



# The predictors of defensive pessimism: Cognitive flexibility, anxiety, and big-five personality traits

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## Abstract

This study aims to investigate the predictor power of cognitive flexibility, anxiety, and neuroticism, and openness personality traits on defensive pessimism in the context of a high-stakes test. For this purpose, the study conducts the adaptation of the Defensive Pessimism Questionnaire (DPQ) and the Cognitive Flexibility Inventory (CFI), and measures the validity and reliability of these tools on Turkish teenagers. The participants in the study consisted of three independent groups of participants with a total number of 1361 students enrolling at high schools. The DPQ, CFI, Big-Five Inventory, and Trait-State Anxiety Scale were administered to the participants. The findings demonstrated that the factor structures of both scales were similar to the original forms, and both of the scales had a high level of validity and reliability. The study also concluded that cognitive flexibility, anxiety, and personality explained 44% of defensive pessimism after a regression analysis.

**Keyword** Defensive pessimism; cognitive flexibility; anxiety; personality traits; high-stakes tests

Individuals use a number of strategies to protect their self-esteem, regulate their emotions, and increase their motivation. While the cognitive strategies constitute a broad research area, defensive pessimism, one of these strategies, is used mostly in evaluative situations, has recently been discussed. Defensive pessimism (DP) involves setting unrealistic low expectations (negativity/negative thinking) and reflecting on possible outcomes (reflectivity) before evaluative situations (Norem, 2001b). Despite negativity dimension, DP does not negatively affect performance. On the contrary, some individuals' performance decreases when they are prevented from using DP (Norem & Cantor, 1986a; Norem & Illingworth, 1993). DP is an unusual strategy that goes against the general belief that pessimistic thoughts and low expectations negatively affect individuals' success, making DP a remarkable strategy. Despite this, possible predictors of the strategy have not been studied before.

DP begins with setting low expectations for a coming anxiety-provoking performance/evaluative situation and continues with passing different scenarios through one's mind (Norem & Cantor, 1986a; Norem, 2001a). As pointed out in some research (e.g., Norem & Cantor, 1986a, b; Norem & Chang, 2002; Norem, 2001a; Spencer & Norem, 1996), defensive pessimists are anxious individuals. In general, anxiety may affect cognitive performance (Eysenck, 1992) because it makes it difficult to focus on the task for individuals. In addition to its psychological effects, anxiety also harms mental performance as it affects concentration (Fernández-Castillo & Caurcel, 2015). In an academic setting, anxiety may arise when there is a high probability that a negative consequence will occur or when the result is important even if the negative probability is low. Anxiety may cause loss of interest, decreased performance, and failure in the learning process (Akpur, 2015; Cassady & Johnson, 2002; Hembree, 1988).

On the other hand, like many negative emotions, anxiety serves a purpose. Some levels of arousal are adaptive because it helps individual pay attention to environmental signs (Steimer, 2002). It is thought that the adverse effects of anxiety on achievement stem from its effects on reducing effort. From the point of view of DP, it is known that anxiety does not reduce defensive pessimists' efforts and motivation. By contrast to expecting worst-case scenarios and

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expending lots of time and energy mentally rehearsing how things may fail or go wrong, this strategy can help anxious people (Norem & Illingworth, 1993; Norem, 2001b). By adopting the Defensive Pessimistic Approach, individuals mentally consider possible outcomes before an upcoming event, rehearse mentally, plan for the situation, and consider how it would feel like performing well or poorly in that situation. Therefore, defensive pessimists use their anxiety as a warning and plan actively to avoid negative scenarios and strengthen themselves against possible negative outcomes. Additionally, DP helps anxious individuals gain a sense of control (del Valle & Mateos, 2008; Lim, 2009; Norem & Cantor, 1986a, b; Norem & Illingworth, 1993; Norem, 2001b; Sanna, 1996; Showers & Ruben, 1990; Wright, 2014). It can be stated that the main point that distinguishes DP from pessimism and depression is the timing, direction, and quality of negative and reflective thinking.

According to Pérès et al. (2002), the DP strategy protects the individual from the harmful effects of anxiety and failure. Although defensive pessimists worry about future events, they do not remain passive and do not experience despair (Lim, 2009; Wright, 2014). Defensive pessimists remove some of the pressure on them by lowering their expectations and making them feel less anxious (Norem & Chang, 2002). In sum, anxiety may predict the use of the DP strategy.

