مجلة جامعة الملك عبد العزيز: الآداب والعلوم الإنسانية، م (٣٤)، ع (١)، ص ص: ٥٤١ – ٥٥٥ (٢٠٢٦م)
DOI: 10.4197/Art.34-1.20

The role of sensitivity enhancement systems and self-regulation in the academic achievement of students at the University of Ha'il

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Abstract: This study paper aims to clarify the relationship between self-regulation and sensitivity reinforcement systems. In addition to how they affect the academic achievement of the female students at Ha'il University, although determining whether there are differences between the participants in the sample. Following a descriptive-correlational methodology, 156 female students majoring in medicine and humanitarian studies were included in the stratified random sample. Reinforcement sensitivity was measured using a revised reinforcement sensitivity scale (rRST-Q), translated into Arabic by the researcher, and self-regulation was measured using a shortened self-regulation scale (SSRQ), which was also translated into Arabic by the researcher. The study's findings indicate a statistically significant positive correlation between behavioral activation (BAS) and self-regulation; there is also a negative relationship between BIS and FFFS. It was also evident from the study that behavioral inhibition is predictive of a decrease in the grade point average (GBA), while self-regulation contributes to an increase in it.

Keywords: behavioral activation systems, behavioral inhibition systems, the grade point average.

Introduction:

This research deals with the personality of students through the theory of sensitivity of reinforcement and its relationship to self-regulation and how they affect the academic performance of undergraduate students.

The reinforcement sensitivity theory RST contains three behavioral systems of the brain, forming individual differences in sensitivity to reward, punishment, and motivation. It has been used to study and predict anxiety, impulsivity, and extrovert personality (Gray J. a., 2003). The theory RST evolved from Gray's theory of psychological biology of personality, integrating findings from several fields in psychology and neuroscience, which were revised in the year 2000, and the theory emerged in a new and revised form (Corr P. J., 2004). The

revised theory distinguished between fear and anxiety and added a new dimension, which is the system of fight, flight, and freeze FFFS (Clark, 2012).

The theory of sensitivity reinforcement (RST) is one of the most prominent theories of biological basis in personality psychology (Corr P. J., 2008).

This theory is based on the concepts of BAS behavioral activation systems, BIS behavioral inhibition systems, and (FFFS) fight, flight, and freezing. The author of the theory suggested that BAS is related. In the medial limbic dopamine pathways (Pickering, 2001). People whose dopamine is released in their brains in greater amounts than others can be described as having energy, a desire for exploration, and are more enthusiastic than others for the rewards (Leyton, 2002). Those with BIS have concurrent activity in the amygdala and septohippocampal system (McNaughton, 2000). Barrós-Loscertales et al. mention that gray matter volumes in the hippocampus and amygdala have a positive relationship; they are more worried and driven to avoid punishments (Barrós-Loscertales, 2006). Higher BIS activity suggests hesitation, risk assessment, or cautious action in the face of conflicting goals and uncertainties. According to Gray and McNaughton (McNaughton, 2000), they also have trouble deciding between two people who are equally beautiful or ugly (Gray J. A., 1982). In behavioral terms, FFFS is linked to a proclivity for using avoidance tactics to cope with anxiety (Hayes, 2004). Withdrawal behavior is linked to this activity in FFFS. A high-trait FFFS individual has high levels of in-flight and freezing behavior but low levels of fight behavior. A person who is unwilling to fight when under attack tends to withdraw more quickly from uncomfortable situations when compared to someone more likely to fight if they are threatened (Reuter, 2015).

In the writings of classical and contemporary thinkers such as Heraclitus Kirk, Descartes, and Kant, the first lines of knowledge related to the concept of self-organization may be discovered. Nonetheless, due to its heavy emphasis on the abstract nature of self-organizing dynamics, studies refer to Ashby as a contemporary introduction as the first explicit usage of the notion of self-regulation in a manner substantially comparable to contemporary reports (Anzola, 2016).

