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Metacognitive thinking skills as indicators of mental health: Possible effects of alexithymia levels

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Abstract: This study aimed to examine the potential effects of alexithymia levels on metacognitive thinking skills among university students by identifying the prevalence levels of alexithymia, determining the level of metacognitive thinking skills, and examining the effects of alexithymia levels on metacognitive thinking skills that are indicators of mental health. A descriptive and comparative research design was adopted to analyze behavioral patterns related to alexithymia and metacognition. The sample included 120 male and female university students randomly selected from the population. The Toronto Alexithymia Scale and the Metacognitive Thinking Scale were administered to measure the main variables. The results revealed that students exhibited generally high levels of both alexithymia and metacognitive thinking. However, significant differences were observed among groups; students with low alexithymia levels demonstrated superior metacognitive thinking skills compared to those with medium and high levels. These findings highlight the inverse relationship between alexithymia and metacognitive capacity and that alexithymia affects metacognitive thinking skills, which are important indicators of a learner's mental health. Alexithymia negatively affects students' ability to monitor, evaluate, and regulate their own cognitive processes, which may have implications for their overall mental health and academic performance. The study recommends implementing psychoeducational programs that enhance emotional awareness, imaginative engagement, and reflective practices to strengthen metacognitive thinking and support students' psychological well-being.

Keywords: *Alexithymia, Mental health, Metacognitive thinking skills, University students.*

1. Introduction

University students represent a crucial age group within society, as their skills and abilities have the potential to bring about significant change. However, given the current era and the changes and challenges it presents, university students are increasingly susceptible to various psychological, social, and mental issues. These challenges can negatively impact their performance in university tasks and hinder their ability to engage in various thinking skills.

Alexithymia is one of the most common psychological, behavioral, and mental problems faced by university students, and it has negative effects on performance, thinking, adaptation, and interaction with others [1]. Researchers have emphasized the role of alexithymia in difficulty identifying, understanding, and describing emotions; externally directed thinking; deficits in cognitive processing; emotion regulation; poor social interactions and communication with others; and deficits in empathy, dealing with, and regulating emotions. It is negatively associated with resilience, a sense of personal accomplishment, academic performance, satisfaction, self-efficacy, and metacognitive thinking [2, 3].

Studies have indicated that alexithymia affects the learner's motivation in performing tasks, enduring stressful situations, and mobilizing emotional energy and feelings toward the learning task. It also affects mental alertness and the amount of effort exerted to achieve goals, leading to a scarcity of imagination, emotional distress, and weak emotional engagement with learning topics, which prevents the achievement of the required levels of performance and leads to mental health issues [4-8]. Negative

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emotional experiences and a lower capacity for positive emotions were associated with a greater number of mental health problems [9]

Saghaei [10] noted that anxiety affects key components of metacognitive thinking, such as monitoring skills, strategy use, and goal knowledge. This anxiety is positively correlated with alexithymia among students [11]. Research shows that individuals with high levels of alexithymia have an increased level of anxiety and exhibit lower metacognitive processes and skills Kleitman and Stankov [12]. Sifneos [13] and Babaei et al. [14] further confirmed that high levels of metacognitive impairments are closely related to alexithymia, suggesting that individuals with high metacognitive thinking tend to have lower levels of alexithymia traits, leading to better educational performance. They concluded that metacognitive abilities might affect alexithymia traits, particularly the ability to recognize emotions.

Since alexithymia is associated with a diminished capacity for abstract thinking (a cognitive aspect of metacognitive processes), a reluctance to engage in thought, and a weak ability to empathize with tasks (an emotional aspect of metacognitive processes), it negatively impacts the application of metacognitive skills and the ability to understand and connect new ideas with prior knowledge and experiences [3].

The deficit in metacognitive thinking skills in an individual with a high level of alexithymia stems from traits associated with alexithymia that hinder the effective operation of metacognitive thinking processes, leading to a lack of awareness of their mental states. The loss of the ability to express feelings is characterized by limitations in perceiving, distinguishing, and organizing feelings; it is considered an important vulnerability factor for the development of mental disorders that hinder metacognitive thinking processes [9, 15]. Additionally, metacognitive thinking is a powerful factor in the development and maintenance of psychological disorders such as depression and anxiety, which are often associated with alexithymia. Therefore, the current research aims to examine the possible effects of alexithymia levels on metacognitive thinking skills in university students.

2. Research Problem

The emotional state of an individual is crucial in the learning process and in performing various educational tasks. Alexithymia, along with associated behavioral and academic challenges, is one of the most prevalent issues faced by university students and adversely impacts their cognitive abilities and performance. It serves as a risk factor for numerous psychological and physical disorders, including anxiety, depression, and, in some cases, schizophrenia, as well as decreased life satisfaction and the development of mental disorders [11, 16]. They also noted that alexithymia is associated with mental health [4, 17, 18] and is associated with a greater number of mental health problems [4, 9], and has effects on conscious thinking processes. The seriousness of these issues is underscored by multiple studies that indicate that alexithymia is a widespread phenomenon among students [7]. These studies also suggest that alexithymia affects conscious thinking processes, leading to deficits that hinder cognitive development, disrupt emotional regulation, diminish self-efficacy, and impair mental processing [3, 7, 15, 19]. and these represent important indicators of mental health. Students' behavior related to health in general and mental health in particular is affected by many factors, including knowledge, as they obtain information through knowledge, transform it into internal psychological activities, and then control their behavior. Hence, metacognitive thinking comes as a monitoring system of human thinking responsible for the individual's awareness of himself and his self-regulation of the cognitive and internal activities that he performs [20], and it is also responsible for changing cognitive processes and internal activities to confront behaviors that are harmful to mental health [11, 21]. Thus, investigating the potential effects of alexithymia levels on students' metacognitive thinking skills is essential.

Given this context, the research problem concerns the following main question: What are the potential effects of alexithymia levels on metacognitive thinking skills among university students? This question is divided into the following questions:

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1. What are the levels of alexithymia prevalence among university students?
2. What is the level of metacognitive thinking skills among university students?
3. What is the effect of alexithymia level on metacognitive thinking skills among university students?

