Counterfactual Thinking among University Students

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Abstract

The importance of the research stems from the importance of its variables and the scarcity of Arab and local studies on them, and from the importance of the research sample - university students - who are considered among the most important segments of society, as the research community consisted of (23,353) students from the morning study for the academic year (2020-2021), As for the research sample, it consisted of (467) male and female students, with a percentage of (2%) from the research community, and to measure the research variables, the researcher prepared a measure of counterfactual thinking, and to identify the results of the research objectives, the researcher used the Statistical Analysis Package (SPSS), which showed a high level of Counterfactual thinking among university students, and based on the results reached, the researcher presented a set of conclusions and recommendations as well as proposals.

Keywords: Counterfactual thinking, University Students, The Functional Theory.

Chapter one: Definition of search.

First. Problem of the Research

The student segment is one of the most important segments of society, especially university students. Because it is the most aware segment and is aware of the future, and of what is relied upon in building society - that is, society - and there is no doubt that the successive crises (economic, political, security, and others ...) that our dear country is going through, They have generated negative effects on the psychological and societal structure and have also generated stressful conditions that made them more vulnerable to excitement and emotions, and that these emotions are directly related to the decisions taken by the individual (right or wrong) and thus he tries to avoid them (behaviorally, cognitively, or emotionally) or to generate alternative worlds; To imagine better results than what he obtained, trying to implement them in the future or to maintain what he obtained from the results by reassuring himself by imagining worse results that did not happen, Roese et al. (1999) indicated that many individuals suffer from problems related to the extent to which they accept the results of their actions and this suffering may continue with them, generating remorse and frustration later. Therefore, there are results that could have happened, as mental processes are concerned with current results, as they are also concerned with the past and the future (Roese et al, 1999: P. 1109), and the researcher summarizes his research problem with the following question:

• **What is the level of counterfactual thinking among university students?**

Second. The Importance of the Research:

University students represent a vital energy for building society and achieving its aspirations; therefore, attention should be paid to this important segment and permanent wealth by educators, such as professors and mentors, as well as thinkers and others, because this segment - university students - has flexibility and mental health that makes them more open and receptive to facing the pressures of life in its various forms and more confirmation of their creative energies, If the student understands himself, he can control and control it, and in recent times an important variable has emerged in the construction of the individual's self, which is (counter-reality thinking, at the level of education,

academic goals are one of the important goals that affect the process of counterfactual thinking when thinking about better alternatives to what happened already; a study conducted by (Petrocelli et al. 2012; p. 5)

The students whose results were not convincing to them and used different representations of their actual results in an effort to explain their wrong responses, they realized later that they possess the skills of imagination and generate alternative worlds that help them improve their results in the future regardless of their actual performance (Petrocelli et al, 2009; p. 5).

Third. Aim of the Research:

• counterfactual thinking among university students.

Fourth. Limits of the research

The current research is determined by studying (counter-reality thinking) among students of Babylon University for the academic year (2020-2021), from the morning study.

Fifth. Limits of the Terminologies:

• **Roese (2008)**

Mental representation of alternatives to past events, actions or situations can be summarized as "what could have been", including the juxtaposition of a better or worse imagined situation versus real-life (Roese, 2008; p.168)

Theoretical definition: The researcher adopted the definition of Roese (2008), because he adopted his theory in constructing the scale and interpreting the research results.

Procedural definition: The overall score obtained by the respondent student after his answers to the paragraphs of the counterfactual thinking scale prepared for this purpose.

