

Predicting Emotional Dysregulation Using Artificial Neural Networks Based on Childhood Trauma, Attachment Insecurity, Alexithymia, and Mindfulness

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ABSTRACT

Objective: This study aimed to predict emotional dysregulation using artificial neural networks based on childhood trauma, attachment insecurity, alexithymia, and mindfulness among adults in Armenia.

Methods and Materials: This quantitative, cross-sectional, predictive study was conducted on 842 adults from Armenia. Participants were selected through convenience sampling from universities, community centers, healthcare settings, and online research platforms. Data were collected using the Difficulties in Emotion Regulation Scale, Childhood Trauma Questionnaire-Short Form, Experiences in Close Relationships-Revised questionnaire, Toronto Alexithymia Scale, Five Facet Mindfulness Questionnaire-Short Form, and a demographic information form. After data screening, normalization, and reliability assessment, descriptive and correlational analyses were performed in SPSS version 29. Artificial neural network modeling was conducted in Python using TensorFlow and Keras. The dataset was divided into training, validation, and testing subsets, and model performance was evaluated using MAE, MSE, RMSE, MAPE, R^2 , and five-fold cross-validation. SHAP analysis was used to interpret predictor importance.

Findings: Emotional dysregulation showed significant positive correlations with childhood trauma ($r = .69, p < .001$), attachment insecurity ($r = .64, p < .001$), and alexithymia ($r = .72, p < .001$), and a significant negative correlation with mindfulness ($r = -.67, p < .001$). The optimized artificial neural network demonstrated strong predictive performance, explaining 91.4% of variance in the training set, 90.1% in the validation set, and 89.6% in the independent testing set. The model produced low prediction errors, including MAE = 4.28, RMSE = 5.64, and MAPE = 5.81%. Five-fold cross-validation confirmed model stability, with a

mean R^2 of .902. SHAP analysis identified alexithymia as the strongest predictor, followed by childhood trauma, attachment insecurity, and mindfulness.

Conclusion: Emotional dysregulation was accurately predicted through a nonlinear artificial neural network model based on developmental, relational, emotional-awareness, and mindfulness-related factors. The findings highlight alexithymia and childhood trauma as central risk indicators and mindfulness as an important protective factor.

Keywords: Emotional dysregulation; Artificial neural network; Childhood trauma; Attachment insecurity; Alexithymia; Mindfulness; Machine learning

1. Introduction

Emotional dysregulation is increasingly recognized as a transdiagnostic psychological process that underlies a broad range of emotional, behavioral, interpersonal, and somatic difficulties. Rather than representing a single symptom domain, emotional dysregulation refers to persistent difficulties in identifying, understanding, modulating, accepting, and adaptively expressing emotional states, particularly under conditions of stress, relational threat, trauma-related activation, or internal conflict. Individuals with elevated emotional dysregulation often experience intense affective reactions, reduced tolerance of negative emotions, impaired impulse control, limited access to effective regulation strategies, and difficulties maintaining goal-directed behavior when distressed. These difficulties are clinically important because they provide a common mechanism through which early adversity, insecure relational development, impaired emotional awareness, and deficits in mindful self-regulation may become organized into stable patterns of psychological vulnerability. Contemporary research increasingly suggests that emotional dysregulation should be conceptualized not merely as an outcome of psychopathology, but as a central organizing mechanism linking developmental experience to later psychological functioning, interpersonal adaptation, and mental health risk (Cruz et al., 2022; Omidbakhsh & Soltanabadi, 2025; Panagou & MacBeth, 2022).

Among the developmental antecedents of emotional dysregulation, childhood trauma occupies a particularly prominent position. Experiences such as emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect may disrupt the maturation of affective, cognitive, and interpersonal systems that ordinarily support emotional learning and self-regulation. Developmental trauma has been associated with elevated vulnerability to internalizing and externalizing symptoms, impaired stress tolerance, dissociation, somatic complaints, maladaptive coping, and disturbances in identity formation, suggesting that early traumatic exposure may interfere with multiple pathways of adaptive psychological development (Cruz et

al., 2022; Lin, 2024; Omidbakhsh & Soltanabadi, 2025). In this context, emotional dysregulation may emerge when a child's emotional needs are repeatedly invalidated, ignored, punished, or overwhelmed by threat, thereby limiting the development of secure affective representation and adaptive regulatory strategies. Research on childhood maltreatment and complex posttraumatic stress has further shown that developmental adversity is not only associated with symptomatic distress, but also with difficulties in emotion recognition, interpersonal trust, self-organization, and distress modulation, all of which are core components of dysregulated emotional functioning (Mattar et al., 2025; Omidbakhsh & Soltanabadi, 2025).

The relationship between childhood trauma and later emotional dysregulation is rarely direct or isolated; rather, it is embedded within broader interpersonal and intrapsychic mechanisms. Studies examining adverse childhood experiences have highlighted the roles of resilience, distress disclosure, mentalization, dissociation, and psychological flexibility in shaping whether early adversity leads to persistent psychological impairment or adaptive recovery (Panagou & MacBeth, 2022; Wagner-Skacel et al., 2021; Zhang et al., 2025). For example, low distress tolerance may intensify the impact of childhood maltreatment on anxiety and related emotional outcomes, suggesting that the inability to endure negative affect without avoidance or disorganization may serve as an important bridge between trauma history and emotional dysregulation (Mattar et al., 2025). Similarly, trauma exposure has been linked to somatization and embodied distress, indicating that unprocessed emotional experience may be expressed through bodily symptoms when reflective and regulatory capacities are insufficiently developed (Glaus et al., 2022; McGovern, 2023). These findings collectively support the view that emotional dysregulation is a multidetermined outcome of trauma-related disruptions in affective awareness, relational security, body-based self-experience, and meaning-making.

Attachment insecurity represents another major psychological pathway through which emotional dysregulation may develop and persist. Attachment theory

emphasizes that early relationships with caregivers shape internal working models of the self, others, and emotional needs. Secure attachment relationships typically provide the child with repeated experiences of emotional attunement, comfort, and co-regulation, whereas insecure attachment patterns may develop in relational environments characterized by inconsistency, rejection, emotional unavailability, fear, or unpredictability. In adulthood, attachment insecurity is commonly expressed through attachment anxiety, involving hyperactivation of the attachment system and fear of abandonment, and attachment avoidance, involving deactivation of attachment needs and emotional distancing. Both forms of insecurity may contribute to emotional dysregulation by impairing the individual's capacity to interpret emotional signals, seek support effectively, tolerate intimacy, and regulate affect in relational contexts (Greenman et al., 2024; Scharfe, 2026; Ścigala et al., 2021).

Evidence from clinical and non-clinical populations indicates that attachment insecurity is closely related to psychological distress, somatic symptoms, and emotion-processing deficits. Attachment-related mechanisms have been shown to explain the association between childhood trauma and later somatic symptoms, suggesting that insecure attachment may translate early relational injury into both psychological and bodily distress (Greenman et al., 2024). Research on complex traumatization and functional motor disorder has similarly indicated that unresolved attachment states of mind may be associated with trauma-related symptom presentations in which emotional conflict, bodily expression, and relational insecurity are deeply intertwined (Civillotti et al., 2024). In studies of functional neurological symptom disorder, autonomy-related personality factors and disturbances in self-organization have also been implicated, further emphasizing the importance of relational and self-regulatory development in psychosomatic and emotional outcomes (Stroink, 2024). These findings suggest that emotional dysregulation may be intensified when individuals lack stable internal representations of safety, support, and emotional coherence.