DP is a strategy as it is used selectively in various situations and for context specific goals. In other words, one may be a defensive pessimist in academic situations, while may not be in social situations (Cantor & Norem, 1989; Cantor et al., 1987; Norem, 1989; Norem & Cantor, 1986a; Norem, 2001a, b). Pérès et al. (2002) suggest that defensive pessimists have the cognitive flexibility (CF) that enables them to use their strategies in risky situations and choose different strategies from their repertoires in situations where failure is unlikely. CF, which is thought to be an important factor for the use of DP, is defined as the selective change of people's perception system to respond to appropriate environmental stimuli (Scott, 1962).

Cognitive flexibility refers to "the ability to shift between response sets, learn from mistakes, devise alternative strategies, divide attention, and process multiple sources of information concurrently" (Anderson, 2002, p. 74). According to Jacobson and Spiro (1995), CF is the ability to switch between thoughts appropriately and evaluate more than one thought at the same time. CF usually manifests itself in new or unexpected situations and is expressed in awareness of alternatives (Maltby et al., 2004; Martin & Anderson, 1998, 2001; Martin & Rubin, 1995). Statements about CF emphasize evaluating from broad perspectives rather than focusing on a single point. The reflective thinking of defensive pessimists focuses more on the negative outcomes and also includes positive outcomes. Many possible consequences are

envisaged, and detailed and in-depth mental rehearsals are carried out on these results. When considered in these terms, it is thought that CF may be a predictor of DP.

One of the most used inventories to measure CF structure (the CFI developed by Dennis & Vander Wal, 2010) consists of two dimensions, namely, alternatives and control. The alternatives subscale measures the ability to perceive the possible alternatives to human behaviors and situations that occur in life and produce many solutions to solve difficulties. On the other hand, the control subscale measures the tendency to perceive difficult situations as controllable (Dennis & Vander Wal, 2010). Defensive pessimists seem to carry out the alternatives dimension of CF, which is explained as the ability to produce many solutions in difficult situations, in their minds before the real situation. On the other hand, in terms of the control dimension, DP is generally used when the sense of control over the situation is weak. Individuals' sense of control increases with the use of the strategy (Norem, 2001a). Therefore, DP is predicted to be related to both dimensions of CF.

Temperament, family environment, childhood experiences, and choices as adults all may affect the development and use of strategies (Norem, 2001b). As Cantor (1990), Little (1989), and Norem (1989) state, cognitive strategies are units of personality. In other words, some personality traits cause predisposition in the use of strategies. The strategies used are not chosen randomly, but they develop depending on the situations encountered, personality, emotions, and past experiences of individuals (Norem, 2001b). The effectiveness of strategies varies depending on the strategy itself and, beyond that, by whom and in which situation it is used (Norem, 2014). Therefore, it is thought that personality traits may also predict DP.

Defensive pessimists are not defensive pessimists in all matters throughout their lives without any exception. But using DP can be a prominent part of one's life. Theoretically, strategies are the most formable units of personality (Cantor, 1990). When summarizing the relationship between strategy and personality, Norem (1989) states that as long as a particular strategy is used in current life tasks or remains a valid part of the individual's strategy repertoire, it will be a part of the personality. One of the most used personality theories in the literature is the Big Five Personality Traits. The traits identified in this theory are extroversion, agreeableness, neuroticism, conscientiousness, and openness to experience. These traits are considered to regulate the harmony between individuals and strategies (Norem, 2014).

Neuroticism, one of the big five personality traits, includes emotional distress and extreme changes in emotions. As the level of emotional instability increases, the probability of experiencing stress in daily events increases. On the opposite end of neuroticism, some people are calm and not prone to excessive and incompatible

emotional reactions (Gunthert et al., 1999). High scores indicate anxiety, and low scores indicate emotional stability on neuroticism. Researchers state that individuals with high neuroticism use inappropriate coping mechanisms more frequently because they deal with complex emotions more often (Bolger & Schilling, 1991). One of the other traits of the big five is openness to experience. It includes characteristics such as analytical, curious, creative, imaginative, wide-ranging, natural, and open-minded (McCrae & Costa, 1985). Therefore, it may be related to the reflectivity dimension of DP.

According to Norem and Cantor (1986a), DP is one of the strategies used when faced with a performance situation where failure threatens self-esteem and success is very important and desirable. Since DP is a strategy used before anxiety-provoking evaluative situations, studies conducted in this field in the literature mostly include an evaluation, a task, or a performance situation. These situations or evaluations were mostly experimental conditions designed by the researchers (e.g., Norem & Illingworth, 1993, 2004) or criteria such as GPA accepted as an indicator of success obtained as a result of evaluations (e.g., Martin, 1998). However, DP has not been studied in a real evaluation case or an important high risky test. In the current research, the university entrance exam (LYS), which is used for selecting students to higher education in Turkey, is considered an evaluative situation. The research will be carried out with the participation of the students who will take the test. It has critical importance and is regarded as one of the high-stakes tests in the Turkish education system.

