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Research Article

Factor Structure of Temporal Focus Scale and its Mediating Role in Relationship between Impulsive Choice and Procrastination among University Students

Hashem Jebraeili¹

1. Assistant Professor, Department of Psychology, Faculty of Social and Educational Sciences, Razi University, Kermanshah, Iran.

Article Info

Corresponding Author:

Hashem Jebraeili

Email:

h.jebraeili@yahoo.com

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Abstract

Aim: Procrastination or voluntary delay in doing an important and necessary activity, despite the expected negative consequences that outnumber the positive consequences of delay, is a common phenomenon in modern society. Based on various data, procrastination affects 20 to 95 percent of adults in western countries, and studying this phenomenon is very important. The purpose of this study was to investigate the psychometric properties and the factor structure of the temporal focus scale and to study the mediating role of temporal focus in the relationship between procrastination and impulsivity- delay discounting.

Methods: Four hundred people (279 females and 121 males) were selected through convenience sampling from the universities of Kermanshah (west of Iran). They were evaluated by questionnaires on impulsivity, monetary choice, pure procrastination, and temporal focus. Data were analyzed based on Cronbach's alpha test, intra-class and Pearson correlation tests, exploratory factor analysis, and structural equation modeling using SPSS and Mplus software.

Results: The results showed that the reliability of the temporal focus scale was appropriately using all three measures of internal consistency (Cronbach's alpha = 0.91), split-half reliability (Guttman split-half coefficient = 0.90), and test-retest reliability (intra-class correlation = 0.78). Exploratory factor analysis led to the expected three-factor structure. The proposed model fitted well with the data. Temporal focus, urgency, and delay discounting had direct effects, and urgency and lack of perseverance had indirect effects (due to temporal focus) on procrastination.

Conclusion: The Persian version of the temporal focus scale has acceptable validity and reliability, and given the little time it takes to be filled out, it can be a proper tool to be used in various situations. Temporal focus, especially focusing on the past, plays a unique role in negligence, and a closer examination of this variable may help to better understand the underlying mechanisms of procrastination.



1. Introduction

Procrastination or voluntary delay in doing an important and necessary activity, despite the expected negative consequences that outnumber the positive consequences of delay (Klingsieck, 2013), is a common phenomenon in modern society. Based on various data, procrastination affects 20 to 95 percent of adults in Western countries (Steel, 2007), and men and women are equally subject to procrastination (Zabelina et al., 2018). Procrastination is considered a defect in self-regulation (Wypych et al., 2018) and can constantly cause problems for individuals in different situations (Steel & Ferrari, 2013), and it is very detrimental to job performance, academic performance, and psychological well-being (Stead et al., 2010). Individuals who procrastinate and as a result do not work on the intended task not only feel guilty and anxious because of their delayed strategy (Díaz-Morales & Ferrari, 2015) but are often considered as bad, harmful, and stupid people by others, even those who are procrastinating themselves (van Eerde, 2003). Research has shown that procrastination is associated with poor personal performance in the field of work and education, experiencing negative emotions such as shame, guilt, and depression, and would lead to negative health behaviors such as delayed care seeking for health problems (Steel, 2007).

As a result of progress in clarifying correlations of procrastination several factors have been identified that may lead to this problem (Steel, 2007). Although procrastination is mainly regarded as a personality trait, researchers have identified relevant factors at both task-specific and individual-difference levels. At the task-specific level, research has shown that the probability of procrastination is more when tasks are more annoying (Ackerman & Gross, 2005), indicating that individuals temporarily avoid tasks because of aversion (Zhang et al., 2019). Similarly, evidence has shown that procrastination is likely to occur for tasks when the rewards associated with these tasks are granted with delay (Wu et al., 2016), which indicates less capability of the delayed incentives in motivating people to act (Zhang et al., 2019). At the level of individual differences, many researchers have attempted to trace the sources of procrastination by putting them into the five-factor model of personality (Digman, 1990). In this process, self-control and impulsivity, which are the dimensions of factors that underlie conscientiousness and neuroticism, respectively, have often been identified as the most predictable higher-order personal traits of individuals with a tendency to procrastination (van Eerde, 2003; Watson, 2001).

