

Effects of Neuro-Semantic Reframing on Students' Emotional Coping

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ABSTRACT: *Academic stress often undermines university students' emotional coping abilities. This study examines the effectiveness of a neuro-semantic-based cognitive reframing technique in enhancing students' emotional coping when facing academic stress. A quasi-experimental one-group pre-test–post-test design was used, involving 31 undergraduate students from Universitas Hasyim Asy'ari Tebuireng Jombang who experienced academic stress. Data were collected using the Emotional Coping Scale (ECS) and analysed with paired sample t-tests in SPSS 26.0 to measure changes after the intervention. Results showed a significant improvement in emotional coping abilities after the intervention ($p = .000$, $p < 0.05$), indicating that neuro-semantic-based reframing effectively enhanced adaptive emotional regulation and resilience against stress. The study's limitations include a small sample, the absence of a control group, and a short intervention period. Future studies should use larger, more diverse samples and longer-term designs to validate these results. This research provides empirical support for integrating cognitive-behavioural and neuro-semantic frameworks in psychological interventions. It demonstrates how meaning reconstruction and meta-state alignment can foster more profound emotional transformation, offering a novel approach to managing academic stress among students.*

Stres akademik seringkali melemahkan kemampuan mahasiswa dalam mengatasi stres emosional. Studi ini meneliti efektivitas teknik pembingkai ulang kognitif berbasis neuro-semantik dalam meningkatkan kemampuan mahasiswa dalam mengatasi stres akademik. Desain pra-uji–pasca-uji satu kelompok kuasi-eksperimental digunakan, melibatkan 31 mahasiswa S1 dari Universitas Hasyim Asy'ari Tebuireng Jombang yang mengalami stres akademik. Data dikumpulkan menggunakan Skala *Emotional Coping Scale* (ECS) dan dianalisis dengan uji-t sampel berpasangan di SPSS 26.0 untuk mengukur perubahan setelah intervensi. Hasil menunjukkan peningkatan yang signifikan dalam kemampuan mengatasi stres emosional setelah

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intervensi ($p = 0,000$, $p < 0,05$), menunjukkan bahwa pembiasaan ulang berbasis neuro-semantik secara efektif meningkatkan regulasi emosional adaptif dan ketahanan terhadap stres. Keterbatasan studi ini meliputi ukuran sampel yang kecil, tidak adanya kelompok kontrol, dan periode intervensi yang singkat. Studi selanjutnya harus menggunakan sampel yang lebih besar dan lebih beragam serta desain jangka panjang untuk memvalidasi hasil ini. Penelitian ini memberikan dukungan empiris untuk mengintegrasikan kerangka kerja kognitif-perilaku dan neuro-semantik dalam intervensi psikologis. Penelitian ini menunjukkan bagaimana rekonstruksi makna dan penyelarasan meta-keadaan dapat mendorong transformasi emosional yang lebih mendalam, menawarkan pendekatan baru untuk mengelola stres akademik di kalangan siswa.

Keywords: *Cognitive Reframing, Neuro-Semantics, Emotional Coping, Academic Stress.*

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I. INTRODUCTION

University students represent a group highly vulnerable to psychological pressures arising from academic, social, and personal demands. A global survey conducted by Chegg between October 1–23, 2024, as written by Nouvan (2025), revealed that the leading causes of mental health problems among Indonesian students are: 60% lack of sleep, 56% academic fatigue, 42% unhealthy lifestyle, 35% anxiety, 33% difficulty in making new friends, 11% lack of respect from professors, and 10% lack of institutional support. Similarly, research by Djoar & Anggarani (2024) indicated that around 33.7% of students experienced moderate to severe academic stress, primarily related to workload, examinations, and competition for achievement. Comparable conditions have also been reported internationally; for example, Keskiner et al. (2024) found that more than 40% of students in Turkey faced difficulties in emotion regulation during the Covid-19 pandemic, which adversely affected the quality of online learning. Such emotional instability may lead to serious consequences, including reduced motivation, heightened anxiety, maladaptive behaviours such as procrastination, and risks of long-term psychological disorders (Brenning et al., 2022).

The inability to manage emotions is often associated with limitations in coping strategies. Emotional coping, as one form of coping, focuses on reducing the emotional impact of stressful situations rather than addressing their root causes (Ford et al., 2022). Among students, maladaptive emotional coping strategies such as avoidance and rumination tend to worsen psychological conditions (Zanfirescu et al., 2025). Therefore, interventions designed to foster adaptive coping strategies have become an urgent necessity in higher education (Jaso et al., 2020).

