



Procrastination and Rational/Irrational Beliefs: A Moderated Mediation Model

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Abstract

The present study focuses on the integrated effect of self-doubt, rational and irrational beliefs, and fear of failure on procrastination in a sample of Turkish undergraduate students ($N=293$). The results confirm prior evidence indicating that self-doubt, fear of failure, and rational/irrational beliefs were important predictors of procrastination. The results show that (a) both self-doubt and irrational beliefs have direct and interactive effects on fear of failure, (b) fear of failure mediates the relationship between self-doubt and procrastination, (c) rational beliefs moderated the predictive effect of fear of failure on procrastination, and (d) the indirect effect of self-doubt on procrastination via fear of failure may vary depending on the level of rational and irrational beliefs. These findings suggest that future intervention attempts should focus on modifying irrational beliefs and enhancing rational beliefs to cope with procrastination.

Keywords Self-doubt · Fear of failure · Irrational and rational beliefs · Procrastination · Moderated mediation model

Introduction

Procrastination is defined to be the voluntarily delay of an intended action in spite of the expectation to be worse off for the delay (Steel 2007). Procrastination includes actions and behaviors that negatively affect the productivity of an individual. It often occurs in both daily and academic life. For instance, Harriott and Ferrari (1996) reported that 20% of adults have a tendency to procrastinate about required tasks.

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Similarly, Özer et al. (2009) indicated in their study that approximately 52% of college students have a tendency to procrastinate.

Many researchers have attempted to explain why people postpone their pre-planned duties and responsibilities (Baumeister et al. 2007; Burka and Yuen 2008; Ferrari et al. 1995; Haghbin et al. 2012; Harrington 2005; Johnson and Bloom 1995; Knaus 2006; Lee 2005; Steel 2007; Senecal et al. 1995). Although early research handled procrastination as a time-management problem, subsequent studies revealed that it is not a time-management problem, but a complex structure consisting of cognitive, affective, and behavioral components (Solomon and Rothblum 1984). In addition to this, with reference to clinical observations, some authors have argued the development and maintained of procrastination in the framework of self-concept (e.g. Burka and Yuen 1983, 2008; Ellis and Knaus 1977). For instance, Burka and Yuen (2008) stated, individuals who have the tendency to procrastinate also have the tendency to believe that their performance is a sign of their own self-concept. When they relive a disappointment about their work performance, they not only think that they have failed, but they also see themselves as unsuccessful (Burka and Yuen 2008). A similar explanation was reported by Ferrari et al. (1995) that when an individual has doubts about completing a task successfully, this doubt leads to his or her fear of failure, and, in turn, this fear increases the risk of injury to self. Therefore, that person might postpone the required tasks to protect his or her self. Consistent with this expectation, Feick and Rhodewalt (1997) found that the self-esteem level of people who avoid failure by procrastinating is higher than individuals who do not postpone their tasks. Furthermore, research on the fear of failure and procrastination show that there is a positive relationship between the two (Haghbin et al. 2012; Özer et al. 2009; Solomon and Rothblum 1984). What's more, research on self-esteem and procrastination found a negative relationship between the two (Ferrari 1994, 2000; Ferrari and Díaz-Morales 2007; Pychyl et al. 2002). Another study examining two of the variables reported a positive relationship between procrastination and protection of self-esteem (Dinnel et al. 2002). Briefly, these studies support the explanation that procrastination's function is to protect an individual's self-worth.

In addition to the conceptual framework mentioned above, in rational emotive behavioral therapy (REBT), the development of procrastination is discussed in terms of ego disturbance (Dryden and Neenan 2004). Ego disturbance stems from demands and negative evaluations about a person's self. These beliefs generate ego anxiety, which an emotional strain is stemming from the perception an individual has that there is a threat to his or her self or personal worth. This anxiety causes an avoidance of situations that contain risks of failure or disapproval (Froggatt 2005). Ellis and Knaus (1977) stated that the extreme need of procrastinators to perform tasks perfectly causes them to avoid them, resulting in these individuals not doing their duties and/or meeting their responsibilities on time. In this context, Rorer (1983) stated that a familiar ego disturbance belief leading to procrastination is that one must do well, and that if one does not do so, you are not good, one should procrastinate than risk the probability of finding out that one is worthless. Research findings indicate that there is a relationship between procrastination and negative thoughts about self (Flett et al. 2012), self-criticism (Flett et al. 1995; Powers et al. 2007),

defectiveness schema (Aftab et al. 2017), self-blame (Sirois 2015), negative self-processing, a failure in positive self-processing (Harriott et al. 1996), self-downing (Balkis and Duru 2018a), and self-deprecating thoughts (McCown et al. 2012).