The present study mainly aimed to examine the relationship between DP, CF, anxiety, and personality traits in the academic field before a high-stakes test. More specifically, this study examines the extent to which DP can be predicted by CF, anxiety, and neuroticism, and openness traits of personality. To test these relationships, we firstly set the sub-aim to validate the Turkish version of the DPQ and the CFI.

## Method

### Research Design

This study is designed to be correlational research. We did not attempt to control or manipulate the variables; instead, we seek to understand what kind of relationships naturally occurring variables have with one another. By using correlational design, we seek to anticipate DP by using CF, anxiety, and personality as predictors.

## Participants

The participants in the study consisted of three different study groups attending various types of high schools in various districts of Istanbul province. Two of these participant groups were utilized to evaluate the validity and reliability studies of the DPQ (N = 360) and the CFI (N = 458). The participants were high school students from 9<sup>th</sup> grade to 12<sup>th</sup> grade. Of the participants, 165 (45.8%) were female, and 195 (54.2%) were male for the first sample group, and 224 (48.9%) were female, and 234 (51.1%) were male for the second sample group.

The sample group in the main stage of the research consisted of 543 students attending 15 high schools, belong to six different school types, in Istanbul, Turkey. Data was gathered from 12<sup>th</sup>-grade students studying for the university entrance exam during the spring term, 2016. The rationale behind choosing the 12<sup>th</sup>-grade high school students was that they were in the preparation process for the university entrance exam. This exam was an evaluative situation that usually caused anxiety and considered that might reveal the DP strategy. Multi-stage sampling method was used to determine the sample group of the study. Students from different socio-economic levels and various school types from the Anatolian and European sides of Istanbul were included in the sample group. For this purpose, first, three districts were chosen randomly from the Anatolian and European sides. Then, the sample group was determined by stratified sampling according to school types and students' discipline. A sample of 670 respondents was reached, yet data loss occurred due to various reasons. Forty-three of the students in the sample group filled the scales incompletely, and 84 stated that they would not take the university entrance exam. For these reasons, the data obtained from these participants were excluded from the analysis, while a sample group of 543 remained. Regarding the gender distribution of the main study group, 311 of the participants were female (57.3%), and 232 were male (42.7%). In terms of perceived socio-economic status, 17 (1.1%) of them reported that they were in the low socio-economic level, 291 (55.6%) were in the middle, and 235 (43.2%) were in the high socio-economic level (Fig. 1).

### Tools

The data collection tools consisted of a background questionnaire that gathered demographic information of the participants, including their gender, socio-economic status, schools, and departments. Other instruments used to collect data are introduced below.