3. Hypotheses

1. University students have a high level of alexithymia.
2. University students have a high level of metacognitive thinking skills.
3. There are no statistically significant differences ($p = 0.01$) between the mean scores of each group of students (high, medium, and low) in alexithymia regarding metacognitive thinking skills.

4. Conceptual Framework

4.1. Alexithymia: Concept, Structure, and Explanatory Theories

The concept of alexithymia is relatively new in psychopathology and was introduced by the scientist [13]. In the clinical field, it has received the attention of researchers as one of the concepts related to health and disease. Taylor and Bagby [22] and Taylor [23] used the term "affective aphasia" to express the clear separation between emotions and thoughts and to refer to the state of inability to transform thoughts into language.

Alexithymia is defined as a disorder in cognitive and emotional performance or in some cognitive and emotional functions of the individual, who exhibits a decline in his ability to use appropriate words and verbal expressions to describe and identify his feelings and internal emotions toward others [24] it is a deficiency in the ability to verbalize and identify feelings, to distinguish between different emotional states, and to the limited capacity of the individual's imagination [25]. It is a specific disorder in emotional processing, especially the weakness of the ability to verbalize and perceive feelings [26]. It is also defined as the inability to recognize or distinguish feelings and respond to them in an appropriate manner, which affects the quality of interpersonal relationships and how to use them in making effective decisions in life [27].

Alexithymia is a personality structure characterized by four basic elements, including the inability to experience feelings, express feelings, imagine, and reflect on one's emotions [28, 29]. It is defined as a cognitive and affective trait that manifests as difficulties in emotional processing, particularly in recognizing one's feelings and in verbal emotional communication [30].

Research indicates that alexithymia comprises two components that contribute to deficits in cognitive emotional processing: the affective component, which involves the inability to distinguish between emotions and physical sensations; the weakness of the ability to express feelings to others; and the cognitive component, which is associated with difficulties in imaginative thought processes. Individuals with alexithymia suffer from a weakness in their ability to process emotional experiences and have a notable lack of creativity [5, 31].

According to behavioral theory, alexithymia is defined as a disorder in emotional regulation resulting from painful life experiences and emotional neglect. These factors lead to the inability to identify feelings. When traumatic experiences and emotional neglect are repeated, individuals may develop a state of emotional ignorance, often resulting from the continuous suppression of painful feelings associated with these experiences [32].

The neurological theory explains alexithymia in light of a disorder in the neural connections between the right hemisphere of the brain, which is responsible for creativity, imagination, and feelings, and the left hemisphere, which is responsible for language and verbal expressions. Failure to transfer emotional information from the right hemisphere to the left hemisphere can contribute to physiological disease accompanied by alexithymia. This theory indicates that psychiatric patients suffer from a functional brain deficit that hinders the transmission and exchange of information between the right and left hemispheres. As a result, individuals with alexithymia struggle to convey their emotions verbally

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because of the right hemisphere's inability to transmit feelings to the language centers in the left hemisphere [24, 33].

The cognitive theory explains alexithymia as a relationship between thinking and emotion, and that thinking processes are affected by the feelings that the individual is experiencing [34]. Therefore, alexithymia, in light of this theory, is an emotional state that reflects a weakness in the cognitive processing of emotions and feelings [11, 34, 35]; thus, individuals who suffer from alexithymia experience disturbances in imagination and feelings that lead to a malfunction in the mentalization process [5, 32, 36].

Finally, social theory suggests that individuals with alexithymia experience disruptions in social functioning [37] and they may lack social support and face difficulties in communication and social integration, which affects their psychological and social health [38]. Additionally, they often exhibit reduced emotional sensitivity to social situations and struggle with behavioral adaptations to reality and society [5, 16].

Many studies have examined alexithymia; Leweke et al. [9] and Sadeghi Fard et al. [15] indicated that the prevalence of alexithymia is relatively high in patients with mental disorders, and that the loss of the ability to express emotions is significantly associated with greater impairment in mental health and mental illness. Dwarakanath and Thangapandian [39] indicated a significant negative relationship between the loss of the ability to express feelings and mental health. The inability to express feelings and difficulties regulating emotions lead to the emergence of various mental health problems. Thus, alexithymia plays a role in determining the mental health of individuals, i.e., individuals with high levels of alexithymia are at risk of poor mental health Sayar et al. [4]. Taylor [40] agrees that alexithymia is associated with mental health problems and that there is a negative association between them. The greater the loss of the ability to express feelings, the lower the mental health, and vice versa. Pape et al. [41] reported that alexithymia is highly prevalent in patients with internet gaming disorder (IGD). Ucok [16] and Rösch et al. [5] highlighted that cognitive deficits related to emotional awareness and realistic thinking contribute to decreased emotional sensitivity in social contexts and hinder behavioral adaptation. Nahar and Kakulte [38] noted that alexithymia is associated with a variety of psychological problems, including depression, schizophrenia, emotional deficits, and mental health issues. Mohamed and Ahmed [28] reported that emotional intelligence is negatively associated with alexithymia. Luo et al. [42] indicated that alexithymia affects metacognitive components such as cognitive confidence, positive beliefs about anxiety, and the need to control thoughts.

4.2. Metacognitive Thinking

The concept of metacognitive thinking was first introduced in cognitive psychology by John Flavell as a crucial component of human behavior and subjective experience [43] and refers to the ability to reflect on our own cognition and mental states. It plays a role in supporting the performance of language acquisition processes, comprehension, attention, self-regulation, memory, writing, problem solving, and personality development in students [43-45]. Metacognitive thinking is defined as the learner's awareness of thinking processes and the ability to control these processes [43, 46]. It refers to the learner's knowledge, awareness, and control of cognitive activities [47] and refers to the learner's awareness of their ability to understand and control learning, choose appropriate strategies to achieve their goals, and constantly assess and evaluate their performance [48]. It is also defined as "thinking about thinking," which allows learners to control and reconstruct their thoughts [49, 50].