Attachment insecurity is also important because it interacts with contemporary social and relational stressors across different populations. Research on military families has shown that relational experiences shaped by instability, mobility, separation, and family-system stress can influence adult relationship patterns, suggesting that attachment processes remain relevant beyond childhood and continue to structure emotional functioning in adulthood (Freeman et al.,

2024). Other studies have linked attachment anxiety and avoidance to technology-related dependency, nomophobia, smartphone addiction, and addictive behaviors, indicating that insecure attachment may promote compensatory regulation strategies when interpersonal regulation is perceived as unreliable or threatening (Gori et al., 2023; Jin et al., 2023; Liang, 2024). These findings are relevant to emotional dysregulation because maladaptive external regulation, compulsive behaviors, or excessive reliance on digital reassurance may function as attempts to manage distress in the absence of secure internal or interpersonal regulation. Thus, attachment insecurity may not only predict emotional dysregulation directly, but may also amplify the effects of trauma, alexithymia, and low mindfulness through maladaptive coping pathways.

Alexithymia is a further construct of central relevance to emotional dysregulation because it reflects deficits in identifying, describing, and cognitively processing emotional states. Individuals with high alexithymia often experience emotions as vague, confusing, somatic, or behaviorally activating rather than symbolically meaningful and verbally expressible. This deficit may interfere with emotional regulation at a foundational level, because effective regulation requires at least some capacity to notice, label, interpret, and communicate internal affective experiences. When individuals cannot identify what they feel, distinguish emotions from bodily arousal, or describe distress in interpersonal contexts, they may be more likely to rely on avoidance, impulsive action, suppression, somatization, or maladaptive coping strategies. Research among university students has shown that childhood trauma is associated with both alexithymia and emotion regulation difficulties, supporting the possibility that alexithymic features may serve as a key mechanism connecting early adversity with later emotional dysregulation (Akpınar, 2024). Similarly, studies of parental bonding, childhood abuse, and psychological distress have demonstrated that impaired emotional awareness is often rooted in early relational and developmental contexts (Zainab et al., 2023; Zhang et al., 2025).

The intersection of attachment insecurity and alexithymia has received increasing empirical attention. Research has shown that insecure attachment is associated with alexithymia, fear of intimacy, and reduced self-differentiation, indicating that individuals who lack secure relational models may also struggle to understand and communicate emotional experience within close relationships (Ścigala et al., 2021). Studies of late

adolescents have demonstrated that attachment to parents and peers may influence psychological distress through alexithymia, suggesting that the inability to process emotions may mediate the relationship between relational insecurity and mental health difficulties (Tambelli et al., 2021). Similar findings have emerged in research on institutionalized and late-adopted adolescents, where attachment and alexithymia predicted emotional and behavioral problems across informant perspectives (Muzi & Pace, 2023). In adult and family contexts, alexithymia and attachment dimensions have also been linked to parental burnout, while ideal attachment style approaches have been proposed as potentially relevant to reducing alexithymic traits (Karmakar et al., 2024; Ścigala et al., 2025). These findings support an integrated model in which insecure attachment and alexithymia jointly contribute to emotional dysregulation by weakening both relational regulation and internal emotional representation.

Alexithymia is particularly important in trauma-related and interpersonal risk populations because it may convert emotional pain into indirect, behavioral, or somatic expressions. Studies of intimate partner violence aggressors have reported associations between alexithymia and insecure attachment, suggesting that deficits in emotional awareness may contribute to maladaptive relational behavior when attachment systems are dysregulated (Vergés-Báez et al., 2021). Research on maternal childhood trauma and postpartum well-being has similarly identified a pathway from attachment to alexithymia, indicating that trauma-related relational patterns may shape later emotional functioning during psychologically demanding life transitions (Kahya & Uluç, 2023). In psychosis research, trauma, attachment, dissociation, and alexithymia have been examined as interconnected pathways to negative symptoms, further demonstrating that impaired emotional processing may be implicated across severe and complex forms of psychological distress (Grady et al., 2025). These lines of evidence suggest that alexithymia is not simply a descriptive emotional deficit, but a clinically meaningful mechanism through which developmental trauma and insecure attachment may become organized into persistent emotional dysregulation.

Mindfulness represents a potentially protective factor in this network of developmental and emotional vulnerabilities. Dispositional mindfulness involves present-centered awareness, nonjudgmental acceptance of internal experience, nonreactivity to thoughts and emotions, and the capacity to observe bodily and affective states without

immediate avoidance or impulsive reaction. From this perspective, mindfulness may reduce emotional dysregulation by increasing awareness of emotional cues, improving tolerance of distress, interrupting automatic reactions, and strengthening reflective distance from painful internal states. Research on trauma, early life stress, and mindfulness in adulthood suggests that mindfulness may be especially relevant for individuals with histories of adverse experiences, because it supports a more accepting and regulated relationship with internal experience (Gibson, 2024b). Conceptual work on meditation and interoception further indicates that mindfulness may influence both narrative and experiential aspects of the self by enhancing awareness of bodily signals and integrating them into coherent self-experience (Gibson, 2024a). This is especially relevant to emotional dysregulation because trauma and alexithymia often disrupt the connection between bodily arousal, emotional meaning, and self-understanding.

The role of mindfulness may also be understood in relation to broader models of embodied identity, somatic distress, and psychological integration. Clinical-theoretical work on eating disorders has emphasized the importance of integrating narrative and bodily identity, highlighting that dysregulated emotional experience is frequently expressed through disturbances in bodily self-representation and meaning (Pellegrini et al., 2021). Studies of somatization, functional neurological symptoms, and trauma-related bodily distress similarly suggest that psychological suffering may become embodied when emotional experience cannot be mentalized, verbalized, or regulated adaptively (Civillotti et al., 2024; Glaus et al., 2022; McGovern, 2023). In this regard, mindfulness may function as a corrective process by improving interoceptive awareness, reducing experiential avoidance, and helping individuals observe emotional and bodily states without becoming overwhelmed by them. Therefore, mindfulness is theoretically positioned not merely as a symptom-reducing trait, but as a regulatory capacity that may buffer the effects of childhood trauma, attachment insecurity, and alexithymia on emotional dysregulation.

Although existing studies have clarified important associations among childhood trauma, insecure attachment, alexithymia, mindfulness, and emotional outcomes, much of the available evidence has relied on linear statistical models that may not fully capture the complexity of these relationships. Emotional dysregulation is likely produced through nonlinear and interactive pathways in which the effect of one predictor depends on the level of another. For

example, childhood trauma may be more strongly associated with dysregulation among individuals with high alexithymia, low mindfulness, or elevated attachment insecurity. Similarly, mindfulness may show a protective effect that varies depending on trauma severity or the degree of emotional awareness impairment. Conventional regression-based models are useful for estimating average associations, but they are often limited in their ability to identify complex patterns, thresholds, and interactions among multiple psychological predictors. Artificial neural networks provide a flexible data-driven approach for modeling such complexity because they can detect nonlinear associations and higher-order interactions without requiring restrictive assumptions about the functional form of relationships among variables.