**The Defensive Pessimism Questionnaire (DPQ)** DPQ aims to measure defensive pessimism with two subscales: negativity

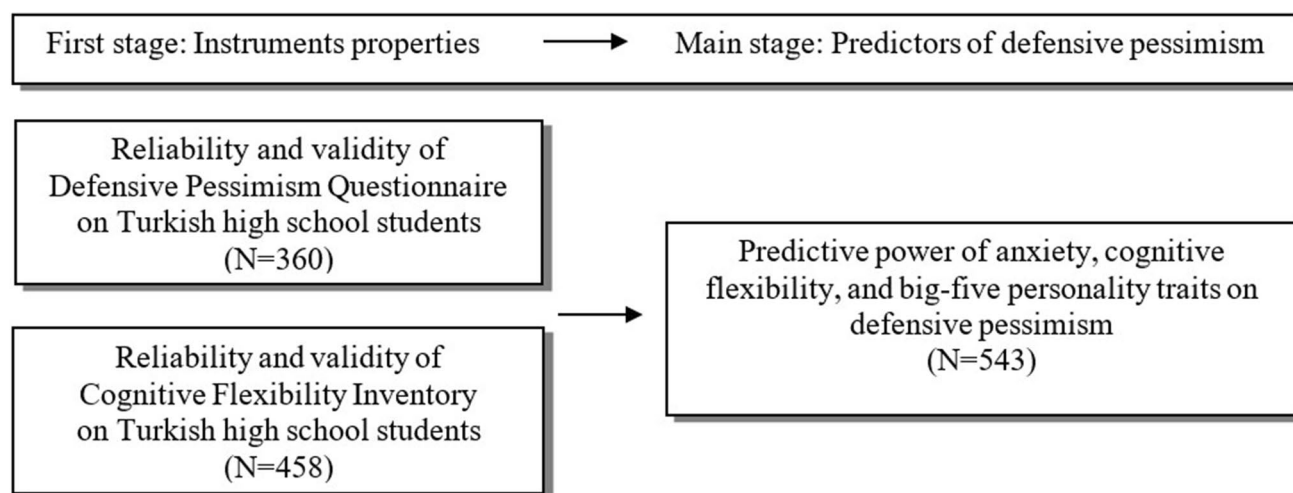


Fig. 1 Research stages flowchart

and reflectivity. It is a 12-item Likert questionnaire (Norem, 2001a, b). The psychometric properties of the Turkish version of the questionnaire were examined by Çelik-Örücü (2013) on university students sample (Mean score for age = 18.39). Since the sample group of the present study is high school students, the psychometric properties of the measurement tool are tested on high school students in the current research and presented below. The instructions for participants were as follows: “When you answer the following questions, please think about how you prepare for and think about situations related to academic conditions.”

**The Cognitive Flexibility Inventory (CFI)** CFI was developed by Dennis and Vander Wal (2010, p. 241) to measure three aspects of cognitive flexibility: “(a) the tendency to perceive difficult situations as controllable; (b) the ability to perceive multiple alternative explanations for life occurrences and human behavior; and (c) the ability to generate multiple alternative solutions to difficult situations”. Inventory consists of two sub-scales (alternatives and control) with 20 items. Gülüm and Dağ (2012) carried out the reliability and validity studies of CFI on the Turkish university student sample. The psychometric properties of the inventory on high school students are examined as a part of this study and presented below, as in DPQ.

**The State-Trait Anxiety Inventory (STAI)** STAI (Spielberger et al., 1970) was developed to evaluate both transitory (state) and continuous (trait) anxiety of both clinical patients and non-clinical individuals over the age of 14. STAI consists of two subscales, the State Anxiety Scale and Trait Anxiety Scale, each consisting of 20 items and rated according to a four-point Likert scale. State Anxiety Scale measures the anxiety in a specific situation and at a specific time, whereas

the Trait Anxiety Scale measures the general and continuous anxiety level independent of the current situation. The adaptation study of the scale into Turkish was carried out by Öner and Le Compte (1985).

**The Big-Five Inventory (BFI)** The 44-item BFI was developed by John et al. (1991) to measure the dimensions of openness, conscientiousness, extraversion, agreeableness, and neuroticism (see also Benet-Martínez & John, 1998). Turkish adaptation study was carried out by Sümer and Sümer (2005) as part of an international study conducted in 56 countries by Schmitt et al. (2007), and reliability and validity study of the BFI on high school students was conducted by Demirbaş (2014).

**The Life Orientation Test (LOT)** LOT, developed by Scheier and Carver (1985) and adopted into Turkish by Aydın and Tezer (1991), consists of 12-items and measures the level of individuals’ optimism towards the future. This test was used to assess the criterion validity of the DPQ in the present study.

**The Cognitive Flexibility Scale (CFS)** CFS, developed by Martin and Rubin (1995) and adopted into Turkish by Çelik-kaleli (2014), consisted of a 12-item scale and was used to assess the criterion validity of the CFI in the current research.

## Procedure

Before starting data collection, necessary permissions were obtained from the İstanbul Provincial Directorate of National Education. In addition, the school principals were

preliminarily interviewed to plan the data collection process. In addition, consent was received from the participants together with the tools and it was stated in the consent form that the results could be published in scientific research.

Within the scope of the research first, the validity and reliability of the DPQ and the CFI on Turkish high school students were investigated then, the main aim of the study, which was to investigate the predictor power of cognitive flexibility, anxiety, and big-five personality traits on defensive pessimism, was examined. Since DP is a strategy used in anxiety-provoking evaluative situations, research tools were administered to the participants approximately two months before the university entrance exam (LYS). The university entrance exam is one of the most important exams in the education system in Turkey. It is considered one of the high-stakes tests, and therefore it is chosen as an evaluative situation that might reveal DP. The purpose of the research, how to respond to the tools, and the confidentiality of the responses were explained to participants before collecting the data.

