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Positive, Negative, and Neutral Mood Induction and Emotional Prediction in Anxious Students: Emotional Intelligence as a Moderator

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ABSTRACT

Objective: This study aimed to determine the impact of mood induction (positive and negative) on emotional prediction, considering the moderating role of emotional intelligence in a clinical population exhibiting anxiety symptoms.

Methods and Materials: An experimental person × environment (P×E) design was used with emotional intelligence (high vs low) as a trait factor and mood induction (positive/negative/neutral) as a manipulable factor, forming a 2×3 structure. The population comprised students at Islamic Azad University, West Tehran Branch (2023–2024). Sixty counseling-seeking students meeting inclusion criteria (including Beck Anxiety Inventory score >25) were purposively recruited and randomly allocated to six cells (n≈10 per cell). Emotional prediction was assessed using Gilbert's Emotional Prediction Questionnaire, and emotional intelligence was measured with Schering's Emotional Intelligence Scale. Data were analyzed using multivariate analysis of covariance (MANCOVA), controlling for pretest scores, followed by Bonferroni pairwise comparisons.

Findings: The interaction between mood induction and emotional intelligence level was significant for emotional prediction ($F=32.63$, $p<0.01$; $\eta^2=0.561$). Pairwise comparisons showed no significant differences between high- and low-emotional-intelligence groups under negative or neutral mood induction ($p>0.05$). Under positive mood induction, however, individuals with high emotional intelligence demonstrated significantly higher emotional prediction scores than those with low emotional intelligence (mean difference=2.93, $p<0.01$)

Conclusion: In anxious students, positive mood induction appears to facilitate more accurate emotional prediction primarily among individuals with higher emotional intelligence. Brief positive mood–enhancing procedures may serve as an adjunctive supportive strategy when integrated with broader anxiety-focused interventions.

Keywords: Mood induction, emotional prediction, emotional intelligence, anxiety, moderation.

Introduction

Anxiety is characterized by a state of anxious anticipation, fear, excessive arousal, heightened awareness of threat cues, avoidance behaviors, and negative cognitions (Association, 2013). Anxiety may be transient, triggered by situational stressors, and reduced through self-regulation strategies (Casares et al., 2024). However, when fear persists without identifiable triggers or when regulation strategies fail, it impairs daily functioning, resulting in chronic anxiety (Taylor et al., 2021). Although our understanding of psychiatric disorders is dimensional, they are determined by diagnostic criteria and artificial cutoff scores for the existence of a disorder (Kendler, 2016). Individuals who do not meet diagnostic criteria but exhibit some clinical symptoms are often overlooked, particularly when group comparisons between patients and healthy controls are made. Subclinical anxiety refers to a condition where individuals do not meet the diagnostic criteria for anxiety but still experience anxiety symptoms (Spira et al., 2008). Anxiety disorders are often linked to inefficient cognitive control, especially in the form of attentional bias toward negative information (Barry et al., 2023).

Theorists have long acknowledged that a comprehensive understanding of emotions must extend beyond momentary emotional experiences to include cognitive representations of those experiences (Batool et al., 2025). Emotional prediction occurs when individuals forecast their emotional responses based on future events (Sampson et al., 2024). Emotional predictions may have a stronger influence on behavior than actual emotional experiences (Nuijs et al., 2025). Specifically, undesirable predictions or recalling past emotional experiences may lead to withdrawal, reduced engagement in activities, or a decrease in goal-directed behaviors, potentially extending emotional distress (Rauch et al., 2025). If these processes are excessive or pervasive, they can contribute to the development and maintenance of emotional disorders, including anxiety or depression (Mathersul & Ruscio, 2020). Research on emotional prediction shows that individuals generally miscalculate the emotional impact of various experiences. Specifically, people tend to overestimate the intensity and duration of their emotional responses to both positive and negative events. Although this bias might encourage individuals to avoid negative outcomes (Hezel et al., 2019). (Senta et al., 2025) showed that anxiety is particularly related to inaccurate emotional prediction abilities in a non-clinical sample. Ardite (Thompson et al., 2017) also reported that symptoms of anxiety and depression were linked to negative emotional prediction bias, with cognitive sensitivity and social anxiety being more associated with greater negative prediction bias.