The use of artificial neural networks in the prediction of emotional dysregulation is therefore methodologically appropriate for a construct shaped by developmental, interpersonal, emotional, and cognitive factors. Childhood trauma reflects early adverse experience; attachment insecurity reflects relational regulation and internal working models; alexithymia reflects emotional awareness and symbolic representation; and mindfulness reflects present-centered awareness and adaptive self-regulation. Together, these variables provide a theoretically coherent set of predictors that map onto central domains of vulnerability and resilience. Prior research has examined many of these variables in pairs or smaller models, including trauma and alexithymia (Akpınar, 2024), attachment and alexithymia (Muzi & Pace, 2023; Ścigala et al., 2021), childhood maltreatment and anxiety-related mechanisms (Mattar et al., 2025), trauma and complex posttraumatic outcomes (Omidbakhsh & Soltanabadi, 2025), and mindfulness in the context of early life stress (Gibson, 2024b). However, fewer studies have integrated these predictors into a single predictive framework capable of estimating their combined and potentially nonlinear contribution to emotional dysregulation.

Accordingly, the aim of the present study was to predict emotional dysregulation using artificial neural networks based on childhood trauma, attachment insecurity, alexithymia, and mindfulness among adults in Armenia.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a quantitative, cross-sectional, predictive research design to investigate the capacity of

artificial neural networks (ANNs) to predict emotional dysregulation based on childhood trauma, attachment insecurity, alexithymia, and mindfulness among adults in Armenia. The research was conducted between February and July 2026 across multiple urban regions of Armenia, including Yerevan, Gyumri, and Vanadzor. The primary objective was to construct and validate a machine learning model capable of identifying nonlinear relationships between psychological predictors and emotional dysregulation while evaluating the relative predictive contribution of each independent variable. Unlike traditional linear statistical methods, artificial neural networks provide the ability to detect complex interactions among multiple psychological constructs, making them particularly suitable for modeling emotional functioning, which is inherently multidimensional and influenced by interconnected cognitive, affective, and developmental factors.

A total of 842 participants were recruited using a multistage convenience sampling strategy from universities, community organizations, healthcare centers, and online psychological research platforms throughout Armenia. Adults between 18 and 65 years of age who were fluent in Armenian and capable of providing informed consent were considered eligible for participation. Individuals currently diagnosed with severe neurological disorders, active psychotic disorders, intellectual disabilities, or cognitive impairments that could interfere with questionnaire completion were excluded from the study. Participants experiencing acute psychiatric crises during data collection were also excluded to ensure the accuracy and stability of self-reported psychological information.

Prior to participation, all individuals received detailed information describing the aims of the study, confidentiality procedures, voluntary participation, anonymity, and their right to withdraw from the research at any stage without consequences. Written informed consent was obtained electronically or in person before data collection commenced. All questionnaires were completed anonymously using either secure online survey software or paper-and-pencil forms administered in supervised settings. The average completion time ranged from 35 to 45 minutes. Missing data were carefully examined prior to statistical analyses. Cases with more than 10% missing responses were excluded, while isolated missing values were imputed using expectation-maximization procedures after confirming that the missing data pattern was random. Following data screening, all 842 datasets met quality control criteria and were retained for final analyses.

2.2. Measures

Emotional dysregulation was assessed using the Difficulties in Emotion Regulation Scale (DERS), a comprehensive self-report instrument designed to evaluate multiple domains of emotional regulation difficulties. The questionnaire consists of 36 items rated on a five-point Likert scale ranging from almost never to almost always. The instrument measures six dimensions of emotional dysregulation, including nonacceptance of emotional responses, difficulties engaging in goal-directed behavior during emotional distress, impulse control difficulties, lack of emotional awareness, limited access to effective emotion regulation strategies, and lack of emotional clarity. Higher total scores indicate greater emotional dysregulation. Previous international research has consistently demonstrated excellent internal consistency, strong construct validity, satisfactory convergent validity, and high test-retest reliability. In the present study, Cronbach's alpha demonstrated excellent internal consistency for the total scale.

Childhood trauma was measured using the Childhood Trauma Questionnaire-Short Form (CTQ-SF), which evaluates retrospective experiences of emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. The instrument contains 28 items rated on a five-point Likert response format ranging from never true to very often true. Higher scores reflect greater exposure to adverse childhood experiences. The CTQ-SF has been extensively validated across different cultural settings and has consistently demonstrated strong psychometric properties, including excellent internal consistency, factorial validity, and temporal stability. The multidimensional assessment of childhood adversity provided a comprehensive developmental perspective for predicting later emotional regulation difficulties.

Attachment insecurity was assessed using the Experiences in Close Relationships-Revised (ECR-R) questionnaire. This widely used instrument contains 36 items measuring two fundamental dimensions of adult attachment: attachment anxiety and attachment avoidance. Participants responded using a seven-point Likert scale ranging from strongly disagree to strongly agree. Higher scores indicate greater insecurity within interpersonal attachment relationships. The ECR-R has consistently demonstrated excellent reliability and validity across clinical and non-clinical populations and is considered one of the most robust measures of adult attachment patterns. The two

attachment dimensions were entered independently into the predictive model to capture distinct relational vulnerabilities associated with emotional dysregulation.

Alexithymia was evaluated using the 20-item Toronto Alexithymia Scale (TAS-20), one of the most frequently employed instruments for assessing emotional awareness deficits. The TAS-20 measures three related components: difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking. Items are scored on a five-point Likert scale ranging from strongly disagree to strongly agree, with higher scores indicating greater alexithymic characteristics. Extensive psychometric investigations have supported the reliability, construct validity, factorial stability, and cross-cultural applicability of the TAS-20. The total score and individual subscale scores were considered during preliminary analyses to determine their predictive importance.

Mindfulness was measured using the Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF), which assesses observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience. The questionnaire contains 24 items rated on a five-point Likert scale ranging from never or very rarely true to very often or always true. Higher scores represent greater dispositional mindfulness. Previous studies have consistently reported satisfactory internal consistency, factorial validity, convergent validity, and measurement stability across diverse cultural populations. Since mindfulness represents an important protective psychological resource, it was included as a potential negative predictor of emotional dysregulation within the neural network model.

Demographic information including age, gender, educational level, marital status, employment status, and place of residence was collected using a researcher-developed questionnaire. These demographic characteristics were used to describe the study sample and to evaluate potential associations with the primary study variables during preliminary analyses.

2.3. Data analysis

Data analysis was conducted using IBM SPSS Statistics version 29 for descriptive and preliminary statistical analyses and Python version 3.12 using TensorFlow and Keras libraries for artificial neural network development and validation. Initial analyses included descriptive statistics, frequency distributions, measures of central tendency and

dispersion, skewness and kurtosis indices, assessment of missing data patterns, identification of multivariate outliers using Mahalanobis distance, and examination of multicollinearity through variance inflation factors and tolerance statistics. Internal consistency reliability for all psychological instruments was evaluated using Cronbach's alpha coefficients, while Pearson correlation analyses were performed to examine bivariate relationships among study variables before machine learning model construction.