The components of metacognitive thinking are identified in metacognitive knowledge, which includes the learner's knowledge about himself or herself as a thinker, awareness of task variables, and knowledge about the effective strategies needed to achieve task goals. It also includes metacognitive experiences that help the learner choose the most effective strategies to perform a task, as well as metacognitive monitoring and control, which refer to the learner's ability to monitor and control thinking processes Finn [51] and Flavell [43]. Nordin and Yunus [52], Koulianou and Samartzi [53], Yaghoubi and Salehi [3], Schraw and Dennison [48] and Jacobs and Paris [54] identified two key

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components of metacognitive thinking: knowledge of cognition (declarative knowledge, procedural knowledge, and conditional knowledge) and regulation of knowledge (planning, information management, self-monitoring, debugging, and evaluation).

Metacognitive thinking is important for self-regulation, learning, and performance; it leads to improvements in overall health [14, 27, 55]. It enhances the learner's awareness of task-related thinking and strategies, optimizes learning processes, and fosters control over learning [56]. Additionally, it supports decision-making abilities [57] and problem-solving skills [58, 59], suppresses maladaptive thoughts, and helps individuals overcome emotional and cognitive challenges [60]. Furthermore, it stimulates critical thinking and self-regulation [61, 62].

From the perspective of positive psychology, metacognitive processes become particularly evident when individuals face challenging situations. These processes are associated with indicators of well-being or happiness, intrinsic motivation, and adaptive coping strategies. When learners deal with difficult tasks, they activate metacognitive processes that facilitate experiential learning [46, 63]. The importance of metacognitive thinking is underscored by its role in regulating perception, knowledge, metacognition, metaemotion, and emotions, as well as its involvement in various psychological phenomena related to emotions, including depression, anxiety, and fear [44, 60].

Pandey and Jaiswal [60] argued that metacognition refers to stable knowledge about one's cognitive system, knowledge about the factors that influence the functioning of this system, and the organization and awareness of knowledge, which are important factors in preventing and managing psychological disorders such as depression and anxiety, pathological anxiety, and obsessive-compulsive symptomatology. Therefore, many researchers have emphasized that metacognitive thinking is closely related to psychopathology, suggesting that it contributes to a vicious cycle involving psychological disorders such as anxiety, depression, anger, and burnout, as well as psychotic disorders Wasmuth et al. [64] and Olstad et al. [65]. Hudlicka [66] indicated that emotional deficits, such as difficulties in recognizing emotions, are influenced by an individual's confidence in and awareness of thinking processes.

Previous studies have confirmed a statistically significant negative relationship between metacognitive strategies and knowledge with alexithymia [2, 3, 15, 19]. Additionally, metacognitive beliefs play an important role in predicting alexithymia among students [14], and both positive metacognition and metaemotion are negatively correlated with alexithymia [60].

4.3. Metacognitive Thinking as an Indicator of Mental Health

Mental health has a profound impact on performance, and studies have supported the relationship between mental health and academic success. Mental health issues (e.g., anxiety disorders) are common among students and impact achievement [67, 68]. Therefore, using metacognitive thinking and self-regulation as components of metacognitive thinking supports students with anxiety, Weight and Bond [69]. Weight and Bond [69] see the importance of using metacognitive educational strategies as methods to support students' mental health in the context of the classroom environment. Hattie [70] and Wells and King [71] indicate that metacognitive thinking is a powerful strategy for enhancing student learning in schools and is one of the effective variables and strategies for addressing mental health issues within learning environments (e.g., anxiety treatment).

This can be attributed to the fact that metacognitive thinking plays a role in examining and modifying the learner's thinking and beliefs [71] which is a high-level psychological process that refers to all processes related to knowledge, thinking about thinking, and the learner's response to what he has of thinking through monitoring and organizing his thoughts [72] and plays a role in preparing the learner for academic success in learning environments and in life, and it is an organizational system that gives the person the ability to be aware of and control mental processes, thus enhancing his social and emotional health, and then as a strategy to support the learner's mental health [69].

Researchers have attributed the presence of mental health problems in students to their inability to understand their metacognitive abilities and lack of awareness of the metacognitive processes that

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participate in organizing and evaluating thinking, or when they are activated incorrectly [69]. In particular, the failure to employ metacognitive thinking skills poses a threat to mental health [71], which is what made Weight and Bond [69] emphasize the importance of using metacognitive thinking strategies in treating mental health problems.

The importance of metacognitive thinking in supporting the learner's mental health stems from it being one of the most significant mental processes related to an individual's awareness of cognitive processes and outcomes. It involves designing metacognitive strategies to monitor cognitive progress, effectively using metacognitive skills to supervise one's own learning process, and continuously monitoring and modifying thoughts [43] and supporting the ability to learn, the ability to plan and self-regulate, and to monitor and correct learning errors [46, 73, 74].

Metacognitive thinking improves the learner's ability to address mental health problems through self-control and self-regulation, preventing illness, and maintaining the learner's mental health [75, 76]. A wealth of empirical studies has shown a relationship between metacognitive thinking skills and mental health; Fisher et al. [77] indicated that metacognitive disorders are a major factor in psychological vulnerability, and Gong et al. [78] indicated that high levels of anxiety in individuals increase the likelihood of developing metacognitive disorders. Foumany et al. [79] indicated that metacognitive thinking is associated with mental health and that learners with positive metacognitive beliefs have better mental health. Melli et al. [80] also indicated that metacognition predicts depression, anxiety, and dysfunctional health-related beliefs. Hamonniere and Varescon [81] indicated that alexithymia can produce psychological disorders and exacerbate a series of health-harmful behaviors, and that poor metacognitive thinking is associated with harmful behavior and poor mental health Desender et al. [82] and Morales et al. [83]. Commodari et al. [84] also suggest that metacognition affects depression, stress, anxiety symptoms, and quality of life, and that metacognitive skills play a role in promoting mental health. Weight and Bond [69] suggest that there is a relationship between metacognitive thinking and its use as a mental health support strategy for students with mental health disorders (such as anxiety). Finally, Li et al. [20] suggest that there is an association between metacognitive thinking and health-related behavior in students, and that metacognition can positively predict health-related behavior.