In brief, procrastination cannot be explained with a single factor, and negative evaluations about a person's "self and fear of failure have an important role in the development of the procrastination. Nevertheless, the evaluations of the relationship between those two variables are based on clinical observations and theoretical explanations rather than being tested empirically. However, the co-effect of the two variables on procrastination has not been tested. Examining the related literature, while the direct effect of self-evaluation on the self and fear of failure on procrastination has been tested separately, the indirect or the interaction effect of these two variables has not been tested. The examining the co-effect of self-doubt and fear of failure on procrastination may help to understand the nature of the relationship between self-doubt, fear of failure and procrastination. Therefore, this study aims to fill an important gap in the literature by examining the direct and indirect effects of self-doubt and fear of failure on procrastination.

Rational/Irrational Beliefs and Procrastination

The first rational emotive behavioral formulations of procrastination were made by Ellis and Knaus (1977). They argued that absolutistic and rigid demands (doing well at almost anything, getting approval from others, having comfortable life situations, and being treated fairly by others) contribute to procrastination. When these demands are not met, this generates anxiety that causes an avoidance of situations that contain risks, such as failure, disapproval, or unfairness and are seen as difficult or very difficult to overcome (Ellis 2003; Ellis and Dryden 1997). Considering the related literature, many of the studies focused on the relationship between procrastination and irrational beliefs (IBs) and the effect of IB on procrastination (Beswick et al. 1988; Bridges and Roig 1997; Ferrari and Emmons 1994; Harrington 2005; Steel 2007). However, there is some research into the role of rational beliefs (RBs) on procrastination (Balkis 2013, 2015; Balkis and Duru 2018a). For instance, Balkis (2013) found that RB for studying have a mediator role on the relationship between academic achievement and academic satisfaction.

The Current Study

The current study is designed to investigate the integrative effect of self-doubt, RB and IB, and fear of failure on procrastination. In light of the explanations above, significant relationships might be expected between self-doubt, fear of failure, and procrastination. Moreover, RB and IB might play key roles in this process. Put differently, when the individual is not sure about his or her ability to perform a task successfully and IB step in, he or she may experience the fear of failure more, so he or she might procrastinate more. In other words, IBs would serve as moderator between self-doubt and fear of failure (*Hypothesis 1*). On the contrary, if RB step in during the same situation, the possibility of procrastination

might decrease. According to Caserta et al. (2010), RB have a protective role in the development of mental disorders. In one study on the protective role of RB, Balkis (2015) stated that RB buffer academic satisfaction against the negative effect of procrastination. In another study, Hyland et al. (2014) found that RB have a protective role in the combating the effects of IBs on post-traumatic stress symptoms. Accordingly, RBs might be expected to have a similar role in the relationship between negative self-evaluation, fear of failure, and procrastination. Based on previous findings (Balkis 2015; Hyland et al. 2014, we hypothesized that RBs would affect the strength of the relationship between fear of failure and procrastination (*Hypothesis 2*). Moreover, based on Ferrari et al.'s (1995) explanation, we hypothesized that self-doubt would affect procrastination indirectly through a fear of failure, the indirect effect of self-doubt on procrastination via fear of failure would be moderated by RB and IB (*Hypothesis 3*, Fig. 1).

Method

Participants

A total of 293 college students (64.8% women) ranging in age from 18 to 32 ($N=293$, $M=20.75$, $SD=1.35$) and attending various departments of the faculty of education participated in the study. Of the participants, 18.2% were studying in the Turkish Education Department, 11.8% in the Social Sciences Education Department, 24% in the Psychological Counseling and Guidance Department, 11% in the Information and Science Technology Department, 12% in the Science Education Department, and 23% in the Pre-School Education Department.

