Cognitive Computing and Internet of Things, Vol. 73, 2023, 143–151
https://doi.org/10.54941/ahfe1003291

Cognitive Nature of Procrastination

Dastan Smanov and Ekaterina Zabelina

Chelyabinsk State University, Chelyabinsk, 129 Bratiev Kashirinykh 454001, Russia

ABSTRACT

One of the typical social problems of the 21st century - procrastination - is defined as the unreasonable postponement of desired goals indefinitely, even when aware of the negative consequences of this delay (Lay, 1997). Although possible causes of procrastination have long been cited, such as irrational beliefs (Ellis, Knaus, 1977), low self-esteem, and fear of failure (Burka, Yuen, 1983), cognitive predictors of procrastination have not been studied holistically as a system. Moreover, it remains unclear which cognitive mechanisms are involved in different types of procrastination. This study seeks to partially fill this gap by finding the cognitive features of people prone to procrastination. The results of the study (N = 311) revealed differences in most of the diagnosed cognitive indicators, which suggests an important role of cognitive processes in the shaping of a procrastination tendency. Comparison of cognitive scores in the high and low procrastination groups showed that procrastinators had higher rates of cognitive closure, namely higher scores on the scales of order (p = 0.000), predictability (p = 0.052), decisiveness (p = 0.000), aspiration to cognitive closeness (p = 0.000). This is consistent with the data on higher stiffness in procrastinators (p = 0.05). Besides, procrastinators have a more pronounced frustration tolerance (p = 0.000), and a sense of self-improvement (p = 0.001). They have less vigilance (p = 0.000), but more overindulgence (p = 0.000), as well as more avoidance in decision-making (p = 0.000). Differences are also found on the temporal focus scale: people prone to procrastination are less focused not only on the future (p = 0, 000) but also on the present (p = 0, 000). Predictably, procrastinators had significantly lower levels of claims (p = 0.004) and self-esteem (p = 0.01). Procrastinators showed lower indicators of self-organization of activities: consistency (p = 0.000), purposefulness (p = 0.000), perseverance (p = 0.024), fixation (p = 0.000), self-organization (p = 0.000), orientation to the present (p = 0.000). At the same time, they have more pronounced cognitive copying strategies: avoiding behavior (p = 0.000), anxiety (p = 0.000), cognitive overestimation (p = 0.000), and intolerance to stress situations (p = 0.000). The results of the discriminant analysis made it possible to determine the indicators that have the greatest influence on inclusion in the group procrastinators. These are low orientation towards the present, avoidance in decision-making, vigilance, the pursuit of cognitive closeness, low tolerance of frustration, and low self-organization of activities. The study thus expands the understanding of the cognitive nature of procrastination. The results suggest that such cognitive features as a weak focus on the events of the present, a habit of avoiding decision-making, weakened vigilance, an increased desire for cognitive closure, low tolerance to frustration, and a low level of self-organization of activities are important predictors of procrastination.

Keywords: Procrastination, Cognitive predictors, Cognitive closeness, Cognitive overestimation

INTRODUCTION

The rapidly accelerating development of modern life, built on the widespread use of information technology in all spheres of activity, leads to the fact that most people do not keep up with its rhythm. A huge number of tasks and problems that require urgent resolution are perceived differently by a person. One may strive to do anything and finish everything in time or postpone the decision of important matters for the future, even if this leads to negative consequences for him. The latter phenomenon is called procrastination.

The foundations of the study of procrastination laid by P. Rigenbach, A. Ellis, and V. Knaus (1987) became the starting point of its study as a psychological phenomenon. The accumulated empirical experience, however, turns out to be rather fragmentary and does not cover all aspects of the problem. Despite numerous works on this problem (Ferrari, Tice, 2000, Lay, 1986, Milgram et al., 1992; Steel, 2007), determining the causes of procrastination remains a difficult and controversial task, including due to the lack of a clear understanding of its cognitive nature.

