

# Causal attributions and executive functions of academic procrastination in Mansoura University students

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## Background

Academic procrastination is the irrational delay in the beginning or completion of an academic task within the desired time frame. It has many negative consequences on students, for example, wasting time, loss of opportunities, decreased productivity, and lack of success in addition to serious emotional and health problems.

## Aim

The purpose of this study was to assess procrastination among a sample of college students in different academic areas, identify the possible reasons of this behavior, and examine the role of causal attributions and various executive functions (EFs) of students in academic procrastination.

## Participants and methods

Eighty college students from Mansoura University participated in this study and were diagnosed by the staff members of the Committee of Postponing Exams in the Department of Psychiatry using Diagnostic and Statistical Manual of Mental Disorders, 4th ed., text revision. After being diagnosed, they were asked to complete three questionnaires; the Procrastination Assessment Scale-Students, Executive Skills Questionnaire, and the Causal Dimension Scale II.

## Results

The results show that the age of the procrastinating students ranges between 18 and 32 years. The men ( $n=48$ ) represent 60% of the procrastinators. Most of the students procrastinate during the second and third years of their college study (30 and 32.5%, respectively). Students from the Faculty of Engineering represent 25% of the procrastinators. The commonest psychiatric diagnosis among the procrastinating students is obsessive compulsive disorder (27.5%), followed by malingering (17.5%), and generalized anxiety disorder (12.5%). Reasons of procrastination, for example, aversiveness of the task and low frustration tolerance, tendency to feel overwhelmed and poor time management, and peer influence, have significant positive correlation ( $P \leq 0.01$ ) with procrastination among students. Several EFs have a significant negative correlation ( $P \leq 0.001$ ) with presence of procrastination among students, for example, working memory, organization, time management, emotional control, task initiation, and sustained attention and flexibility. Finally, locus of causality and stability have a significant positive correlation ( $P \leq 0.001$ ) with procrastination among students, whereas personal control has a highly significant negative correlation ( $P \leq 0.001$ ), with the presence of procrastination among students. There are 11 significant predictors of procrastination, for example, difficulty in making decision, dependency and help seeking, laziness, anxiety, rebellion against control, fear of success, response inhibition, sustained attention, metacognition, goal-directed persistence, and external control.

## Conclusion and recommendations

Procrastination is more common among male students with obsessive compulsive disorder. Several EFs, for example, working memory, organization, time management, emotional control, task initiation, and flexibility as well as locus of causality, stability, and personal control are impaired among procrastinating students and significantly correlated with the occurrence of procrastination. Finally, many variables can be considered as predictors of procrastination among students, for example, difficulty in making decision, dependency and help seeking, laziness, anxiety, rebellion against control, fear of success, response inhibition, sustained attention, metacognition, goal-directed persistence, and external control. All previous data represent cues for the development of strategies among students to prevent the aggravation of this problem.

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**Keywords:**

academic procrastination, causal attributions, executive functions

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## Introduction

Procrastination can be defined as the act of delaying tasks to the point of experiencing subjective discomfort (Solomon and Rothblum, 1984). The term ‘procrastination’ comes from the Latin language, (Pro) means ‘forward, forth, or in favor of’, and (crastinus) means ‘of tomorrow’. So, one procrastinates when he delays in beginning or completing an intended course of action (Lay, 1986). However, considering procrastination as the irrational delay of behavior (Schraw *et al.*, 2007) reflects the dictionary definition: ‘defer action, especially without good reason’ (Oxford English Reference Dictionary, 1996).

Generally, two types of procrastination can be distinguished: (a) academic procrastination which is the irrational delay in the beginning or completion of an academic task within the desired time frame, for example, studying for exams or writing a term paper and (b) general, everyday procrastination, which is irrational delay of nonacademic life tasks, for example, delaying the payment of a bill (Karatas, 2015). It must be distinguished from planned delay which may be a wise strategy rather than irrational behavior hoping to achieve the best performance. Also, procrastination is associated with experiencing subjective discomfort such as anxiety, irritation, or self-blame (Seo, 2011).