A large body of research has supported the link between impulsivity and procrastination, and impulsivity seems crucial in explaining the underlying mechanism of procrastination (Wypych et al., 2018). Steel (2007) showed that impulsivity is one of the strongest correlations of procrastination. Gustavson et al. (2014) in a behavioral genetics study showed that procrastination and impulsivity are partly hereditary and that these two elements are initially related through genetic influences. Liu and Feng (2017) also with brain structural analysis found a negative correlation between procrastination and the gray matter volume in the dorsolateral prefrontal cortex. The dorsolateral prefrontal cortex is one of several brain units that has a similar relationship with procrastination (Liu & Feng, 2017). Other studies have shown that procrastinators' intertemporal choices prefer immediate rewards to future rewards (Wu et al., 2016) and have difficulty with delayed gratification (van Eerde, 2003). These findings not only indicate a high degree of

impulsivity in procrastinators (Steel & König, 2006) but may also affirm high delay discounting in them.

Delay discounting which is closely related to procrastination is a behavioral phenomenon in which incentives lose their value as a result of a delay in being received (Madden & Bickel, 2010). Delay discounting is a behavioral economics term that denotes the decrease in the current value of a future reward as a result of the delay in receiving that reward (Gray et al., 2016). The higher one's score in delay discounting might be, the more likely s/he would be intended to short-term rewards, even if the value of the immediate reward is less than the delayed reward (Kirby, 2009). Studies show that the tendency to procrastinate may be attributed to an inability to delay gratification associated with a lack of impulse control (van Eerde, 2003). Procrastinators often delay their work several times when faced with long-term goals to obtain short-term resources (Steel & Klingsieck, 2016). Consistent with these findings, the temporal motivation theory (TMT) (Steel & König, 2006) considers time delay sensitivity as an important element in the motivational utility equation (Steel, 2007). According to this equation, the more the time delay increases, the more the utility would decline (Steel, 2010). Distraction, impulsivity, and lack of self-control are closely related to delay sensitivity. As a result, it is assumed that procrastinators are more impulsive and more sensitive to time delays compared to those who delay less (Wu et al., 2016).

Here in particular it seems that the concept of time is especially important the role of time sensitivity has been somewhat confirmed in the tendency to procrastination (Wu et al., 2016), and various studies show that individuals with higher levels of procrastination are concerned about the present rather than the future (Díaz-Morales & Ferrari, 2015; Diaz-Morales et al., 2008; Ferrari & Díaz-Morales, 2007; Sirois, 2014). Therefore, not only does temporal focus seem to be directly related to procrastination, but the relationship between impulsivity and delay discounting, and procrastination may also be explained by this temporal focus on the present rather than the future. Temporal focus is a relatively constant pattern of the extent to which people turn their attention to the past, present, or future (Shipp et al., 2009). Individuals live differently in the moment; they may dwell in the past or dream about the future (Shipp & Aeon, 2019). The concept of temporal focus goes back to Lewin's early work (Lewin, 1943) when he regarded it as a version of the person's future or past in his present moment and he argued that people can only be understood in the light of their widespread "time perspective". The idea was developed by Frank (1939), who incorporated all aspects of the past, present, and future into the concept of time perspective.

Other researchers consider time perspective as a stable personality trait its situational properties are based on impacts of culture, society, religion, age-related specialties, socioeconomic status, and education level (Zimbardo & Boyd, 1999). Zimbardo and Boyd (1999) argue that time perspectives reflect unconscious processes that include how experiences are assigned to time classifications in order to create order, structure, and sense for these events. When a person finds the tendency to repeatedly and habitually emphasize one temporal framework over the others at the moment of decision-making, this temporal framework can turn into a cognitive temporal bias. Excessive and persistent use of this temporal framework can become a form of preparedness that guides day-to-

day decisions in different areas (Sirois, 2014). According to this viewpoint, a present-oriented time perspective can also have negative (fatalistic) or positive (hedonistic) values, which the latter reflects a focus on seeking pleasure and less concern for future consequences of this pleasure orientation (Shipp & Aeon, 2019; Zimbardo & Boyd, 1999). In accordance with these views, various tools have been developed for temporal focus measurements, in the most recent efforts, Shipp et al. (2009) developed a 12-item Temporal Focus Scale (TFS) based on previous tools, all four of which measure one of the presents, past, and future temporal focuses. Not only does this scale enjoy high reliability and validity (McKay et al., 2012; Shipp et al., 2009), but because of its shortness, it can be a preferred tool for use in clinical and research settings.

