiety and test anxiety. To this end, the DFS (by Zaleski et al., 2019), was adapted into Turkish through validity and reliability analyses (Study 1). Using this scale, Study 2 employed SEM to investigate the longitudinal mediating roles of self-compassion and academic self-efficacy in the link between future anxiety and test anxiety.

EFA and CFA were performed to evaluate the structural validity of Turkish DFS. Firstly, the suitability of the data for factor analysis was checked using KMO and BST (Pullant, 2001). The EFA results indicated that the Turkish form of the scale retained the original one-dimensional structure, with factor loadings reaching acceptable levels (Tabachnick & Fidell, 2013). The CFA results indicated that the scale achieved acceptable fit indices after establishing a covariance relationship between the item 4 ("I am afraid that changes in the economic and political situation will threaten my future") and item 5 ("I am disturbed by the thought that in the future, I won't be able to realize my goals"), as recommended by the modification guidelines (Bentler & Bonnett, 1980; Hair et al., 2014; Kline, 2015). This adjustment was likely attributable to shared variance between two closely related items, reflecting overlapping perceptions among participants. The modification (covariance) between these items was implemented to improve the model's fit to the data and to more accurately represent the relationships between the items. Similar modifications for Item 4 and Item 5 were observed in the Turkish adaptation studies of the Dark Future Scale, conducted with private college students (Yakın & Şen, 2023) and adults (Yıldırım et al., 2023). In this study, the error terms of Item 4 and Item 5 were linked based on the modification indices suggested by CFA. This can be attributed to the overlapping conceptual content between the items. This adjustment improved the overall model fit."

IRT was employed to evaluate the validity and discriminative capacity of the scale's items. The item discrimination (α) values demonstrated that the DFS effectively differentiates individuals with high DFS scores from those with lower scores. The corrected item-total correlations indicated that the scale's item discrimination indexes were within an acceptable range (Aiken & Growth-Marnat, 2006). Furthermore, the scale's internal consistency coefficients and test-retest reliability values confirmed that the DFS met established reliability standards (Aiken & Growth-Marnat, 2006; Tabachnick & Fidell, 2013). Comparable

item discrimination and reliability values were also reported for the English version of the DFS (Zaleski et al., 2019).

The correlation results demonsrated that future anxiety, self-compassion, academic self-efficacy, and test anxiety significantly associated with each other. The SEM results showed that self-compassion and academic self-efficacy longitudinally mediate the link between future anxiety and test anxiety. The bootstrap analysis showed that the variables had significant mediating roles. As students' future anxiety scores increase, their test anxiety levels increase as well. However, this longitudinal relationship is mediated by self-compassion and academic self-efficacy.

Although no prior study has directly examined the mediating roles of self-compassion and academic self-efficacy in the link between future anxiety and test anxiety, previous research provides indirect support for the present findings. Consistent with self-regulation theory, longitudinal studies have shown that higher self-efficacy is linked to greater grade expectations, lower pre- and post-exam anxiety, and improved exam performance (Roick & Ringeisen, 2017). The findings have been interpreted as highlighting the necessity of strengthening self-efficacy in schools and universities, particularly for students with high test anxiety (Roick & Ringeisen, 2017). Previous studies indicated that higher levels of self-compassion are associated with lower depression, anxiety, and stress (MacBeth & Gumley, 2012; Neff, 2003b), and that self-compassion contributes to psychological well-being (Fong & Cai, 2019). Individuals experiencing high levels of test anxiety tend to be preoccupied with negative cognitions and emotions. For example, they may anticipate encountering difficulties before and during the exam, which they perceive as inevitably leading to failure. Self-compassion is negatively associated with self-criticism, rumination, perfectionism (Neff, 2003b), anxiety (Neff et al., 2007), fear of failure (Neff et al., 2005), and test anxiety. Given that individuals with higher levels of self-compassion tend to feel more hopeful about the future (Fong & Cai, 2019; Neff & Faso, 2015), it can be inferred that self-compassion helps students approach future exams with greater optimism and experience more positive emotions. Fong and Cai (2019) found that self-compassion enhanced Chinese students' hope regarding their exams. Similarly, Tang (2019) found that self-compassion plays a key role in reducing test anxiety.