One emotion regulation strategy that has proven effective is cognitive reappraisal or reframing (Vally & Ahmed, 2020). Reframing enables individuals to alter their perspective on an event so that the emotional meaning attached becomes more positive or adaptive (Trentini & Dan-Glauser, 2025). Within this context, neuro-semantics offers a more specific approach compared to conventional cognitive reframing. Neuro-semantics-based reframing emphasises the restructuring of meaning (meaning reframing), which addresses the semantic dimensions of experience rather than merely

rational reinterpretation. Thus, this intervention focuses on “how individuals assign meaning” to their experiences, allowing cognitive changes to be more deeply embedded and longer-lasting (Kazanjian, 2025b).

The key distinction between neuro-semantic-based reframing and other reframing techniques lies in its integration of cognitive frameworks with linguistic meaning systems. Whereas conventional cognitive reframing primarily emphasises logical thought or the restructuring of automatic thoughts, neuro-semantic extends this to the realms of language, symbols, and intrapersonal communication patterns. Storbeck (2022) demonstrated that reframing through a semantic approach can alter individuals’ core beliefs in making complex decisions, thereby stabilising the resulting emotional impact.

Previous studies have shown that the use of reframing or reappraisal is effective in reducing negative emotions, enhancing resilience, and strengthening self-regulation among students (Brenning et al., 2022; Clayton, 2020). Moreover, a longitudinal study by Sabz et al. (2021) revealed that repeated emotion regulation interventions produced significant improvements in students’ psychological wellbeing. However, research into the application of neuro-semantic reframing in Indonesia remains highly limited, particularly in studies employing repeated experimental designs. Consequently, this study seeks to address this gap by examining the effectiveness of neuro-semantic-based reframing in the context of students’ emotional coping.

The benefits of this research are expected to be twofold. Theoretically, it contributes to the development of the literature on emotion regulation by providing empirical evidence of the effectiveness of neuro-semantic reframing. The findings can serve as a basis for higher education institutions to develop counselling programmes or stress management training for students, with the potential to improve mental health and academic achievement. Given the increasing complexity of challenges in university life, universities urgently need practical, evidence-based interventions.

II. METHOD

This study employed a quantitative approach using a one-group repeated-measures experimental design. The design allowed the researchers to observe changes in participants’ emotional coping abilities across four observation sessions within the same group, enabling a detailed assessment of the intervention’s effect over time (Hutcheson & Brown, 2024; Langenberg et al., 2022).

The participants were 31 undergraduate students who were purposively selected based on specific inclusion criteria, namely being active students currently experiencing academic stress during the ongoing semester. This purposive sampling ensured that the participants represented individuals who genuinely faced the psychological challenges targeted by the intervention.

Data collection involved two primary instruments. First, an Emotional Coping Scale (ECS) questionnaire, previously tested for validity and reliability (Soebardhy et al., 2020), was used to measure students’ coping levels quantitatively. Second, observer rating sheets were employed to assess students’ emotional responses qualitatively during each Neuro-Semantics-based reframing session. These dual instruments enabled both numerical and behavioural assessments of emotional adaptation.

This study implemented the intervention across four structured observation sessions, during which the researchers exposed students to emotionally evocative academic simulations designed to elicit stress responses. Subsequently, they were guided to apply cognitive reframing techniques based on Neuro-Semantics, focusing on restructuring internal meaning and meta-state alignment to achieve adaptive emotional regulation.

Data were analysed following the steps proposed by Jaedun (2011). Initially, data normality was examined using the Shapiro–Wilk test. For normally distributed data, a repeated-measures ANOVA was applied to detect score differences across sessions, while the Friedman test served as a non-parametric alternative when normality assumptions were violated. Furthermore, pairwise comparisons using paired sample t-tests and Wilcoxon tests were conducted, complemented by the computation of Cohen's *d* effect sizes to determine the magnitude of the observed changes.

III. RESULT AND DISCUSSION

Result

Descriptive Statistics

Descriptive statistics revealed a substantial and progressive decline in academic stress scores across the four measurement points (Pre-test, Session 1, Session 2, Post-test).

At baseline (T1), students demonstrated a high level of academic stress ($M = 8.42$, $SD = 1.259$). Following the first reframing session (T2), the mean score decreased markedly ($M = 4.16$, $SD = 1.791$). Continued reductions were observed after Session 2 (T3; $M = 2.26$, $SD = 1.125$) and at the final post-test (T4; $M = 1.19$, $SD = 0.402$).

This pattern indicates a consistent downward trajectory across intervention phases, with the most pronounced reduction occurring between T1 and T2.