5. Methodology

5.1. Research Design

This research adopted a descriptive approach, which aims to describe behavioral phenomena and express them quantitatively and qualitatively; analyze, interpret, and link them to other phenomena; and determine the level of alexithymia and metacognitive thinking skills among university students. Additionally, a comparative approach is utilized to examine the differences in the mean scores of student groups categorized by high, medium, and low levels of alexithymia in relation to their metacognitive thinking skills.

5.2. Population and Sample

The study population included undergraduate students from the Department of Psychology, Faculty of Arts, Benha University, enrolled for the academic year 2023-2024. The sample consisted of 120 male and female students, who were randomly selected from this population, with ages ranging from 17 to 22 years. The participants represented all four academic groups within the Department of Psychology, with an average age of 20.1 years and a standard deviation of 1.8. The following table shows the characteristics of the sample according to the variables of academic group and chronological age.

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Table 1.
Characteristics of the Sample According to the Variables of the Four Academic Groups in the Psychology Department and Chronological Age.

The Four Academic Groups					
	First	**Second**	**Third**	**Fourth**	**Total**
Chronological age	22 <17 -	20 < 19 -	21 <20 -	22< 21 -	120
Number	30	32	32	26	

5.3. Tools

5.3.1. The Toronto Alexithymia Scale (TAS) [85]

The current research utilized the Toronto Alexithymia Scale (TAS-20), which consists of 20 items distributed across three dimensions: difficulty identifying feelings (7 items: 1, 3, 6, 7, 9, 13, 14), difficulty describing feelings (5 items: 2, 4, 11, 12, 17), and externally oriented thinking (8 items: 5, 8, 10, 15, 16, 18, 19, 20). The responses are given on a five-point Likert scale (strongly disagree - disagree - neutral - agree - strongly agree), with values of 1 - 2 - 3 - 4 - 5; for negatively worded items (4, 5, 10, 18, 19), the scores are reversed. The scoring for each dimension is as follows: difficulty identifying feelings (7--35), difficulty describing feelings (5--25), externally oriented thinking (8--40), and overall score (20--100). The scale was applied to a pilot sample consisting of 28 university students to ensure the clarity of the scale items and to calculate the standard efficiency of the scale. The Cronbach's alpha method was used to calculate the reliability coefficients for the dimensions and the scale as a whole, which reached 0.854, 0.754, 0.698, and 0.857, respectively, indicating high reliability. The correlation coefficients for the difficulty identifying feelings dimension ranged from 0.636 to 0.759, those for difficulty describing feelings ranged from 0.677 to 0.849, and those for externally oriented thinking ranged from 0.680 to 0.821. The correlation coefficients between the dimensions of the scale and the total score ranged between 0.721 and 0.846. All the correlation coefficients are statistically significant at 0.01. These results support that the scale has a high degree of validity and reliability.

5.3.2. The Metacognition Thinking Scale [86]

The metacognition scale comprises 42 items categorized into three dimensions: knowledge of cognition (12 items: 2, 4, 8, 13, 15, 20, 21, 22, 23, 25, 26, and 28); regulation of cognition (19 items: 3, 5, 6, 7, 9, 16, 17, 18, 19, 29, 30, 33, 34, 35, 36, 39, 40, 41, and 42); and knowledge processing (11 items: 1, 10, 11, 12, 14, 24, 27, 31, 32, 37, 38). The respondents answer each item on a five-point Likert scale (always - often - sometimes - rarely - never), which is scored as 5 - 4 - 3 - 2 - 1. The scale was applied to a pilot sample consisting of 28 university students to ensure the clarity of the scale items and to calculate the standard efficiency of the scale. The Cronbach's alpha method was used to calculate the reliability coefficients for the dimensions and the scale as a whole, which reached 0.772, 0.675, 0.678, 0.847, and 0.789, respectively, indicating a high level of reliability. The construct validity of the scale was also assessed via Pearson's correlation coefficient by calculating the correlation of each item of the scale with the dimension to which it belongs. The correlation coefficients for the knowledge of cognition dimension ranged between 0.721 and 0.786, for the regulation of cognition dimension ranged between 0.579 and 0.714, for the knowledge processing dimension ranged between 0.733 and 0.801, between the dimensions themselves ranged between 0.723 and 0.785, and for the dimensions of the scale with the total score of the scale ranged between 0.689 and 0.778. All the correlation coefficients were statistically significant at 0.01. These results support that the scale has a high degree of validity and reliability.

5.4. Analyzing of Data

To categorize university students into high, medium, and low levels of alexithymia and metacognitive thinking skills, a five-point Likert scale response for each of the two scales was utilized. The scores were divided into three equal-range levels via the following formula: Category length = (highest value - lowest value) ÷ 5 = (5 - 1) ÷ 3 = 1.33. This calculation led to the classification shown in Table (2).

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Table 2.
The Actual Limits of the Response Level Scores (Relative Weights) on the Scales according to the Five-Point Likert Scale.

NO.	Means	Percentage	Level
1	3.67- 5.00	100% –73.4%	High
2	2.34 – 3.66	%73.2 – 46.8%	Medium
3	2.33 -1	46.6% – 20%	Low

The data were analyzed using descriptive statistics, including means, relative means, standard deviations, percentages, and hypothetical means (highest theoretical score + lowest theoretical score/2) for each dimension of the scale, as well as for the scale as a whole. Additionally, inferential statistics were employed, with one-way ANOVA used to examine the effect of alexithymia on metacognitive thinking skills among university students. This analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 26.0. The Scheffe test was applied for multiple comparisons between the means of the scores for high, medium, and low levels of alexithymia to determine the extent and direction of these differences.