Prior to neural network development, all continuous variables were standardized using z-score normalization to ensure comparable numerical scales across predictors. The complete dataset was randomly divided into training (70%), validation (15%), and testing (15%) subsets while preserving the proportional distribution of demographic characteristics. Childhood trauma, attachment anxiety, attachment avoidance, alexithymia, mindfulness, and demographic covariates served as input variables, whereas emotional dysregulation represented the output variable.

A multilayer feedforward artificial neural network was constructed using supervised learning with the backpropagation algorithm. The network architecture consisted of an input layer corresponding to predictor variables, two hidden layers employing rectified linear unit (ReLU) activation functions, and a single output neuron predicting emotional dysregulation scores through linear activation. Hyperparameter optimization was conducted using grid search procedures to determine the optimal number of neurons, learning rate, batch size, dropout rate, and number of training epochs. The Adam optimization algorithm was employed because of its computational efficiency and adaptive learning capabilities. Early stopping procedures monitored validation loss to minimize overfitting and improve model generalizability.

Model performance was evaluated using multiple complementary indicators, including mean absolute error (MAE), mean squared error (MSE), root mean squared error (RMSE), coefficient of determination (R^2), and mean absolute percentage error (MAPE). Five-fold cross-validation was additionally implemented to assess model stability and robustness across different subsets of the data. Prediction accuracy was further examined by comparing observed and predicted emotional dysregulation scores within the testing dataset.

To improve interpretability of the artificial neural network, explainable artificial intelligence techniques were incorporated following model training. SHapley Additive exPlanations (SHAP) values were calculated to estimate the relative contribution of each predictor to model output, allowing identification of the most influential psychological variables associated with emotional dysregulation. Variable importance rankings were generated based on average absolute SHAP values, providing clinically meaningful insight into the mechanisms underlying emotional dysregulation prediction. Statistical significance for preliminary inferential analyses was established at a two-tailed alpha level of 0.05, whereas the final evaluation of predictive performance relied primarily on machine learning performance metrics rather than conventional hypothesis-testing procedures.

3. Findings and Results

A total of 842 participants completed all study questionnaires and were included in the final analyses. The mean age of the participants was 31.84 years ($SD = 10.62$), with ages ranging from 18 to 65 years. Of the total sample, 472 participants (56.1%) were female and 370 (43.9%) were male. Regarding educational attainment, 23.6% had completed secondary education, 51.8% held a bachelor's degree, 18.5% possessed a master's degree, and 6.1% had doctoral-level education. Approximately 49.5% of participants were single, 45.4% were married, and the remaining participants reported being divorced or widowed. In terms of employment status, 58.3% were employed full-time, 18.9% were employed part-time, 16.2% were university students, and 6.6% were unemployed or retired. Participants were recruited from different geographical regions of Armenia, with 61.5% residing in Yerevan, 18.4% in Gyumri, 11.2% in Vanadzor, and 8.9% from other urban and semi-urban regions. Data screening demonstrated acceptable normality for all variables, with skewness and kurtosis values remaining within recommended limits. No problematic multicollinearity was observed among predictor variables, and reliability analyses indicated excellent internal consistency for all psychological measures, with Cronbach's alpha coefficients ranging from .84 to .94.

Table 1

Descriptive Statistics, Reliability Coefficients, and Correlations Among Study Variables

Variable	Mean	SD	Cronbach's α	1	2	3	4	5
1. Emotional Dysregulation	94.83	22.14	.93	—				
2. Childhood Trauma	43.71	12.46	.91	.69**	—			
3. Attachment Insecurity	81.35	18.59	.90	.64**	.57**	—		
4. Alexithymia	53.62	11.08	.88	.72**	.59**	.63**	—	
5. Mindfulness	70.58	13.74	.92	-.67**	-.48**	-.52**	-.61**	—

Table 1 presents the descriptive statistics, internal consistency coefficients, and Pearson correlation coefficients for the principal study variables. All instruments demonstrated excellent psychometric properties, with Cronbach's alpha values ranging from .88 to .93, confirming high internal reliability within the Armenian sample. Emotional dysregulation exhibited strong positive correlations with childhood trauma ($r = .69$), attachment insecurity ($r = .64$), and alexithymia ($r = .72$), indicating that greater exposure to adverse childhood experiences, higher levels of insecure attachment, and greater difficulty identifying and expressing emotions were all associated with increased emotional dysregulation. In contrast, mindfulness

demonstrated a substantial negative correlation with emotional dysregulation ($r = -.67$), suggesting that individuals reporting greater dispositional mindfulness experienced significantly fewer emotional regulation difficulties. The predictor variables also showed moderate intercorrelations, although none approached levels suggestive of problematic multicollinearity. Variance Inflation Factor values ranged from 1.42 to 2.31, confirming that each predictor contributed unique explanatory information to the subsequent artificial neural network analyses. These preliminary findings supported the inclusion of all four psychological variables in the predictive modeling process.

Table 2

Artificial Neural Network Architecture and Model Performance

Parameter	Value
Input Variables	Childhood Trauma, Attachment Insecurity, Alexithymia, Mindfulness
Number of Input Neurons	4
Hidden Layer 1	32 neurons (ReLU)
Hidden Layer 2	16 neurons (ReLU)
Output Layer	1 neuron (Linear)
Optimizer	Adam
Learning Rate	0.001
Batch Size	32
Epochs Completed	84
Early Stopping	Applied
Training Sample	589
Validation Sample	126
Testing Sample	127
Mean Absolute Error (MAE)	4.28
Mean Squared Error (MSE)	31.84
Root Mean Squared Error (RMSE)	5.64
Mean Absolute Percentage Error (MAPE)	5.81%
R ² (Training)	.914
R ² (Validation)	.901
R ² (Testing)	.896
Five-Fold Cross-Validation Mean R ²	.902

The artificial neural network achieved excellent predictive performance across the training, validation, and testing datasets. As shown in Table 2, the optimized