According to Albert Bandura (Bandura, 1991), it is an active process in which we evaluate our conduct, as well as its repercussions and consequences, and judge our actions concerning our personal and environmental norms. Behavioral self-regulation is defined as a person's ability to display conduct that advances his long-term goals without jeopardizing his values (Stosny, 2011). Self-regulation can also refer to a variety of activities, such as the regulation of thoughts, feelings, and behaviors to govern behavior or the body or self-control (Vohs, 2008). A person with effective self-regulation can keep his emotions under check (Bell, 2016), overcome impulsive acts that may exacerbate his condition, and delight himself when he is feeling low, according to Bell. Flexible enough to meet environmental standards. Independence, strength and flexibility, and dynamics, according to Gilbert et al., are four common features in the numerous definitions that determine the formation of the following organization (Gilbert N, 2015).

When confronted with indicators of impending danger or events that provoke conflict, Miller and Brown embrace the premise that self-regulation is a self-correcting operation. Understanding the nature and effects of behavior change, as well as the success of planning and reaching goals, are all processes that culminate in a comprehensive review (Zapata, 2016). Boekaerts and colleagues conducted a study to compare and contrast self-regulation in various fields of psychology, including health and education. as well as the key areas of applied psychology, as organizations and work, they discovered elements commonly shared by categories, like choosing goals, establishing goals, and being sensitive to feedback, conflict observation (mistake), evaluative self-judgment, self-correction of effective acts, and the establishment of beliefs of self-efficacy (Boekaerts, 2005). The self-regulation process goes through several steps, as shown in Figure 1.

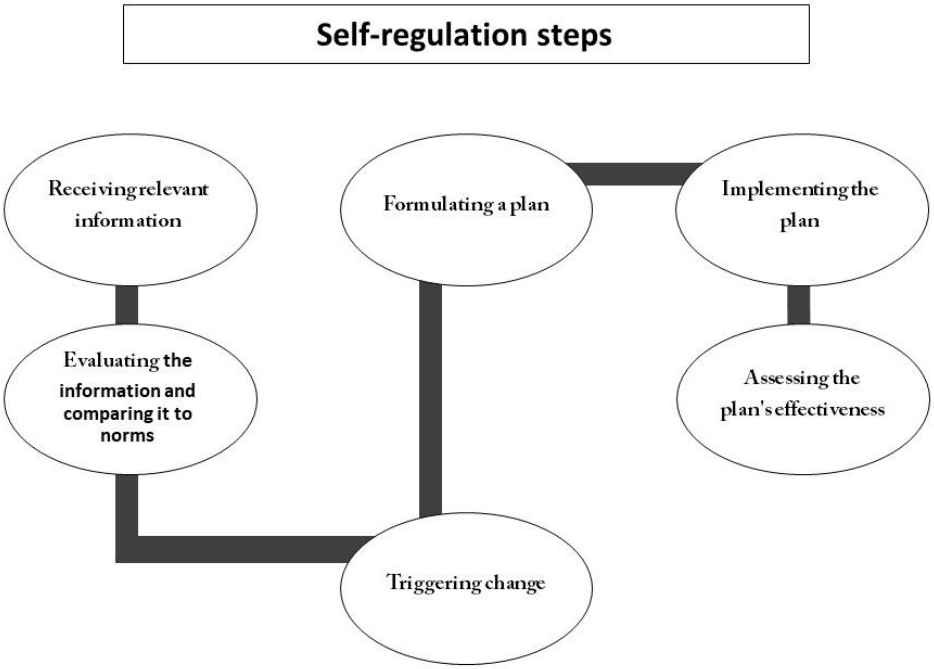

Figure 1. Self-regulation steps

Self-regulation has a good impact on people's lives; it aids in the promotion of a healthy feeling of well-being and ensures that their everyday self-regulatory conduct is marked by increased well-being. Increased self-regulation was favorably connected with both men's and women's well-being (Skowron, 2003). Adolescents who engage in self-regulatory behavior regularly report higher levels of happiness and life satisfaction than their classmates (Verzeletti, 2016). Self-regulation aids in the learning process before the commencement of the learning task, when the student has time to consider the problem, set goals, and devise a strategy for dealing with it; During the assignment, the student must keep track of his progress and assess the effectiveness of his strategies; and then there's the time following the activity when the student can reflect on his performance and figure out what went well, what didn't, and what should be altered (Zimmerman, 2002). When discussing the significance of self-regulation in education and goal-setting, it's important to

remember that it's also linked to motivation. Motivation is a necessary component of self-control. It's one of the things that determines how well you can control your actions and emotions. The level of a person's desire to succeed is linked to their performance. Even if he had the best intentions and well-laid plans, he would most certainly fail if he was not driven to control his behavior and avoid the temptations of procrastination and distraction (Ackerman, 2020).