1. Objectives

The present study was aimed first to investigate the psychometric properties and factor structure of the Persian version of this tool for a sample of students in the west of Iran, and second, to study the mediating role of temporal focus in the relationship of impulsivity and delay discounting with procrastination.

3. Methods

3.1. Sample and procedure

The present study is an analytical, cross-sectional research. The statistical population of the study consisted of Kermanshah University students in the second semester of the academic year 2018-2019. In this study, the available sampling method was used for data collection. The sample size was as large as 400 individuals according to the research objectives and considering the statistical methods used for data analysis. In the present study, the last English version of the questionnaire was translated into Persian by the authors. Then the items translated by different people were compared with each other and the appropriate ones were selected. After selecting the items for content analysis, the equivalence of the Persian translation with the original items, and comprehensibility of the items for non-psychologists, it was respectively assigned to a group of psychologists, a group of bilinguals, and a group of non-psychology students and their views were used to prepare the final Persian version of the questionnaire. Ultimately, the final items were translated back into English and compared to the original version, in order to avoid differences in the meaning and concept with the original one, besides keeping the fluency of the Persian text. After preparing the Persian version, along with other questionnaires, this questionnaire was distributed among the target population at the three Razi, Kermanshah Medical Sciences, and Kermanshah Azad Universities to be filled. Additionally, to obtain the test-retest reliability, the questionnaire was administered to 30 undergraduate students of Razi University twice with a 3-week interval.

3.2. Research Tools

Short form of the five-factor impulsive behavior scale: This scale is a short form (20-item) of a 59-items behavioral impulsivity scale designed in response to criticizing the length of the original scale (Cyders et al., 2014). Like the original version, it included five main dimensions negative urgency, lack of premeditation, lack of perseverance, sensation

seeking, and positive urgency. The items on this scale are scored based on a 4-point scale from 1 (completely disagree) to 4 (completely agree). The reliability of the subscales of the questionnaire was reported to be between 0.74 and 0.88 using Cronbach's alpha test. The validity of this scale by calculating the correlation coefficient of the short and long-version subscales of this questionnaire showed a correlation coefficient of 0.69 for negative urgency, 0.83 for positive urgency, 0.63 for lack of perseverance, 0.71 for lack of reflection, 0.64 for excitement which indicates the criterion validity of this scale (Cyders et al., 2014). In the research carried out in Iran (Jebraeili et al., 2019) the internal consistency reliability of this scale was 0.75 and its split-half reliability was 0.76. The results of exploratory factor analysis, apart from combining two dimensions of urgency under one factor, confirm the factor structure of this scale. The correlation between the short-form dimensions of the impulsive behavior scale and its corresponding dimension in the long form also indicates a high positive correlation ($r = 0.48$ to $r = 0.74$) for the two forms of this scale.

Monetary choice questionnaire: This questionnaire (Kirby & Marakovic, 1996; Kirby et al., 1999) contains a set of 27 items that provide participants with choices between smaller immediate rewards and larger delayed rewards (for example, "would you prefer \$54 today or \$80 in 30 days?"). Instant rewards range from \$11 to \$78 and delayed rewards range from \$25 to \$85 with a delay of 7 to 186 days. Delayed rewards are divided into three groups based on size, and each group contains 9 items: small rewards (\$25 - \$35), medium rewards (\$50 - \$60) and big rewards (\$75 - \$85). As Kirby et al. (1999) described, the magnitude of delay discounting in participants, represented by k , lies in the range between 0.00016 and 0.25, with higher values indicating greater preference for smaller immediate rewards compared to the larger rewards that may come with a delay. Regarding the difficulty of calculating the k value, various computer programs have been developed to do this, including calculating the k value through Excel (Kaplan et al., 2016) and SPSS Syntax (Gray et al., 2016). The psychometric properties and clinical and research utility of this tool have been reported appropriate in various studies (Kirby, 2009; Kirby & Finch, 2010). In the study performed in Iran (Jebraeili et al., In press) the internal consistency reliability of the whole questionnaire was 0.89, its split-half reliability was 0.88, and its test-retest reliability for a three-week period was 0.78. The results of exploratory factor analysis also affirmed the single factor structure of the questionnaire.