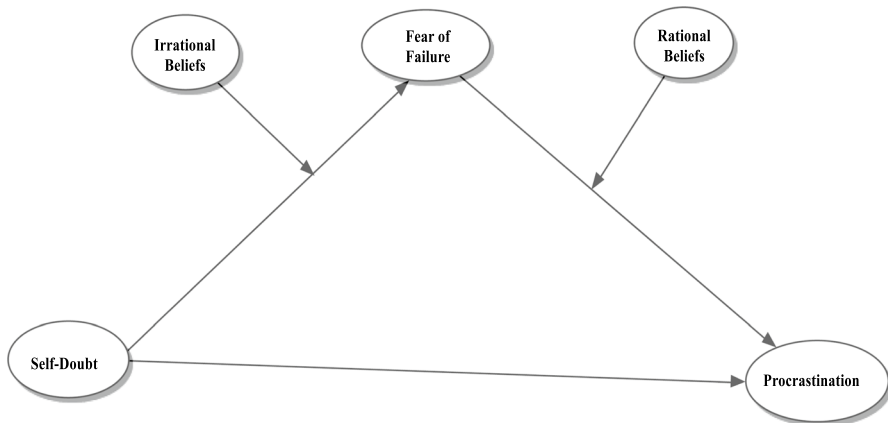


Fig. 1 Conceptual model of predictors of procrastination

Procedure

First, permission for the study was obtained from the deans and faculty of the various departments. Then, students were invited to participate in the study during their classes. Students were informed that the study was voluntary and that they could drop out of the study anytime they wanted. The students filled out the demographic information form and scale battery, including the scales explained below. This process lasted approximately 20 min. No added credit was given to the students for their participation.

Materials

Demographic Information Form

Information about students' gender, age, and department were gathered via a demographic information form prepared for the current study.

Self-Doubt Scale

Participants' level of self-doubt was determined via an eight-item self-doubt subscale of the subjective overachievement scale (Oleson et al. 2000). A sample item is "When engaged in an important task, most of my thoughts turn to bad things that might happen (e.g., failing) than to good." The statements are scored from 1 (*disagree very much*) to 6 (*agree very much*). The self-doubt subscale has shown an acceptable internal consistency with a Cronbach's alpha of .78 (Duru and Balkis 2014). For the current study, the inter-reliability coefficient was found to be $\alpha = .71$.

General Attitude and Belief Scale-Turkish Version (GABS-TV)

To determine the rational and irrational beliefs of the participants, GABS-TV, which was developed by Bernard (1990, 1998) and adapted to Turkish by Balkis and Duru (2018b), was used. In GABS-TV there are 32 items and seven sub-dimensions: rational beliefs (five items), self-downing (five items), need for achievement (five items), need for approval (five items), need for comfort (five items), demand for fairness (five items), and other downing (two items). Items in the scale assess both rational and irrational beliefs (demandingness, awfulizing, global self-rating, and low frustration tolerance) and the three content domains of achievement, approval, and comfort. The statements are rated on a 5-point Likert scale with response options of strongly agree, agree, neutral, disagree, and strongly disagree. The inter-reliability coefficients of the scale are between $\alpha = .64$ and .84 (Balkis and Duru 2018b) For the current study, the Cronbach alpha coefficients were .60 for rationality, .83 for self-downing, .76 for need for achievement, .80 for need for approval, .68

for need for comfort, .80 for demand for fairness, .60 for other-downing, and .88 for total irrationality.

Pure Procrastination Scale

The pure procrastination scale is a 12- item self-report measure of procrastination (Steel 2010). Participants were asked to rate the extent to which they agreed with the statements, such as, “I generally delay before starting on work I have to do.” The statements are scored from 1 (*strongly disagree*) to 5 (*strongly agree*).

First, the researchers translated the pure procrastination scale into Turkish, and then the two academics from the Department of Educational Sciences back translated it into English. A third academic, who can use both languages effectively checked the two forms and finalized the final product. This final form was used with 127 college students who are not included the sample of the current study. Exploratory factor analysis was used to test the structural validity of the scale. The analysis showed a single factor structure with 6.529 eigenvalue and explaining the 54.406% of the total variance. The inter-reliability coefficient of the scale was reported as $\alpha = .92$. For the current study, we performed confirmatory factor analysis (CFA) with data from the current study. Confirmatory factor analysis (CFA) is a multivariate statistical procedure that is used to confirm the factor structure of a set of observed variables. CFA makes possible to test the assumption that a relationship between observed variables and their underlying latent constructs exists (Child 1990; Kline 2005). We used, as suggested by Kline (2005), the following criteria in order to evaluate how the models fitted the observed data. These are Chi Square (χ^2 , $p > .05$; X^2/d ratio was below 3:1), Root Mean Square of Error Approximations (RMSEA) values $\leq .08$, Standardized Root Mean Square Residual (SRMR) values $\leq .05$ and fit indices, Comparative fit index (CFI), Tucker Levinson fit index (TLI), Goodness of fit index (GFI), and, normed fit index (NFI) values greater than .90 indicate good fits (Kline 2005).

Findings from CFA supported a single factor structure of the pure procrastination inventory: ($X^2/df = 2.225$), RMSEA = .065 (.049–.081), SRMR = .048, CFI = .94, TLI = .93. Cronbach’s alpha coefficient was $\alpha = .85$ for the current study.

The Performance Failure Appraisal Inventory (PFAI-Short-Form)

The PFAI-Short Form was used to determine the participants’ fear of failure (Conroy et al. 2002). The PFAI-Short Form includes five items. A sample item is “When I am failing, I am afraid that I might not have enough talent.” The statements are scored from 1 (*strongly disagree*) to 5 (*strongly agree*).