Procrastination is one of the most widespread phenomenon in college settings, as recent studies has estimated procrastination among university students as 20–30%, and sometimes up to 60% (Motie *et al.*, 2012; Lakshminarayan *et al.*, 2013) reporting regular postponement of educational tasks including studying for exams, writing term. Also, it has many negative consequences on students, such as wasting time, loss of opportunities, decreased productivity, and lack of success in addition to serious emotional and health problems (Grunschel *et al.*, 2013).

Student attributions for his academic achievement may play a role in his subsequent behavior through the learning process (Mizanid *et al.*, 2015). According to this attribution theory, human’s response to a certain event is dependent on his interpretation of that event.

So, the learners’ point of view about the causes of his academic level can determine his motivations and influence his emotions, attitudes, and function (Badri Gargari *et al.*, 2011). When a student attempts to understand and explain the causes of success or failure, these causes may be viewed either internally (ability, effort) or externally (luck, context), stable or changeable, and controllable or uncontrollable (Grunschel *et al.*, 2013). Generally, human beings attribute their success to the internal factors, such as hard work, whereas they attribute their failure to external factors, such as the difficulty of the exam. This supportive mechanism is there to maintain a positive self-image (Rozenal and Carlbring, 2014).

Along the educational process, notably in college, students are faced with many challenges which require continuous development of their skills and capacities. The executive system is responsible for the simultaneous coordination of a number of cognitive processes to achieve a goal-directed, task-oriented behavior (Randolph and Chaytor, 2013). Executive function (EF) is an umbrella term for the neurologically based skills involving mental control and self-regulation. EF is required to solve problems, particularly inhibition of automatic or established thoughts, planning, initiation, and self-regulation involving the orchestration of these subfunctions (Dawson and Guare, 2012). EF, therefore, refers to the ability of making decisions and carrying them out, as when, one is trying to solve a problem. The student needs a healthy executive system to process incoming information while listening to a professor explanation, identify relevant information, inhibit irrelevant thoughts, and ignore distractions (Diamond, 2014). Also, it is needed for time management, study skills, planning, setting goals, and self-monitoring (Rabin *et al.*, 2011). So, a student with good EF will have mental flexibility, will be able to form and maintain sets, inhibit impulsive responses, and plan and achieve goals (Fuhs *et al.*, 2014).

These multiple hazards created a new space for research and alerted researchers to study procrastination and examine various cognitive, emotional, and personality variables which may direct learner’s behavior.

On the basis of the previous data, this study aimed to assess procrastination in different academic areas

among a sample of college students, to identify the possible reasons of this behavior, and to examine the role of causal attributions, and various EFs of students in the academic procrastination.

## Study design

### Methodology

The study is descriptive, correlative, and predictive.

### Participants

The study took place during the academic year 2015–2016 at Department of Psychiatry, Faculty of Medicine, Mansoura University by the Committee of Postponing Exams. Eighty students from different colleges of Mansoura University, who requested postponing or procrastinating exams due to psychiatric excuses were recruited to complete this study. The study included 48 (60%) men and 32 (40%) women, with their mean age $\pm$ SD 21.35 $\pm$ 3.43 and range from 18 to 32 years.

Students who agreed to participate were diagnosed by at least two senior staff members of the Committee of Exams Postponement in Department of Psychiatry, Mansoura Faculty of Medicine, with reference to the Diagnostic and Statistical Manual of Mental Disorders, 4th ed., text revision (American Psychiatric Association, 2000), after being diagnosed, they were asked to complete three questionnaires: the Procrastination Assessment Scale-Students (PASS), Causal Dimension Scale II, and Executive Skills Questionnaire. Arabic versions of the three questionnaires were prepared by translation and back translation in the Department of Psychiatry, Faculty of Medicine, Mansoura University.