Self-compassion helps people recognize experiences of failure or inadequacy and cope with the negative self-criticism that comes with them. In turn, this strengthens their sense of self-efficacy (Enns & Cox, 2002). Previous research found that self-efficacy negatively related to depression (Yıldırım & İlhan, 2010) and anxiety (Soysa & Wilcomb, 2015), while being positively linked to psychological well-being (Soysa & Wilcomb, 2015). Moreover, self-efficacy is strongly connected to academic performance. Academic self-efficacy refers to an individual's belief in their ability to successfully accomplish academic tasks (Schunk & DiBenedetto, 2022). Higher levels of academic self-efficacy not only enhance academic achievement (Bandura, 1997; Schnell et al., 2015) but also help reduce test anxiety (Hoffman, 2010; Jamshidi et al., 2017; Nie et al., 2011; Onyeizugbo, 2010; Schnell et al., 2015). Research highlights the mediating role of self-efficacy across different contexts. For instance, Fast et al. (2010) found that self-efficacy partially explained the link between students' perceptions of the classroom environment and their mathematics performance. Similarly, Jamshidi et al. (2017) showed that self-efficacy mediated the connection between spiritual intelligence and test anxiety among high school students. Together, these findings underscore the broader significance of self-efficacy in shaping both academic performance and emotional outcomes.

Previous research has shown that future anxiety is negatively correlated with self-efficacy (Rabei et al., 2020) and self-compassion (Jansen, 2021). Moreover, both factors also predict lower levels of math anxiety, a specific form of academic anxiety (Leppma & Darrah, 2024). Future anxiety and self-efficacy beliefs appear to be shaped by individuals' past experiences and their cognitive appraisals of current circumstances (Szota et al., 2024), consistent with social learning theory (Bandura, 1997). The effects of future anxiety may also extend to self-compassion. From a self-regulation perspective, individuals with heightened future anxiety often rely on maladaptive coping strategies, such as self-criticism and rumination, that erode self-compassion. By contrast, self-compassion promotes adaptive coping by fostering emotional balance and constructive self-reflection, highlighting its mediating role in the link between future anxiety and test anxiety. Overall, these findings suggest that self-compassion and self-efficacy function as key mediators that buffer the impact of future anxiety on test anxiety

Implications

The present study offer important implications for both educators and mental health professionals working with college students. Specifically, the results highlight the pivotal role of self-compassion and academic self-efficacy in attenuating the impact of future anxiety on test anxiety. This underscores the potential value of developing interventions that target these protective factors. For instance, mindfulness-based self-compassion programs may help students adopt more adaptive coping strategies, while interventions designed to strengthen academic self-efficacy, such as structured goal-setting, skills training, and mastery experiences, may enhance confidence and resilience in academic contexts. Collectively, such programs could contribute to reducing test anxiety and improving students' overall academic and psychological well-being.

Educational institutions could create targeted support programs to address future anxiety and its effects on test anxiety. Integrating elements that strengthen self-compassion and academic self-efficacy, such as counseling sessions focusing on self-compassion, stress management, and confidence-building, can help students manage their anxiety better. Training for educators and counselors should stress the importance of self-compassion and academic self-efficacy in managing test anxiety. Providing these professionals with strategies to promote these protective factors will improve their ability to support students. Training should include techniques for recognizing future anxiety and implementing interventions that foster self-compassion and enhance academic self-efficacy.

The study also suggests further research to explore additional variables that might mediate or moderate the link between future anxiety and test anxiety. Investigating other protective factors, such as resilience or social support, could provide a more comprehensive approach to managing test anxiety. Future studies should also assess how these findings apply to different populations or educational settings.