In the current study, similar translation stages were followed to create the Turkish adaptation of the PFAI-Short Form as used in the creation of the pure procrastination scale. The last organized form of the scale was used with 127 college students, and the inter-reliability coefficient was $\alpha = .79$. Factor analysis was conducted to determine the structural validity of the scale. The analysis showed a single factor structure with 2.716 eigenvalue and explaining the 54.313% of the total variance. CFA with data from this study confirmed a single factor structure of PFAI-Short- Form:

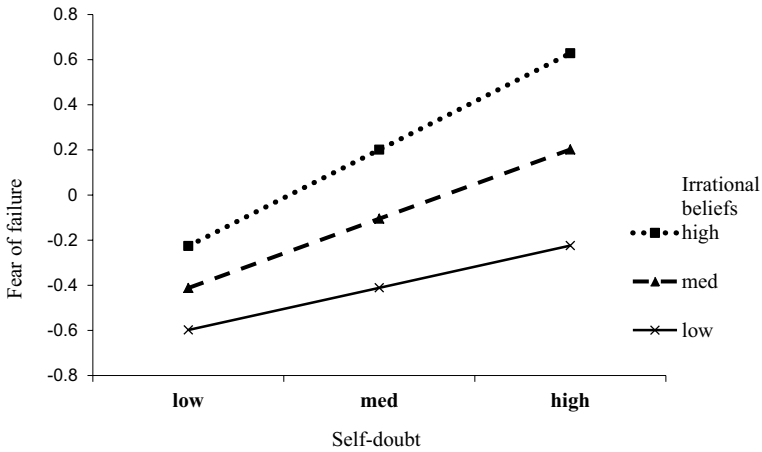


Fig. 2 Interaction effects of self-doubt and irrational beliefs on fear of failure

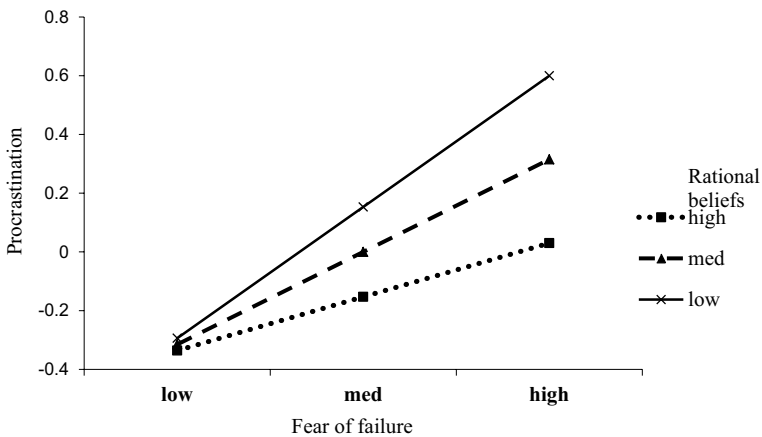


Fig. 3 Interaction effects of fear of failure and rational beliefs on procrastination

($X^2/df = .969$), RMSEA = .00 (.00–.098), SRMR = .022, CFI = 1, TLI = 1. The inter-reliability coefficient of the scale was $\alpha = .63$ for the current research.

Data Analysis

The data analysis was done in four stages using SPSS 22. At the first stage, the properties of the variables were analyzed. At the second stage, correlation analysis was conducted to examine the relationship between self-doubt, procrastination, fear of failure, and rational and irrational beliefs. Cohen’s *d* was calculated to determine the strength of this relationship. As for the third stage, using the SPSS macro PROCESS developed by Hayes (2013), the moderator role of the rational and irrational beliefs

in the relationship between self-doubt, fear of failure, and procrastination was tested (Figs. 2, 3). During the last stage, in the relationship between the fear of failure and procrastination, the mediator role of the fear of failure, and the moderator role of rational and irrational beliefs were tested in one single model.

When the predictive effect of the independent variable on the dependent variable through the mediator variable differs depending on the value of a moderator variable, this is called a moderated mediation effect (Hayes 2013). As suggested by Hayes (2013), we used the bootstrapped confidence interval (CI) to test if the indirect effects self-doubt on procrastination via fear of failure were significant at specific values of IBs and RBs. Sobel test required sampling of indirect effect is normally distributed; however, bootstrapping does not require that variables are normally distributed or skewed (Hayes 2009). Preacher and Kelley (2011) suggested using K^2 (Kappa-squared) to evaluate the strength of the mediation effect. We calculated K^2 (Kappa-squared) to determine the effect size of the indirect effect.