6. Results

6.1. Levels of Alexithymia Prevalence among University Students:

To determine the prevalence levels of alexithymia and its dimensions among university students, Table (3) was used, and the data for each level were analyzed using descriptive statistics, means and relative means, standard deviations, and percentages, as shown in Table (4).

Table 3.
The Prevalence of Alexithymia in the Research Sample (N=120).

Rank	Standard deviation	Relative mean	Mean	Level						Alexithymia Dimensions
				High		Medium		Low		
				%	N	%	N	%	N	
3	9.71	62.54	21.89	44.17%	53	25.83%	31	30%	36	DIF
2	6.72	65.16	16.29	44.15%	53	29.15%	35	26.70%	32	DDF
1	11.26	68.15	27.26	40.83%	43	28.34%	34	30.80%	37	EOT
	27.79	68.15	68.15	44.15%	53	29.15%	35	26.70%	32	AS.tot

Note: Abbreviations: DIF = subscale "difficulties identifying feelings", DDF = subscale "difficulties describing feelings", EOT = subscale "externally oriented thinking style", AS.tot, Alexithymia Scale as a total.

Table 3 indicates that 44.17% of university students experienced difficulty in identifying feelings, with a relative mean of 62.54. Additionally, 44.15% suffer from difficulty in describing feelings, with a relative mean of 65.16. Furthermore, 40.83% of the participants exhibited externally oriented thinking, with a relative mean of 68.15. Overall, 44.15% of university students suffer from alexithymia, with a relative mean of 68.15. Based on the findings in Table 2, the symptoms of alexithymia among students can be ranked as follows: externally oriented thinking, difficulty identifying feelings, and difficulty describing feelings.

To test the validity of the first hypothesis, "University students have a high level of alexithymia," a t-test was used for one independent sample to determine the significance of the difference between the mean scores of students on the dimensions of the alexithymia scale and the hypothetical mean for those dimensions to determine the level of alexithymia among university students. The results are shown in Table (4).

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Table 4.
Means, Standard Deviations, Hypothetical Means, and (t) Values for One Sample to determine the Level of Alexithymia among University Students.

Alexithymia Dimensions	N	Mean	Hypothetical mean	SD	t- test	Sign.	The Level
DIF	120	23.96	20	10	4.33	0.01	High
DDF	120	16.92	15	6.93	3.03	0. 01	High
EOT	120	27.28	22.5	11.26	4.64	0.01	High
AS.tot	120	68.15	60	27.79	3.21	0.01	High

Table (4) shows that the t-values for the dimensions of alexithymia (difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking) and the total score are statistically significant (0.01). Therefore, the level of alexithymia among university students was high in all dimensions and at the scale as a whole.

6.2. The Level of Metacognitive Thinking Skills among University Students:

To determine the levels of metacognitive thinking skills among university students, Table (5) was used; thus, the data for each level were analyzed via descriptive statistics, arithmetic means, relative means, standard deviations, and percentages, as shown in Table (6).

Table 5.
Levels of Metacognitive Thinking Skills among the Research Sample (N=120)

Metacognitive Thinking	Mean	Maximum	Relative mean	SD	Level	Ranking
KoC	45.08	70	75.13%	7.84	High	1
RoC	66.72	95	70.23%	14.21	High	3
KP	38.75	55	70.45%	10.68	High	2
MTS.tot	150.54	210	71.69%	32.04	High	

Note: Abbreviations: KoC = subscale "knowledge of cognition", RoC = subscale "regulation of cognition", KP = subscale "knowledge processing." MTS.tot, Metacognitive Thinking Scale.

Table 5 indicates that the level of metacognitive thinking among university students was high, with 75.13% for knowledge of cognition, 70.23% for regulation of cognition, 70.45% for knowledge processing, and 71.69% for the scale as a whole.

To test the validity of the hypothesis "University students have a high level of metacognitive thinking skills," a t-test was used for one independent sample to determine the significance of the difference between the mean scores of students on the dimensions of the metacognitive thinking scale and the hypothetical means of those dimensions to determine the level of metacognitive thinking among university students. The results are shown in Table (6).

Table 6.
Means, Standard Deviations, Hypothetical Means, and (t) Values for One Sample to determine the level of Metacognitive Thinking of University Students.

Metacognition Thinking	N	Mean	Hypothetical mean	SD	t- test	Sign.	The Level
KoC	120	45.08	36	7.84	12.68	0.01	High
RoC	120	66.72	57	14.21	7.49	0. 01	High
KP	120	38.75	33	10.68	5.90	0.01	High
MTS.tot	120	150.54	126	26.34	10.21	0.01	High

Table (6) shows that the t-values for metacognitive thinking skills (knowledge of cognition, regulation of cognition, and knowledge processing) and the total score are statistically significant ($p < 0.01$). Therefore, the level of metacognitive thinking and its various skills among university students was high.

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6.3. The Effect of Alexithymia Levels on Metacognitive Thinking Skills

To test the validity of the hypothesis "There are no statistically significant differences at the level (0.01) between the mean scores of each group of students (high-average-low) in alexithymia regarding metacognitive thinking skills, one-way analysis of variance (ANOVA) was used to determine the significance of the difference between the mean scores among students categorized by their levels of alexithymia on the dimensions of the metacognitive thinking scale. The results are shown in Tables (7, 8, 9, and 10).

Table 7.
Analysis of the Differences between the Metacognition Thinking skills via one-way ANOVA according to the Difficulty Identifying Feelings (DIF) Levels.