One of the key psychological constructs believed to serve as a predictor of mental health outcomes, including problems, is emotional intelligence (EI) (Guslyakova & Guslyakova, 2020). Generally, emotional intelligence plays a significant role in coping with difficulties, managing psychological stress, adapting to new issues, maintaining memory and perception, sound judgment, decision-making, extraversion, flexibility, agreeableness, and coordinating different emotions, as well as fostering psychosocial growth (Dulewicz & Higgs, 2000). Moreover, individuals with lower emotional intelligence tend to exhibit lower empathy, difficulties in regulating mood, depressive tendencies, severe anxiety, alcohol and drug use, sexual deviance, aggression, and marital problems (Robinson et al., 2020). Various studies on the relationship between emotional intelligence and social, psychological, and physical health have demonstrated that different components of emotional intelligence are related to both issues like depression and anxiety, and positive aspects like social functioning, vitality, and positive perceptions of overall health (Wang et al., 2023). Those with higher emotional intelligence components experienced fewer psychological damages, including anxiety and depression, and exhibited better mental health (Ogston et al., 2011). It can be argued that individuals with higher emotional intelligence tend to have better social skills, more enduring relationships, and better conflict resolution abilities (Malterer et al., 2008). They maintain better emotional balance, effectively control and express emotions, and thus, any factor that enhances emotional intelligence can aid in controlling emotions such as anger and anxiety, providing stability in problem-solving and motivation for well-being. Empirical studies have shown that emotional intelligence may be a significant predictor of anxiety (Malterer et al., 2008).

It has been shown that emotional intelligence is associated with emotional recovery. Emotional recovery

refers to the process of restoring balance to the organism by returning psychological and physiological activation levels to their baseline after an emotional response. Individuals with high emotional intelligence are capable of quicker and more effective emotional recovery and experience less mood fluctuation (Limonero et al., 2015). Mood is a stable emotional state that influences motivation, learning, and decision-making. There are two types of mood: positive and negative (Petagna & Wormwood, 2025). Positive mood brings about behaviors such as interest, energy, alertness, and optimism, representing a pleasant internal experience. In contrast, negative or low mood is associated with behaviors such as dissatisfaction, anger, indifference, and irritability. When individuals experience high negative mood, their positive feelings are typically low, and they often feel sluggish and tired (Zhang et al., 2025).

The induction of positive moods influences the evaluation of specific stimuli (Fulford et al., 2013). Researchers have concluded that positive mood induction improves cognitive performance. Positive emotional states create desirable traits and build sustainable personal and cognitive resources. Positive emotions also have immediate beneficial effects on a range of motivational and cognitive processes. Mood research has shown that positive moods lead to more creativity than neutral moods (Diener et al., 2015). Mood exists in two forms: natural and artificial. Natural mood arises in response to environmental events or the activity of internal systems such as hormones and neurotransmitters. Artificial mood refers to methods used to induce a mood state in experimental conditions (Iau & Verhaeghen, 2025). In various studies, different methods have been used for mood induction, ranging from personal memory recall to presenting emotional stimuli such as words, faces, films, and music. Mood induction methods can be categorized into two main groups: simple (using a single mood induction technique) and combined (using two or more techniques simultaneously) (Batool et al., 2025). Related theories suggest that positive mood supports a more holistic or integrative processing style, whereas negative mood leads to more localized or focused processing (Buehler et al., 2007).

Smith & Kelly, (2015) demonstrated that positive mood induction improves working memory in individuals with low anxiety, while it has the opposite effect in individuals with high anxiety. It can be concluded that anxiety levels can act as a moderating factor in the influence of mood on working memory. Also, (Mohammed & Lyusin, 2022) reported that the ability to update emotional content in working memory is influenced by mood, with negative mood impairing the accuracy of updates. Additionally, (Vaughan et al., 2021) found a significant positive relationship between emotional intelligence and all three components of working memory (emotional, capacity, and ability). Mathersul & Ruscio, (2020) concluded that positive emotion showed the opposite pattern, especially in depressed groups. All clinical groups showed stronger negative prediction biases and stronger memory, and weaker positive prediction biases compared to the control group. Given the above points, examining the effect of mood on executive functions, with an emphasis on trait characteristics such as emotional intelligence, could be of great interest.