Chapter Two: A theoretical framework: counterfactual thinking is essential for motivation and learning, as it refers to the mental simulation of alternatives to past facts and events, and how errors and previous cases are used to correct the course in the future, including, but not limited to, what many students think "I would have passed the test if I had controlled my anxiety." the counterfactual thinking has philosophical origins that go back to the origins of Plato and Aristotle and their ilk, among the early philosophers who pondered much about individual knowledge and its results, and it was also the focus of attention of new philosophers such as Hume (1748), Goodman (1947) and Lewis (1973), and other philosophers who have addressed different ideas (Dehghani et al, 2007, p. 1), Roese (2008) indicates that the term counter-reality thinking is derived from the philosophical writings in which the logical state of probability and probabilistic thinking was examined, including what was indicated by the study of (Evans, 2004 & Kvart, 1986 & Vaihinger, 1965) (Roese, 2008; p. 2), As for psychologists, including specialists in the field of cognitive psychology, they dealt in many of their research with the idea of alternative worlds and the idea of "what could have been", including what Jensberg (1986) and Pearl (2000) dealt with, as well as Hiddleston (Hiddleston). (2005) (Dehghani et al, 2007, p. 1).

Theories that explained counterfactual thinking

The Functional theory

This theory is one of the most important and prominent theories that explained counterfactual thinking, and in it Royce confirms, through his many researches on it, that this type of thinking is useful. It is directly related to the perceptions of the goal.

Both (Epstude & Roese,2008) indicate that there are two aspects of psychological processes that determine functional explanation:

A- The process is activated by a disability or need.

B - The process leads to the generation of behavioral changes that end the disability or satisfy the need.

Roese and Olson (1995) have argued that emotions, including negative ones, greatly stimulate counterfactual thinking, because negative consequences are treated by the individual as signs that he cannot control the environment, and so he examines these events after he pays more attention to them. Of positive events (Zhang, 2010, p. 23).

If the main function of counterfactual thinking is to provide solutions to problems, then it must be activated by the problems themselves, and this assumption forms the core of the processes that control and regulate behavior

(Epstude & Roese, 2008, p. 3), the researcher has adopted in his current research the functional of Roese theory as a theoretical framework for constructing the scale and interpreting the results of the current research because:
• It is considered a comprehensive theory and specialized in counterfactual thinking.
• This theory is more close to reality and easy to apply.
• The researcher has reported in the formulation of a number of the scale paragraphs.

Chapter Three: Research Methodology and Procedures: This chapter includes a presentation of the research methodology used by the researcher and the procedures that he followed in order to achieve his research objectives, starting with choosing the appropriate approach, describing the community, the method for selecting the sample, extracting the psychometric characteristics of the two measures and the application procedures, as well as identifying the most important statistical methods that were used in Data processing as follows:

First: Research method: The relational descriptive approach was used; Because it is the appropriate approach for the current research, and the descriptive approach is defined as "one of the forms of structured scientific analysis and interpretation to describe a specific phenomenon or problem and quantify it quantitatively by collecting codified data and information about the phenomenon or problem, classifying it, analyzing it and subjecting it to careful study." In all cases, one of the most important characteristics of descriptive research is it is objective in diagnosis (Melhem, 2000: p. 387).

Second: The research community: The research community means the overall group with the elements that the researcher seeks to generalize to the results related to the problem (Odeh and Malakawi, 1992: p. 159), and the current research community includes students of Babylon University for morning study and both disciplines (scientific - human) And the two sexes (males - females) for the academic year (2020-2021), and their number is (23353) and by (14229) students represent the scientific specialization, of whom (5779) are male and (8450) female students, and (9124) students represent humanitarian specializations and by (3733) male and (5391) female students.

Third. Research sample: The research sample means a part of the community in which the study is being conducted, and the researcher chooses it to conduct his study on it according to special rules in order for the community to be properly represented (Daoud and Abdel Rahman, 1990: p. 67). The researcher selected the sample according to two phases, as follows:

A. College sample: The researcher used the random stratified method in selecting the college sample. The names of the colleges were written on paper scraps, and the scraps of each group were placed in a bag on one side in order to draw and select (5) colleges.

B. The student sample: The researcher selected the student sample by random stratification method with proportional distributions and by (2%) from the total research community for students. The number of individuals for the basic research sample was (467) male and female students, by (191) male and (276) female students, who were selected according to the percentage. From the total research community.