Conclusions and limitations

Students with high future anxiety can be pessimistic and hopeless about the future, and they are more likely to think that they will fail in an exam, which in turn leads to high test anxiety. Perceptions of a dark future and test anxiety may reduce students' personal, academic, and social harmony. The present study suggest that significant longitudinal associations between test anxiety and future anxiety among college students, and that self-compassion and academic self-efficacy play important roles in these associations. Specifically, higher levels of self-compassion and academic self-efficacy were linked to lower levels of both future anxiety and test anxiety. These findings emphasize the value of fostering self-compassion and academic self-efficacy as strategies to reduce anxiety and enhance well-being among college students. Moreover, alleviating students' concerns about the future may also help decrease their test anxiety, thereby supporting greater academic adjustment and overall harmony. Future research is needed to further clarify these associations and to explore how they may differ across diverse groups of college students.

The present study had several limitations. First, the study was conducted with college students. Future research may be performed with high school students. In this way, the current results can be compared with different samples. Second, measurement invariance analyses could not be carried out, as the sample sizes for the low- and high-SES subgroups were insufficient. This creates uncertainty regarding whether the scale allows for meaningful comparisons across different SES groups. In future studies, measurement invariance analyses of the DFS should be conducted with a larger sample. This would contribute to determining whether the DFS can be reliably compared across individuals from different income levels. Third, the results of the study are based on self-report data, so future studies based on reports from students, families and peers may provide more objective findings. Based on the present findings, future studies can test for the mediating roles of other variables like depression, stress, and negative self-perception in the association between future anxiety and test anxiety. Future studies could also investigate the relationship between perceptions of a dark future and test anxiety in connection with psychological well-being factors such as hope, social support, positive relationships, and mindfulness. Such quantitative future studies also need support from qualitative research to provide clearer and more objective findings. Finally, psycho-education programs that support self-compassion

and academic self-efficacy may help students become more optimistic and hopeful about their future, enhance their psychological well-being and academic performance.

Financing. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data Availability. The dataset is available from the corresponding author upon reasonable request.

Ethical Approval. Ethical approval for this study was obtained from the Sinop University Human Research Ethics Committee (Meeting No: 03, Decision No: 2020/42, Date: 14/04/2020).

Informed Consent. Informed consent was obtained from all participants for inclusion in the study.

Conflict of Interest. The authors declare no competing financial or personal interests.

References

Aiken, L., & Groth-Marnat, G. (2006). Psychological testing and assessment. Allyn and Bacon.

Akça, E. (2014). *Personality and cultural predictors of the Quiet Ego: Comparing Turkey and the United States.* (Unpublished Master Thesis). Middle East Technical University, Social Sciences Institute.

Bagana, E., Raciu, A., & Lupu, L. (2011). Self esteem, optimism and exams' anxiety among high school students. *Procedia-Social and Behavioral Sciences, 30*, 1331–1338. https://doi.org/10.1016/j.sbspro.2011.10.258

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science, 16*(1), 74–94. https://doi.org/10.1007/BF02723327

Baker, F. B. (2001). The basics of item response theory. https://eric.ed.gov/?id=ED458219

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28, 117–148. http://dx.doi.org/10.1207/s15326985ep2802_3

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Bandura, A. (2006). Adolescent development from an agentic perspective. In T. Urdan & F. Pajares (Eds.), *Self-Efficacy Beliefs of Adolescents*, (pp. 1-43.). Greenwich, Connecticut: IAP. https://www.uky.edu/~eushe2/Bandura/001-BanduraAdoEd2006.pdf

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*, 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), Testing structural equation models (pp. 136–162). Sage.