Methods and Materials

Study Design

This study employed an experimental P × E design, which includes both trait variables and manipulable factors. In this study, the trait variable was emotional intelligence, and the manipulable factor was mood induction, each with two levels. The statistical population for this study comprised all students at the Islamic Azad University, West Tehran Branch, during the 2023-2024 academic year. A sample of 60 participants was selected and randomly assigned into four groups of 15 participants each. The sample was selected using a non-random, purposive sampling method from students attending the counseling center at the Islamic Azad University, West Tehran Branch. The inclusion criteria for the study were: minimum educational level of high school diploma, age between 20 and 40 years, obtaining a score above 25 on the Beck Anxiety Inventory, willingness to participate in the study (informed consent), no stressful life events in the past 3 months, no severe physical or psychological disorders based on self-report, and no use of psychiatric medication in the past year based on self-report. The exclusion criteria were: absence from more than two sessions, withdrawal from the study, simultaneous participation in other counseling or psychotherapy programs, non-

cooperation in completing the pre-test and post-test questionnaires, and follow-up. All data collected from the research questionnaires were analyzed using SPSS-26 software. In the inferential analysis, multivariate analysis of covariance (2×3) was used to examine the relationships among the research variables.

Instruments

The Beck Anxiety Inventory (Beck et al., 1993): This self-report questionnaire contains 21 items rated on a 4-point Likert scale, with questions designed to assess the severity of anxiety, including physical and cognitive symptoms such as numbness and tingling sensations. The total score of the inventory ranges from 0 to 63, with higher scores indicating higher levels of anxiety. Suggested cutoff points for this inventory are: 0-7 (none or minimal), 8-15 (mild anxiety), 16-25 (moderate anxiety), and 26-63 (severe anxiety). The inventory has demonstrated high reliability, with an internal consistency coefficient (Cronbach's alpha) of 0.82, a test-retest reliability of 0.75, and item correlations ranging from 0.30 to 0.76 (Beck et al., 1993), cited in (Fathi-Ashtiani, 2019). In the study by (Khesht-Masjedi et al., 2015), content and construct validity were found to be adequate, and the Cronbach's alpha reliability coefficient was above 0.7. In the present study, the Cronbach's alpha coefficient was 0.78.

The Emotional Intelligence Questionnaire: This questionnaire developed by Schering (1996), consists of 33 items and measures five subscales: Self-awareness, Self-regulation, Self-motivation, Empathy, and Social skills. Each participant receives six separate scores: five for the subscales and one total score. In the preliminary version of this test, seven questions were deleted due to low correlation with the total score. The final version includes 33 questions. The internal consistency of the 33-question version was found to be 0.85 using Cronbach's alpha. In the study by (Zarei et al., 2019), the reliability coefficients for emotional intelligence and its components were: 72% for emotional intelligence, 71% for self-regulation, 87% for realism, 81% for responsibility, 82% for empathy, and 80% for emotional self-awareness. In the current study, the Cronbach's alpha for this questionnaire was 0.75.

The Emotional Prediction Questionnaire:

developed by Gilbert & Wilson, (2009), assesses individuals' ability to predict their emotions in response to future events. The questionnaire contains 12 items and two subscales: Emotional Prediction Accuracy (items 1-6) and Stability of Predicted Emotions (items 7-12). This subscale assesses how accurately individuals can predict the intensity and duration of future emotional reactions. Responses are scored on a five-point Likert scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree). The total score ranges from 12 to 60, with higher scores indicating greater ability to accurately predict and sustain future emotions. Although there is no official standard version, the cut-off score for this questionnaire was proposed as 36 in pilot studies, which is considered the average score. The content validity was assessed using well-established theories in the field of emotion psychology and decision-making e.g., (Gilbert, 2015). Factor analysis confirmed two main factors: emotional accuracy and emotional stability. In terms of convergent validity, positive correlations with emotional self-awareness and emotional intelligence, and negative correlations with predictive anxiety and depression, were reported. Cronbach's alpha coefficients for the emotional accuracy subscale, emotional stability subscale, and the total scale were 0.82, 0.78, and 0.86, respectively. Test-retest reliability over a two-week period showed a correlation of 0.80. In this study, the Cronbach's alpha for this questionnaire was calculated to be 0.81.

Findings and Results

As shown in Tables 1 and 2, some descriptive indicators related to frequency based on demographic information, including age range, education level, employment status, and marital status, are presented for the groups with high and low emotional intelligence.