## Data Analysis

The data were analyzed using SPSS 20.0 and LISREL 9.1 software. First, the variables' descriptive statistics and preliminary analyses were done before moving on to the primary analyses: percentage, mean, standard deviation, kurtosis, and skewness. The validity and reliability of scales were investigated by using test re-test, Cronbach's Alpha, confirmatory factor analysis (CFA), and criterion-related validity methods. To assess the construct validity of the DPQ and the CFI CFA was conducted using maximum likelihood estimation once normality of item distributions was evaluated. Chi-square ( $\chi^2$ ) / degree of freedom, RMSEA, CFI, GFI, NFI, NNFI, and SRMR were used to assess the goodness-of-fit. Reliability was assessed using Cronbach's alpha coefficient for internal consistency and test-retest correlation for stability. Since normality was assumed, the relationships between all variables were examined through parametric tests. For the criterion-related validity of the DPQ, the relationship between the DPQ and the LOT was tested using Pearson Moment Correlation Coefficient. In a similar way, for the criterion-related validity of the CFI, the relationship between the CFI and the CFS was tested using Pearson Moment Correlation Coefficient. Pearson Moment Correlation analysis was conducted to determine the correlation between the scores obtained from study variables. The assumptions of multiple regression analysis can be listed as sufficient sample size, linearity, normal distribution, multivariate normal distribution, homoscedasticity, no multicollinearity, and no autocorrelation (Field, 2009; Tabachnick & Fidell, 2013). First, these assumptions required for

regression analysis were checked, and then finally, multiple regression analysis is used to determine the predictor power of the variables on DP. Before the main regression analysis results, the results of the reliability and validity of DPQ and CFI were presented below.

## Results

The items of the DPQ Turkish version which were translated before for adaptation study on university students were assessed. To provide clarity, the scales were applied to three high school students separately. All of these three students stated that all items were clear enough. Accordingly, it was decided that the items were appropriate for high school students, so items were not translated again, and these forms were used. The CFA was executed to confirm the original scale's structure on Turkish high school students. In addition, for the internal consistency reliability, test-retest reliability was examined. The results of the CFA, that carried out with  $N=360$  respondents, indicated that 12 items loaded on two factors (negativity and reflectivity):  $\chi^2/df=3.162$ ,  $RMSEA=0.077$ ,  $CFI=0.936$ ,  $GFI=0.917$ ,  $NFI=0.914$ ,  $NNFI=0.920$ ,  $SRMR=0.059$ . Factor loadings of the Turkish version of DPQ are presented in Table 1. The relationship between DPQ and LOT is used as evidence for the criterion validity of DPQ. The LOT measures the level of students' optimism towards the future so that the significant negative relationship ( $r=-0.658$ ) is considered as evidence of criterion validity. The Cronbach's Alpha internal consistency of the DPQ was 0.76 for the negativity dimension, 0.71 for the reflectivity dimension, and 0.82 for the whole scale.

**Table 1** CFA Factor Loadings and Bifactor Covariances of DPQ

Factors	Items	$\lambda$	SE	t-value	$R^2$
Negativity	1	0.44	0.81	7.86	0.191
	2	0.60	0.64	11.18	0.359
	4	0.62	0.61	11.74	0.388
	5	0.71	0.50	13.92	0.503
	6	0.67	0.55	12.96	0.449
	11	0.41	0.83	7.32	0.168
Reflectivity	3	0.56	0.70	10.08	0.301
	7	0.57	0.68	10.53	0.324
	8	0.31	0.90	5.36	0.095
	9	0.63	0.61	11.78	0.391
	10	0.58	0.66	10.74	0.336
	12	0.61	0.63	11.41	0.371
Bifactor Correlations					
	Reflectivity				
Negativity	0.83*				

$N=360$ ; All Z-values are significant at  $p<.001$ ; \*:  $p<.001$

The result of the test–retest reliability coefficient performed 16 days interval was found 0.81. These results demonstrated that the DPQ has high validity and reliability scores and may be used as a valid and reliable instrument for Turkish high school age (aged 13 to 18).

A similar procedure to the DPQ, as mentioned above, was followed for the CFI. After items were assessed for clarity, the CFA was executed. The results carried out with  $N=458$  students indicated that 20 items loaded on two factors (alternatives and control):  $\chi^2 / df=2.757$ ,  $RMSEA=.062$ ,  $CFI=0.963$ ,  $GFI=0.907$ ,  $NFI=0.943$ ,  $NNFI=0.958$ ,  $SRMR=0.069$ . Factor loadings of the Turkish version of CFI are presented in Table 2. A significant relationship ( $r=0.734$ ) was found between the total CFI and the Cognitive Flexibility Scale, and it is used as evidence for the criterion validity of CFI. The Cronbach's Alpha internal consistency of the CFI was 0.88 for the alternatives dimension, 0.79 for the control dimension, and 0.88 for the whole scale. The result of the test–retest reliability coefficient performed 16 days interval was found to be 0.80. These findings demonstrated that CFI has high validity and reliability scores and may be used as a valid and reliable instrument for Turkish high school age (aged 13 to 18).