Brumariu, L. E., Waslin, S. M., Gastelle, M., Kochendorfer, L. B., & Kerns, K. A. (2023). Anxiety, academic achievement, and academic self-concept: Meta-analytic syntheses of their relations across developmental periods. *Development and Psychopathology*, *35*(4), 1597–1613. https://doi.org/10.1017/S0954579422000323

Chankseliani, M., Qoraboyev, I., & Gimranova, D. (2021). Higher education contributing to local, national, and global development: new empirical and conceptual insights. *Higher Education*, *81*, 109-127. https://doi.org/10.1007/s10734-020-00565-8

Cizek, G. J., & Burg, S. S. (2006). *Addressing test anxiety in a high-stakes environment: Strategies for classroom and schools*. Corwin Press.

Driscoll, R. (2007). Westside Test Anxiety Scale validation. (ERIC database ED495968). https://files.eric.ed.gov/fulltext/ED495968.pdf

Enns, M. W., & Cox, B. J. (2002). The nature and assessment of perfectionism: A critical analysis. In G. L. Flett & P. L. Hewitt (Eds.), *Perfectionism: Theory, research, and treatment* (pp. 33–62). American Psychological Association.

Ergün, M., Sürücü, L., Maslakçı, A., & Turan, İ. B. (2024). Reliability and Validity of a Turkish Version of the 5-Item Future Anxiety Scale. *Alpha Psychiatry, 25*(1), 94. https://doi.org/10.5152/alphapsychiatry.2024.231243

Fast, L. A., Lewis, J. L., Bryant, M. J., Bocian, K. A., Cardullo, R. A., Rettig, M., & Hammond, K. A. (2010). Does math self-efficacy mediate the effect of the perceived classroom environment on standardized math test performance? *Journal of Educational Psychology, 102*(3), 729–740. https://doi.org/10.1037/a0018863

Ferguson, E., & Cox, T. (1993). Exploratory factor analysis: A users' guide. International Journal of Selection and Assessment, 1(2), 84-94. https://doi.org/10.1111/j.1468-2389.1993.tb00092.x

Fong, R. W., & Cai, Y. (2019). Perfectionism, self-compassion and test-related hope in Chinese primary school students. *The Asia-Pacific Education Researcher, 28*(4), 293–302. https://doi.org/10.1007/s40299-019-00466-0

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Gilovich, T., & Medvec, V. H. (1995). The experience of regret: what, when, and why. *Psychological review*, *102*(2), 379.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). *Multivariate data analysis*. Pearson Education Limited.

Haukaas, R. B., Gjerde, I. B., Varting, G., Hallan, H. E., & Solem, S. (2018). A Randomized controlled trial comparing the attention training technique and mindful self-compassion for students with symptoms of depression and anxiety. *Frontiers in Psychology, 9*, 827. https://doi.org/10.3389/fpsyg.2018.00827

Hoffman, B. (2010). "I think I can, but I'm afraid to try": The role of self-efficacy beliefs and mathematics anxiety in mathematics problem-solving efficiency. *Learning and Individual Differences, 20*(3), 276–283. https://doi.org/10.1016/j.lindif.2010.02.001

Hyseni Duraku, Z., & Hoxha, L. (2018). Self-esteem, study skills, self-concept, social support, psychological distress, and coping mechanism effects on test anxiety and academic performance. *Health psychology open*, *5*(2), 2055102918799963.

Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. Journal of Consumer Psychology, 20(1), 90-98. https://doi.org/10.1016/j.jcps.2009.09.003

Jamshidi, M. A.; Moghadam, M. F.; Ghorbani, S.; & Farhoush, M. (2017). Self-efficacy and resilience as mediators in the relationship between test anxiety and spiritual ıntelligence among high school students in Qom. *Journal of Research on Religion & Health 4,* 7–21. https://journals.sbmu.ac.ir/en-jrrh/article/view/19634

Jannini, T. B., Rossi, R., Socci, V., & Di Lorenzo, G. (2022). Validation of the Dark Future Scale (DFS) for future anxiety on an Italian sample. *Journal of Psychopathology*. https://doi.org/10.36148/2284-0249-457