Results

Preliminary Analyses

We examined the univariate and multivariate outliers by using using $z \pm 3$ (Tabachnick and Fidell 2006) and Mahalanobis and Cook's distance. The data from four participants were found to be extreme outliers and excluded from the analyses. All analyses were made with the data from a total of 289 participants. Next, we performed a post hoc power analysis to estimate power. Power analysis indicated that a sample size of 289 has .80, .99 and 1.0 power for a small, medium and large effect size respectively. Finally, we conducted descriptive analysis in order to test the descriptive statistics and correlation among variables. Descriptive analyses indicated that skewness and kurtosis scores ranged from $-.638$ to $.613$, and all variables were relatively normally distributed (skewness and kurtosis ≤ 11).

Findings from the correlation analysis showed that procrastination was positively related to self-doubt, fear of failure, and IB and negatively associated with RB, with effect sizes ranging from moderate to large. Self-doubt was positively associated with fear of failure and irrational beliefs and negatively related with rational beliefs, with effect sizes ranging from small to large. Fear of failure was positively correlated with IB and negatively associated with RB, with effect sizes ranging from moderate to large. Finally, IB were negatively related to RB. Table 1 provides detailed results from descriptive statistics and correlation analyses.

Table 1 Correlations and descriptive statistics

	1	2	3	4	5	6	7	8	9	10	11
1. SDBT	-										
95% of CI		.42**	.40**	-.19**	.32**	.27**	.26**	.23**	.26**	.10	.09
		[.32, .52]	[.30, .49]	[-.29, -.08]	[.21, .42]	[.16, .38]	[.14, .37]	[.12, .34]	[.15, .37]	[-.01, .22]	[-.03, .20]
2. FOF		-	.41**	-.28**	.44**	.41**	.31**	.38**	.33**	.10	.20**
95% of CI			[.31, .51]	[-.38, -.17]	[.35, .54]	[.30, .51]	[.21, .41]	[.27, .47]	[.22, .43]	[-.01, .21]	[.09, .30]
3. PROC			-	-.27**	.24**	.28**	.13*	.16**	.26**	-.02	.14*
95% of CI				[-.37, -.17]	[.12, .35]	[.16, .40]	[.01, .24]	[.04, .28]	[.14, .38]	[-.13, .09]	[.03, .25]
4. RB				-	-.31**	-.41**	-.22**	-.31**	-.30**	-.11	-.08
95% of CI					[-.42, -.20]	[-.51, -.31]	[-.33, -.10]	[-.42, -.20]	[-.40, -.20]	[-.04, .26]	[-.20, .04]
5. IB					-	.56**	.77**	.78**	.76**	.53**	.51**
95% of CI						[.47, .65]	[.72, .81]	[.72, .82]	[.70, .81]	[.44, .61]	[.39, .60]
6. SDW						-	.30**	.41**	.44**	-.12*	.17**
95% of CI							[.19, .40]	[.31, .51]	[.33, .54]	[-.24, .03]	[.06, .28]
7. NFAC							-	.49**	.50**	.35**	.34**
95% of CI								[.38, .59]	[.39, .59]	[.23, .45]	[.22, .45]
8. NFAP								-	.53**	.26**	.23**
95% of CI									[.44, .61]	[.14, .38]	[.09, .36]
9. NFC									-	.23**	.25**
95% of CI										[.10, .35]	[.11, .38]
10. DFF										-	.34**
95% of CI											[.22, .46]
11. ODW											-
M	21.27	12.33	30.27	18.70	72.85	9.14	14.20	13.39	12.37	17.84	5.89
SD	4.48	3.25	7.36	2.68	13.05	3.37	3.63	3.82	3.26	3.66	1.88
Skewness	2.74	.625	.229	-.375	.038	.652	.052	.077	.563	-.428	.261
Kurtosis	-.260	.564	-.660	.309	.331	-.108	-.299	-.546	.647	-.064	-.559

Bootstrap sample size = 10,000

SDBT self-doubt, FOF fear of failure, PROC procrastination, RB rational beliefs, IB irrational beliefs, SDW self-downing, NFAC need for achievement, NFAP need for approval, NFC need for comfort, DFF demand for fairness, ODW other downing, CI confidence interval

* $p < .05$, ** $p < .01$

Moderated Mediation Analyses

Moderation Role of RB/IB on the Relationships Between Self-Doubt, Fear of Failure, and Procrastination

We used Hayes' (2013) SPSS macro PROCESS to examine all hypotheses as two single instances of moderated mediation (Model 21). Moderated mediation analysis gives us the ability to examine the possible indirect predictive effect of self-doubt on procrastination through fear of failure. Moreover, we can determine whether this indirect predictive effect depends on the moderation of RB and IB. Table 2 presents detailed results from the moderated mediation analysis.