**Table 2** CFA Factor Loadings and Bifactor Covariances of CFI

Factors	Items	$\lambda$	SE	t-value	$R^2$	
Alternatives	1	.56	0.68	12.47	.315	
	3	.53	0.72	10.85	.283	
	5	.66	0.56	15.35	.440	
	6	.53	0.72	11.67	.282	
	8	.59	0.66	13.15	.344	
	10	.58	0.67	12.84	.331	
	12	.62	0.61	14.20	.390	
	13	.71	0.49	16.89	.508	
	14	.70	0.52	16.33	.483	
	16	.66	0.57	15.22	.434	
	18	.63	0.60	14.46	.401	
	19	.61	0.63	13.84	.374	
	20	.55	0.69	12.26	.307	
	Control	2	.48	0.77	9.91	.230
		4	.56	0.69	11.75	.308
		7	.70	0.51	15.65	.491
		9	.49	0.76	10.20	.242
		11	.75	0.44	17.06	.561
		15	.52	0.73	10.85	.269
		17	.59	0.65	12.71	.352
Bifactor Correlations						
Alternatives	Control	0.54*				

$N=458$ ; All Z-values are significant at  $p<.001$ ; \*:  $p<.001$

## The predictors of DPQ

Before the main regression analysis, preliminary analyses were executed. The assumptions of regression analysis, namely sample size, linearity, normal distribution, homoscedasticity, multicollinearity, and outliers, were checked (Field, 2009; Tabachnick & Fidell, 2013). All these assumptions had been tested, and regression analysis was performed after determining that all assumptions were met. The inter-correlations and descriptive statistics of the study variables can be seen in Table 3.

Table 4 shows the results for regression analysis. The predictive role of the independent variables was shown to be statistically significant ( $F=70.09$ ,  $p<0.001$ ). Alternatives, control, state anxiety, trait anxiety, neuroticism, and openness predicted DP ( $R=0.663$ ,  $R^2=0.440$ ,  $p<0.001$ ). All these variables explained approximately 44% of the total variance.  $\beta$  scores indicate that alternatives ( $\beta=0.428$ ,  $p<0.001$ ) had the strongest effect on DP. The second predictor that contributed to the model was control ( $\beta=-0.242$ ,  $p<0.001$ ). Other predictors that contributed to the model were neuroticism ( $\beta=0.188$ ,  $p<0.001$ ), trait anxiety ( $\beta=0.176$ ,  $p<0.01$ ), and state anxiety ( $\beta=0.095$ ,  $p<0.05$ ), respectively. In other respects, DP was not predicted by openness ( $\beta=0.042$ ,  $p>0.05$ ).

## Conclusions and Discussion

The CFA results demonstrated that obtained factor structures corresponded to the factor structures of the original scale for both of the scales -the DPQ and the CFI. Thus, it can be concluded that the structural model of the DPQ and CFI, which consist of two factors for each, was well fit to the current sample. Additionally, criterion validity and reliability of scales investigated by test re-test, Cronbach's Alpha, and criterion-related validity methods indicated that both scales may be used as valid and reliable instruments.

Several researchers suggest (e.g., Gasper et al., 2009; Norem, 2001a) that DP tends to be used in important situations where individuals face serious stress and anxiety, feel less sense of control, and it is likely to fail. Thus, it can be assumed that DP should more likely emerge before the high-stakes tests, considering their importance. Drawing from this perspective, data was gathered approximately two months before the Turkish university entrance exam. Preliminary correlation analyses of the study demonstrated that alternatives, trait anxiety, state anxiety, neuroticism, and openness were positively associated with DP, while control was negatively associated. Based on its selective and strategic use, Pérès et al. (2002) developed the idea that defensive pessimists have CF. This study is the first to examine the relationship between CF and DP. The