Learning is a multifaceted process that involves cognitive, personal, psychological, and environmental processes. They are integrated, as well as complementary functions, and all parties involved share responsibility. Its success is not just dependent on the student or the teacher, but rather on a continual sequence of deliberate efforts by all parties to identify strengths and weaknesses. Moreover, the most effective approach for acquiring knowledge and measuring learning outcomes. Researchers and education policymakers all around the world are emphasizing social and emotional aspects, as well as their interrelationships, as indicators of students' psychological growth and proof of their well-being (Chernyshenko, 2018).

Aim and hypotheses:

In this research, the researcher seeks to identify the personality traits of undergraduate students and their associated individual differences in sensitivity to reward, punishment, and motivation according to (RST) theory and the extent of their possession of self-regulation skills. To answer the main research question, can the sensitivity of reinforcement and self-regulation cause differences in academic achievement for undergraduate students?

Hypothesis 1: A statistically significant correlation has been shown between the reinforcement sensitivity systems (BAS-BIS-FFFS) and self-regulation among the sample members.

Hypothesis 2: There are statistically significant differences in the sensitivity of reinforcement according to specialty in favor of medical specialty.

Hypothesis 3: The reinforcement sensitivity systems (RST) and self-regulation (SR) predict grade point average (GPA).

The researcher hopes that the results of this study will impact the motivational methods used in universities, teaching methods, and assessment. It also hopes that it will provide those interested in the educational process with information that will help them enhance students' mental health and develop their independence and personal and cognitive abilities. Moreover, this study can be added to the studies that dealt with the theory of reinforcement sensitivity in the Arab environment.

Procedures and materials:

The methodology:

The researcher, due to its relevance to the study problem and hypotheses, used the descriptive-correlational approach.

Study sample:

Data was collected anonymously via an online questionnaire; a promotional message outlining the study's goal and providing a link to the online survey site was provided. Students received reminders to encourage them to participate in the study.

The study sample consisted of 162 students, six of whom were excluded for lack of completeness of data, so the final number became 156, and they were divided into two groups according to academic specialization. The number of female students in the field of human sciences (n = 66) and medical students (n = 90). The participants were between the ages of 17 and 25. Female, GPAs ranging from one to four points, from November to December 2020, data were collected.

Study tools:

Data was gathered anonymously through an online questionnaire. The first section deals with personal information such as specialty, GBA, as shown in Table 1.

Table 1. Personal information

Categories		N	%
specialty	Human	66	42.3%
	Medical	90	57.7%
	Total	156	100%
GBA	1 to 2	6	3.8%
	2.1 to 2.5	54	34.6%
	2.6 to 3	42	26.9%
	3.1 to 3.5	24	15.38%
	>3.5	30	19.23%
	Total	156	100%

The sensitivity of the reinforcement questionnaire (rRST-Q):

To measure the sensitivity of reinforcement among the members of the sample, the rRSTQ scale was used, which was designed in Germany and then translated into English, and it was translated into Arabic by the researcher. The scale's English version was translated into Arabic by an English and Arabic bilingual speaker; a native Arabic speaker double-checked the translated items, and numerous minor changes were made to suit Arabic speakers.

The BIS behavioral inhibition systems, BAS behavioral activation systems, and fight, flight, and freezing scales each have 31 items divided across three dimensions of FFFS. BAS is made up of 8 items, BIS is made up of 11 items, and FFFS is made up of 12 items. The five Likert scales, ranging from never to allow, are used to correct them.

By analyzing the Pearson correlation coefficient (*r*) between the scores on the scale and the overall score, the validity of the scale's internal consistency was confirmed. At a threshold of 0.05 significance, the correlation coefficient ranged from (.455 to .801) for the paragraphs, and the reliability score was 0.96. As a result, the scale's paragraphs are all internally consistent. demonstrating the scale's suitability for the study.

Confirmatory factor analysis was also used to verify the validity of the scale with its three factors. The results of the analysis showed that it was valid at a significance level of <0.001, as shown in Table 2.

Check the dependability of the scale with Cronbach's Alpha. The overall reliability level was calculated (.92). This implies that the scale is quite reliable and can be trusted.