For the relationship between self-doubt and fear of failure, moderation analyses indicated that both self-doubt ($B = .22$, $SE = .04$, $p < .001$) and IB ($B = .09$, $SE = .01$, $p < .001$) significantly predicted fear of failure, and the interaction effect of self-doubt and IB was significant as well ($B = .01$, $SE = .00$, $\Delta R^2 = .02$, $p < .05$). Then, to determine which of the IB content areas has more moderation effect, the analyses were repeated for each IB content area. The results revealed that the interaction effect of self-doubt and self-downing ($B = .03$, $SE = .01$, $\Delta R^2 = .01$, $p < .05$), interaction effect of self-doubt and need for approval ($B = .02$, $SE = .01$, $\Delta R^2 = .02$, $p < .05$), interaction effect of self-doubt and need for achievement ($B = .02$, $SE = .01$, $\Delta R^2 = .01$, $p < .05$), and total ego disturbance (self-downing, need for achievement, and need for approval) on fear of failure ($B = .01$, $SE = .01$, $\Delta R^2 = .02$, $p < .05$) were significant as well. Considering Cohen's (1988) argument, the effect size of the interaction effect might be evaluated as small. However, Evans (1985) stated that to determine the moderator effect power is so difficult that even a 1% contribution to total variance can be evaluated as significant. Furthermore, Champoux and Peters (1987) indicated that the level of increase in R^2 is not enough to identify the effect size of the interaction effect, thus to determine the interaction effect, they recommended calculating slope coefficients (Champoux and Peters 1987). Therefore, we interpret the interaction effects by utilizing simple slope analysis. The slope analysis showed that the positive relationship between self-doubt and fear of failure was stronger for the high IB slope ($b = .30$, $p < .001$) than for the low IB slope ($b = .14$, $p < .01$). These findings indicate that the positive relationship between self-doubt and fear of failure was reinforced with a high level of IB (Fig. 2). Thus, Hypothesis 1 was supported: IBs would serve as moderator between self-doubt and fear of failure.

For the relationship between fear of failure and procrastination, moderation analyses indicated that both fear of failure ($B = .73$, $SE = .14$, $p < .001$) and RB ($B = -.46$, $SE = .15$, $p < .01$) significantly predicted procrastination, and their interaction effect of fear of failure and RB was significant as well ($B = -.11$, $SE = .05$, $\Delta R^2 = .02$, $p < .05$). The slope analysis showed that the positive relationship between self-doubt and procrastination was stronger for the low RB slope ($b = 1.02$, $p < .001$) than for the high RB slope ($b = .43$, $p > .05$). These findings suggested a high level of RB buffer procrastination against the impact of fear of failure (Fig. 3). Thus, Hypothesis 2 was confirmed: RBs would affect the strength of the relationship between fear of failure and procrastination.

Table 2 Moderated mediation statistics (*N* = 289)

Predictor variables	<i>B</i>	<i>SE</i>	<i>t</i>	Outcome: Fear of Failure	
				95% of CI	Model <i>R</i> ²
Self-doubt	.22	.04	5.68***	[.14, .30]	.30***
Irrational beliefs	.09	.01	6.21***	[.06, .12]	
Self-doubt × irrational beliefs	.01	.01	2.09*	[.00, .01]	
Self-doubt	.24	.04	6.14***	[.17, .32]	.29***
Self-downing	.30	.06	4.87***	[.18, .42]	
Self-doubt × self-downing	.03	.01	2.29*	[−.01, .05]	
Self-doubt	.26	.04	6.45***	[.18, .34]	.23***
Need for achievement	.22	.05	4.38***	[.12, .31]	
Self-doubt × need for achievement	.02	.01	2.04*	[.01, .04]	
Self-doubt	.25	.04	6.82***	[.18, .33]	.27***
Need for approval	.26	.05	5.71***	[.17, .35]	
Self-doubt × need for approval	.02	.01	2.35*	[.01, .04]	
Self-doubt	.21	.04	5.59***	[.14, .29]	.32***
Egos disturbance	.15	.02	6.25***	[.10, .19]	
Self-doubt × ego disturbance	.01	.01	2.49*	[.01, .02]	
Predictor variables	<i>B</i>	<i>SE</i>	<i>t</i>	Outcome: Procrastination	
				95% of CI	Model <i>R</i> ²
Fear of failure	.73	.14	5.33***	[.46, .99]	.21***
Rational beliefs	−.46	.15	−3.11**	[−.75, −.17]	
Fear of failure × rational beliefs	−.11	.05	−2.43*	[−.20, −.02]	
Mediation analyses	<i>B</i>	<i>SE</i>	<i>t</i>	Outcome: Procrastination	
				95% of CI	Model <i>R</i> ²
Self-doubt	.46	.10	4.67***	[.27, .64]	.23***
Fear of failure	.67	.13	5.04***	[.41, .922]	
Conditional indirect effect analysis			Outcome: Procrastination		
Irrational beliefs	Rational beliefs	<i>ab</i>	Boot <i>SE</i>	Boot <i>LLCI</i>	Boot <i>ULCI</i>
Low	Low	.11	.04	.34	.19
Low	Med	.07	.03	.02	.14
Low	High	.03	.03	−.02	.11
Med	Low	.17	.04	.10	.26
Med	Med	.11	.04	.05	.20
Med	High	.05	.05	−.04	.16
High	Low	.23	.07	.13	.40
High	Med	.15	.06	.06	.29
High	High	.07	.07	−.05	.24