Fourthly. Research tool: To achieve the objectives of the current research that aims to measure counterfactual thinking among university students, and in view of the inability to have measures that are suitable for the community and the research sample in the Iraqi environment, it may require the researcher to undertake the preparation of the counter-reality scale of thinking, using the scientific and practical steps to prepare the standards by identifying the theoretical principles and the basic needs on which we rely in preparing the scale, as Cronbach stresses the need to start by defining the structural concepts from which the procedures for building and preparing the scale are based (Cronbach, 1980; p. 462), and as follows:

The counter-reality scale of thinking: After it was not possible to find a suitable measure for the requirements of the current research, the researcher prepared the counter-reality scale of thinking relying on the scientific steps necessary to prepare psychological standards as follows:

A. Determining the characteristic to be measured: The researcher has determined the attribute to be measured, which is counterfactual thinking, and in order for the tool to be more accurate, the researcher adopted the theory and definition of Roese (2008), which he defined as (a mental representation of alternatives to events, actions, or past states, which can be summarized by the phrase " What would have been "a juxtaposition of a better or worse

imagined state versus the real one" (Roese, 2008, p168), and according to this theory, Roese (2008) identified two directions (two areas) of counterfactual thinking:

- Upward Counterfactual Thinking
- Downward Counterfactual Thinking

B. Preparing the scale paragraphs: After developing the theoretical definition of counter-reality thinking, defining its domains and defining each of them, the researcher formulated the scale paragraphs in the manner of self-report according to the form of the speaker, in light of the definition of the concept, theory, nature of the target society for measurement and previous literature, 38 paragraphs were prepared that measure thinking Counterfactual in general.

C. Alterative Response: For each of the paragraphs, five alternatives have been specified for the answer, which are (they always apply to me, they often apply to me, they apply to me sometimes, they rarely apply to me, they never apply to me) their scores are (5, 4, 3, 2, 1) respectively and reflect when correcting the field of thinking contrary to the descending reality, and based on the aforementioned, the researcher prepared the paragraphs of the scale that consisted of (38) paragraphs and two domains with (20) paragraphs that measure thinking contrary to the reality directed towards the upward (ascending) and (18) Paragraph thinking counteracting to reality heading downward (bearish).

D. The validity of the paragraphs of the scale: The logical analysis of the paragraphs is necessary because it indicates the extent to which the paragraph outwardly represents the feature that was prepared to measure it (Al-Kubaisi and Al-Dahri, 2001: p. 17), so the researcher verified the validity of the paragraphs by presenting the scale to a group of arbitrators specialized in the field of science The educational and psychological numbers of (36) arbitrators, and in light of the opinions of the referees, all the paragraphs were approved through the use of the chi-square, and Table (5) shows that:

Table (1) shows the value of chi-square to know the opinions of the arbitrators regarding the validity of the paragraphs of the counterfactual thinking scale

Paragraph numbers	Number	Number of arbitrators	Accepters	Non-conformists	Calculated chi-value	Tabular chi value	The significance level is 0.05
1,2,3,6,11,8,14,16,19,22,25,28,31,34,37,38	16	36	36	0	36	3,84	Statistical function
4,9,13,17,20,23,26,30,35,36	11		35	1	32.11		
5,7,12,18,24,27	6		33	3	25		
21,32,33	3		31	5	18.77		
10,15	2		30	6	16		

After looking at the above table, we find that the calculated chi-square value ranged between (36-16), which is much higher than the tabular value of (Ca2) of (3.84) at a level of statistical significance (0.05) and a degree of freedom (1), thus, all the paragraphs were accepted, by arbitrators with modifying the wording of some paragraphs.