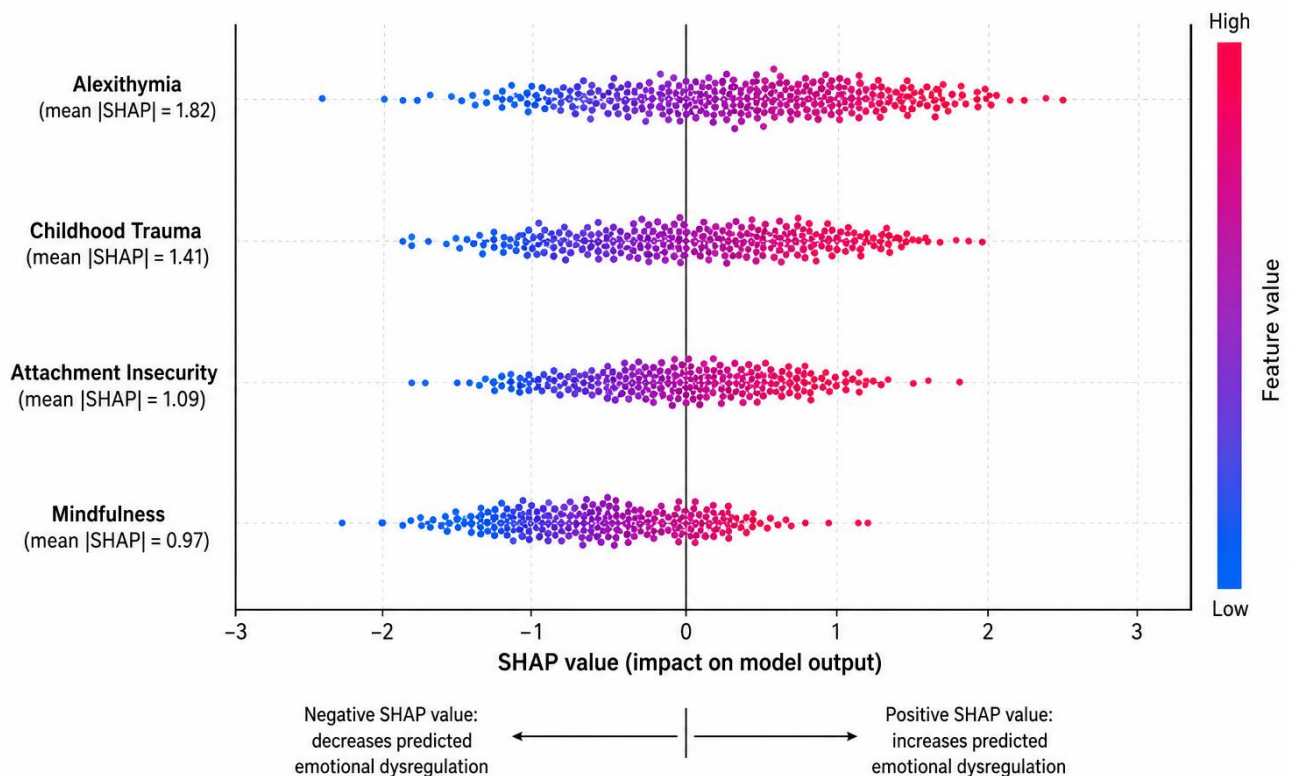
multilayer feedforward neural network consisted of two hidden layers with 32 and 16 neurons, respectively, using Rectified Linear Unit activation functions and the Adam

optimization algorithm. Training terminated after 84 epochs because the early stopping criterion indicated convergence of the validation loss, thereby reducing the likelihood of overfitting. The model explained approximately 89.6% of the variance in emotional dysregulation within the independent testing dataset ($R^2 = .896$), while maintaining similarly high predictive accuracy during both the training ($R^2 = .914$) and validation ($R^2 = .901$) phases. The relatively low values for MAE (4.28), RMSE (5.64), and MAPE (5.81%) further demonstrated that predicted emotional

dysregulation scores closely approximated observed values. Moreover, the five-fold cross-validation procedure produced a highly stable average R^2 value of .902, confirming excellent model generalizability and robustness across different subsamples. Collectively, these findings indicate that the artificial neural network successfully modeled the complex nonlinear relationships among childhood trauma, attachment insecurity, alexithymia, and emotional dysregulation with a high degree of predictive precision.

Figure 1

SHAP Summary Plot Demonstrating the Relative Importance of Childhood Trauma, Attachment Insecurity, Alexithymia, and Mindfulness in Predicting Emotional Dysregulation



The explainable artificial intelligence analysis provided valuable insight into the relative contribution of each predictor variable within the neural network model. As illustrated in Figure 1, alexithymia emerged as the strongest predictor of emotional dysregulation, demonstrating the largest average absolute SHAP values and therefore exerting the greatest influence on the model's predictions. Childhood trauma represented the second most influential predictor, indicating that adverse developmental experiences substantially increased the probability of elevated emotional dysregulation. Attachment insecurity ranked third in

predictive importance and consistently contributed to higher predicted emotional dysregulation scores, particularly among participants with elevated attachment anxiety and avoidance. Mindfulness demonstrated a strong protective effect and ranked fourth in overall importance. Higher mindfulness scores consistently reduced predicted emotional dysregulation across nearly all observations, highlighting its buffering role against emotional difficulties. The SHAP summary plot further illustrated considerable individual variability in predictor influence, reflecting the capacity of artificial neural networks to capture complex nonlinear

interactions among psychological variables that are not readily detected using conventional regression approaches. Overall, the explainable artificial intelligence results confirmed that emotional dysregulation is best understood as a multidimensional psychological outcome influenced by interacting developmental, interpersonal, emotional, and cognitive factors rather than by isolated predictors. The consistency between the SHAP analysis and the overall predictive performance metrics further strengthened confidence in the stability, interpretability, and clinical applicability of the proposed neural network model.

4. Discussion

The present study aimed to predict emotional dysregulation using an artificial neural network model based on childhood trauma, attachment insecurity, alexithymia, and mindfulness among adults in Armenia. The findings demonstrated that the proposed neural network model had strong predictive accuracy, explaining a substantial proportion of variance in emotional dysregulation in the independent testing dataset. The high training, validation, and testing performance, together with the stable cross-validation results, indicates that emotional dysregulation can be effectively modeled through the combined contribution of developmental adversity, insecure relational patterns, emotional awareness deficits, and mindful self-regulation. This finding is important because emotional dysregulation is not a simple or isolated psychological outcome; rather, it reflects the interaction of early life experience, attachment-based emotion regulation, emotional symbolization, and present-centered awareness. The results therefore support a multidimensional conceptualization of emotional dysregulation in which adverse childhood experiences increase vulnerability, attachment insecurity shapes relational regulation strategies, alexithymia impairs the recognition and verbalization of internal states, and mindfulness functions as a protective regulatory capacity. This interpretation is consistent with developmental trauma frameworks suggesting that childhood adversity disrupts affective, cognitive, relational, and bodily self-regulatory systems, thereby increasing vulnerability to later psychological distress and emotional instability (Cruz et al., 2022; Lin, 2024; Omidbakhsh & Soltanabadi, 2025). The strong predictive capacity of the artificial neural network further suggests that these psychological variables may operate through nonlinear and interactive pathways that are not always fully captured by conventional linear models.

One of the most important findings of the study was that alexithymia emerged as the strongest predictor of emotional dysregulation in the SHAP-based interpretability analysis. This result suggests that difficulties identifying, describing, and cognitively processing emotions may represent a central mechanism through which emotional dysregulation becomes clinically expressed. Individuals with elevated alexithymia may experience emotional arousal without sufficient symbolic understanding, which can make emotional states feel confusing, somatic, overwhelming, or behaviorally urgent. When emotions cannot be clearly identified or verbally represented, adaptive regulation strategies such as cognitive reappraisal, interpersonal communication, distress tolerance, and reflective problem solving may become less accessible. This finding aligns with evidence showing that childhood trauma is associated with alexithymia and emotion regulation difficulties among university students, indicating that emotional awareness deficits may be a key pathway from adversity to dysregulated affect (Akpınar, 2024). It is also consistent with research showing that alexithymia is linked to psychological distress, parental bonding difficulties, distress disclosure problems, and emotional-behavioral symptoms across adolescent and adult populations (Muzi & Pace, 2023; Zainab et al., 2023; Zhang et al., 2025). The present findings extend this literature by demonstrating that alexithymia was not merely correlated with emotional dysregulation, but was the most influential predictor within a nonlinear machine learning model.