Unstandardized regression coefficients were reported. Bootstrap sample size = 10.000

LL low limit, *CI* confidence interval, *UL* upper limit

p* < .05, *p* < .01, ****p* < .001

Mediation Role of Fear of Failure in Relation to Self-Doubt and Procrastination

Results from mediation analysis showed that self-doubt positively predicted fear of failure ($B = .31$, $SE = .04$, $p < .001$) and procrastination ($B = .66$, $SE = .09$, $p < .001$). Procrastination was predicted by fear of failure ($B = .67$, $SE = .13$, $p < .001$), and the indirect effect of self-doubt on procrastination ($ab = .20$, $SE = .05$, 95% confidence interval $[CI] = .12, .31$) through fear of failure was significant as well. The point estimate of K^2 was .12 (95% of $CI = .072, .180$). According to Cohen's guidelines, the point estimate of K^2 was moderate. In other words, the indirect effect of self-doubt on procrastination via fear of failure was moderate.

Finally, we tested whether there was a significant indirect effect of self-doubt on procrastination through fear of failure, depending on the RB and IB, by using bootstrapping ($N = 10,000$). The findings indicated that the indirect effect of self-doubt on procrastination via fear of failure is stronger in the condition of a high level of IB and a low level of RB ($ab = .23$, $SE = .07$, 95% of $CI = .13, .38$) rather than in a high level of IB and a medium level of RB ($ab = .15$, $SE = .06$, 95% of $CI = .06, .29$) and in a high level of IB and a high level of RB ($ab = .07$, $SE = .07$, 95% of $CI = -.05, .25$). Thus, Hypothesis 3 was supported: self-doubt would affect procrastination indirectly through a fear of failure, the indirect effect of self-doubt on procrastination via fear of failure would be moderated by RB and IB.

Discussion

The current study was conducted to determine the interrelationships between self-doubt, fear of failure, rational and irrational beliefs, and procrastination. The findings revealed the mediating effect of fear of failure in the relationship between self-doubt and procrastination and the moderating effect of RB and IB in the relationship between self-doubt, fear of failure, and procrastination. These findings are in line with previous research concerning the connection of procrastination with self-doubt (Duru and Balkis 2014), fear of failure (Balkis and Duru 2012; Haghbin et al. 2012; Özer et al. 2009), and RB/IB (Balkis 2015; Beswick et al. 1988; Bridges and Roig 1997; Ferrari and Emmons 1994; Harrington 2005; Steel 2007).

According to the analysis of the first hypothesis of the research, the interaction effect of self-doubt and IB predicts the fear of failure. In other words, the positive relationship between self-doubt and fear of failure changes based on the level of IB. It was observed that the level of relationship between the two variables increases in the cases of high levels of IB, especially self-downing, need for approval, and need for achievement. The current findings support REBT's formulation of fear of failure in that fear of failure stems from absolutistic and rigid demands and negative evaluations about a person's self (Bernard 1995). The current results suggest that students with a high level of need for achievement (rigid/absolutistic demands for success.), need approval (rigid/absolutistic demands for being approved by others), and often practice self-downing (general negative evaluations about a person's self) are more likely to experience a fear of failure that facilitates procrastination when students have doubt about adequately completing assignments. Solomon and Rothblum

(1984) found that fear of failure was positively associated with irrational cognition. Individuals who have negative perceptions about the self were inclined to doubt their efficiency and to be uncertain about successfully finishing tasks (Balkis and Duru 2018a; McCown et al. 2012). This finding is also in line with the arguments of Ellis (2003) that when the individual's need for success, approval, and comfort is not met, his or her anxiety will increase, and, in turn, this high level of anxiety will trigger a fear of failure. In a similar way, Bernard (2011) stated that the unconditional self-approval of the individual protects him or her from the fear of failure.