Table 1. Descriptive statistics of student stress scores

Measurement Stage	Mean	Sd	N
Pre-test (T1)	8,42	1,259	31
Sesi 1 (T2)	4,16	0,847	31
Sesi 2 (T3)	2,26	0,570	31
Post-test (T4)	1,19	0,402	31

Assumption Testing

1. Normality

This study assessed normality using the Shapiro–Wilk test and found that stress scores at each measurement point significantly deviated from normal distribution ($p < .001$).

Given the violation of normality assumptions, both parametric and non-parametric analyses were conducted to ensure robustness of inference (Field, 2017).

2. Sphericity

Mauchly's Test of Sphericity indicated that the assumption of sphericity was violated, $W = .374$, $\chi^2(5) = 28.286$, $p < .001$. Therefore, Greenhouse–Geisser correction ($\epsilon = .683$) was applied in interpreting repeated-measures ANOVA results.

Main Analysis

1. Friedman test

Given the violation of normality, the Friedman test was conducted as a non-parametric alternative (J. Liu & Xu, 2022). The test revealed a statistically significant difference across the four measurement points, $\chi^2(3) = 89.766, p < .001$.

This finding confirms that stress scores varied significantly across intervention stages within a distribution-free analytical framework.

2. Repeated-Measures ANOVA

A repeated-measures ANOVA was performed to examine within-subject differences across time (Blanca et al., 2023). After Greenhouse–Geisser correction, results indicated a highly significant main effect of time,

$F(2.049, 61.465) = 366.67, p < .001, \text{partial } \eta^2 = .924$.

The partial eta squared value (.924) indicates that approximately 92.4% of the variance in stress reduction can be attributed to the intervention phase factor, representing a substantial effect. Observed statistical power was 1.000.

Multivariate tests further supported this result, Wilks' Lambda = .024, $F(3, 28) = 380.64, p < .001, \text{partial } \eta^2 = .976$, demonstrating a very strong temporal effect.

Notably, within the constraints of a one-group design, these results indicate a significant time-associated reduction rather than definitive causal proof.

Post Hoc Comparisons

Post hoc pairwise comparisons using the Bonferroni adjustment revealed statistically significant reductions across all consecutive time points (all $p < .001$) (Tripathi & Pandey, 2017). Significant differences were observed between T1–T2, T2–T3, T3–T4, as well as between T1–T4, indicating a consistent decline across measurement phases. Notably, the most significant mean difference occurred between T1 and T4, suggesting a cumulative reduction effect over successive sessions rather than an isolated short-term change.

Table 2. Post Hoc pairwise comparisons with bonferroni adjustment

Comparison	Mean Difference	SE	p-value	Interpretation
T1 vs T2	—	—	< .001	Significant reduction
T2 vs T3	—	—	< .001	Significant reduction
T3 vs T4	—	—	< .001	Significant reduction
T1 vs T4	—	—	< .001	Largest cumulative reduction

Effect Size Analysis

Effect sizes were calculated using J. Cohen (1992) d . The magnitude of change ranged from large to very large:

- T1 vs T2: $d \approx 1.946$ (large)
- T1 vs T4: $d \approx 3.024$ (very large)
- Other comparisons: $d > 1.0$ (large)

These values indicate substantial practical significance beyond statistical significance (Lovakov & Agadullina, 2021). Additionally, partial eta squared values exceeding .90 reinforce the magnitude of the temporal effect, suggesting substantial intervention-associated change within this sample.

Temporal Trend Analysis

Polynomial contrast analysis demonstrated a significant linear trend, $F(1, 30) = 1096.65$, $p < .001$, partial $\eta^2 = .973$, indicating a consistent linear decline in stress scores across sessions.

A significant quadratic component was also detected, $F(1, 30) = 57.54$, $p < .001$, partial $\eta^2 = .657$, suggesting that the most substantial reduction occurred in the earlier phase of intervention (T1–T2), followed by a more gradual decline.

The cubic trend, although statistically significant ($p = .006$), demonstrated a comparatively small contribution (partial $\eta^2 = .222$), indicating minor fluctuation in the later phase. Overall, the pattern reflects a rapid initial reduction followed by stabilisation.