### Instruments

#### *Procrastination Assessment Scale-Student*

PASS was developed (Solomon and Rothblum, 1984) to assess academic procrastination. PASS is developed consistent with the view of procrastination as an irrational, maladaptive delay (Solomon and Rothblum, 1984). The PASS contains two parts: The first part examine the presence of procrastination in six different academic areas which are as follows: (a) writing a term paper, (b) studying for an exam, (c) keeping up weekly reading assessment, (d) performing administrative tasks, (e) attending meetings, and (f) performing academic tasks in general. Participants indicate on a five-point Likert scale the extent to which they procrastinate on each task (1=never procrastinate; 5=always procrastinate) and the extent to which procrastination on each task is a problem for them (1=not at all a

problem; 5=always a problem). The second part of PASS describes a procrastination scenario; delay in writing a term paper and then suggesting as many as possible reasons for procrastination in the task. These reasons include: (a) evaluation anxiety, (b) perfectionism, (c) difficulty in making decisions, (d) dependency and help seeking, (e) aversiveness of the task and low frustration tolerance, (f) lack of self-confidence, (g) laziness, (h) lack of assertion, (i) fear of failure, (j) tendency to feel overwhelmed and poor time management, (k) rebellion against control, (l) risk taking, and (m) peer influence. For each of these reasons, two statements are given, and students rate each statement on a five-point Likert scale according to how much it reflects, and why they procrastinated the last time they delayed writing a paper.

#### *Executive Skills Questionnaire*

Executive Skills Questionnaire was developed (Dawson and Guare, 2010) to assess a group of EFs (response inhibition, working memory, emotional control, task initiation, sustained attention, planning/prioritization, organization, time management, flexibility, metacognition, goal-directed persistence, and stress tolerance). Each student is asked to read each item in the questionnaire, and then rate that item based on the extent to which it describes him using a rating scale below to choose the appropriate score. Each EF is represented by three statements. The scoring is done by adding the three scores in each section, which helps to determine the executive skills' strengths and weaknesses.

#### *Causal Dimension Scale II*

Causal Dimension Scale II was designed (McAuley *et al.*, 1992) to measure causal attributions of students' poor performance. It comprises 12 items measuring four attribution dimensions, namely, locus of causality, stability, personal control, and external control, which are scored on a nine-point Likert scale. Scoring: The total scores for each dimension are obtained by summing the items, as follows: 1, 6, and 9=locus of causality; 5, 8, and 12=external control; 3, 7, and 11=stability; and 2, 4, and 10=personal control.

#### **Ethical consideration**

To consider ethical issues and increase the response rate, the students were asked to take part in the study anonymously. All the students who participated gave informed consent in accordance with the Helsinki II Declaration after the purpose of the study and the protocol had been explained to them, and before any intervention was performed. Four students refused to participate were either not interested, had personal causes, or were busy.

**Statistical analysis**

Data entry and analysis were made by using SPSS software (version 16; IBM; SPSS Inc., Released 2007, SPSS for Windows, Version 16.0, Chicago). Parametric data were summarized as means and SDs. Nonparametric data were described as numbers and percentages. The main findings were presented in proportions with 95% confidence intervals. Correlation was tested by Pearson’s product–moment correlation coefficient equation and stepwise linear regression model was applied to identify procrastination–predicting factors.

**Results**

Table 1 showed that the age of the procrastinating students ranges from 18 to 32 years. Men ( $n=48$ ) represent 60% of the procrastinators. Most of the students procrastinate during second and third years of their college study (30 and 32.5%, respectively).

**Table 1 Descriptive data of students**

	N (%)
Age	
18–<24	62 (78.0)
≥24–32	18 (22.0)
Sex	
Male	48 (60.0)
Female	32 (40.0)
Years of education	
1	10 (12.5)
2	24 (30.0)
3	26 (32.5)
4	18 (22.5)
5	2 (2.5)
Faculty	
Pharmacy	10 (12.5)
Art	8 (10.0)
Law	8 (10.0)
Engineering	20 (25.0)
Education	4 (5.0)
Commerce	6 (7.5)
Medicine	6 (7.5)
Veterinary	2 (2.5)
Science	8 (10.0)
Agricultural	6 (7.5)
Nursing	2 (2.5)
Diagnosis	
Adjustment disorder with anxiety and depression	8 (10.0)
Mood disorder bipolar I recent episode mania	6 (7.5)
Panic disorder	6 (7.5)
Obsessive compulsive disorder	22 (27.5)
Generalized anxiety disorder	10 (12.5)
Mood disorder unipolar major dispersion	8 (10.0)
Schizophrenia	6 (7.5)
Malingering	14 (17.5)
Total	80 (100)