E. Experimenting with clarity of paragraphs and instructions: For the purpose of identifying the clarity of the scale's instructions and the clarity of its paragraphs and alternatives, as well as revealing the difficulties that the respondents face in order to avoid them, the researcher conducted an exploratory experiment and applied the scale in its initial form on (30) students and students, they were randomly selected and not from members of the basic research and statistical analysis samples, and they were assured that their answers were for the purposes of scientific research; Therefore, they were not asked to mention the name in order to reduce the potential impact of the social desirability factor, and after reviewing the answers on the scale paragraphs, it became clear that all the paragraphs were clear, easy to answer and understandable, and the average time taken to respond was (13) minutes.

F. Statistical analysis of paragraphs:

1. Discriminatory power: The statistical analysis sample consisted of (496) male and female students and not the main research sample, the two peripheral groups' method is an appropriate procedure in the paragraph analysis process; Therefore, the researcher used this method, using a (t-test) test for two independent samples to calculate the significance of the differences between the averages of the upper and lower groups for each paragraph, and it was found that all the paragraphs were distinct, as all the calculated t-test values were greater than the tabular value, which amounted to (1.96) at a level of statistical significance (0.05) and with a degree of freedom (266), with the exception of paragraphs (7 and 11), as the value of (t) calculated for them, respectively (1.88) and (0.66) was less than the tabular value, and thus they were excluded.

2. Paragraph degree relationship: Since the discriminatory strength of the paragraphs does not determine the extent of their homogeneity in measuring the phenomenon designed to measure it, it is possible that there are paragraphs that are close in their discriminatory strength, but they measure different behavioral dimensions (Anastasi & Urbina, 2010; p. 155), and on This basis, the veracity of the paragraphs of the scale was calculated through:

• **The relationship of the paragraph score with the total score of the scale:** To achieve this, the values of the correlation coefficient between the paragraph score and the total score of the scale were calculated using the Pearson correlation coefficient, and it was found that all the paragraphs are statistically significant because all the values of the correlation coefficients were greater than the tabular value of (0.123) at the level of significance a statistic (0.05) and with a degree of freedom (494), except for paragraphs (7) and (11), which were smaller than the tabular value.

• **The relationship of the paragraph score to the total score of the field to which it belongs:** The method of relationship of the paragraph score to the total score of the field to which the paragraph belongs was used, after applying the scale to the statistical analysis sample of (496) students respondents, and when calculating the correlation coefficient between the score of each paragraph and the total score For the field to which the paragraph belongs, using the Pearson correlation coefficient, and it was found that all the paragraphs are statistically significant because all the values of the correlation coefficients were greater than the tabular value of (0.123) at a level of statistical significance (0.05) and with a degree of freedom (494).

The relationship of the field degree to the other field:

To achieve this, the values of the correlation coefficient between the first field and the second field of the scale were calculated using the Pearson correlation coefficient, and Table (2) shows that.

Table (2) shows the values of the Pearson correlation coefficients between the first and second fields of the scale

First area	×	The second area	The value of the Pearson correlation coefficient
rising	×	Descended	0.485

It was found from the above table that the relationship of the first domain with the second domain is statistically significant because the value of the correlation coefficient of (485) was greater than the tabular value of (0.123) at a level of statistical significance (0.05) and with a degree of freedom (494).

Confirmatory factor analysis of the scale:

The statistical analysis of the data that the researcher collects and downloads is Structural Equation Modeling (SEM) using the AMOS program that engages all factors together in one analysis, which is of course better than separating them from each other because human behavior cannot be studied separately, so the researcher used Confirmatory factor analysis after collecting and unpacking data by using (SPSS) and (AMOS) programs for counterfactual thinking scale to ensure that the underlying factors are explored as follows:

A- The correlation matrix for the factor analysis: The correlation matrix examination is one of the important matters for conducting the confirmatory factor analysis, as we find through it the coefficient values of the paragraphs and know their ability to perform the factor analysis, and the correlation matrix was found for the scale paragraphs, it appeared that the correlation matrix for all the correlation coefficients values was less than (0.90), so no paragraph

was excluded during the statistical analysis of the scale paragraphs, as the quality of (2008) indicates the need to delete the paragraphs whose correlation strength is (0.90) or more from the analysis statistician (Quality, 2008: p. 174).