Pure procrastination scale: This scale (Steel, 2010) contains 12 items that measures procrastination on a five-point Likert scale from one (never) to five (almost always). Scores obtain from this scale range from 12 to 60 and higher scores indicate more procrastination. Steel (2010) reported internal consistency of this scale using Cronbach's alpha of 0.92. Its validity and reliability have been confirmed in various studies (Rebetz et al., 2014; Rozental et al., 2014; Steel, 2010). In the study carried out in Iran (Besharat et al., 2018), the Cronbach's alpha coefficient for the students was 0.89, and for the public it was 0.93. The construct validity of this scale is also confirmed by exploratory and confirmatory factor analysis.

Temporal focus scale: This scale (Shipp et al., 2009) which has been designed to measure cognitive engagement with the past, present, and future, has 12 items, all four of

which are assigned to one of the present, past, and future times. This questionnaire is scored on a seven-point Likert scale from one (completely disagree) to seven (completely agree), and higher scores in the time-related items indicate more conflict with that time. Shipp et al. (2009) in a series of samples obtained Cronbach's alpha for this scale in the range of 0.74 to 0.89. The validity of this scale has also been reported as appropriate by examining the correlation between the factors of this scale and other pre-existing tools of time perspective (Shipp et al., 2009).

3.3. Ethical consideration

It is explained to the participants that participation in the study is voluntary and there is no compulsion to complete the questionnaires.

3.4. Data analysis

Data were analyzed using Cronbach's alpha test, confirmatory factor analysis, structural equation modeling, and intra-class and Pearson correlation tests, and SPSS version 22 and Mplus software version 7.

4. Results

4.1. Descriptive and demographic information

Demographic data indicated that out of 400 participants in this research 166 (41.5%) were from Razi University, 109 (27.3%) were from Kermanshah University of Medical Sciences, and 125 (31.3%) were from Azad University, Kermanshah Unit. 121 (30.3%) participants were male and 279 (69.8%) were female; 348 (87%) were single and 51 (12.8%) were married, and 1 had not mentioned his/her marital status. The average age of the participants was 22.64 with a standard deviation of 3.68. To assess the reliability of the Persian version of the temporal focus scale, first this questionnaire was administered to 30 undergraduate students of Razi University with a three-week interval. The results of the intra-class correlation test showed that the test-retest reliability coefficient of the total score of this questionnaire was .78 which is statistically significant ($p < .001$). The internal consistency reliability of the questionnaire using the Cronbach's alpha test in the original sample of the study for the three past, present and future times was .88, .80 and .89, respectively, and it was .91 for all items of the questionnaire. The split-half reliability of the questionnaire was .90 for all items using the Guttman split-half coefficient.

4.2. Psychometric characteristics of temporal focus scale

To examine the factor structure of the questionnaire the exploratory factor analysis with the principal component analysis method and the direct Oblimin rotation were used. Prior to using this analysis, the appropriateness of the data for exploratory factor analysis was assessed using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of Sphericity. The results of these tests ($KMO = .89$; $P < .01$, $X^2 = 3102.70$) indicated the appropriateness of the data for exploratory factor analysis. Eigenvalues greater than one were used to extract the factors. This criterion resulted in the extraction of three factors

that together accounted for about 73% of the total variance of temporal focus, and the items relating to each one time were subordinate to the factor at that time (Table 1).