Table 2. Confirmatory factor analysis of the scale (rRST-Q)

	Value	**p**	**RMSEA**	**RMSEA 90% confidence**	**SRMR**	**TLI**	**CFI**
Model	3.746	< .001	0.0361	0.955 - 0.969	0.09	0.91	0.95

(SSRQ) Short Self-Regulation Questionnaire:

The Self-Regulation Questionnaire (SSRQ) Short Version consists of 31 phrases, a self-report assessment of the ability to influence behavior sufficiently to achieve goals. The scale elements are divided into seven dimensions: Obtaining pertinent information when evaluating data and comparing it to norms, bringing about change while looking for alternatives, creating a strategy, putting the strategy into action, evaluating the plan's efficacy

Participants rate their agreement with each item on a Likert scale with five points: one (never), two (rarely), three (sometimes), four (often), and five (always). Scores from 1 to 5, with a breakpoint of 3.

To verify the validity of the items, apply the Pearson correlation coefficient to examine the internal consistency of each one. The process's outcomes demonstrated that every sentence was statistically significant and saturated. With a significance threshold of 0.01 for all items. The correlation coefficient varied from 0.460 to 0.746. The score for dependability was 0.96. As a result, the scale items are all internally consistent, demonstrating the items' validity. As a result, this scale is appropriate for conducting the research. Additionally, Confirmatory factor analysis component analysis was carried out to confirm the Self-Regulation Questionnaire's validity. According to Table (3), the findings demonstrated that it was valid at a significance level of less than 0.001.

Cronbach's Alpha was used to assess the reliability of the scale, and (.92) was the total reliability degree. This demonstrates that the scale is highly stable and reliable for use in this research.

Table 3. Confirmatory factor analysis of the scale (SSRQ)

	Value	p	RMSEA	RMSEA 90% confidence	SRMR	TLI	CFI
Model	2.554	< .001	0.0573	0.955 - 0.969	0.07	0.96	0.95

Statistical analytical data:

The analysis was conducted using parametric tests. Correlations between variables were examined using the Pearson correlation test coefficient. For intergroup comparisons, the Mann-Whitney test was applied, and for categorical variables, one-way analysis of variance (ANOVA) was applied. To determine the predictive value of various factors, it was ascertained through an incremental multiple linear regression. All computations were done on a Windows 10 PC running IBM Corporation's SPSS for Windows v24 (Armonk, New York). Cronbach's Alpha, the Spearman-Brown, and the Guttman split-half were used to confirm the study instruments' validity.

Result:

Hypothesis 1: A statistically significant correlation has been shown between the reinforcement sensitivity systems (BAS-BIS-FFFS) and self-regulation among the sample members.

Table 4. Correlation between reinforcement sensitivity systems and self-regulation

variables	N	Pearson Correlation	Sig. (2-tailed)
BAS	156	.206	0.010
BIS		-.651-	٠,٠٠٠
FFFS		-.444-	٠,٠٠٠

The Pearson Association coefficient was used to check for a statistically significant correlation between reinforcement sensitivity systems and self-regulation. The correlation of the three dimensions of the reinforcement systems was tested, and it was found that there is a relationship with (BAS) R =.206, at the significance level = 0.0.10, while (BIS) is negatively related R =-0.651-**, at the significance level = 0.000, and (FFFS) He has a positive correlation R =-.444-**, at the significance level = 0.000, as that in Table 4.

To know whether it is possible to predict self-regulation through sensitivity reinforcement systems, multiple regression was used. Regression results indicated that both BAS and BIS explained 0.677% of the variance (R2 =.823, f = 105.95, p <.01). It was found that BAS significantly predicted self-regulation (β = 1.326, p<.01), while BIS predicted negatively) β =-1.126-, p<.01), as well as FFFS (β =-1.187-, p<.01) As shown in figure 2.