Also, students of the Faculty of Engineering represent 25% of the procrastinators, followed by Faculty of Pharmacy 12.5%, then Faculties of Art, Law, and Science each 10%. The lowest percentage was from the Faculties of Nursing and Veterinary Medicine (2.5%). Commonest psychiatric diagnosis among the procrastinating students is obsessive compulsive disorder (27.5%), followed by malingering (17.5%), generalized anxiety disorder (12.5%). Adjustment disorder with anxiety and depression, mood disorder unipolar major dispersion 10% each, mood disorder bipolar I recent episode mania, panic disorder, and schizophrenia 7.5% each. Table 2 highlighted that among the most common possible reasons of procrastination using the first part of PASS, presence of procrastination is positively correlated with aversiveness of the task and low frustration tolerance with mild statistical significance ( $r=0.25$ ;  $P\leq 0.05$ ). However, its presence among students shows moderate significant positive correlation with tendency to feel overwhelmed and poor time management, and peer influence ( $r=0.40$  and  $0.37$ , respectively;  $P\leq 0.01$ ).

Table 3 showed that presence of procrastination has mild significant negative correlation with response inhibition and stress tolerance ( $r=-0.28$ ;  $P\leq 0.05$ ), on using the first part of PASS. However, its presence has moderate significant negative correlation with working memory ( $r=-0.36$ ;  $P\leq 0.01$ ) and high

**Table 2 Correlation of presence of procrastination using first part of PASS with reasons of procrastination using second part of PASS**

Variables	Mean±SD	r	P
A	6.00±2.84	0.16	NS
P	5.78±2.75	0.21	NS
DMD	5.08±2.56	0.21	NS
DHS	4.45±2.23	0.06	NS
AT and LFT	4.33±2.45	0.25	<0.05
LSC	5.40±2.63	0.15	NS
L	5.35±2.55	0.19	NS
LA	2.25±1.60	0.13	NS
FF	5.28±2.10	0.10	NS
T and PMT	4.55±2.31	0.40	<0.01
RAC	5.18±3.16	0.14	NS
RT	5.23±2.85	0.19	NS
PI	4.55±2.85	0.37	<0.01

Mean score of part 1 of PASS=41.03±10.53, N=80. A, anxiety; AT and LFT, aversiveness of task and low frustration tolerance; DHS, dependency and help seeking; DMD, difficulty in making decision; FS, fear of failure; L, laziness; LA, lack of assertion; LSC, lack of self-confidence; NS, nonsignificant; P, perfectionism; PASS, Procrastination Assessment Scale-Students; PI, peer influence; RAC, rebellion against control; RT, risk taking; T and PMT, tendency to feel overwhelmed and poor time management. Mild significant≤0.05, moderate significant≤0.01, highly significant≤0.001.