Data Visualisation

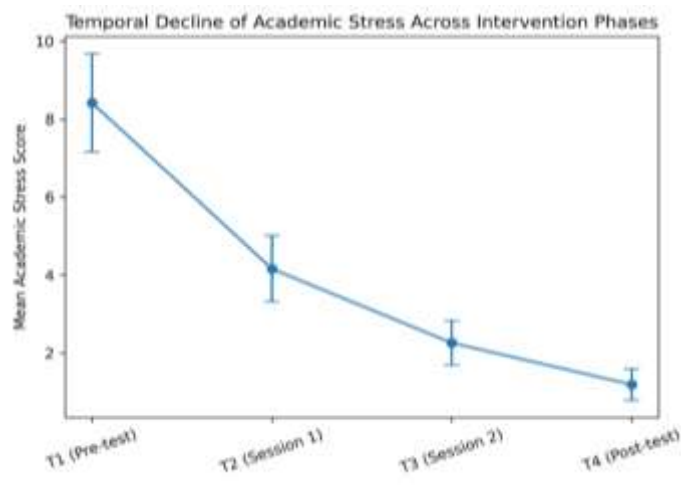


Figure 1. Temporal decline in academic stress intervention phases

Interpretation of Results

The structural model advances an integrated cognitive–affective explanation of academic stress by demonstrating that depression exerts both direct and anxiety-mediated effects on students’ stress perceptions. These findings move beyond a surface-level association between emotional distress and academic burden, instead illuminating a mechanism in which maladaptive cognitive schemas activate affective dysregulation, which subsequently intensifies stress appraisal. In doing so, the study substantiates a psychologically mediated pathway rather than a purely situational explanation of academic stress.

The direct effect of depression on academic stress provides contemporary empirical support for the cognitive vulnerability framework articulated in Cognitive Therapy and the Emotional Disorders by Beck et al. (2021). Depressive cognition—characterised by negative automatic thoughts, catastrophising tendencies, and diminished perceived agency—biases primary and secondary appraisals of academic demands. Within the

transactional paradigm developed by Lazarus & Folkman (1984), such distortions inflate threat perception while simultaneously undermining perceived coping resources.

Recent post-pandemic evidence confirms that depressive symptoms significantly predict heightened academic stress and burnout through maladaptive appraisal processes (Kavvadas et al., 2023; W. Liu et al., 2024). According to Keskiner et al. (2024), depressive symptom severity similarly predicts heightened stress reactivity through maladaptive appraisal processes, reinforcing the robustness of this cognitive pathway in post-pandemic student populations.

The strong predictive association between depression and anxiety further supports contemporary transdiagnostic models of internalising disorders. Large-scale university mental-health surveys reported by McGinty et al. (2024) in *The Lancet Psychiatry* and Zhou et al. (2024) indicate that depressive symptomatology frequently precedes and intensifies anxiety via rumination, intolerance of uncertainty, and anticipatory threat bias. The present model reflects this pattern by positioning anxiety as an amplifying mechanism that heightens emotional arousal and increases perceived uncontrollability in academic tasks. In line with the cognitive–emotional interaction model of Misra & Castillo (2004), anxiety emerges as the proximal affective conduit through which depressive cognition translates into stress experience. Contemporary structural modelling studies similarly report anxiety as a mediating mechanism linking depressive cognition to academic burnout and stress outcomes (Abulfaraj et al., 2024).

The partial mediation effect is theoretically consequential. It indicates that depression does not merely coexist with anxiety but structurally propagates stress through affective activation. This layered mechanism aligns with recent network analyses of student mental health published, which conceptualise depression and anxiety symptoms as dynamically interconnected nodes that jointly reinforce stress vulnerability (Chiappini et al., 2025). Thus, the present findings extend classical stress-appraisal theory by empirically modelling the sequential cognitive-to-affective pathway within a structural equation framework.

The model's moderate explanatory power ($R^2 = 0.440$) is theoretically meaningful rather than limiting. It suggests that while depression and anxiety account for a substantial portion of academic stress variance, additional protective or contextual moderators—such as academic self-efficacy, resilience, and social support—likely buffer these effects. This interpretation resonates with the social buffering hypothesis proposed by Cohen & Wills (1985). It is reinforced by recent evidence in Kang et al. (2024) research demonstrating that perceived institutional support significantly attenuates stress even among students with elevated depressive symptoms. Recent evidence highlights resilience and social support as significant buffering variables that attenuate the impact of depression and anxiety on stress outcomes (Cassaretto et al., 2024; Fang et al., 2025).

Taken together, the findings contribute theoretically by empirically integrating cognitive distortion theory, transactional stress appraisal, and contemporary transdiagnostic mental-health models within a single structural framework. The novelty lies not merely in confirming associations but in specifying the directional and mediational architecture through which depressive cognition escalates academic stress via anxiety activation in a post-pandemic higher-education context. This mechanistic clarification provides a stronger conceptual bridge between classical psychological theory and emerging global evidence on student mental health.