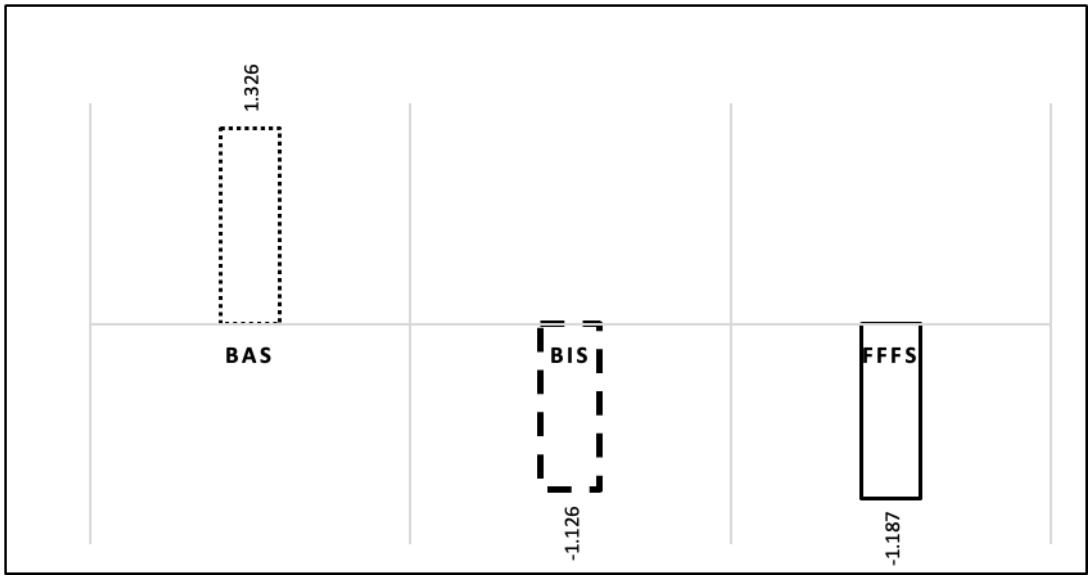

Figure 2. Predictive values of (SR) according to (RST)

Hypothesis 2: There are statistically significant differences in the sensitivity of reinforcement according to specialty in favor of medical specialty.

Table 5. Differences in reinforcement sensitivity according to specialty

variables	specialty	U	Z	Sig
BAS	medical	2664.00	1.11	0.266
	humane			
BIS	medical	2718.000	0.91	0.364
	humane			
FFFS	medical	1656.000	4.74	0.000
	humane			

The Mann-Whitney U Test is used to explain the differences among groups; this finding indicates variances in reinforcement sensitivity regimes depending on specialty. Table No. (5) shows that there are no disparities in BAS and BIS for female students in humanitarian majors; however, there are variances in FFFS. U = -4.74, P = 0.000

Hypothesis 3: The reinforcement sensitivity systems (RST) and self-regulation (SR) predict grade point average (GPA)

Table 6. Multiple regression between RST and GBA.

R	R- Square	Unstandardized B	F	Sig
-461	.213	-.1-	41.63	.000

The three reinforcement sensitivity systems were tested to see if they could predict grade point average (GPA) using stepwise multiple linear regression. Table 6 illustrates the regression results, which indicated that the behavioral inhibition systems BIS were only related and that predictors cleared - 0.1% of the variance (R2 = .47, F = 41.63, p <.01). It was found that BIS significantly predicted GPA (β = -. 1, p <.01).

A main effect of self-regulation (SR) was found for grade point average (GPA) , F =16.602, p<.0••. Group1 (1- 2) (M =74.0, SD =.•••), Group2(2.1-2.5) (M = 98.25, SD = .44), Group3 (2.6-3) reported self-regulation is significantly less than the second group (M = 91.77, SD = 7.72), Group 4 (3.1-3.5) (M = 95.85, SD =11 .41) and Group5 (>3.5) The fifth group reported self-regulation to a higher degree than all groups,(M= 101.14, SD = 10.14). See Figure 3.