Main Variable			Sum of Squares	df	Mean Square	F	Sig.	Post hoc Scheffe test
difficulties identifying feelings (DIF)	KoC	Between Groups	5688.64	2	2844.32	204.45	P < 0.001	Low > medium & High Medium > High
		Within Groups	1627.69	117	13.91			
		Total	7316.33	119				
	RoC	Between Groups	22258.35	2	11129.17	732.34	P < 0.001	Low > medium & High medium> High
		Within Groups	1778.02	117	15.20			
		Total	24036.37	119				
	KP	Between Groups	11869.34	2	5934.67	410.10	P < 0.001	Low > medium & High medium> High
		Within Groups	1693.16	117	14.47			
		Total	13562.5	119				
	MTS.tot	Between Groups	110574.65	2	55287.32	560.10	P < 0.001	Low > medium & High medium> High
		Within Groups	11549.15	117	98.71			
		Total	122123.79	119				

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Table 8.
Analysis of the Differences between the Metacognition Thinking Skills via One-Way ANOVA according to the Difficulty Describing Feelings (DDF) Levels.

Main Variable			Sum of Squares	df	Mean Square	F	Sig	Post hoc Scheffe test
difficulties describing feelings (DDF)	KoC	Between Groups	5728.67	2	2864.33	211.08	P < 0.001	Low > medium & High medium> High
		Within Groups	1587.66	117	13.57			
		Total	76316.33	119				
	RoC	Between Groups	22080.39	2	2864.33	660.39	P < 0.001	Low > medium & High medium> High
		Within Groups	1955.98	117	16.72			
		Total	24036.37	119				
	KP	Between Groups	11882.95	2	5941.48	413.89	P < 0.001	Low > medium & High medium> High
		Within Groups	1679.55	117	14.36			
		Total	13562.50	119				
	MTS.tot	Between Groups	110477.13	2	55238.56	554.92	P < 0.001	Low > medium & High medium> High
		Within Groups	11646.66	117	99.54			
		Total	122123.79	119				

Table 9.
Analysis of the Differences between Metacognition Thinking Skills via One-Way ANOVA according to the Externally Oriented Thinking (EOT) Levels

Main Variable			Sum of Squares	d.f	Mean Square	F	Sig	Post hoc Scheffe test
externally oriented thinking (EOT)	KoC	Between Groups	5847.70	2	2923.85	232.93	P < 0.001	Low > medium & High medium> High
		Within Groups	1468.63	117	12.55			
		Total	7316.33	119				
	RoC	Between Groups	21835.34	2	10917.67	580.35	P < 0.001	Low > medium & High medium> High
		Within Groups	2201.03	117	18.81			
		Total	24036.37	119				
	KP	Between Groups	12358.82	2	6179.41	600.65	P < 0.001	Low > medium & High medium> High
		Within Groups	1203.68	117	10.29			
		Total	13562.50	119				
	MTS.tot	Between Groups	111322.62	2	55661.31	602.93	P < 0.001	Low > medium & High medium> High
		Within Groups	10801.18	117	92.32			
		Total	122123.79	119				

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Table 10.
Analysis of the Differences between the Metacognitive Thinking Skills via One-Way ANOVA according to Alexithymia Level.

Alexithymia Dimensions	Main Variable		Sum of Squares	df	Mean Square	F	Sig.	Post hoc Scheffe test
Alexithymia Scale as a total (AS.tot)	KoC	Between Groups	5728.67	2	2864.33	211.08	P < 0.001	Low > medium & High medium> High
		Within Groups	1587.66	117	13.57			
		Total	76316.33	119				
	RoC	Between Groups	22080.39	2	2864.33	660.39	P < 0.001	Low > medium & High medium> High
		Within Groups	1955.98	117	16.72			
		Total	24036.37	119				
	KP	Between Groups	11882.95	2	5941.48	413.89	P < 0.001	Low > medium & High medium> High
		Within Groups	1679.55	117	14.36			
		Total	13562.50	119				
	MTS.tot	Between Groups	110477.13	2	55238.56	554.92	P < 0.001	Low > medium & High medium> High
		Within Groups	11646.66	117	99.54			
		Total	122123.79	119				

The results presented in Tables (7), (8), (9), and (10) reveal statistically significant differences ($P < 0.001$) between the mean scores of each group of students (high, medium, low) in alexithymia with respect to metacognitive thinking skills (knowledge of cognition, regulation of cognition, and knowledge processing). To determine the extent and direction of these differences, the Scheffe test was used for multiple comparisons between the means. The results revealed that students with low levels of alexithymia outperformed both high- and medium-alexithymia students in terms of metacognitive thinking skills, whereas medium-alexithymia students performed better than those with high alexithymia.

7. Discussion

7.1. Levels of Alexithymia Prevalence Among University Students

The results in Tables 3, 4 are consistent with those of Faramarzi and Khafri [7], who reported that alexithymia is widespread among university students and that the prevalence rate of alexithymia was 21.8% among students. Similarly, Mohamed and Ahmed [28] concluded that the majority of individuals with depression also experience alexithymia. It is consistent with the study of Sayar et al. [4] and Leweke et al. [9], which indicates that the prevalence of alexithymia is relatively high in patients with mental disorders, and that the loss of the ability to express emotions is associated with greater impairment in mental health and the incidence of mental illness.

The results imply that university students face challenges in emotional functioning, struggling to identify and describe their internal feelings and sensations toward others. They exhibit weak imaginative abilities and a lack of internal thought processes [28], as well as a limited capacity for emotional reflection and verbal communication regarding their internal states [27]. Many students experience difficulty expressing their feelings due to an inadequate vocabulary to articulate their emotions [15, 30], and they tend to focus more on external events than on their feelings and imaginations [29]. Therefore, students are expected to suffer from mental health problems [9, 17].

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These results can be interpreted within the context of the various factors that contribute to the emergence of alexithymia among university students today. These include exposure to significant life stressors; maladaptive experiences leading to emotional deprivation; and tendencies to withdraw from social situations in favor of isolation or online gaming. Furthermore, negative coping strategies such as avoidance, stemming from a lack of knowledge, alongside increased tension, anxiety, and difficulty in making decisions, further exacerbate the situation [1, 23, 35, 41, 44, 87]. Emotional factors include dysfunction in processing emotional information and a lack of mental representation of emotions [22, 41].