B. The Kaiser-Mayer index and the Bartlett test: It was concluded in the table shown below that the value of the Bartlett test is a statistical function of the scale, as the value of the chi-square of the counterfactual thinking scale was (9784.451), which is greater than the tabular value of the chi-square, which is (456.388) at a degree of freedom (630), the level of statistical significance reached (0.000), which indicates that the above correlation matrix refers to the unit matrix, and it was also found that the value of the KMO test for the scale is (0.798) which is greater than the value (0.50) so the sample is homogeneous and also sufficient to perform the factor analysis (Ghanem , 2013: pp. 156-157).

Table (3) shows the value of Bartlett's and KMO test for the counter-reality thinking scale

C- The prevalence of the observed variables or paragraphs (contributions): the prevalence of the observed

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.798
Bartlett's Test of Sphericity	Approx. Chi-Square	9784.451
	df	630
	Sig.	.000

paragraphs and the percentage of contributions were extracted for the counterfactual thinking scale, and the variation due to common factors (contributions), which is usually shared between several variables or paragraphs, subscriptions are known as "The percentage of variance in a particular variable, which is mainly due to common factors (Brown, 2005; p. 104-106), in the above results, we find that the first paragraph of the counterfactual thinking scale contributes 13% of the variance related to the first factor, and so on for the rest of the paragraphs. .

D- Rotation, drawing results, and naming factors: The researcher used the orthogonal rotation method (Varimax) for the counterfactual thinking scale, and after the rotation process was carried out, the results shown below were reached, as the statistical literature indicates that the sample size in the factor analysis if it is (200) and more, the Kaiser test, which depends on the slope method, is considered accurate, , and it became clear that there are two underlying factors for the scale, as the value of the latent roots of the first component of the scale reached (7.237) and an explained variance amounted to (20.103%) of the total variance, while the value of the latent roots of the second component of the scale reached (4.618) with an interpreted variance of (12.828%) from Total variance, and thus the confirmatory factor analysis after performing the italic rotation process revealed to us two main factors of the scale.

E - The graph of the underlying roots of the "Scree Plot": Determining the inflection point (refraction) of the curve is affected relatively by the influence of the subjectivity of the researcher, and this is one of the disadvantages of using the Catel's criterion, therefore, the researcher used the Kaiser criterion, which depends mainly on the total contrast ratio, and thus this criterion is less likely to be subjectively affected, as the statistical sources indicate that the saturation ratio (0.3) indicates the value separating between the minimum acceptance (the intensity of the paragraph or variable correlation with the factor to which it belongs), and the saturation reads as the relation of the paragraph to the factor, and to know the strength of this saturation statisticians prefer to square it, the following figure shows the graph of the slope curve of the scale according to the Kaiser test and the total variance ratio, as it showed the existence of two potential factors because the point of occurrence of the change in the values of the underlying roots began after the second factor:

Figure (1) shows the point of occurrence of change for the underlying factors
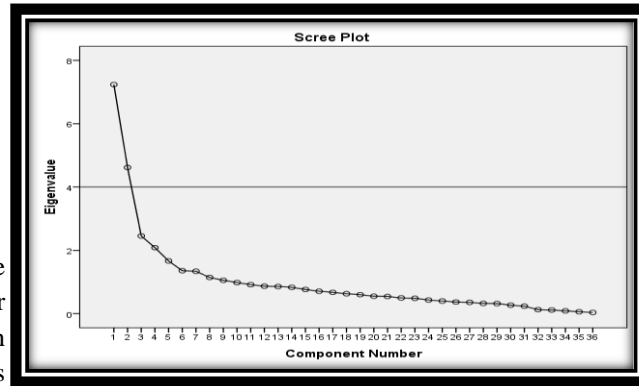
Through the figure on the behavior thinking, through which are two main factors Kaiser's test (Ghanem, 2011: 139). contemplation of the above scale, counteracting we can conclude that there latent only according to