The central role of alexithymia is also supported by studies connecting emotional awareness deficits with attachment insecurity and broader interpersonal dysfunction. Previous research has shown that insecure attachment is associated with alexithymia, fear of intimacy, and weak self-differentiation, suggesting that individuals who experience relational insecurity may also have difficulty developing coherent emotional self-understanding (Ścigała et al., 2021). Similarly, research on late adolescents has indicated that attachment to parents and peers contributes to psychological distress through alexithymia, supporting the idea that emotional processing deficits mediate the impact of relational vulnerability on mental health outcomes (Tambelli et al., 2021). Findings from structural equation modeling research on alexithymia and attachment dimensions in parental burnout also support the close interdependence of relational insecurity and impaired emotional processing (Ścigała et al., 2025). The present study's finding that alexithymia was the strongest predictor of emotional dysregulation therefore suggests that interventions targeting

emotion identification and expression may be especially important for individuals with trauma histories and insecure attachment patterns. Furthermore, evidence that alexithymia is associated with insecure attachment among intimate partner violence aggressors and with emotional-behavioral problems among vulnerable adolescents reinforces the clinical significance of emotional awareness deficits across diverse psychosocial contexts (Muzi & Pace, 2023; Vergés-Báez et al., 2021).

Childhood trauma was the second most influential predictor in the model, confirming the strong developmental contribution of adverse early experiences to later emotional dysregulation. This finding supports the view that emotional abuse, neglect, physical abuse, sexual abuse, and other forms of early adversity may interfere with the maturation of emotion regulation systems. In unsafe or emotionally invalidating environments, children may not receive sufficient co-regulation, emotional labeling, protection, or support for organizing distress into manageable psychological experience. Over time, this may result in heightened emotional reactivity, poor distress tolerance, impulsivity, dissociation, somatic expression, and limited access to adaptive regulation strategies. This interpretation is consistent with systematic evidence linking childhood maltreatment to complex posttraumatic outcomes and disturbances in self-organization (Omidbakhsh & Soltanabadi, 2025). It also aligns with developmental trauma models emphasizing the broad psychiatric, relational, and functional consequences of early adversity (Cruz et al., 2022). Research on adverse childhood experiences and adult mental health has further shown that resilience-related mechanisms may influence whether trauma exposure leads to persistent distress, suggesting that emotional dysregulation may be intensified when protective processes are insufficiently developed (Panagou & MacBeth, 2022). The present findings add to this literature by demonstrating that childhood trauma maintained a strong predictive contribution even when alexithymia, attachment insecurity, and mindfulness were simultaneously included in the model.

The predictive role of childhood trauma can also be understood through trauma-related pathways involving distress tolerance, disclosure, dissociation, somatization, and bodily self-experience. Research has shown that distress tolerance mediates the association between childhood maltreatment and anxiety, suggesting that trauma-exposed individuals may be especially vulnerable when they cannot tolerate negative emotional arousal without becoming overwhelmed or avoidant (Mattar et al., 2025). Other studies

have linked adverse childhood experiences to dissociation and mentalization difficulties, indicating that trauma may disrupt the individual's capacity to integrate emotional experience into coherent self-reflection (Wagner-Skacel et al., 2021). Evidence on families exposed to violence and the intergenerational transmission of somatization further suggests that traumatic environments may shape bodily expressions of emotional distress, particularly when emotions are not safely processed within relationships (Glaus et al., 2022). Clinical-theoretical work on somatization and deficit pathology similarly supports the idea that unprocessed emotional pain may be expressed through bodily or indirect psychological symptoms when affective representation is impaired (McGovern, 2023). In this regard, the current finding that childhood trauma strongly predicted emotional dysregulation is consistent with the broader view that trauma affects both emotional and embodied self-regulatory capacities.

Attachment insecurity was also a meaningful predictor of emotional dysregulation, ranking third in the SHAP importance analysis. This finding suggests that insecure relational models contribute to difficulties in modulating emotional states, particularly in contexts involving intimacy, dependence, rejection, abandonment, or interpersonal conflict. Attachment anxiety may heighten emotional reactivity and fear-based monitoring of relationships, whereas attachment avoidance may promote emotional suppression, distancing, and reduced support-seeking. Both patterns can contribute to dysregulated emotional functioning, though through different pathways. The present findings are consistent with attachment research showing that insecure attachment representations are associated with depression and broader emotional vulnerability (Scharfe, 2026). They also align with evidence that attachment helps explain the relationship between childhood trauma and somatic symptoms, suggesting that insecure attachment may operate as a bridge between early adversity and later dysregulated psychological or bodily functioning (Greenman et al., 2024). Research on attachment state of mind and complex traumatization in functional motor disorder further supports the idea that unresolved attachment and trauma-related processes can become intertwined in symptom formation (Civiloti et al., 2024). Thus, the present study supports an integrated model in which attachment insecurity contributes to emotional dysregulation by weakening both interpersonal regulation and internalized safety.

The importance of attachment insecurity is further supported by findings across relational, technological, and family-system contexts. Studies have shown that insecure attachment may contribute to smartphone addiction, nomophobia, and other compensatory behaviors, suggesting that individuals with relational insecurity may seek external strategies for affective stabilization when internal or interpersonal regulation is insufficient (Jin et al., 2023; Liang, 2024). Research on addictive behaviors has similarly emphasized vulnerability and maintenance factors that overlap with emotional dysregulation, including insecure relational patterns and maladaptive coping (Gori et al., 2023). In addition, studies of military family experiences indicate that relational instability and family-system stress may shape adult relationship functioning, further highlighting how attachment-relevant experiences can influence later emotional and interpersonal adaptation (Freeman et al., 2024). Evidence that ideal attachment style approaches may be associated with lower alexithymic traits also suggests that attachment security may support emotional awareness and regulation (Karmakar et al., 2024). The present findings therefore indicate that attachment insecurity should not be considered only an interpersonal variable, but also a regulatory vulnerability that can influence how individuals experience, interpret, and manage emotions.

Mindfulness showed a strong negative association with emotional dysregulation and emerged as a protective predictor within the neural network model. This finding indicates that higher dispositional mindfulness was associated with lower predicted emotional dysregulation, even when childhood trauma, attachment insecurity, and alexithymia were included as risk factors. Mindfulness may protect against dysregulation by strengthening present-centered awareness, nonjudgmental acceptance, emotional clarity, and nonreactivity to internal experience. These capacities are particularly relevant for individuals who experience intense affect, trauma-related arousal, insecure attachment activation, or difficulty identifying emotions. Research on trauma, early life stress, and mindfulness in adulthood supports the protective role of mindfulness in trauma-exposed individuals, suggesting that mindful awareness may help individuals relate differently to distressing internal experiences (Gibson, 2024b). Conceptual work on meditation and interoception also indicates that mindfulness may enhance the integration of narrative and experiential aspects of the self, which is highly relevant for emotional regulation because adaptive

regulation depends on the capacity to observe, interpret, and integrate bodily and emotional signals (Gibson, 2024a). The present results therefore support the inclusion of mindfulness as a resilience-oriented predictor in models of emotional dysregulation.