Table 1. Factor loadings of the temporal focus scale items on the relevant factor

Items	Future factor	Present factor	Past factor
12. I think about times to come.	.92	-	-
7. I imagine what tomorrow will bring for me.	.87	-	-
5. I focus on my future.	.83	-	-
3. I think about what my future has in store.	.58	-	-
8. My mind is on the here and now.	-	.93	-
2. I live my life in the present.	-	.81	-
4. I focus on what is currently happening in my life.	-	.65	-
10. I think about where I am today.	-	.47	-
11. I think back to my earlier days.	-	-	.95
1. I think about things from my past.	-	-	.94
6. I replay memories of the past in my mind.	-	-	.84
9. I reflect on what has happened in my life.	-	-	.42

Factor loads less than .30 were omitted from the table.

4.3. Mediating role of temporal focus in the relationship between procrastination and impulsivity

The mediating role of temporal focus in the relationship between procrastination and impulsivity

In order to achieve the second goal of the study, first the correlation of variables was tested using the Pearson test and then the conceptual model of research was examined using the structural equation modeling. Results of the correlation test (Table 2) indicated that procrastination has a significant correlation with the past focus ($r=.23$, $P<.01$), delay discounting ($r=-.17$, $P<.01$), and most dimensions of impulsivity (all dimensions except for lack of perseverance). Positive correlation of the past focus with procrastination, the positive correlation of current focus with sensation seeking ($r=.26$, $P<.01$), and the negative correlation of the future focus with lack of premeditation ($r=-.46$, $P<.01$) also indicate some kind of criterion validity of the temporal focus scale.

Table 2. Correlation coefficients for variables (n= 400)

Variables	M	SD	Procs.	Past	Curr.	Futu.	Dela.
Procrastination	32.28	10.25					
Past focus	20.80	5.47	.23**				
Current focus	19.46	4.82	.02	.50**			
Future focus	21.44	5.19	.08	.68**	.55**		
Delay discounting	.098	.081	-.17**	-.07	.05	-.11*	
Lack of premeditation	7.56	2.38	.16**	-.34**	-.37**	-.46**	.02
Negative urgency	9.51	2.61	.31**	.27**	.02	.14**	-.02
Sensation Seeking	10.57	2.72	.12*	.17**	.26**	.20**	-.01
Lack of perseverance	7.55	2.62	.06	-.42**	-.38**	-.49**	.02
Positive urgency	8.84	2.63	.33**	.17**	-.03	.09	-.01