F- Paragraph saturation matrix after rotation:

After performing all the necessary conditions for factor analysis and extracting the factors, the researcher presented a matrix of paragraphs saturations on the factor that saturated it with a value of (0.3) or more according to the Kaiser index, and it was clear from the analysis factors for each field of the scale by using the orthogonal rotation method, depending on the outputs of the factor analysis, it is possible to name the factors and paragraphs that were saturated on them after deleting paragraphs (18) from the first field and (32) from the second field because their values were less than (0.30) so that the number of paragraphs in each field became (17) paragraphs, thus verifying One of the underlying factors for the scale using confirmatory factor analysis.

Psychometric properties of the counterfactual thinking scale:

Verification of the psychometric properties of educational and psychological standards is one of the basic requirements, as they indicate the quality of the scale to measure what was prepared to measure, and some specialists in psychological measurement indicate that honesty and consistency are among the most important psychometric characteristics that should be available in the psychological scale and whatever the purpose of its use (Allam, 1986: p. 209), and the researcher dealt with indicators of validity and reliability of the scale according to the following procedures:

A. Validity: validity is the psychometric feature that reveals the extent to which the scale performs the purpose for which it was prepared (Odeh, 1985: 163), Anastasi and Urbina argue that validity is my position because it is calculated from degrees when applied to the sample, and thus it is relative and not absolute (Anstasi & Urbina, 2010; p. 115).

Thus, two types of validity are achieved in the scale:

A -1. Ostensible validity: Apparent validity depends on the logical analysis made by specialists for the paragraphs of the scale, so it is called logical validity (Allen, 1970; p.95) this type of validity was achieved by presenting the scale paragraphs to a group of specialists in educational and psychological sciences to judge the extent of its validity in measuring the characteristic to be measured, as was previously explained, and as the apparent truthfulness is the general appearance of the scale or the external image of it in terms of the type of paragraph, its wording and the extent Its clarity (al-Gharib, 1977: p. 584).

A - 2. Structure validity: It is intended to analyze the degrees of the scale based on the psychological structure of the phenomenon to be measured (Stanley & Hopkins, 1972: 111), which is the extent to which it can be determined that the scale measures a certain characteristic and is sometimes called the truthfulness of the concept or the sincerity of the hypothetical formation (Anastasi, 1988; p. 151), and it has been verified by finding the discriminatory strength and the relationship of the paragraph to the total degree of the scale and the relationship of the paragraph to the

domain to which it belongs and the relationship of the field to the other field, as well as by extracting the global honesty, which indicates the validity of the construct by conducting a confirmatory factor analysis.

B. Stability: The researcher used the following method to extract stability:

The Alpha Cronbach equation for internal consistency: In order to extract the consistency of the counterfactual thinking scale, a statistical analysis of the answers was conducted. It was shown that the Alpha Cronbach reliability coefficient for the current scale is (0.86), this coefficient is also acceptable because the determination coefficient is greater than (0.50), which was determined by psychometrists (Parker et al. 1999: 122), and the error of the scale was (0.61) according to the Alpha Cronbach score.