Table 1

Frequency of individuals with high emotional intelligence based on demographic variables

Variable	Category	High Emotional Intelligence Group				
		Positive Mood Group		Negative Mood Group	Neutral Mood Group	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Age Range	18-25 years	4	40%	3	30%	4
	26-32 years	4	40%	5	50%	5
	33 years and above	2	20%	2	20%	10
Education Level	Diploma & Associate Degree	3	20%	3	30%	5
	Bachelor's Degree	5	50%	5	50%	4
	Master's & PhD	2	20%	2	20%	1
Employment Status	Unemployed	4	40%	3	30%	2
	Employed	6	60%	7	70%	8
Marital Status	Single	4	40%	5	50%	4
	Married	6	60%	5	50%	6

Table 2

Frequency of individuals with low emotional intelligence based on demographic variables

Variable	Category	Low Emotional Intelligence Group				
		Positive Mood Group		Negative Mood Group	Neutral Mood Group	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Age Range	18-25 years	3	30%	2	20%	4
	26-32 years	5	50%	4	40%	3
	33 years and above	2	20%	4	40%	3
Education Level	Diploma & Associate Degree	4	40%	5	50%	4
	Bachelor's Degree	4	40%	4	40%	5
	Master's & PhD	2	20%	1	10%	1
Employment Status	Unemployed	4	40%	5	50%	4
	Employed	6	60%	5	50%	6
Marital Status	Single	5	50%	4	40%	6
	Married	5	50%	6	60%	4

As can be seen from Tables 1 and 2, there are no significant differences in terms of age, education, employment, and marital status between the groups. Table 3 shows the means and standard deviations for the groups based on the research variables.

Table 3

Means and standard deviations of working memory and emotional prediction in the groups

Variable	Group	Pre-mood Induction	Post-mood Induction
Emotional Prediction	High Emotional Intelligence	Positive Mood Group	21.90
		Negative Mood Group	22.60
		Neutral Mood Group	22.30
	Low Emotional Intelligence	Positive Mood Group	23.60
		Negative Mood Group	22.90
		Neutral Mood Group	22.90

According to the data in Table 3, it appears that the mean of the research variable in the groups differed significantly in the post-test compared to the pre-test. While there was no significant difference between the pre-test and post-test means in the control group, this difference was fully explored in the inferential data analysis section with more details.

The M-Box test (p = 0.979, F = 0.548) showed that the result was statistically significant, indicating that the covariance matrices of the dependent variable for the

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independent variable are unequal. Therefore, the assumption of homogeneity of covariance matrices was not met, which is one of the assumptions of multivariate analysis of variance (MANOVA). If the M-Box test is significant, it suggests heterogeneity in the variance-covariance matrices, and the Pillai's trace is reported, which is robust to this assumption (Gamst et al., 2008; Khorsandpour et al., 2020). Additionally, the normality of the data distribution was examined using the Kolmogorov-Smirnov test. Based on the results of this test and the z-values obtained for the research variables at the 0.05 level, the data distribution was found to be normal, and the assumption of normality was met, allowing for the use of covariance analysis.

The results also showed that the F value of Levene's test (equality of variances) for all variables was not significant at the 0.05 level. Therefore, the null hypothesis is not rejected, and the test is not significant, indicating that there are no significant differences in the variances of the dependent variables.

Table 4

Results of multivariate covariance analysis for testing the interaction between mood induction (positive, negative, and neutral) and emotional intelligence level (high and low) on emotional prediction

Source	Sum of Squares Type III	df	Mean Square	F	p-value	Effect Size
Pre-Test	0.045	1	0.045	0.128	0.722	0.003
Mood Induction	2.960	2	1.480	4.202	0.020	0.141
Mood Induction * Emotional Intelligence Level	22.991	2	11.495	32.634	0.000	0.561
Error	17.965	51	0.352			

As seen in Table 4, the F value for the interaction between mood induction and emotional intelligence level in the post-test, after controlling for the pre-test, is 32.63, which is statistically significant at $p < 0.01$. This indicates a significant difference in the emotional prediction scores between the high and low emotional intelligence groups in the post-test across the three mood induction groups (positive, negative, and neutral). This difference is significant in favor of the positive mood induction group. To further analyze this, pairwise comparisons of the emotional prediction means in the interaction of mood induction and emotional intelligence level were conducted using the Bonferroni post hoc test. The results are presented in the following table.

Table 5

Pairwise comparisons of the emotional prediction variable

Variable	Group	I-Group	J-Group	Mean Difference	Standard Error	p-value
Emotional Prediction	Positive Mood	High EI	Low EI	2.928	0.300	0.000
	Negative Mood	High EI	Low EI	0.245	0.267	0.363
	Neutral Mood	High EI	Low EI	0.104	0.275	0.707

As shown in Table 5, there were no significant differences in emotional prediction between the high and low emotional intelligence groups in the negative and neutral mood inductions ($p>0.05$). However, in the positive mood induction group, the difference between the high and low emotional intelligence groups was statistically significant ($p<0.01$). Based on the mean differences, it can be concluded that individuals with high emotional intelligence predicted emotional outcomes significantly better than individuals with low emotional intelligence.