Jansen, P., Siebertz, M., Hofmann, P., Zayed, K., Zayed, D., Abdelfattah, F., ... & Meneghetti, C. (2021). Does self-compassion relate to the fear of the future during the 2020 coronavirus pandemic? A cross-cultural study. *Cogent Psychology*, *8*(1), 1976438. https://doi.org/10.1080/23311908.2021.1976438

Jerusalem, M., & Schwarzer, R. (1981). Fragebogen zur Erfassung von "Selbstwirksamkeit". In R. Schwarzer (Hrsg.), *Skalen zur Befindlichkeit und Persoenlichkeit (Forschungsbericht 5)* (pp. 15-28). Berlin: Freie Universitaet, Institut fuer Psychologie.

Jöreskog, K. G. (1996). LISREL 8: User's reference guide. *Scientific Software International*.

Karam, J. M., Malaeb, D., Hallit, R., Fekih-Romdhane, F., Obeid, S., & Hallit, S. (2024). Psychometric properties of the Arabic translation of the Dark Future Scale questionnaire in a non-clinical sample of Arabic-speaking young adults. *BMC psychiatry*, *24*(1), 456. https://doi.org/10.1186/s12888-024-05822-z

King, R. B., Cai, Y., & Elliot, A. J. (2024). Income inequality is associated with heightened test anxiety and lower academic achievement: A cross-national study in 51 countries. *Learning and Instruction*, *89*, 101825. https://doi.org/10.1016/j.learninstruc.2023.101825

Kline, P. (2014). *An easy guide to factor analysis*. Routledge.

Kline, R. B. (2015). Principles and practice of structural equation modeling (4th ed.). Guilford Publications.

Lee, J. (2009). Universals and specifics of math self-concept, math self-efficacy, and math anxiety across 41 PISA 2003 participating countries. *Learning and Individual Differences, 19*(3), 355-365. https://doi.org/10.1016/j.lindif.2008.10.009

Leppma, M., & Darrah, M. (2024). Self-efficacy, mindfulness, and self-compassion as predictors of math anxiety in undergraduate students. *International Journal of Mathematical Education in Science and Technology*, *55*(4), 883-898. https://doi.org/10.1080/0020739X.2022.2054740

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, *9*(2), 151-173. https://doi.org/10.1207/S15328007SEM0902_1

Little, T. D., Rhemtulla, M., Gibson, K., & Schoemann, A. M. (2013). Why the items versus parcels controversy needn't be one. *Psychological Methods*, *18*(3), 285. https://doi.org/10.1037%2Fa0033266

MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review, 32*(6), 545-552. https://doi.org/10.1016/j.cpr.2012.06.003

McDonald, A. S. (2001). The prevalence and effects of test anxiety in school children. *Educational Psychology, 21*(1), 89-101. https://doi.org/10.1080/01443410020019867

Neff, K. (2011). *Self-compassion: The proven power of being kind to yourself.* Hachette UK.

Neff, K. D. (2003a). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity, 2(*2), 85-102. https://doi.org/10.1080/15298860309032

Neff, K. D. (2003b). The development and validation of a scale to measure self-compassion. *Self and identity*, *2*(3), 223-250. https://doi.org/10.1080/15298860309027

Neff, K. D., & Dahm, K. A. (2015). Self-compassion: What it is, what it does, and how it relates to mindfulness. In B. D. Ostafin, M. D. Robinson & B. P. Meier (Eds.), *Handbook of Mindfulness and Self-Regulation* (pp. 121–137). NY: Springer.