There are various approaches to the study of the cognitive sphere of procrastination. In the cognitive approach, procrastination is considered a set of irrational attitudes (Ellis, Knaus, 1987), low self-esteem (Burka, Yuen, 2008), and inability to make decisions (Janis, Mann, 1979). The main attention in these studies is paid to the identification of cognitive distortions, which are understood as rolled and habitual ways in which we thought painfully and ineffectively moves, burning incredible amounts of our time, sucking energy, and not creating any values for ourselves or anyone. (Kukla, 2007).

A group of scientists (Ferrari et al., 1995, Chun Chu, Choi, 2005, Kormacheva, 2021) suggests that the cognitive component of procrastination is based on a decision about procrastination, which is accompanied by an understanding of its negative consequences. The next area of research on the cognitive nature of procrastination is related to the inability to manage goals. Several scientists (Gustavson, Miyake, Hewitt, Friedman, 2015) note that procrastination is based on an irrational inability to support and manage their actions to achieve short- and long-term goals.

According to Russian researchers, the cognitive sphere of procrastination includes internality, maladaptive beliefs, features of time perspective (Ryzova, 2019), ideas about time, locus control, irrational beliefs (Karlovskaya, Baranova, 2008), reflection (Chevrenidi, 2019), etc.

Among the studies of cognitive procrastination are the work associated with the uncertainty and fear of failure (Balkis, Duru, 2019; Haghbin et al., 2012; Ozer et al., 2009), negative thoughts about oneself (Flett et al., 2012), self-criticism (Powers et al., 2007), defectiveness and insufficient self-control (Aftab et al., 2017), the self-blame (Sirois, 2015), self-condemning thoughts (McCown et al. 2012), need for cognition and emotional intelligence (Geertman E, Valk A., 2021), poor time management and lack of confidence (Atalayin et al. 2018)

However, despite numerous studies and interpretations of the cognitive features of procrastination, there are still many "white spots" in this issue. No holistic model has been identified to explain the cognitive predictors of

procrastination. Moreover, it remains unclear which cognitive mechanisms are involved in various types of procrastination.

A particular interest in the study of cognitive predictors of procrastination is specific cognitive characteristics, such as the desire for cognitive closure, self–organization of activities, time focus, coping strategies, and decision-making in difficult situations. The above determined the expediency and relevance of the study, the purpose of which was to identify the features of the cognitive sphere of students with a tendency to procrastinate, as well as cognitive predictors of procrastination.

We assume the presence of certain cognitive features in people prone to procrastination, which force them to postpone solving important tasks, despite their importance and a high degree of urgency.

METHODOLOGY AND METHODS

An empirical study of cognitive features and predictors of procrastination among students was conducted in September-October 2022 based on Chelyabinsk State University and M. Dulatov Kostanay University of Engineering and Economics (Kazakhstan). The total sample size of the study was 311 people aged 17 to 45 years (average age 19 years).

The sample of subjects consisted of 1st-4th year students of full-time study. The gender composition includes 140 women (45%) and 171 men (55%). Specialties are humanities – 42.5%, natural sciences - 9%, and technical ones – 48.5%. By place of residence, the sample was distributed as follows: 224 people (72%) live in the city, 23 people (7.4%) live in district centers, and 64 people (20.6%) live in rural areas.

The following methods were used in the study:

1. The Scale of General Procrastination by K. Lay in the adaptation by O. S. Vendeker and M. V. Osatina. The use of this technique is used to assess the severity of the level of procrastination. The scale includes 20 statements, the answers to which are related to solving and postponing everyday tasks in everyday life.
2. The Need for Closure Scale developed by A. Kruglyansky (M. I. Yasin's language adaptation) is used to study individual psychological characteristics and allows you to measure closeness by five parameters: the desire for order, predictability, determination, dislike of ambiguity, prejudice.
3. The method of diagnosing irrational attitudes by A. Ellis is used to determine the degree of rationality-irrationality of thinking, and the presence and severity of irrational attitudes.
4. The Melbourne Decision-Making Questionnaire (MDMQ) was developed based on the Flinders Questionnaire to diagnose individual decision-making styles. The questionnaire includes four main patterns of decision-making in difficult situations: 1) vigilance 2) avoidance, 3) procrastination, and 4) over-vigilance.
5. The Questionnaire of Self-Organization of Activity (QSOA), developed by E. Y. Mandrikova, is intended for the diagnosis of formation, self-organization, planning, and goal-setting.