** $P<.01$ * $P<.05$

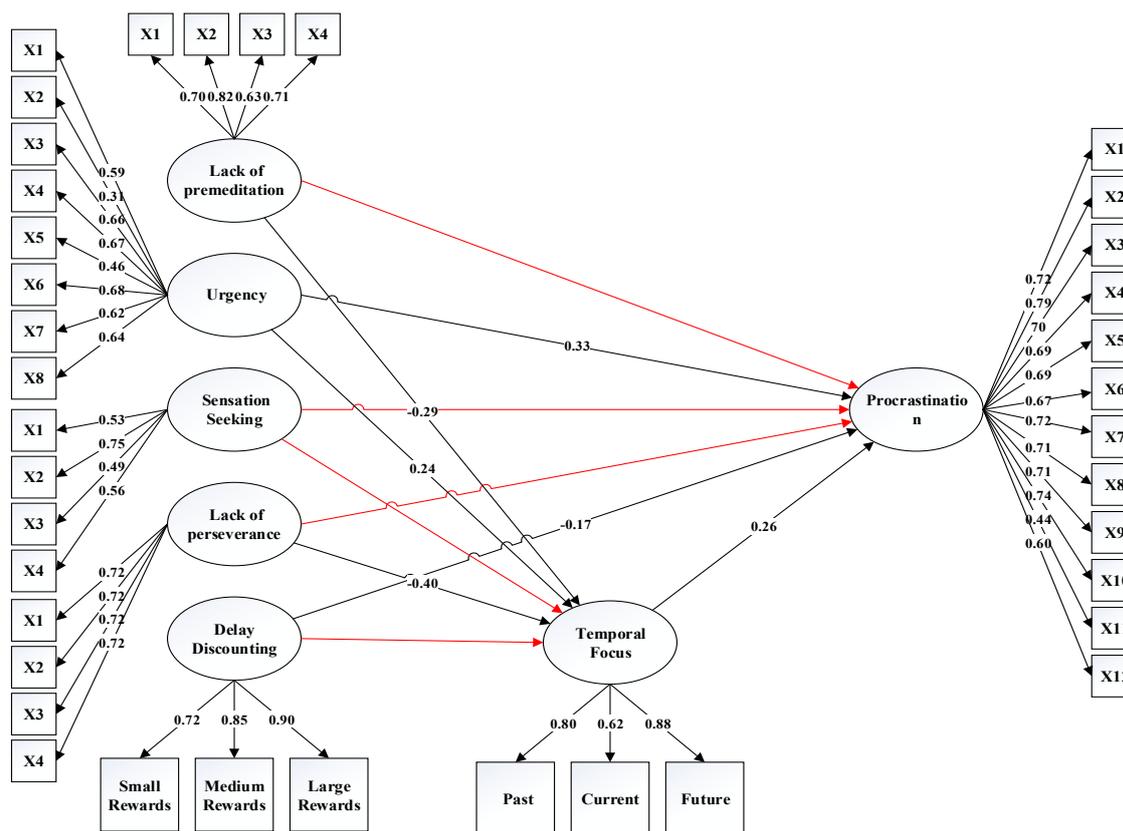


Figure 1. Structural equation modeling and significant direct path effects

Structural equation modeling (SEM) was used to evaluate the proposed model by the method of estimating the weighted least squares with adjusted mean and variance (WLSMV). The reason for choosing this method was the Likert type of indicators of some of the latent variables that could make it difficult to achieve a multivariate normal distribution. Model test results showed that the proposed model fits well with the data (Root Mean Square Error Of Approximation (RMSEA)=.05, Comparative Fit Index (CFI)=.91, Tucker Lewis index) TLI(=.90). In addition to the direct effects of temporal focus, urgency and delay discounting (Figure 1), urgency ($\beta=.06$, $P<.05$) and lack of perseverance ($\beta=-.10$, $P<.05$) had also significant indirect effects on procrastination. The model explained 28% of the total variance of procrastination and 44% of the total variance of temporal focus.

5. Discussion

The purpose of this study was first to investigate the psychometric properties of the Persian version of the temporal focus scale. For this purpose, the reliability and validity of this questionnaire were evaluated using various methods. The results of the Cronbach's alpha test that was used to examine the internal consistency of the questionnaire showed that the items of the questionnaire had good internal consistency and were highly correlated. Similarly, the results of the Gutman test which was applied to assess the split-half reliability showed that the first half of the questionnaire was similar to the second half and the distribution of the questionnaire questions was uniform. Most importantly, the results of the intra-class correlation test used to assess retest reliability showed that the temporal

stability of this questionnaire was high and the scores of individuals on the questionnaire did not change significantly over time.

Exploratory factor analysis was used to investigate the factor structure of the questionnaire. The results of the analysis showed that based on the default criterion (Eigenvalue greater than one) and without any changes in the factor extraction criteria, three factors were extracted, each of which was exactly the same as focusing on one time. Items associated with any time were exactly located under their own factor, and the correlation between neither of these items with the other two factors was not found to be above 0.30. The extracted factors were able to cover about 73% of the total temporal focus variance. On the whole, these findings confirmed the factor structure of the temporal focus scale. In addition to the factor structure test, the validity of the scale was evaluated by examining the correlation between temporal focus scores and other tools. The results showed a positive correlation between focusing on the past and procrastination, a positive correlation between focusing on the present and sensation seeking, and a negative correlation between focusing on the future and lack of premeditation. The findings show that people who are more involved with the past postpone their work; those who are more engaged with the present are looking for exciting experiences and enjoying life; and people who are more focused on the future before embarking on every action think about its consequences. These findings, in line with what is expected of focusing on each of the times (Shipp & Aeon, 2019; Zimbardo & Boyd, 1999), indicate the criterion validity of the temporal focus scale.

To achieve the second objective, the structural relationships of the variables were investigated. The results of the structural equation modeling showed that the proposed model based on the mediating role of temporal focus on the relationship of impulsivity and delay discounting with procrastination fits well with the data. Temporal focus, urgency, and delay discounting had a direct effect, and urgency and lack of perseverance had a significant indirect effect on procrastination. In the meantime, impulsivity-related dimensions had the greatest relationship with procrastination in particular, and not only the effect of urgency and perseverance on the model but also the two-variable correlation of other dimensions of impulsivity with procrastination were significant.