significant negative correlation with emotional control, task initiation, sustained attention, planning/prioritization, organization, time management, flexibility, metacognition, and mean score of EFs questionnaire ( $r = -0.42, -0.43, -0.46, -0.44, -0.49, -0.53, -0.59,$  and  $-0.53,$  respectively;  $P \leq 0.001$ ). Finally, goal-directed persistence reveals nonsignificant correlation. Table 4 demonstrated that presence of procrastination among students has highly significant positive correlation with locus of causality ( $r = 0.39$ ;  $P \leq 0.001$ ) and moderate significant positive correlation with stability ( $r = 0.31$ ;  $P \leq 0.01$ ), whereas it has high significant negative correlation with personal control ( $r = -0.47$ ;  $P \leq 0.001$ ). Table 5 shows by reviewing the standardized  $\beta$ 's and the coefficients, it is found that there are only 11 significant predictors of procrastination, which can be summarized as follows: (a) Reasons of procrastination as predictors of procrastination are; difficulty in making decision, dependency and help seeking, and laziness are three of high significance ( $P = 0.001$ ), whereas anxiety and rebellion against control are of moderate significance ( $P = 0.01$ ), and fear of failure of mild significance ( $P = 0.05$ ). (b) EFs as predictors of procrastination are; response inhibition, sustained attention, and metacognition, which are three of moderate significance ( $P = 0.01$ ), and goal-directed persistence of mild significance ( $P = 0.05$ ). (c) Causal attribution of students' poor performance as predictor of procrastination is external control of mild significance ( $P = 0.05$ ).

**Table 3 Correlation of presence of procrastination using first part of PASS with executive functions using ESQ**

Variables	Mean $\pm$ SD	$r$	$P$
RI	13.78 $\pm$ 4.08	-0.28	<0.05
WM	11.90 $\pm$ 4.04	-0.36	<0.01
EC	11.20 $\pm$ 3.66	-0.42	<0.001
TI	11.30 $\pm$ 3.66	-0.43	<0.001
SA	11.18 $\pm$ 4.80	-0.46	<0.001
PP	12.05 $\pm$ 4.61	-0.44	<0.001
O	11.38 $\pm$ 4.92	-0.49	<0.001
TM	10.45 $\pm$ 4.66	-0.53	<0.001
F	10.08 $\pm$ 5.02	-0.59	<0.001
Mc	12.35 $\pm$ 3.86	-0.23	<0.05
GDP	13.25 $\pm$ 4.10	0.04	NS
ST	12.73 $\pm$ 4.45	-0.27	<0.05
Mean score ESQ	1.42 $\pm$ 37.17	-0.53	<0.001

Mean score of part 1 of PASS = 41.03  $\pm$  10.53,  $N = 80$ . EC, emotional control; ESQ, executive functions questionnaire; F, flexibility; GDP, goal-directed persistence; Mc, metacognition; Mean score ESQ, mean score of executive functions questionnaire; NS, nonsignificant; O, organization; PASS, Procrastination Assessment Scale-Students; PP, planning/prioritization; RI, response inhibition; SA, sustained attention; ST, stress tolerance; TI, task initiation; TM, time management; WM, working memory. Mild significant  $\leq 0.05$ , moderate significant  $\leq 0.01$ , highly significant  $\leq 0.001$ .

**Table 4 Correlation of presence of procrastination using first part of PASS with causal attributions of students' poor performance using CDS-II**

Variables	Mean $\pm$ SD	$r$	$P$
LC	15.05 $\pm$ 5.63	0.39	<0.001
EC	13.75 $\pm$ 7.75	0.13	NS
S	14.83 $\pm$ 6.30	0.31	<0.01
PC	11.65 $\pm$ 6.16	-0.47	<0.001
Score CDS-II	55.50 $\pm$ 16.23	0.01	NS

Mean score of part 1 of PASS = 41.03  $\pm$  10.53,  $N = 80$ . CDS-II, Causal Dimension Scale II; EC, external control; LC, locus of causality; NS, nonsignificant; PASS, Procrastination Assessment Scale-Students; PC, personal control; S, stability. Mild significant  $\leq 0.05$ , moderate significant  $\leq 0.01$ , highly significant  $\leq 0.001$ .