6. Comprehensive Coping Questionnaire (CCQ) (M. McKay, M. Skene, P. Fanning) is used to assess how a person reacts to a threat to cope with it.

Descriptive statistics, the nonparametric criterion for comparing samples, the H-Kruskal-W–Wallace criterion, and the U-Mann-Whitney criterion were used for the mathematical processing of the results. Discriminant analysis was used to identify cognitive predictors of procrastination. Mathematical data processing was carried out using a standardized software package IBM SPSS Statistics v. 26.0.

RESULTS AND DISCUSSION

At the first stage of the study, based on the results of the Scale of General Procrastination, the total sample (N = 311) was divided into three groups: subjects with a low level of procrastination (N = 70); subjects with an average level of procrastination (N = 146), and a group with a high level of procrastination (N = 95). The cognitive indicators of these groups' representatives were compared in the second stage. Cognitive predictors of procrastination were identified using discriminant analysis in the third stage.

The results of the study (N = 311) revealed differences in most of the diagnosed cognitive indicators, which indicates the important role of cognitive processes in the formation of procrastination (see Table 1).

As can be seen from Table 1, procrastinators have higher indicators of cognitive closeness, namely, a high average rank of the trait on the scale of propensity to order ($p = 0.000$), predictability ($p = 0.052$), determination ($p = 0.000$), striving for cognitive closeness ($p = 0.000$). Cognitive closeness means the motivation to get an unambiguous answer and cut off unnecessary, contradictory, and interfering information. This is consistent with the data on greater rigidity in procrastinators ($p = 0.05$). In general, according to most indicators of cognitive closeness, it can be concluded that students with a high level of procrastination are more prone to an unwillingness to rebuild at the last minute, they differ in a higher level of determination when deviating from their main job, prefer the old familiar ways of behavior and are not prone to situations where you need to flexibly respond to external changes. Students with a low level of procrastination can be observed with a high need to isolate themselves from additional, confusing, debatable information and the desire to have an unambiguous answer to the question.

The results illustrating the degree of severity of the prevailing irrational attitudes of students were obtained in the study. Significant differences were found in such indicators as self-esteem ($u = 2233$, $p<0.000$) and frustration tolerance ($u = 1975$, $p<0.000$). According to the scale of "self-esteem", most of the procrastinators showed high scores, which indicates the absence of a pronounced tendency to high self-esteem. In addition, procrastinators have a more pronounced low tolerance to frustration ($p = 0.000$). Students with a high level of procrastination do not tolerate traumatic events or stressful situations. This is due to their perception of life, which seems to them the way they want, with a quick and easy solution to problems. But when these

Table 1. Comparative results of cognitive indicators of students with low and high levels of procrastination.

	Indicators	The average rank of the feature		Level of statistical significance	
		low level of procrastination	high level of procrastination	U	p
Results according to the Need for Closure Scale					
1	Striving for order	56.86	102.26	1495.000	0.000
2	Striving for predictability	73.24	90.19	2642.000	0.024
3	Determination	53.12	105.02	1233.500	0.000
4	Duality	83.72	82.47	3274.500	0.868
5	Closeness of thinking	97.35	72.43	2320.500	0.001
6	General closeness	60.76	99.39	1768.000	0.000
Diagnostic indicators according to the Method of Diagnosing Irrational Attitudes by A. Ellis					
1	Catastrophization	80.35	84.95	3139.500	0.540
2	Duty to oneself	67.40	94.49	2233.000	0.000
3	Obligation to others	79.08	85.89	3050.500	0.364
4	Frustration tolerance	102.29	68.79	1975.000	0.000
5	Self-assessment	87.94	79.36	2979.000	0.253
Indicators according to the Melbourne Decision-Making Questionnaire methodology					
1	Vigilance	107.54	64.92	1607.500	0.000
2	Avoidance	52.55	105.44	1193.500	0.000
3	Procrastination	44.24	111.56	611.500	0.000
4	Super - vigilance	61.19	99.07	1798.500	0.000
Results of indicators according to the Questionnaire of Self-organization of Activity					
1	Regularity	105.39	66.50	1757.500	0.000
2	Purposefulness	107.57	64.89	1605.000	0.000
3	Persistence	91.84	76.49	2706.500	0.041
4	Fixing	114.46	59.82	1123.000	0.000
5	Self-organization	111.29	62.15	1344.500	0.000
6	Focus on the present	111.39	62.08	1338.000	0.000
Diagnostic indicators according to the Comprehensive Coping Questionnaire					
1	Avoidant behavior	65.34	96.01	2089.000	0.000
2	Anxiety and "winding up"	61.70	98.69	1834.000	0.000
3	Cognitive reassessment	56.55	102.49	1473.500	0.000
4	Intolerance of stressful situations	65.27	96.06	2084.000	0.000