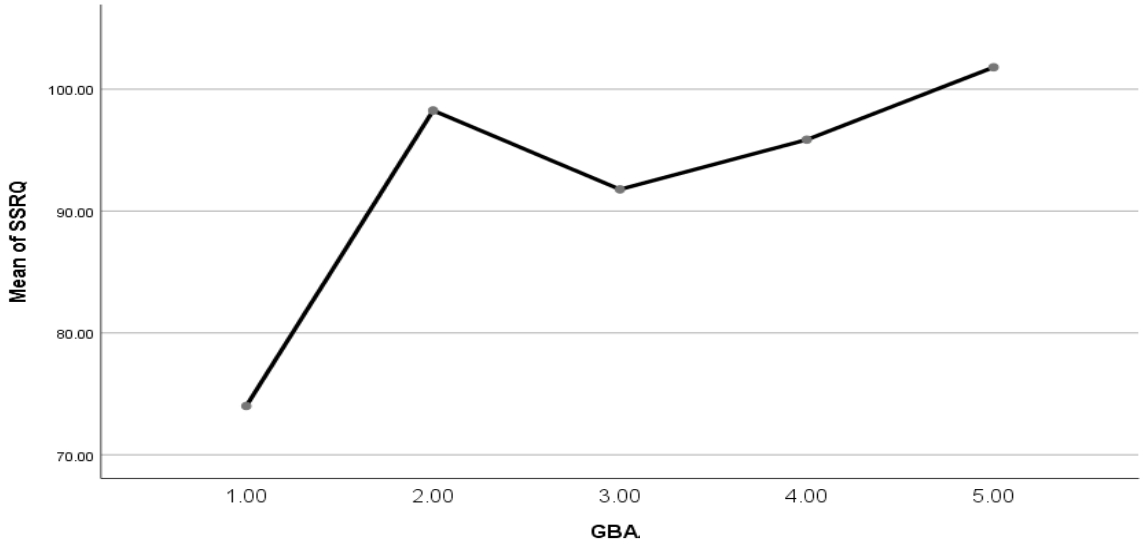

***Figure 3*. Differences in GBA according to self-regulation**

Discussion:

To be able to understand the academic achievement of students that we measure in this study from GBA, we must understand the psychological factors associated with the students and that affect their performance.

It became obvious from this research that there is a link between self-regulation and the three reinforcement sensitivity systems. The positive relationship with behavioral activation is that the system is believed to be its owners tend to obtain the reward instead of receiving the punishment, so they work in an organized and diligent manner to be able to achieve their goals, and they also experience positive emotions such as hope and elation (Carver, 1994). This is exactly in line with goal selection, resource allocation, and executive performance that is self-regulated (Gestsdottir, 2008).

According to Carver & White, individuals with BIS are predicted to experience increased anxiousness and to use caution. On the other hand, those with BAS are thought to exhibit risky behaviors and be more impulsive. (Vandeweghe L., 2016). The foreclosure cognitive trend highlights the assumption that BIS discourages all persistent behavior when conflicts

develop because of competing goals. That means it is no longer a punitive framework but instead a method for identifying and resolving conflicts. (Smillie, 2006). It also balances reward and punishment, thus leading to approach or avoid behavior (Keiser, 2011).

Anxiety is a basic human emotion consisting of fear and uncertainty, as it obscures the natural state of thought processes. He prefers to take a passive approach to substances rather than interact with them. According to Ajmal and Ahmad, anxiety has a detrimental relationship with the perception of essential cognitive and emotional outcomes in learning, as it constantly makes students underperforming (Ajmal, 2019), and fear badly affects the brain structure of memory and learning because of poor academic performance and low level of learning (Ullah, 2018).

Van Beek and colleagues reported that their study of undergraduate students in the Netherlands showed that activation of BIS was positively associated with fatigue and determination to drop out (Van Beek, 2013). BAS activity was linked to learning positively; high BIS activation students are believed to lean toward negativity and have self-protection concerns (Heimpel, 2006). Moreover, although students with a high BIS show great interest and commitment to education, they fall victim to burnout due to their growing fears and aspirations to achieve a high academic standard (Van Beek, 2013). The current study showed that BIS can predict a decrease in the academic rate of at least two degrees, which constitutes an obstacle to academic achievement and negatively affects the psychological state of students. Therefore, appropriate measures must be put in place.

Self-regulation is a developmental pathway that affects the context of individual desires, purposes, needs, goals, interactions with others, and the environment (Geldhof, 2010). Self-regulation makes individuals' lives more efficient; effectiveness is an attribute discriminator of an active and self-adapted life system (Overton, 2014). Understanding self-regulation is the most crucial aim for us to be able to comprehend development, according to Posner and Rothbart (Posner, 2000). Self-regulation has enormous consequences for health and well-being. Self-regulation is essential for successful task performance at all stages of life. Self-regulatory skills are shaped in part by life path transitions and points, which can have a positive (preventive) or negative (incapable of adaptation) impact on developmental pathways (Halfon, 2018).