Moreover, biological factors contribute to this issue, as many students tend to use left-brain thinking patterns, neglecting the right side, which is associated with imagination, creativity, and emotional awareness. This tendency is likely influenced by the theoretical nature of their academic courses and the underutilization of neural pathways connecting emotional and cognitive areas, leading to dysfunction in neurotransmission between these regions [5, 24, 34]. Numerous studies have suggested a correlation between alexithymic traits and dysfunction in the right hemisphere of the brain or the anterior cingulate cortex [5, 33, 34, 36].

7.2. The Level of Metacognitive Thinking Skills among University Students

The results in Tables 5, 6 are consistent with those of Akaydin et al. [57] who revealed that metacognitive awareness among students was high. These results can be explained in light of what university students acquired from previous experiences throughout the different educational stages that enabled them to practice planning, monitoring, and evaluation of their thinking continuously and to control their thinking processes, in addition to their use of different learning strategies and models that enhance their motivation to learn and increase their self-confidence.

This result also indicates that university students have the ability to possess knowledge, awareness, and control over their cognitive activities [47]. They demonstrate the ability to engage in metacognitive practices [48]. Additionally, they can control and restructure their thoughts [50] and consciously monitor and organize cognitive phenomena [88]. Therefore, students are expected to have high mental health [20] as metacognitive thinking is responsible for changing cognitive processes and internal activities to counter behaviors that are harmful to mental health [21].

The high level of metacognitive thinking among university students can be attributed to their declarative knowledge, which forms their awareness of their thinking processes, and procedural knowledge, which enhances their awareness of how to use learning strategies. They apply knowledge organization techniques such as planning, setting goals, and identifying learning resources, which allow them to manage effectively and select the most effective strategies for processing information [48].

Overall, these results are consistent with those of Akaydin et al. [57], who recommended providing students with diverse opportunities to enhance metacognitive thinking skills through the use of different methods and techniques. Rivas et al. [61] emphasized the importance of improving students' metacognitive thinking through effective teaching strategies. Akcaoğlu et al. [62] recommended designing training programs, curricula, and educational activities that enhance self-regulation and awareness of metacognitive thinking.

7.3. The Effect of Alexithymia Levels on Metacognitive Thinking Skills

In light of Tables 7, 8, 9, and 10, students with low metacognitive thinking skills show symptoms of alexithymia compared with students with high metacognitive thinking skills, who show lower symptoms of alexithymia. This result supports previous research that identified a statistically significant negative relationship between alexithymia and its dimensions (difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking) and metacognitive thinking skills such as metacognitive strategies and metacognitive knowledge [3, 14, 19].

These results can be attributed to the fact that high levels of alexithymia among students lead to a weak ability to imagine and think abstractly, causing them to focus on simple details in the learning

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subject and a deficit in deep cognitive processing of information, which negatively affects satisfaction, self-efficacy, and metacognitive thinking [3, 89]. In addition, alexithymia is associated with academic anxiety, which affects learners' practice of metacognitive strategies [3, 11]. This result is consistent with that of Pandey and Jaiswal [60] who indicated that positive metacognition and metaemotion are negatively associated with alexithymia and that positive metacognition and metaemotion give low-alexithymic students the ability to suppress ineffective thoughts and prepare them to overcome both emotional and cognitive problems, emphasizing that metacognitive thinking is an important factor in protecting them from psychological disorders [2, 64, 65].

Thus, students with high metacognitive thinking have lower manifestations of alexithymia, which is characterized by difficulties in distinguishing between different emotional states and a limited ability to think and use emotions to deal with situations [15, 60]. This result can be explained by the fact that metacognitive thinking enhances students' ability to control perception, knowledge, positive metacognition, and metaemotion. It also contributes to exploring many psychological phenomena and processes related to emotions and feelings and improving the understanding of others [59, 60] and addressing mental health problems through self-control and self-regulation, preventing illness and maintaining the mental health of the learner [75, 76] resulting from the inability to express feelings and difficulties in regulating emotions [39, 40]. Thus, if alexithymia has its effects on the performance and mental health of the learner [4, 40] The use of metacognitive thinking supports academic performance and mental health, and therefore studies have confirmed the importance of using metacognitive educational strategies as strategies to support students' mental health [69, 90]. Metacognitive thinking represents a powerful strategy to address mental health problems within learning environments, such as treating anxiety [70, 71] it plays a role in preparing the learner for academic success in learning environments and in life, supporting the ability to learn, to plan, and to self-regulate, monitor, and correct learning errors [46, 73, 74] and examine and modify his thinking and beliefs [71] thinking about thinking, and responding to his thinking by monitoring and organizing his thoughts [43, 51, 72] and designing metacognitive strategies to monitor his cognitive progress, monitor and modify thoughts [43, 46] and therefore represents a strategy to support the learner's mental health, as it gives them the ability to be aware of and control mental processes [69].

The results presented in Tables (7), (8), (9), and (10) can also be interpreted in light of the fact that students with high levels of alexithymia have low metacognitive thinking skills. This can be due to emotional disorders that hinder performance and thinking processes, as well as the inability to practice abstract thinking and a lack of emotional awareness, which affect metacognitive thinking skills and related processes such as knowledge of cognition, regulation of cognition, and knowledge processing; it leads to the loss of the ability to express feelings and mental health [4, 39] which was confirmed by Taylor [40] that individuals with high levels of alexithymia are at risk of poor mental health, which is an important indicator of the learner's poor practice of metacognitive thinking skills Sadeghi Fard et al. [15], Ghandour et al. [67] and Stephan et al. [68]. Hamonniere and Varescon's [81] study indicates that alexithymia can produce psychological disorders and exacerbate a series of harmful behaviors, and that poor metacognitive thinking is associated with harmful behavior and poor mental health [82, 83, 91]. The presence of mental health problems in students is due to their inability to understand their metacognitive abilities and a lack of awareness of the metacognitive processes involved in organizing and evaluating thinking [69] and studies support this as the failure to employ metacognitive thinking skills poses a threat to mental health [71] which is what made Weight and Bond [69] emphasize the importance of using metacognitive thinking strategies in treating mental health problems, especially in students suffering from alexithymia. This aligns with Hudlicka [66], who indicated that emotional deficits (i.e., recognizing emotions) are affected by learners' confidence and awareness of their thinking processes, resulting in a reduced ability to process emotional information and perform metacognitive tasks.