expectations become negative, procrastinators feel stress and begin to avoid disappointing events, which, paradoxically, leads to increased frustration and even greater mental stress.

The obtained data indicate that procrastinators have a less pronounced vigilance index ($p = 0.000$). This means that they have a more pronounced desire to avoid responsibility and a tendency to shift the decision of important matters to other people. Such avoidance allows you to postpone a conflict situation, does not require decisive action, and eventually leads to procrastination. The "Super-vigilance" parameter has particular importance. This suggests that procrastinator students are more prone to impulsive decision-making, which allows them to avoid solving problems, and in crises leads to a "panic" in the choice of alternatives.

Procrastinators have lower indicators of self-organization of activity: regularity (U = 1757.5, at p = 0.000), purposefulness (U = 1605.0, at p = 0.000), fixation (U = 1123, at p = 0.000) and self-organization (U = 1344.5, at p = 0.000), orientation to the present (U = 1338, at p = 0.000), persistence (U= 2706.5, at p = 0.041). Low indicators of self-organization of activities in a group with a high level of procrastination indicate problems with planning activities and following the developed plan in procrastinated ones, difficulties with setting goals and making efforts to achieve them, high distraction and lack of will to complete the things started, lack of commitment and consistency in their actions, lack of inclination to resort to with the help of external tools that help in time management, which can negatively affect their level of self-organization, and also the unwillingness to live in the present time, preferring the past and the future.

Procrastinators have more pronounced cognitive coping strategies. Significant differences at a high level of significance were found in all indicators of the methodology: avoidant behavior (U = 2089.0, at p = 0.000), anxiety and hype (U=l834.0, at p = 0.000), cognitive reassessment (U = 1473.5, at p = 0.000) and intolerance to stressful situations (U = 2084.0, at p = 0.000). It can be concluded that students with a high level of procrastination are more likely to apply a strategy of avoiding everything that makes them feel anxious. Stimuli can be a variety of objects: people, places, situations, things, or internal sensations.

At the same time, procrastinators are ready to worry about any change in their lives that is temporarily negative. They, unlike non-procrastinators, are more prone to erroneous assessment, according to which any situation, object, sensation, or person is perceived as a source of threat, although they are not in reality. Additionally, procrastinators are not sure that they can withstand the pressure of certain circumstances and the emotions caused by them.

At the final stage of the study, a discriminant analysis was conducted to identify cognitive predictors of procrastination. The data of the discriminant analysis are shown in Table 2.

The results of the discriminant analysis indicate that such cognitive features as a weak focus on the events of the present, the habit of avoiding decision-making, weakened vigilance, an increased desire for cognitive closure, low

Table 2. Comparative results of indicators of coping strategies in subjects with low and high levels of procrastination.

Steps	Indicators of cognitive components	Wilks Lambda	F	p
1	Focus on the present	0.824	32.913	0.000
2	Avoiding decision-making	0.725	26.789	0.000
3	Vigilance	0.669	22.703	0.000
4	Striving for cognitive closeness	0.638	19.216	0.000
5	Tolerance to frustration	0.615	16.741	0.000
6	Self-organization	0.597	15.373	0.000

tolerance to frustration, and a low level of self-organization of activity are important predictors of procrastination.