**Table 5 Summary of simultaneous multiple linear regression model for variables predicting procrastination**

	$B$	Std. Error $B$	Beta	$t$	$P$
Anxiety	1.882	0.726	0.507	2.592	0.012
Perfectionism	-0.559	0.388	-0.146	-1.441	0.156
Difficulty in making decision	3.732	0.940	0.907	3.971	0.000
Dependency and help seeking	-2.714	0.768	-0.574	-3.534	0.001
Aversiveness of task and low frustration tolerance <sup>a</sup>	-0.454	0.541	-0.105	-0.838	0.406
Lack of self-confidence	0.764	0.831	0.191	0.920	0.362
Laziness	-2.484	0.734	-0.602	-3.386	0.001
Lack of assertion	-0.582	0.847	-0.089	-0.688	0.495
Fear of failure	-1.660	0.806	-0.331	-2.059	0.045
Tendency to feel overwhelmed and poor time management <sup>a</sup>	-0.985	0.573	-0.215	-1.718	0.092
Rebellion against control	1.702	0.627	0.510	2.715	0.009
Risk taking	-0.139	0.439	-0.038	-0.316	0.753
Peer influence <sup>a</sup>	-0.251	0.682	-0.068	-0.368	0.714
Response inhibition <sup>a</sup>	1.242	0.396	0.482	3.133	0.003
Working memory <sup>a</sup>	0.496	0.313	0.190	1.582	0.120
Emotional control <sup>a</sup>	0.005	0.379	0.002	0.013	0.990
Task initiation <sup>a</sup>	-0.206	0.415	-0.071	-0.496	0.622
Sustained attention <sup>a</sup>	-2.350	0.867	-1.071	-2.712	0.009
Planning/prioritization <sup>a</sup>	0.995	0.636	0.435	1.565	0.124
Organization <sup>a</sup>	-0.117	0.354	-0.055	-0.330	0.743
Time management <sup>a</sup>	-0.662	0.568	-0.293	-1.165	0.249
Flexibility <sup>a</sup>	0.034	0.512	0.016	0.066	0.947
Metacognition <sup>a</sup>	0.783	0.307	0.287	2.554	0.014
Goal-directed persistence	0.945	0.384	0.368	2.460	0.017
Stress tolerance <sup>a</sup>	-0.739	0.489	-0.312	-1.512	0.137
Locus of causality <sup>a</sup>	-0.095	0.213	-0.051	-0.444	0.659
External control	-0.467	0.172	-0.343	-2.719	0.009
Stability <sup>a</sup>	0.296	0.188	0.177	1.572	0.122
Personal control <sup>a</sup>	0.126	0.199	0.074	0.633	0.530

<sup>a</sup>Dependent variable: presence of procrastination using PASS scores. Note:  $N = 80, R^2 = 0.853, F(29, 50) = 10.01, P = 0.000$ .

## Discussion

Procrastination is a growing problem among college students representing a serious threat to their academic performance and success. The aim of this study was to assess procrastination in different academic areas among a sample of college students, to identify the possible reasons of this behavior and to examine the role of causal attributions and EFs of students in academic procrastination.

The age of the procrastinating students is ranging between 18 (17.5%) (i.e. at the beginning of their college study) and 32 (5%) years (i.e. chronic procrastinators are more prone to the negative consequences of procrastination) with the peak in the beginning of 20s: 19 (25%) years; procrastination is covering a wide range of age among students consistent with the results of similar study by Steel and Ferrari (2013). Usually, young people lack many skills and abilities to adapt with the new situations and requirements in their colleges, with growing age and maturity they may acquire more experiences. On the contrary, men ( $n=48$ ) represent 60% of the procrastinators indicating that procrastination is more prevalent in men than women confirming the findings of recent study by Özer (2011), reporting that higher levels of impulsiveness and lower levels of self-control in men decrease their ability for academic achievement (Pychyl and Flett, 2012). In this study, most of the students procrastinate during the second and third years of their college study (30 and 32.5%, respectively). During these years, more challenging curriculum are present and more difficult academic tasks are required. Students of the Faculty of Engineering represent 25% of the procrastinators followed by Faculty of Pharmacy (12.5%), then Faculties of Art, Law, and Science (each, 10%). The lowest percentage was from Faculties of Nursing and Veterinary Medicine (2.5%). Indeed, the Faculty of Engineering requires distinct mental capacities to achieve success through its study.