The protective role of mindfulness may also be interpreted in relation to embodied self-regulation. Trauma, alexithymia, and insecure attachment may all disrupt the connection between bodily arousal and emotional meaning, making emotions more difficult to identify, tolerate, and regulate. Mindfulness may counteract this disruption by increasing interoceptive awareness and reducing automatic avoidance or impulsive reaction. This interpretation is consistent with work on narrative and bodily identity in eating disorders, which emphasizes the clinical importance of integrating bodily experience and psychological meaning (Pellegrini et al., 2021). It also aligns with studies of functional neurological symptoms and autonomy-related personality factors, where difficulties in self-organization, bodily expression, and emotional processing are central to symptom development (Civiloti et al., 2024; Stroink, 2024). Therefore, the present finding that mindfulness reduced predicted emotional dysregulation suggests that regulatory protection may occur not only through cognitive control, but also through greater acceptance and integration of emotional and bodily states.

5. Conclusion

Overall, the findings provide strong support for a nonlinear, multivariable model of emotional dysregulation. The artificial neural network demonstrated that the combined predictors captured emotional dysregulation with high accuracy, while the SHAP analysis clarified that alexithymia, childhood trauma, attachment insecurity, and mindfulness contributed in theoretically meaningful ways. This pattern is consistent with research showing that trauma, attachment, dissociation, and alexithymia form interconnected pathways to severe psychological outcomes, including negative symptoms in psychosis (Grady et al., 2025). It also aligns with research on maternal childhood trauma, postpartum well-being, attachment, and alexithymia, which supports the idea that developmental adversity may influence emotional functioning through relational and emotional-processing mechanisms (Kahya & Uluç, 2023). The contribution of systematic evidence on childhood experiences and intimate relationships further reinforces the developmental significance of early adversity

for adult relational and emotional functioning (Price et al., 2025). Taken together, the present findings suggest that emotional dysregulation is best understood as a dynamic outcome of interacting developmental, relational, affective, and mindfulness-related processes. The use of artificial neural networks was therefore valuable not only for prediction, but also for identifying the relative importance of clinically meaningful psychological variables.

6. Limitations & Suggestions

The present study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design prevents causal conclusions about the direction of relationships among childhood trauma, attachment insecurity, alexithymia, mindfulness, and emotional dysregulation. Although the theoretical model assumes that developmental and relational vulnerabilities contribute to dysregulation, longitudinal data are required to determine temporal ordering. Second, the study relied on self-report questionnaires, which may be influenced by recall bias, response style, social desirability, or limited emotional awareness, particularly among participants with high alexithymia. Third, childhood trauma was assessed retrospectively, and therefore participants' current psychological state may have influenced how early experiences were remembered and reported. Fourth, the sample was recruited from adults in Armenia using a non-random sampling method, which may limit generalizability to other cultural groups, clinical populations, or age ranges. Fifth, although artificial neural networks provide strong predictive power, they may be less transparent than traditional statistical models, even when interpretability methods such as SHAP are applied. Finally, the study did not include clinical diagnostic interviews, physiological indicators, behavioral emotion regulation tasks, or informant-based measures, which could have provided a more comprehensive assessment of emotional dysregulation.

Future research should extend the present findings through longitudinal, clinical, and multimethod designs. Longitudinal studies are needed to examine whether childhood trauma predicts later emotional dysregulation through attachment insecurity and alexithymia over time, and whether mindfulness moderates these developmental pathways. Future studies should also test the model in clinical groups, including individuals with posttraumatic stress symptoms, depression, anxiety disorders, somatic

symptom disorders, eating disorders, addictive behaviors, and personality-related difficulties. Multigroup analyses could determine whether the predictive model operates similarly across gender, age, educational level, and cultural background. Future research should also compare artificial neural networks with other machine learning algorithms, such as random forests, support vector machines, gradient boosting models, and explainable ensemble approaches, to determine which methods provide the best balance of accuracy and interpretability. In addition, future studies should include behavioral, physiological, and ecological momentary assessment data to capture real-time emotional regulation processes in daily life. Finally, intervention studies should examine whether reducing alexithymia, strengthening attachment security, processing trauma, and increasing mindfulness lead to measurable reductions in emotional dysregulation.

The findings have important implications for psychological assessment and practice. Clinicians working with emotional dysregulation should assess not only current emotional symptoms, but also childhood trauma history, attachment insecurity, alexithymia, and mindfulness capacities. Because alexithymia emerged as the strongest predictor, interventions should prioritize the development of emotional awareness, emotional labeling, affective vocabulary, and the ability to distinguish emotions from bodily sensations. Trauma-informed approaches should be used when working with individuals who report adverse childhood experiences, with attention to safety, stabilization, distress tolerance, and gradual processing of traumatic memories. Attachment-informed interventions may help clients develop more secure relational expectations, improve support-seeking, reduce fear of abandonment, and decrease emotional suppression or avoidance. Mindfulness-based strategies may be especially useful for improving present-centered awareness, nonjudgmental acceptance, and nonreactivity to distressing internal experiences. In applied settings, artificial neural network models may eventually support screening and risk identification by helping practitioners identify individuals at elevated risk for emotional dysregulation based on complex psychological profiles, although such models should always be used as decision-support tools rather than replacements for clinical judgment.

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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.

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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References