CONCLUSION

The hypothesis about specific cognitive features and predictors of procrastination has generally been confirmed. However, in the group of subjects with a high level of procrastination, there are no pronounced irrational attitudes, which are the main elements of the cognitive component of procrastination, according to supporters of the cognitive approach. As a consequence, it can be assumed that irrational attitudes are not a key indicator of the cognitive sphere in procrastinating individuals.

Cognitive parameters such as lower indicators of self-organization of activity, and vigilance, but at the same time high indicators of cognitive closeness and low tolerance to frustration were revealed in persons prone to procrastination. In addition, procrastinators have more pronounced cognitive coping strategies: avoidant behavior, anxiety, cognitive overestimation, and intolerance to stressful situations.

The results of the discriminant analysis allowed us to determine the indicators that have the greatest impact on the inclusion of procrastinators in the group. These are low orientation in the present, avoidance of decision-making, vigilance, striving for cognitive closeness, low tolerance to frustration, and low self-organization of activities.

In general, for further study of the procrastination phenomenon, unique data on the presence of specific psychological characteristics in the cognitive sphere of procrastination have been obtained. The main parameters and indicators reflecting the patterns of determining the high or low level of procrastination, as well as their significance and orientation, are established. The data obtained in the study make it possible to determine in advance the predisposition to procrastination and the ways of its manifestation in various situations, as well as to determine the conditions responsible for its reduction. Thus, the study expands the understanding of the cognitive nature of procrastination.

ACKNOWLEDGMENT

The authors are grateful to the Head of Chelyabinsk State University.

REFERENCES

Aftab, S., Klibert, J., Holtzman, N., et al. (2017) Schemas Mediate the Link Between Procrastination and Depression: Results from the United States and Pakistan. J Rat-Emo Cognitive-Behav Ther 35, 329–345.

Atalayin, C., Balkis, M., Tezel, H., Kayrak, G. (2018) Procrastination and predictor variables among a group of dental students in Turkey, Psychology, Health & Medicine, 23:6, 726-732

Balkis, M., Duru, E. (2019) Procrastination and Rational/Irrational Beliefs: A Moderated Mediation Model. J Rat-Emo Cognitive-Behav Ther 37, 299–315.

Beck A., Rush A., Shaw B., Emery G. (1979) Cognitive Therapy of Depression, Guilford, New York.