The current study found that academically excellent students have high self-regulation skills, and the more self-regulation, the GBA increases. This result is consistent with many studies conducted in various parts of the world. A study was conducted on university students in Spain and Portugal, and it was found that those who use higher psychological skills can achieve better academic results (Martinez, 2019). Moreover, university students in Saudi Arabia who are characterized by the skills of self-regulation and behavioral activation have excellent academic performance (Adam, 2023). Because self-efficacy is associated with reduced academic problems, supportive learning environments are positively associated with achievement. Regardless of the psychological and personal difficulties faced by students, Eakman and his colleagues (Eakman, 2019) and Cho and Kim (Cho, 2019) showed that early independence motivation was positively associated with

mastery-oriented goals the following year, which correlated with increased autonomous motivation in the next year.

Executive function (EF) research focuses on the flexible cognitive processes that underpin self-control. Attention, stress regulation, and working memory are only a few examples (McClelland M. M., 2010). In adolescents and adults, stressful control is linked to self-control and conscientiousness (Eisenberger, 2012). There is also a correlation between education and self-regulation, and early educational environments contribute to increasing differences between students (Morrison, 2010). A long-term study was conducted that demonstrated the positive role of self-regulation in achieving high academic achievement during the educational stages from high school to college completion (McClelland M. M., 2013).

Based on the foregoing, the researcher recommends training students in various educational stages on self-regulation skills because of their positive impact on academic achievement, mental health, and well-being. Regardless of the reinforcement sensitivity system that dominates the person, this procedure will achieve growth opportunities, achievement, and balance and harmony consensus for all.

Conclusion:

The study concluded that sensitivity enhancement systems are associated with self-regulation; BAS works with self-regulation positively, while both BIS and FFFS are negatively related. There are no differences between the female students according to the academic specialization in most of the dimensions. Female students' academic accomplishment has a favorable impact on self-regulation and BAS behavioral activation, while BIS behavioral inhibition predicts a decline in academic achievement.

Acknowledgment:

The author expresses gratitude to all participants for sharing their experiences and insights.

Conflict of Interests Declaration:

The author acknowledged there are no possible conflicts of interest related to the research, writing, or publication of this paper.

Funding for the research:

The author did not receive any financial funding from any party when writing this manuscript or when publishing it.

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DOI: 10.4197/Art.34-1.20

دور أنظمة تعزيز الحساسية والتنظيم الذاتي في التحصيل الأكاديمي لطلبة جامعة حائل

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المستخلص: تهدف هذه الدِّراسة إلى توضيح العلاقة بين التَّنظيم الذَّاتيّ وأنظمة تعزيز الحساسية بالإضافة إلى مدى تأثيرها على التَّحصيل الدِّراسيّ لدى طالبات جامعة حائل، مع تحديد ما إذا كانت هناك فروق بين المشاركين في الدِّراسة. تمَّ اتِّباع المنهج الوصفيّ الارتباطيّ، تمَّ تضمين ١٥٦ طالبة من التَّخصُّصات الطِّبِّيَّة والإنسانيَّة، تمَّ اختيار العيِّنة بالطَّريقة العشوائيَّة الطَّبقيَّة. وتمَّ قياس حساسية التَّعزيز باستخدام مقياس حساسية التَّعزيز المنقَّح (rRST - Q) الَّذي ترجمه الباحث إلى اللُّغة العربيَّة، كما تمَّ قياس التَّنظيم الذَّاتيّ باستخدام مقياس التَّنظيم الذَّاتيّ المختصر (SSRQ) الَّذي ترجمه الباحث إلى اللُّغة العربيَّة. وتشير نتائج الدِّراسة إلى وجود علاقة إيجابيَّة ذات دلالة إحصائيَّة بين التَّنشيط السُّلوكيّ (BAS) والتَّنظيم الذَّاتيُّ، كما توجد علاقة سلبيَّة مع BIS، (FFF) كما تبيَّن من الدِّراسة أنَّ التَّثبيط السُّلوكيَّ ينبئ بانخفاض المعدَّل التَّراكميّ (GBA)، بينما يساهم التَّنظيم الذَّاتيُّ في ارتفاعه.

الكلمات المفتاحية: نظام التنشيط السلوكي، نظام التثبيط السلوكي، التنظيم الذاتي، المعدل التراكمي.