Discussion and Conclusion

This study aimed to investigate the impact of positive and negative mood induction on emotional prediction with the moderating role of emotional intelligence in an anxious clinical population. In evaluating the specific hypothesis of the study, the findings indicated that there was no significant difference in emotional prediction between the high and low emotional intelligence groups in the negative and neutral mood inductions ($p > 0.05$). However, in the positive mood induction, a significant difference was found between the high and low emotional intelligence groups, with individuals with high

emotional intelligence predicting emotions significantly better than those with low emotional intelligence. Some of the findings of the third specific hypothesis were confirmed. These results implicitly align with previous studies.

In interpreting these findings, it can be concluded that a significant difference in emotional prediction performance was observed only in the positive mood induction condition between individuals with high and low emotional intelligence, while no such difference was observed in the negative and neutral mood conditions. This finding can be explained through the complex interaction between cognitive intelligence, current emotional state, and emotional future-thinking ability. Emotional prediction is a process where an individual attempts to forecast their emotional state in response to hypothetical or real events (Gilbert, 2015). This ability is not only dependent on past emotional experiences but also on cognitive capacity to imagine the future, emotional regulation, and meta-cognitive accuracy (Buehler et al., 2007).

In individuals with high emotional intelligence, executive functions such as working memory, cognitive inhibition, cognitive flexibility, and future representation capacity are more enhanced (Britton, 2021). When positive mood is induced, reward systems and dopaminergic circuits in the brain are activated, leading to an expanded attention span, creativity, and motivation to analyze situations in an open and structured manner (Ashby et al., 2024). In such conditions, individuals with high emotional intelligence can use their enhanced cognitive capacity to construct more accurate scenarios of future events and the emotional responses associated with them, as positive mood allows them to effectively leverage their cognitive resources. On the other hand, individuals with low emotional intelligence, while experiencing increased motivation in a positive mood, may not be cognitively capable of processing and representing the emotional future more accurately. This requires effective coordination between episodic memory, future imagination, and executive functions (Kilduff et al., 2010). Therefore, in positive mood, this group may experience a bias in emotional prediction, either exaggerating or underestimating future emotions based on past emotional experiences without logical and objective analysis of the event.

But why is this difference not observed in negative and neutral mood conditions? In negative mood, individuals often act in a more cautious and threat-focused manner, concentrating more on potential future threats and discomforts (Lerner & Keltner, 2001). This focus can reduce prediction accuracy in both high and low emotional intelligence individuals, leading to convergence in their performance. Conversely, in a neutral mood, where there is no specific emotional arousal, cognitive resources remain at a moderate level, resulting in no significant difference between the two groups in utilizing mood for prediction. In fact, it can be said that positive mood provides a specific cognitive-emotional context in which the cognitive superiority of individuals with high emotional intelligence becomes evident and leads to greater accuracy in emotional prediction. According to (Fredrickson & KURTZ, 2011) broaden-and-build theory, positive mood not only enhances emotional performance but also improves cognitive capacities, but only when the necessary cognitive infrastructure (such as high intelligence) is present to utilize these capacities. Additionally, high emotional intelligence aids in the ability to use future-oriented thinking, meaning the ability to imagine the long-term emotional consequences of a situation. This skill becomes more active in positive mood conditions, leading high emotional intelligence individuals to predict not only the intensity of future emotions but also their duration, quality, and outcomes.

Overall, these findings emphasize the important role of positive mood in activating cognitive-emotional abilities in individuals with high emotional intelligence and suggest potential interventions that, by creating positive environments, could improve the emotional prediction accuracy of students with high cognitive abilities in critical life decisions. From an educational and mental health perspective, these results could inform the design of programs aimed at increasing positive emotions in the academic setting while fostering self-awareness, future visualization, and emotional prediction skills in students.

Regarding the limitations of this study, environmental and psychological factors such as academic pressure, sleep quality, interpersonal relationships, and cultural influences may have affected how individuals experienced mood and cognitive responses. These factors were not fully controlled in the natural setting of

the study. Future research could explore the impact of various cultural and social factors on the relationship between mood and cognitive functions. In societies with specific cultural characteristics, such as Iranian society, factors such as customs, social pressures, or family expectations may influence this relationship. Thus, cross-cultural studies could provide a better understanding of these processes. Additionally, in practical applications, it is recommended that psychological therapists focus on enhancing emotional intelligence and the ability to predict emotions in their patients. This could help improve resilience and overall psychological functioning.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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