As for the analysis made for the second hypothesis of the research, the interaction effect of fear of failure and RB predicts procrastination. Put differently, the positive relationship between fear of failure and procrastination changes depending on the level of RB. This positive relationship increases when the level of RB is low. When the level of RB is high, no relationship was found between the two variables. These results show that in any situation of failure if the individual evaluates the situation rationally, she or she can cope with it easier rather than practicing avoidance. Accordingly, REBT indicates that rational beliefs lead to adaptive and healthy behaviors and emotions (David et al. 2010).

Considering the third hypothesis of the research analysis, the findings revealed that fear of failure has a mediator role in the relationship between self-doubt and procrastination. Self-doubt predicts procrastination directly and also indirectly via the mediation of fear of failure. In other words, self-doubt predicts fear of failure, and, in turn, fear of failure predicts procrastination. These findings specifically support the theoretical link between self-doubt, fear of failure, and procrastination (Ferrari et al. 1995). Moreover, the analysis showed that the mediator effect of fear of failure on the relationship between self-doubt and procrastination changes depending on the level of RB/IB. In other words, the indirect effect of self-doubt on procrastination through fear of failure increases when RB are low and IB are high. Balkis and Duru (2018a) reported that RB buffered procrastination against the predictive effect of self-doubt. This finding also supports the arguments of REBT that IB leads to unhealthy and nonfunctional behaviors and emotions, while RB leads to healthy and adaptive behaviors and emotions (David et al. 2010).

Finally, the findings from the present study contribute to REBT literature by suggesting that RB function as a protective factor in the development of maladaptive emotional and behavioral consequences (Caserta et al. 2010). The current study suggests that in the case of a high level of IB, the indirect effect of self-doubt on procrastination via fear of failure changes based on the level of RB. Even if the level of IB is high, this indirect effect decreases when the level of RB are middle and high. Therefore, these findings empirically support the statements arguing that RB increase an individual's resilience in stressful situations (Caserta et al. 2010).

In sum, this study should be evaluated with its limitations. This is a cross-sectional study; so a cause-effect relationship should not be considered between the variables. Future experimental and longitudinal research might provide clarity for the role of RB and IB in the relationship between self-doubt and procrastination. Finally, another limitation of the current study is that the sample was not diverse enough because the participants were all college students (64.8% female), and they had roughly the same age ($M = 20.75$, $SD = 1.35$). This might prevent the generalizability

of the findings of this study. Therefore, future research with different samples might contribute to the generalizability of the current findings.

Conclusion

In summary, findings from the current study give insight into two of the mechanisms that clarify the relationship between self-doubt and procrastination. First, it enhances the explanation of Ferrari et al. (1995) regarding relationships between self-doubt and procrastination that suggest that self-doubt leads to fear of failure that facilitates procrastination. In line with this suggestion, the current findings also suggest that self-doubt generates the fear of failure, which, in turn, facilitates procrastination. Second, the findings of the current research support REBT, indicating that IB lead to unhealthy and maladaptive emotions and behaviors, while RB lead to healthy and adaptive behaviors and emotions. In this sense, when IB are high, the effect of self-doubt on fear of failure increases, and a high level of RB have a protective role against the effect of fear of failure on procrastination. Finally, the current findings provide additional pieces of evidence for the protective role of RB. In this regard, the results suggest that even if the level of IB is high, the middle and high level of RB decrease the indirect effect of self-doubt on procrastination through fear of failure.

There are some implications in light of the research findings and explanations above. First, the findings point out the role of both RB and IB in the relationship between self-doubt and procrastination. As Ferrari et al. (1995) stated that as the level of self-doubt increases, the fear of failure increases as well. Moreover, IB are effective in this process. In the other words, the effect of self-doubt on fear of failure varies depending on the level of IBs. This effect increases when the level of IBs are high, but decreases when it is low. Second, the effect of fear of failure on procrastination changes based on the level of RB. The negative effect of fear of failure on procrastination is removed if the individual has a high level of RB. Third, the indirect effect of self-doubt on procrastination through fear of failure increases when the individual's RB are low and IB are high. Individuals who have doubts about their self and efficiencies might have a fear of failure because of IB. If their RB levels are low also, they will probably procrastinate. Therefore, psychological counselors may consider this finding when they are dealing with individuals who have self-doubt and fear of failure and, thus, a high possibility of procrastination. The current findings provide an understanding related to the development of interventions which target to cognitive process to reduce the procrastination.

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Compliance with Ethical Standards

Conflict of interests The authors declare no conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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