Burka J., Yuen L. (1983) Procrastination: Why you do it, what to do about it, Da Capo, Cambridge
Chevrenidi A. A. (2019) The relationship between time perspective and procrastination among employees of different official statuses. Dis.... Candidate of Ps. sciences. Moscow (In Rus.).
Chun Chu A. H., Choi J. N. (2005) Rethinking of Procrastination: Positive Effects of ≪Active≫ procrastination behavior on attitudes and performance, Journal of Social Psychology, 145(3), 245–264
Cigdem, Murat Balkis, Huseyin Tezel & Gul Kayrak (2018) Procrastination and predictor variables among a group of dental students in Turkey, Psychology, Health & Medicine, 23:6, 726–732
Gustavson D. E., Miyake A., Hewitt J. K., and Friedman N. P. (2015) ≪Understanding the Cognitive and Genetic Underpinnings of Procrastination: Evidence for Shared Genetic Influences With Goal Management and Executive Function Abilities≫. Journal of Experimental Psychology: General Journal, 144(6), 1063–1079
Dzhansen J, Ivrard U. (2002). Definition of male puberty by Isaev DN, (ed). Sexology. Peter; Saint-Petersburg (In Rus.)
Ellis A., Knaus W. J. (1977) Overcoming procrastination, Signet Books, New York Kahneman D. (2017), Think long…solve quickly. ASR, Moscow (In Rus.) Rogers KR. (2001), Personality development. Perspective on psychotherapy. Eksmo-Press. Moscow (In Rus.).
Ferrari J. R., Wolfe R. N., Wesley J. C., Schoff L. A., Beck B. L. (1995) ≪Ego-identity and academic procrastination among university students≫, Journal of College Student Development, 36 361-367
Ferrari, J. R., & Tice, D. M. (2000). Procrastination as a Self-Handicap for Men and Women: A Task-Avoidance Strategy in a Laboratory Setting. Journal of Research in Personality, 34, 73–83
Festinger L. (1984), Introduction to dissonance theory. Modern abroad social psychology. 97–110.
Flett, G. L., Stainton, M., Hewitt, P. L et al. (2012) Procrastination Automatic Thoughts as a Personality Construct: An Analysis of the Procrastinatory Cognitions Inventory. J Rat-Emo Cognitive-Behav Ther 30, 223–236
Gardner, R. W., Holzman, P. S., Klein, G. S., Linton, H. B., & Spence, D. P. (1959) Cognitive control: A study of individual consistencies in cognitive behavior. International Universities Press
Geertman E, Valk A. (2021) Academic procrastination: the underlying psychological and neurological factors. J Radboud annals of medical students. 19, 11–17.
Gordeeva T. O. (2006) Psychology of achievement motivation: studies. manual for university students studying the direction and specialties of psychology. Moscow: Sense (In Rus.).
Haghbin, M., McCaffrey, A., & Pychyl, T. A. (2012). The complexity of the relationship between fear of failure and procrastination. Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30(4), 249–263.
Karlovskaya N. N., Baranova R. A. (2008) The relationship between general and academic procrastination and anxiety in students with different academic performance // Psychology at the university. No. 3. pp. 38–49 (In Rus.)
Kholodnaya M. A. (2004) Cognitive styles. About the nature of the individual mind. St. Petersburg: Peter (In Rus.)
Kormacheva I. N. (2021) Emotional, volitional and motivational determinants of personality procrastination (on the example of educational activity): dis.... Candidate of Ps. sciences. St. Petersburg (In Rus.)

Kukla A. (2007) Mental Traps: Stupid Things That Sane People Do to Mess Up Their Minds. McGraw-Hill, New York

Lay, C. H. (1986). At last, my research article on procrastination: A search for types. Personality and Individual Differences, 8, 705–714.

McCown, B., Blake, I. K., & Keiser, R. (2012). Content analyses of the beliefs of academic procrastinators. Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30(4), 213–222.

Maddi S., Kobasa S. (1984) The Hardy Executive: Health under Stress. Homewood (IL): Dow Jones – Irwin

Milgram, N. A., Gehrman, T., & Keinan, G. (1992). Procrastination and emotional upset: A typological model. Personality and Individual Differences, 13(12), 1307–1313.

Özer, B. U., Demir, A., & Ferrari, J. (2009). Exploring academic procrastination among Turkish students: Possible gender differences in prevalence and reasons. The Journal of Social Psychology, 149(2), 241–257.

Powers, T. A., Koestner, R., & Zuroff, D. C. (2007). Self-criticism, goal motivation, and goal progress. Journal of Social and Clinical Psychology, 26(7), 826–840.

Pratkanis, A. R., Breckler, S. J., & Greenwald, A. G. (Eds.) (1989) Attitude structure and function. Psychology Press, Philadelphia, PA

Ryzova S. V. The influence of procrastination on the psychological adaptation of students and their psychological correction by methods of cognitive behavioral psychotherapy. Dis.... Candidate of Medical Sciences. M.; 2019.

Sirois, F. M. (2015). Is procrastination a vulnerability factor for hypertension and cardiovascular disease? Testing an extension of the procrastination–health model. Journal of Behavioral Medicine, 38(3), 578–589.

Steel, P. D. G. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. Psychological Bulletin, 133(1), 65–94.

Yasin M. I. (2020) The concept of cognitive closure: history and related concepts // Bulletin of Kostroma State University. Series: Pedagogy. Psychology. Sociokinetics. Vol. 26, No. 1. pp. 174–181 (In Rus.).