On studying psychopathology of enrolled students, it is found that the commonest psychiatric diagnosis among procrastinating students is obsessive compulsive disorder (27.5%), followed by malingering (17.5%), and generalized anxiety disorder (12.5%), then, adjustment disorder with anxiety and depression, and mood disorder unipolar major dispersion (10%, each), mood disorder bipolar I recent episode mania, panic disorder, and schizophrenia (7.5%, each). These results confirm those of a recent study by Sadeghi *et al.* (2014), which reported that students with obsessive compulsive disorder work hardly to feel satisfied with

their level of performance, so procrastination gives them a chance to do better. Malingering students represent a high proportion of procrastination aimed to have benefit from claiming to have psychiatric symptoms. Meanwhile, generalized anxiety disorder, adjustment disorder with anxiety and depression, and mood disorder unipolar major dispersion; each represent valuable occurrence. It is known that anxiety is usually associated with anger, hostility, impulsiveness, and vulnerability, which negatively affect the student performance, which is the same opinion in a recent study by Hakan Karatas (2015). In addition, procrastination and depression may have a complex relation as depressive symptoms (i.e. low energy and poor concentration) playing a role in procrastination. Simultaneously, procrastination has many negative consequences on students, such as wasting time, loss of opportunities, decreased productivity, and lack of success, low self-esteem, which may participate or aggravate depressive symptoms. More research is needed to further understand the relation between procrastination and different psychiatric disorders.

The study highlights relations between mean score of first part of PASS, as an indicator of presence of procrastination among college students of Mansoura University, and other areas of interest, for example, EFs and causal attributions of those students that lead to procrastination with consequent burden on student academic life and achievement. First part of PASS is actually affecting all six different academic areas which are: (a) writing a term paper, (b) studying for an exam, (c) keeping up weekly reading assessment, (d) performing administrative tasks, (e) attending meetings, and (f) performing academic tasks in general, which will have negative impact on the academic level of students in all modalities, whereas in study by Özer (2011), the following areas were only affected: (a) writing a term paper, (b) studying for an exam, and (c) keeping up weekly reading assessment. Grunschel *et al.* (2013) concluded that procrastination could be considered as a self-regulatory failure to achieve goal-directed activities, procrastinators usually engage in delaying duties, feel overwhelmed and poor time management, underestimate the time needed for the completion of the required tasks, and being heavily influenced by the opinions of peers, difficulty in making decision and help seeking.

The study revealed that several EFs have significant negative correlation with the presence of procrastination among students agreeing with the results of other recent researches, like those of

Gupta *et al.* (2012) and Abbasi and Alghamdi (2015). Those students with time management and organization difficulties, who may fail to achieve certain academic task in a specific time, also may achieve it in a haphazard way. Working memory is also crucial in all areas of learning through holding information, while performing other tasks. However, flexibility is concerned with changing plans in the face of new conditions (Randolph and Chaytor, 2013). Response inhibition is the ability to deliberately suppress dominator responses in favor of more goal-appropriate ones, its impairment might result in behaviors, such as responding before the task is understood, answering before sufficient information is available (Chatham *et al.*, 2012). However, emotional control dysfunction appears in the form of loss of the ability to control one's emotional response appropriate to the surrounding situation, so becoming easily angry or explosive (Demeyer *et al.*, 2012). Students with task initiation dysfunction usually have trouble in getting started on different academic tasks. Also, planning/prioritization is needed for developing appropriate steps within a specified time, without planning any assignment to be done randomly (Miyake and Friedman, 2012). Sustained attention, also, is essential to maintain attention despite distractibility, whereas stress tolerance means the ability to thrive in stressful situations, to cope with continuous requirements, and finally metacognition, which helps the student to have a birds eye view of his current situation, including self-monitoring and evaluation (Snyder *et al.*, 2015).