Neff, K. D., & Faso, D. J. (2015). Self-compassion and well-being in parents of children with autism. *Mindfulness, 6*(4), 938-947. https://doi.org/10.1007/s12671-014-0359-2

Neff, K. D., Hsieh, Y.-P., & Dejitterat, K. (2005). Self-compassion, achievement goals, and coping with academic failure. *Self and Identity, 4*(3), 263–287. https://doi.org/10.1080/13576500444000317

Neff, K. D., Rude, S. S., & Kirkpatrick, K. L. (2007). An examination of self-compassion in relation to positive psychological functioning and personality traits. *Journal of Research in Personality, 41*, 908–916. https://doi.org/10.1016/j.jrp.2006.08.002

Nie, Y., Lau, S., & Liau, A. K. (2011). Role of academic self-efficacy in moderating the relation between task importance and test anxiety. *Learning and Individual Differences, 21*(6), 736–741. https://doi.org/10.1016/j.lindif.2011.09.005

Onwayed, E. F. (2005). Academic achievement and its relationship with anxiety, self esteem, optimism and pessimism in Kuwaiti students. *Journal of Social Behavior and Personality, 33(*1), 95-104. https://doi.org/10.2224/sbp.2005.33.1.95

Onyeizugbo, E. U. (2010). Self-efficacy, gender and trait anxiety as moderators of test anxiety. Electronic *Journal of Research in Educational Psychology, 8*(1), 299-312. https://www.redalyc.org/pdf/2931/293121995014.pdf

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879-891. https://doi.org/10.3758/BRM.40.3.879

Pullant, J. (2001). *SPSS survival manual: a step by step guide to data analysis using SPSS for Windows.* Open University Pres.

Rabei, S., Ramadan, S., & Abdallah, N. (2020). Self-efficacy and future anxiety among students of nursing and education colleges of Helwan University. *Middle East Current Psychiatry*, *27*(1). https://doi.org/10.1186/s43045-020-00049-6

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. *Clinical Psychology and Psychotherapy, 18*, 250-255. https://doi.org/10.1002/cpp.702

Roick, J., & Ringeisen, T. (2017). Self-efficacy, test anxiety, and academic success: A longitudinal validation. *International Journal of Educational Research*, *83*, 84-93. https://doi.org/10.1016/j.ijer.2016.12.006

Sarı, S. A., Bilek, G., & Çelik, E. (2018). Test anxiety and self-esteem in senior high school students: A cross-sectional study. *Nordic Journal of Psychiatry, 72*(2), 84–88. https://doi.org/10.1080/08039488.2017.1389986

Schnell, K., Ringeisen, T., Raufelder, D., & Rohrmann, S. (2015). The impact of adolescents' self-efficacy and self-regulated goal attainment processes on school performance — Do gender and test anxiety matter? *Learning and Individual Differences, 38*, 90–98. https://doi.org/10.1016/j.lindif.2014.12.008

Schumacker, R. E., & Lomax, R. G. (2004). A beginner's guide to structural equation modeling. Lawrence Erlbaum.

Schunk, D. H., & DiBenedetto, M. K. (2022). Academic self-efficacy. In Allen, K. A., Furlong, M. J., Vella-Brodrick, D., & Suldo, S. (Eds.), *Handbook of positive psychology in schools* (pp. 268-282). Routledge.

Sideeg, A. (2015). Test anxiety, self-esteem, gender difference, and academic achievement: The case of the students of medical sciences at Sudanese uiversities: a mixed methods approach. *British Journal of Arts and Social Sciences, 19*(2), 39–59. https://www.researchgate.net/profile/Abdunasir-Sideeg/publication/276060435

Soysa, C. K., & Wilcomb, C. J. (2015). Mindfulness, self-compassion, self-efficacy, and gender as predictors of depression, Anxiety, Stress, and Well-being. *Mindfulness, 6*(2), 217–226. https://doi.org/10.1007/s12671-013-0247-1

Sujadi, E. (2022). Mindfulness, Self-Compassion, Resilience, and Academic Anxiety among College Students: A Structural Equation Modeling Approach. *Tarbawi: Jurnal Ilmu Pendidikan*, *18*(2), 122-139. https://doi.org/10.32939/tarbawi.v18i2.2460

Szota, M., Rogowska, A. M., Kwaśnicka, A., & Chilicka-Hebel, K. (2024). The indirect effect of future anxiety on the relationship between self-efficacy and depression in a convenience sample of adults: revisiting social cognitive theory. *Journal of Clinical Medicine*, *13*(16), 4897. https://doi.org/10.3390/jcm13164897

Tabachnick, B. G., & Fidell, L. S. (2013). Using multivariate statistics (6th ed.). Pearson Education.