C. Statistical indicators of the scale:

The researcher found the statistical indicators for the counterfactual thinking scale and found that the highest possible total score is (170) degrees and the lowest overall score is (34) with a hypothetical average of (102) degrees, and to verify that psychological phenomena are moderately distributed among members of society, the statistical indicators were extracted, to find out how close the distribution of the sample scores is to the normal distribution, which is a criterion for judging the sample's representation of the community to which it belongs, and then the possibility of generalizing the results; therefore, the statistical indicators of the scale were extracted on the sample of statistical analysis amounting to (496), and it was found that the statistical indicators of the counterfactual thinking scale were close to the equilibrium distribution, which gives an indication of the sample's representation of the research community and the possibility of generalizing the results, since the kurtosis value reached (1.121) and it is close to the standard value of kurtosis of the equilibrium distribution, while the value of torsion reached (176 Thus the torsion is described as symmetry because it falls within the range of the equilibrium distribution, which ranges from (+0,5) to (-0,5) (Odeh and Al-Khalili, 2000: 79). As for the measures of central tendency (mean, median, mode), they were close in degrees, and Figure (4) illustrates that.
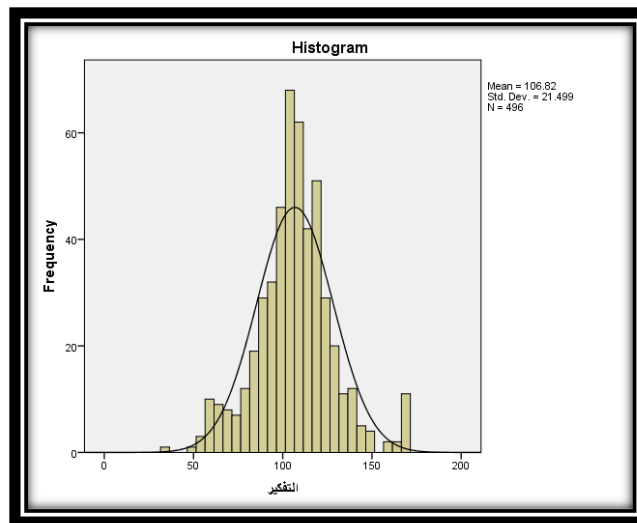

Figure (2) shows the distribution of the sample members on the normal distribution table

5. The final version of the counterfactual thinking scale:

After preparing the counterfactual thinking scale and presenting its paragraphs to a group of specialized referees, and its graded alternatives to answer are (it applies to me always, applies to me often, applies to me sometimes, applies to me rarely, does not apply to me at all), and the grades are given upon correction (1, 2, 3, 4, 5) respectively for the first domain and reverses when correcting for the second domain.

Fifth: Statistical methods: The researcher used the Statistical Portfolio in Social Sciences (SPSS) version (25) in analyzing his research data.

Chapter fourth. Presentation, interpretation and discussion of results.

The level of counterfactual thinking among university students.

The counterfactual thinking scale was applied to a sample of university students, and after correcting it and performing the appropriate statistical analysis, the results showed that the arithmetic mean of the scores was (108.69) degrees with a standard deviation of (20.461) and the hypothetical average was (102) degrees, and to know the significance of the difference between the achieved arithmetic mean and the hypothetical mean, the T-test was used for one sample, and the results showed that the calculated T value reached (7.061) degree. It is greater than the tabular T value of (1.96); therefore, it is statistically significant at the level of significance (0.05) and the degree of freedom (466). Table (5) illustrates this.

Table (5) the arithmetic mean, hypothetical, standard deviation, and the calculated and tabular T-value for the counterfactual thinking scale of the individuals of the research sample.

Sample volume	Arithmetic mean	Hypothesized mean	standard deviation	Degree of freedom	T value		The level of statistical significance
					Calculated	Tabular	
467	108.69	102	20.461	466	7.061	1.96	0.05

It is evident from Table (1-4) that university students have a high level of counter-reality thinking, and this result can be interpreted according to what was mentioned in the second chapter of literature and previous studies that have shown that the opposite thinking in the case of an upward orientation is very beneficial; as an individual can benefit from better results when thinking about different results, and this speeds him up more perceptive and exclusive to what he will take in later steps, this is from the perspective of (Roese, 1994), several studies have agreed with his results, including (Rye et al, 2008) and Myres study (2009) and Ostheimer (2012).

Second. Conclusions: The rise in thinking contrary to reality and towards the upside is a positive aspect for university students, and evidence that university students are aware of the importance of correcting past mistakes.

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