**Table 3** Descriptive statistics and intercorrelations of the study variables (*N* = 543)

Variables	Dimensions	Minimum	Maximum	$\bar{X}$	SS	SE $\mu$	Defensive Pessimism	Alternatives	Control	Trait Anxiety	State Anxiety	Neuroticism
Defensive Pessimism	Negativity	26.00	84.00	59.792	.45601	10.626						
	Reflectivity	6.00	42.00	28.301	.31813	7.413						
Cognitive Flexibility	Alternatives	14.00	42.00	31.492	.22207	5.175	.050					
	Control	43.00	99.00	73.713	.44080	10.272	.346***	.193***				
Anxiety	Trait Anxiety	27.00	65.00	51.209	.32894	7.665	-.388***	-.609***				
	State Anxiety	8.00	35.00	22.504	.23663	5.514	.446***	-.423***	-.665***			
Personality Traits	Neuroticism	20.00	75.00	47.015	.42763	9.965	.382***	-.089*	-.426***	.632***	.570***	
	Openness	20.00	77.00	44.208	.52425	12.216	.418***	-.103*	-.468***	.632***	.570***	-.107*
		9.00	40.00	24.310	.27347	6.372	.112***	.364***	.172***	-.103*	-.064	
		14.00	50.00	36.898	.27777	6.473						

\*\*\*: *p* < .001. \*\*: *p* < .01. \*: *p* < .05

relationship between DP and CF was not found to be statistically significant. On the other hand, the relationship between DP and the dimensions of CF was found to be positively significant for the alternatives dimension and negatively significant for the control dimension. The significant positive correlation between DP and the alternatives dimension of CF can be explained by the reflectivity dimension of DP. Because reflectivity is the process of envisioning the possible consequences of an upcoming situation step by step with details, thinking through and mentally rehearsing them (Martin et al., 2001; Norem, 2001a, 2014). On the other hand, alternatives signify the ability to perceive the possible alternatives to situations and human behaviors that occur in life and produce many solutions to solve difficult situations (Dennis & Vander Wal, 2010). Therefore, it is theoretically significant that these two variables are positively correlated with each other. When assessed in terms of the control dimension, it expresses the tendency to perceive difficult situations as controllable. Generally, defensive pessimists have a weak sense of control over the event, and individuals' sense of control increases with the use of the strategy (Norem, 2001a; Showers, 1992). These outcomes are in line with the theoretical frameworks of these two structures.

In studies dealing with DP, it is stated that anxious individuals use this strategy. It is even stated that DP is used to control anxiety (Norem, 2001a, 2014; Spencer & Norem, 1996). The findings extend on previous results (Berry, 2007; Martin, 1998; Norem, 2001a; Schoneman, 2002; Spencer & Norem, 1996; Wilson et al., 2002) that DP is related to anxiety, by finding a moderately significant positive relationship between both trait and state anxiety and DP. Considering that the current study was conducted with students in the preparation period for the university entrance exam, which is one of the high-stakes tests, and in a time period about two months before the test, it seems significant that the students' state anxiety, as well as their trait anxiety, was high. In summary, it can be said that the relationship between DP and anxiety is compatible with the literature and is supported by previous research.

When the personality is considered in terms of the big five personality traits, the studies conclude that optimism is generally associated with extraversion, and pessimism is usually associated with neuroticism (Marshall et al., 1992; Norem & Chang, 2002; Sharpe et al., 2011). Looking at the relationship between DP and personality traits, in particular, it is seen that Norem (2001a) found similar results. When examining the relationship between academic DP and big five personality traits, Norem (2001a) found that the highest correlation between academic DP and personality traits was found out with neuroticism. This correlation was at a moderate level. In addition, Zimmerman and LaDuke (2017) found a significant positive relationship

**Table 4** Regression analysis predicting defensive pessimism using measures of alternatives, control, state anxiety, trait anxiety, neuroticism, and openness

Model	B	SE <sub>B</sub>	$\beta$	t	p	R	R <sup>2</sup>	F
Constant	17.286	4.260		4.058	.000	.663	.440	70.09***
Alternatives	.593	.049	.428	12.186	.000			
Control	-.467	.080	-.242	-5.805	.000			
Trait Anxiety	.187	.056	.176	3.368	.001			
State Anxiety	.083	.039	.095	2.121	.034			
Neuroticism	.314	.073	.188	4.317	.000			
Openness	.070	.057	.042	1.213	.226			

\*\*\*:  $p < .001$

between DP and neuroticism. In the present study, a significant positive moderate correlation was found between DP and neuroticism.

In the current study, a weak positive relationship was found between DP and openness. In contrast with the current study, the relationship between these two variables was found to be positive among a female sample and almost unrelated to another sample in a study conducted by Norem (2001a). The relationship between these two variables seems to remain ambiguous. However, as in the current study, the relationship between these two variables was found to be weak in Norem's study (2001a).