Tang, W. K. (2019). Resilience and self-compassion related with achievement emotions, test anxiety, intolerance of uncertainty, and academic achievement. *Psychological Studies 64* (1), pp. 92–102. https://doi.org/10.1007/s12646-019-00482-6

Thomas, C. L., Cassady, J. C., & Finch, W. H. (2018). Identifying severity standards on the cognitive test anxiety scale: Cut score determination using latent class and cluster analysis. *Journal of Psychoeducational Assessment*, *36*(5), 492-508. https://doi.org/10.1177/0734282916686004

Torfayeh, M., Ghamarani, A., & Bagherzadeh, S. (2020). Investigation of the validity and reliability of the Dark Future Scale in mothers of children with intellectual disability. *Journal of Fundamentals of Mental Health, 22*(5), 333-340. https://doi.org/10.22038/jfmh.2020.17507

Totan, T., & Yavuz, Y. (2009). The validity and reliability study of the Turkish version of Westside Test Anxiety Scale. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 9*(17), 95–109. https://toad.halileksi.net/sites/default/files/pdf/westside-sinav-kaygisi-olcegi-toad.pdf

Yakın, İ., & Şen, E. T. (2023). Psychometric properties of the Turkish version of the Dark Future Scale. *Alpha Psychiatry*, *24*(1), 8-12. https://doi.org/10.5152%2Falphapsychiatry.2023.22972

Yang, C., Nay, S., & Hoyle, R. H. (2010). Three approaches to using lengthy ordinal scales in structural equation models: Parceling, latent scoring, and shortening scales. *Applied Psychological Measurement, 34*, 122–142. https://doi.org/10.1177/0146621609338592

Yıldırım, F., & İlhan, İ. Ö. (2010). The validity and reliability of the General Self-efficacy Scale-Turkish Form. *Turkish Journal of Psychiatry, 21*(4), 301–308. http://www.turkpsikiyatri.com/pdf/c21s4/301-308.pdf

Yıldırım, M., Kaynar, Ö., Arslan, G., & Chirico, F. (2023). Fear of COVID-19, resilience, and future anxiety: psychometric properties of the Turkish version of the dark future scale. *Journal of Personalized Medicine*, *13*(4), 597. https://doi.org/10.3390/jpm13040597

Yılmaz, M., Gürçay, D., & Ekici, G. (2007). Akademik Özyeterlik Ölçeğinin Türkçe'ye uyarlanması [Adaptatıon of the Academıc Self-effıcacy Scale to Turkish]. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 33*(33), 253–259. http://efdergi.hacettepe.edu.tr/yonetim/icerik/makaleler/1047-published.pdf

Zaleski, Z. (1996). Future anxiety: Concept, measurement, and preliminary research. *Personality and Individual Differences, 21*(2), 165–174. https://doi.org/10.1016/0191-8869(96)00070-0

Zaleski, Z., Sobol-Kwapinska, M., Przepiorka, A., & Meisner, M. (2019). Development and validation of the Dark Future scale. *Time & Society, 28*(1), 107–123. https://doi.org/10.1177%2F0961463X16678257

Zeidner, M. (2007). Test anxiety in educational contexts: Concepts, findings, and future directions. In *Emotion in Education* (A. Schutz, & R. Pekrun Eds.). Academic Press.

Zeidner, M., & Matthews, G. (2010). *Anxiety 101*. Springer Publishing Company.