To understand the relationship between procrastination and impulsivity, one must consider that impulsivity is a multidimensional construct. In fact, Whiteside and Lynam (2001) identified four distinct components of impulsivity, namely: lack of premeditation (tendency to ignore the consequences of an action before engaging in it); urgency (tendency to experience strong and repetitive reactions under emotional conditions); lack of perseverance (inability to focus on a difficult or frustrating task); and sensation seeking (the tendency to enjoy and pursue new or exciting activities). Although Cyders et al. (2014) attempted to add a fifth factor (the tendency to experience strong and frequent reactions under positive affect), the study of the factor structure (Jebraeili et al., 2019) did not support the five-factor model and showed that the proposed items by Cyders et al. (2014) are subcategories of the same urgency factor and are not a separate factor. For this reason, both positive and negative urgency factors in the present study were subjected to a factor called urgency in the model.

The results of the present study indicating the correlation between procrastination and impulsivity dimensions are in line with Rebetz et al. (2018), which emphasizes the role of impulsivity in procrastination. Even Rebetz et al. (2018) predict that the lack of premeditation, urgency and lack of perseverance which are associated with cognitive self-control mechanisms play a more prominent role in explaining procrastination compared to sensation seeking which is dependent on emotional areas (Bechara & Van Der Linden, 2005). In the present study, urgency directly and indirectly and lack of perseverance indirectly influenced procrastination, too. Therefore, as Rebetz et al. (2018) suggest, the urgency observed in procrastinators may indicate readiness to engage in activities other than the intended activity when faced with severe emotional states. Delay discounting which was another variable that had a direct effect on procrastination and is closely related to the concept of urgency may indicate the preferences of procrastinators for immediate rewards over delayed rewards.

Although lack of perseverance had no direct effect on procrastination, it indirectly led to a reduction in procrastination by decreasing temporal focus. Temporal focus itself was strongly correlated with procrastination, which was reflected in both structural equation modeling and bivariate correlations. Results of structural equation modeling showed that there is a positive direct relationship between temporal focus and procrastination, which means that people who care more for time are more likely to be procrastinated. However, to better understand the relationship between temporal focus and procrastination, paying attention to the two-way relationship between each of the times and procrastination seems more informative. Reviewing the bivariate correlations shows that out of the three times, only focusing on the past has a significant positive correlation with procrastination. Although most previous studies (Díaz-Morales & Ferrari, 2015; Diaz-Morales et al., 2008; Ferrari & Díaz-Morales, 2007; Sirois, 2014) showed that procrastinators are more concentrated on the present than on the future, and use temporal motivation theory (Steel & König, 2006) to explain their findings, it seems that in the present study procrastination can be better explained with the emotion regulation perspective (Wypych et al., 2018) and the procrastinators are probably involved in past experiences and dealing with the emotions that result from it. In line with this conclusion, the indirect negative effect of lack of perseverance on procrastination can originate from the fact that the less the focus on the past may be, the less the procrastination will be.

6. Limitation and Recommendation

This study has some restrictions that may limit the generalization of results: one of these restrictions is that the study is cross-sectional and it has been conducted on students whose temporal focus may largely be different in comparison to the general public.

7. Conclusion

The temporal focus scale has good validity and reliability and given the relatively short time required to fill it, it can be an appropriate tool for being used in clinical and research settings. The temporal focus seems to be a valuable concept in understanding the underlying mechanisms of procrastination, and part of the relationship between impulsivity and procrastination reported in various studies is due to changes in temporal

focus. In particular, it seems that focusing on the past, which has not received enough attention in past studies, plays an integral role in procrastination and linking other variables to procrastination, and needs to be studied more deeply in future research.

8. Author Contributions

The article has only one author

9. Ethical moral code

The study does not involve animal or human intervention.

10. Acknowledgment

The author thank all dear colleagues who have helped in this research.

11. Conflicts of interest

The authors declare there is no conflict of interest in this article.

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