As a result of regression analysis, alternatives and control subscales of CF, trait and state anxiety, and neuroticism trait of personality together predicted DP significantly. This result shows that the more alternatives, trait and state anxiety, and neuroticism level increase, the more DP level increases. On the other hand, the more the control level increases, the more the DP level decreases. When comparing the predictive values of DP, the most predictive subdomain was alternatives. It seems theoretically consistent that the alternatives dimension, which is expressed with the ability to switch between thoughts, evaluates multiple thoughts at the same time, and focus on alternatives, predicts DP because, as stated above, they both share characteristics. Additionally, Norem and Illingworth (1993) report that when study participants were asked to think about their thoughts and list them while engaging in tasks, defensive pessimists reported feeling better and less anxious than when distracted from this reflective thinking process.

The second strongest predictor of DP is the control dimension of CF, and it negatively predicted DP. According to Bandura (1997), people always try to control events that affect their lives. Before using their strategies, defensive pessimists have a weak sense of control (Martin, 1998; Norem & Cantor, 1986a, b), and thanks to their strategies, defensive pessimists' sense of control increases. It is stated in the literature that thinking about possible consequences and taking precautions against these consequences increase defensive pessimists' sense of control (Cantor & Harlow, 1994; Cantor et al., 1987; Lim, 2009; Norem, 2014).

Norem (2008) and Norem et al. (2015) consider DP as an emotion regulation strategy. Therefore, it seems meaningful that individuals with high levels of neuroticism use DP, which is an emotion regulation strategy. This result is in line with the theoretical frameworks of these two structures.

According to their predictive power, the last two variables that significantly predicted DP were trait anxiety and state anxiety, respectively. Martin (1998) found out that both trait and state anxiety significantly and positively predicted DP in his study where DP was addressed separately on negativity and reflectivity dimensions. DP strategy is used by anxious people. This strategy helps people to work through their anxious thoughts rather than denying them so that they may achieve their goals (Martin, 1998; Norem & Cantor, 1986a). In this study, state and trait anxiety were found as predictors of DP, and this finding is consistent with the result mentioned above in the literature.

## Limitations and Future Directions

This study has a few limitations. First, it should be noted that this study was conducted with a limited group, Turkish 12<sup>th</sup> grades, before a high-stakes test, and it may limit the generalizability. Thus, we recommend that future studies be conducted with larger sample groups. Additionally, utilizing diverse methodological approaches (e.g., individual interviews, focus groups) could prove efficient in revealing the structure/nature of DP. Second, participants in this study were defensive pessimists in the academic field, and the data were collected prior to an academic evaluation. As Cantor et al. (1987) stated, individuals who are defensive pessimists in the academic field may not be defensive pessimists in other fields, for instance, in the social field. Thus, a fruitful next step in this research area would include exploring whether anxiety, CF, and neuroticism predict DP in other contexts and exploring possible other predictors within different contexts. Additionally, the present study investigated the direct relationship of DP with CF, anxiety, and personality traits, but it precluded the indirect links and mediated relationships among these

variables. Further studies should look for the variables that mediate the relationships among these variables.

Despite limitations, this study makes significant contributions. First of all, it was demonstrated that DPQ and CFI are valid and reliable measurement tools that can be used when working with teenagers. Second, this is one of a small number of empirical studies attending to DP and its correlates among teenagers. Third, to our knowledge, this is the only study that deals with DP in the context of real-life high-stakes tests. Moreover, this is the only study that accounts for the link between DP, anxiety, CF, and personality traits.

From a broader perspective, parents and educators, especially teachers and school counselors, should realize that students may use different strategies to handle their anxiety. Defensive pessimism is a relatively new and less studied concept so far. To deeply insight this concept, quantitative and qualitative design research should be conducted, especially in different cultures.

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**Data Availability** The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

**Code Availability** Not applicable.

## Declarations

**Ethics Approval** The authors declare that all the procedures of the study were conducted in compliance with the Helsinki Declaration. Voluntary participation, anonymity and informed consent were ensured for all participants and there was no experimental manipulation involved in the study.

It has been approved by the Provincial Directorate of National Education. 30.09.2016/ 16110545-300-1600259462.

**Additional Declarations for Articles in Life Science Journals that Report the Results of Studies Involving Humans and/or Animals** Not applicable.

**Consent to Participate (Include Appropriate Statements)** Consent was received from the participants together with the measurement tools.

**Consent for Publication (Include Appropriate Statements)** It was stated in the consent form that the results could be published in scientific research.

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