- Akpinar, B. (2024). Examining the Relationship Between Childhood Traumas, Alexithymia and Emotional Regulation Difficulties in University Students. <https://doi.org/10.5772/intechopen.1005138>
- Civilotti, C., Nisticò, V., Tedesco, R., Cuoco, S., Bisogno, R., Barone, P., Celeghin, A., Fini, G. D., Gandino, G., Erro, R., & Demartini, B. (2024). Attachment State of Mind and Complex Traumatization in Patients With Functional Motor Disorder (Motor Conversion Disorder). *Brain Behavior & Immunity - Health*, 42, 100913. <https://doi.org/10.1016/j.bbih.2024.100913>
- Cruz, D., Lichten, M., Berg, K., & George, P. S. (2022). Developmental Trauma: Conceptual Framework, Associated Risks and Comorbidities, and Evaluation and Treatment. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsyt.2022.800687>
- Freeman, B., Salivar, E. G., & Thayer, K. K. (2024). The Impact of the Military Lifestyle on Adult Military Children Relationships. *Couple and Family Psychology Research and Practice*, 13(1), 1-14. <https://doi.org/10.1037/cfp0000252>
- Gibson, J. (2024a). Meditation and Interoception: A Conceptual Framework for the Narrative and Experiential Self. *Frontiers in psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1393969>
- Gibson, J. (2024b). Trauma, Early Life Stress, and Mindfulness in Adulthood. *BMC psychology*, 12(1). <https://doi.org/10.1186/s40359-024-01563-6>
- Glaus, J., Moser, D. A., Serpa, S. R., Jouabli, S., Turri, F., Plessen, K. J., & Schechter, D. S. (2022). Families With Violence Exposure and the Intergenerational Transmission of Somatization. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsyt.2022.820652>
- Gori, A., Topino, E., Cacioppo, M., Craparo, G., Schimmenti, A., & Caretti, V. (2023). An Integrated Approach to Addictive Behaviors: A Study on Vulnerability and Maintenance Factors. *European Journal of Investigation in Health Psychology and Education*, 13(3), 512-524. <https://doi.org/10.3390/ejihpe13030039>
- Grady, S., Crowley, N., Scott, S., Ndukwe, C. I., Donohoe, R. T., & Gaynor, K. (2025). The Role of Trauma, Attachment, Dissociation, and Alexithymia in Pathways to Negative Symptoms in Psychosis. *British Journal of Clinical Psychology*, 64(4), 1002-1019. <https://doi.org/10.1111/bjc.12554>
- Greenman, P. S., Renzi, A., Monaco, S., Luciani, F., & Trani, M. D. (2024). How Does Trauma Make You Sick? The Role of Attachment in Explaining Somatic Symptoms of Survivors of Childhood Trauma. *Healthcare*, 12(2), 203. <https://doi.org/10.3390/healthcare12020203>
- Jin, X., Jiang, Q., Xiong, W., & Zhao, W. (2023). Effects of Use Motivations and Alexithymia on Smartphone Addiction: Mediating Role of Insecure Attachment. *Frontiers in psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1227931>
- Kahya, Y., & Uluç, S. (2023). Maternal Childhood Trauma and Postpartum Well-Being in a Turkish Sample: The Path From Attachment to Alexithymia. *Klinik Psikoloji Dergisi*, 7(1), 1-10. <https://doi.org/10.57127/kpd.26024438m000076x>
- Karmakar, A., Tanwar, S., & Parmar, V. (2024). Reducing Alexithymic Traits Using an Ideal Attachment Style Approach; A Correlational Study. *Eatp*. <https://doi.org/10.53555/kuey.v30i5.3616>
- Liang, Y. (2024). Attachment Anxiety and Nomophobia: A Moderated Parallel Mediation Model. *Psychological Reports*, 128(6), 4273-4303. <https://doi.org/10.1177/00332941241226907>
- Lin, X. (2024). Childhood Trauma: Effects on Adolescents' Mental Health. *Applied & Educational Psychology*, 5(3). <https://doi.org/10.23977/appep.2024.050306>
- Mattar, E., Sawma, T., Hallit, R., Malaeb, D., Sakr, F., Dabbous, M., Hallit, S., Fekih-Romdhane, F., & Obeid, S. (2025). The Mediating Role of Distress Tolerance in the Relationship Between Childhood Maltreatment and Anxiety in a Sample of Lebanese Adults. *Scientific reports*, 15(1). <https://doi.org/10.1038/s41598-025-98417-x>
- McGovern, P. (2023). Understanding Somatization Through the Prism of Deficit Pathology and Winnicott's False Self. *British Journal of Psychotherapy*, 39(3), 501-518. <https://doi.org/10.1111/bjp.12848>
- Muzi, S., & Pace, C. S. (2023). Attachment and Alexithymia Predict Emotional-behavioural Problems of Institutionalized, Late-adopted and Community Adolescents: An Explorative Multi-informant Mixed-method Study. *Clinical Psychology & Psychotherapy*, 30(5), 1130-1145. <https://doi.org/10.1002/cpp.2862>
- Omidbakhsh, Z., & Soltanabadi, S. (2025). Childhood Maltreatment and Complex PTSD: A Systematic Literature

- Review. *Trauma Violence & Abuse*, 27(3), 558-578.
<https://doi.org/10.1177/15248380251320985>
- Panagou, C., & MacBeth, A. (2022). Deconstructing Pathways to Resilience: A Systematic Review of Associations Between Psychosocial Mechanisms and Transdiagnostic Adult Mental Health Outcomes in the Context of Adverse Childhood Experiences. *Clinical Psychology & Psychotherapy*, 29(5), 1626-1654. <https://doi.org/10.1002/cpp.2732>
- Pellegrini, R. A., Finzi, S., Veglia, F., & Fini, G. D. (2021). Narrative and Bodily Identity in Eating Disorders: Toward an Integrated Theoretical-Clinical Approach. *Frontiers in psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.785004>
- Price, J., Hinton, R., Baker, C., Richardson, S. R., & Wilson, C. (2025). The Impact of Childhood Experiences on Sexual Behaviours and Intimate Relationships: A Systematic Review. <https://doi.org/10.21203/rs.3.rs-6905929/v1>
- Scharfe, E. (2026). Attachment Representations and Depression. 423-439. <https://doi.org/10.1037/0000437-023>
- Ścigała, D. K., Fabris, M. A., Badenes-Ribera, L., Zdankiewicz-Ścigała, E., & Longobardi, C. (2021). Alexithymia and Self Differentiation: The Role of Fear of Intimacy and Insecure Adult Attachment. *Contemporary Family Therapy*, 43(2), 165-176. <https://doi.org/10.1007/s10591-021-09567-9>
- Ścigała, D. K., Sikora-Ścigała, J., & Zdankiewicz-Ścigała, E. (2025). Alexithymia and Attachment Dimensions in Relation to Parental Burnout: A Structural Equation Modelling Approach. *PLoS One*, 20(11), e0334647. <https://doi.org/10.1371/journal.pone.0334647>
- Stroink, L. (2024). Autonomy-Related Personality Factors in Patients With Functional Neurological Symptom Disorder. <https://doi.org/10.5772/intechopen.1004200>
- Tambelli, R., Cimino, S., Marzilli, E., Ballarotto, G., & Cerniglia, L. (2021). Late Adolescents' Attachment to Parents and Peers and Psychological Distress Resulting From COVID-19. A Study on the Mediation Role of Alexithymia. *International journal of environmental research and public health*, 18(20), 10649. <https://doi.org/10.3390/ijerph182010649>
- Vergés-Báez, L., Lozano-Paniagua, D., Requena, M., García-González, J., García-Álvarez, R., & Alarcón, R. (2021). Alexithymia and Insecure Attachment Among Male Intimate Partner Violence Aggressors in the Dominican Republic. *Healthcare*, 9(12), 1626. <https://doi.org/10.3390/healthcare9121626>
- Wagner-Skacel, J., Riedl, D., Kampling, H., & Lampe, A. (2021). Mentalization and Dissociation After Adverse Childhood Experiences. <https://doi.org/10.21203/rs.3.rs-907657/v1>
- Zainab, S., Arzeen, N., & Arzeen, S. (2023). Impact of Parental Bonding on Alexithymia and Psychological Distress Among Pakistani Adolescents. *International Journal of Psychology and Cognitive Education*, 2(1), 21-30. <https://doi.org/10.58425/ijpce.v2i1.141>
- Zhang, M., Dou, G., Shi, M., & Yue, P. (2025). Childhood Abuse, Distress Disclosure, Resilience, and Alexithymia: Testing a Moderated Mediation Model. <https://doi.org/10.21203/rs.3.rs-6858058/v1>