The results also indicate that students with low metacognitive thinking have symptoms of alexithymia. The dimensions of alexithymia (difficulty identifying feelings, difficulty describing feelings,

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and externally oriented thinking) contribute to lower awareness of thinking among these students. These factors lead to disturbances and collapse in emotional regulation, and a malfunction in the mental thinking process [7, 15, 32], which in turn affects various thinking processes, including metacognitive thinking [19]. These results support those of Kleitman and Stankov [12], Yaghoubi and Salehi [3], and Rösch et al. [5], who indicated that there is an effect of alexithymia levels on higher meta-cognitive processes, which in turn affect individuals' cognitive processes.

In other words, the results show that students with high awareness of thinking processes have lower alexithymic traits. Thus, metacognitive skills (knowledge of cognition, regulation of cognition, and knowledge processing) influence alexithymic traits (difficulty identifying emotions, difficulty describing emotions, and externally oriented thinking) [13, 14] and enhances the learner's mental health [79] predicts depression, anxiety, and dysfunctional health-related beliefs, and plays a role in promoting mental health [80]. This finding supports what Weight and Bond [69] indicate, the existence of a relationship between metacognitive thinking and its use as a strategy to support the mental health of students with mental health disorders. It also supports what Liu et al. [11] and Commodari et al. [84] indicated that metacognition affects depression, stress, anxiety symptoms, and quality of life, and what Li et al. [20] indicate the existence of a relationship between metacognitive thinking and health-related behavior in students, and that metacognition can positively predict health-related behavior. This is consistent with Papaleontiou-Louca [88], who indicated that metacognitive thinking includes not only "thinking about thinking" and cognitive states but also emotional states, motivations, and intentions, which support the cognitive processes of metacognitive thinking. It is also used as a monitoring system of human thinking [20] responsible for the individual's awareness of himself and his self-regulation of the cognitive and internal activities he performs [71], and it is also responsible for confronting behaviors that are harmful to mental health [21].

8. Conclusion

The current study shed light on the levels of alexithymia and metacognitive thinking, and examined the impact of alexithymia levels on metacognitive thinking skills among university students. The study results revealed that students had high levels of alexithymia (difficulties identifying feelings, difficulties describing feelings, and externally oriented thinking style). Students also had high levels of metacognitive thinking and its various skills (knowledge of cognition, regulation of cognition, and knowledge processing). The results indicated that alexithymia levels affect university students' metacognitive thinking skills. Low-alexithymia students outperformed both high-alexithymia and medium-alexithymia students in metacognitive thinking skills, while medium-alexithymia students outperformed high-alexithymia students in metacognitive thinking skills. Overall, the results indicate a close relationship between metacognitive thinking and alexithymia. The more symptoms of emotional blindness increase, the greater the learner's ability to be aware of thinking decreases, making them more vulnerable to psychological disorders, which negatively affects their knowledge of cognition, regulation of cognition, knowledge processing, and mental health [75, 76, 78]; conversely, the fewer symptoms of emotional blindness decrease, the greater the learner's ability to be aware of their thinking [64, 65].

9. Recommendations and Suggestions for Further Research

The research results lead to several recommendations, emphasizing the need to develop the capabilities of university students who suffer from alexithymia by helping them articulate their feelings, practice imaginative thinking, and participate in educational activities that enhance their emotional and affective growth and mental health. University staff members should focus on both cognitive and emotional aspects in their teaching, as these significantly influence the development of metacognitive thinking skills and overall psychological well-being. Additionally, there is a need to develop intervention programs to enhance metacognitive thinking skills (knowledge of cognition, regulation of cognition, and knowledge processing) among students with alexithymia. Exploring treatment options

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based on metacognitive thinking to improve mental health and reduce manifestations of alexithymia in students. Building interventions based on metacognitive thinking skills (such as cognitive behavioral therapies) for students who suffer from a lack of ability to express emotions. Also, students should be guided to adopt metacognitive strategies to overcome difficulty in identifying emotions, difficulty in describing emotions, externally oriented thinking, and developing healthy behavioral habits.

Future studies should explore the correlation between alexithymia and other variables, such as critical and innovative thinking and problem solving as indicators of mental health, and examine other psychological variables related to alexithymia, such as cognitive flexibility, self-efficacy, emotional distress, and emotional dysfunction among university students. Furthermore, we investigated the effectiveness of counseling programs in reducing symptoms of alexithymia, developing metacognitive awareness, and improving mental health among university students, and studying the role of metacognitive thinking in promoting mental health in students with alexithymia. Future research should seek to determine how alexithymia and metacognitive thinking affect mental health disorders, emotional and academic well-being, student quality of life, and learning ability.

10. Limitations

There are a number of limitations to the study results, including the use of Likert-type scales as tools to assess the study variables, as other assessment tools such as observation or interviews should be used. Another limitation is the descriptive approach and the comparative method, which weaken the internal validity of the study. Qualitative research can be suggested to learn more about these variables and explore the effect of alexithymia levels on metacognitive thinking. The study was conducted on 120 students and was limited to students of the Faculty of Arts, Benha University only; therefore, similar studies should be conducted on larger groups of students in other universities. In addition, the participants were selected by convenience sampling within the target population, which may prevent the generalization of the study findings.

Institutional Review Board Statement:

An official approval to conduct this research was obtained from the Ethics Committee of the Faculty of Arts, Benha University. IRB NUMBER: 119680631142(19). APPROVAL DATE:16/03/2025.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Acknowledgment:

The authors declare that generative AI or AI-assisted technologies were not used in any way to prepare, write, or complete this manuscript. The authors confirm that they are the sole authors of this article and take full responsibility for the content therein, as outlined in COPE recommendations.

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