On the contrary, this study demonstrated that locus of causality and stability have significant positive correlation with procrastination. However, personal control has significant negative correlation with the presence of procrastination. Four attribution dimensions are measured; locus of causality (internal or external), stability (stable or unstable), personal control, and external control. Procrastinators often attributed failure in exams to internal (e.g. disabilities) and stable factors being under external, not personal control (Chatham *et al.*, 2012). The stability aspect is related to the student hope or disappointment as a stable factor meaning that the same outcome will occur, whereas unstable factor means that a new outcome could be expected. Procrastinated students attributing their academic level to factors being under external, not personal control, tend more to procrastinate their academic tasks. Finally, locus of causality could be classified into internal (as disabilities) and external (as luck or level of exams). However, students who have

external causal explanations in case of failure try to provide positive self-concept despite the failure (Badri Gargari *et al.*, 2011).

The study provides simultaneous multiple linear regression model for all examined variables; it is found that there are only 11 significant predictors of academic procrastination among college students. Reasons of procrastination as predictors of procrastination, for example, difficulty in making decision, dependency and help seeking, and laziness are three of high significance, which are not surprising and congruent with study on procrastination by Gupta *et al.* (2012), suggesting that these reasons will direct the learner to delay initiation or completion of the academic tasks. Although anxiety and rebellion against control are of moderate significance, anxiety is usually associated with angriness, hostility, impulsiveness, and lack of concentration that negatively affects the student performance concordant with the opinion of a prior study by Hakan Karatas (2015). Rebellion against control is a significant predictor of procrastination; specified curriculum, commitment to attend lectures, and the need to be prepared for the exam at a specific time each of these obligations constitute a sort of control, which are defined by the student to prove his independence and the ability to insurgency. The last reason of procrastination is the fear of Failure; as this failure will cause blame and punishment from others. So, fear of failure can represent an obstacle to the student ability of creation and productivity. EFs as predictors of procrastination; response inhibition, sustained attention, and metacognition, are three of moderate significance, and goal-directed persistence of mild significance. It seems that those students, who have the ability to deliberately suppress dominator responses in favor of more goal-appropriate ones, to maintain attention despite distractibility, to evaluate continuously their performance through metacognitive functions, and have goal-directed persistence, which is the ability to have a goal and the ability to work through until completion of it, rarely postpone their academic tasks. External control leading to poor performance as predictor of procrastination is of mild significance; here, students attributing their academic level to factors being under external, not personal control tend more to procrastinate their academic tasks, as they lack control over their efforts and fail to have mastery on the approaches to their goals. All these predictors need to be worked upon by different strategies among students to prevent the aggravation of this problem.



### Limitations

The study has some limitations that may have impacted the results. For example, number of participants was relatively small, further assessment with larger number of college students is advised. In addition, one of main limitations of the current study, one can mention the use of self-reporting tool in procrastination. Using such a tool, the students will be influenced by many factors, for example, conflicts between needs and social endorsements. Therefore, to avoid bias, experimental measuring tool may be used in future.

### Conclusion

Results of this study revealed that procrastination is more common among male students, more expected to occur in students with obsessive compulsive disorder. Also, several EFs are impaired among procrastinating students, especially working memory, organization, emotional control, task initiation, time management, and flexibility. Finally, this study demonstrated that locus of causality, personal control, and stability are significantly affecting the procrastinating students. Procrastinators often attributed failure in exams to internal (e.g. disabilities) and stable factors being under external, not personal control. All the previous data represent cues for the development of strategies among students to prevent the aggravation of this problem.

### Recommendations

Future studies are recommended in different faculties and universities, which may help in generalization of the current results. The results of this study may provide valuable information for counselors and university staff about the problem of academic procrastination. College students are faced with many challenges which requires continuous development of their skills and capacities; developing effective educational programs to improve EFs of those students will, undoubtedly, help them to improve their academic performance. Nevertheless, students' causal attributions should be worked upon through different strategies, such as administration of weekly or repeated short quizzes with regular feedback about the student academic level, which will give a chance for improving his performance by increasing his effort and identifying the points of weakness. This continuous achievement will change students' attributions about their failure. Another strategy is the organization of regular workshops and programs for college students aiming to change their faulty attributions not only about their academic performance, but also about their whole life events.

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### Conflicts of interest

There are no conflicts of interest.

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