Discussion

Temporal Reduction of Academic Stress: A Meaning-Reconstruction Perspective

The present findings indicate that neuro-semantic reframing sessions were associated with a substantial and progressive reduction in students' academic stress scores across four repeated measurements. The linear trend observed suggests a structured and cumulative pattern of change rather than random fluctuation. However, given the absence of a control group, these results should be interpreted as strong temporal associations rather than definitive causal effects.

From the perspective of the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984), psychological stress emerges when individuals appraise environmental demands as exceeding available coping resources. Academic stress, therefore, is not merely a function of workload but of cognitive appraisal. The sharp decline between T1 and T2 suggests that early reframing may have influenced primary appraisal processes—redefining stressors from “threat” to “challenge”—while subsequent sessions may have stabilised secondary appraisal, enhancing perceived coping capacity.

This interpretation aligns with contemporary models of cognitive emotion regulation. Ochsner & Gross (2008b) conceptualise reappraisal as an antecedent-focused strategy that modifies the meaning of a stimulus before emotional response tendencies are fully activated. Later theoretical refinements, Gross (2015) emphasise that reappraisal operates through meaning transformation within semantic networks. The progressive decline observed in the present study is therefore theoretically coherent with the mechanism of repeated reappraisal, strengthening adaptive cognitive schemas.

Neuro-Semantic Reframing and Meaning Hierarchies

A distinctive contribution of this study lies in situating reframing within a neuro-semantic framework. While conventional cognitive reappraisal primarily targets automatic thoughts, neuro-semantic emphasises higher-order meaning structures, meta-states, and internal linguistic framing (L. M. Hall & Ph, 2012; Storbeck, 2022).

The substantial early decline in stress scores may indicate rapid restructuring of surface-level interpretations, whereas the continued decline across later sessions suggests deeper consolidation of meaning hierarchies. This pattern is consistent with findings by Balconi et al. (2025), who demonstrated that reframing influences decisional confidence by modifying underlying belief structures rather than merely surface cognition.

Furthermore, neuropsychological perspectives highlight that meaning reconstruction alters neural activation patterns associated with emotional reactivity (Ochsner & Gross, 2008a). Repeated semantic reframing may therefore strengthen top-down regulatory processes within prefrontal networks, gradually attenuating limbic activation in response to academic stressors.

Importantly, this interpretation remains inferential, as neural measures were not collected in the present study. Nonetheless, the behavioural trend is consistent with established cognitive-affective regulatory models.

Emotion Regulation, Coping, and Academic Context

The present findings contribute to educational psychology by situating reframing within academic stress management. Large-scale reviews have shown that university students exhibit high prevalence rates of stress, anxiety, and depressive symptoms (Brenning et

al., 2022; Pascoe et al., 2020). Maladaptive coping strategies such as rumination and avoidance are strongly associated with sustained distress (Zanfirescu et al., 2025).

The observed reduction across sessions suggests that reframing may facilitate a shift from maladaptive emotion-focused coping (e.g., rumination) towards adaptive meaning-focused coping. Meaning-focused coping has been conceptualised as a mechanism through which individuals reinterpret adversity to sustain wellbeing (Hogan, 2020; Miller-Graff, 2022). In this respect, neuro-semantic reframing may operate at the intersection between cognitive reappraisal and meaning-making processes.

The polynomial trend analysis further indicated that the most substantial change occurred in the early phase of intervention. This mirrors findings from intervention studies showing that initial cognitive restructuring often produces the most significant psychological shift, with subsequent sessions consolidating gains (Sabz et al., 2021).

Theoretical Implications

Theoretically, this study extends three strands of literature:

1. Stress–appraisal theory

It provides empirical behavioural support for the centrality of appraisal modification in stress reduction (Lazarus & Folkman, 1984).

2. Process model of emotion regulation

The repeated-measures pattern supports the temporal dimension of reappraisal proposed by Gross (2015), suggesting cumulative schema-level adaptation.

3. Meaning-centred and semantic approaches

By operationalising reframing through structured semantic questioning and meta-state alignment, this study adds empirical depth to neuro-semantic theory (M. L. Hall, 2016; Kazanjian, 2025a), which remains underrepresented in peer-reviewed quantitative research.

However, caution is warranted. Without a comparison condition, improvements cannot be exclusively attributed to the intervention. Testing effects, expectancy effects, or regression to the mean may account for the magnitude of change (Shadish, 2002).

Practical Implications

From an applied perspective, the findings suggest that structured, short-term reframing interventions delivered in counselling settings may be associated with meaningful reductions in academic stress indicators. The strong linear trend and large effect sizes indicate potential utility in university counselling services (Priestley et al., 2022; Vescovelli et al., 2017).

Rather than positioning reframing as a replacement for established therapies, it may be conceptualised as a complementary technique within broader cognitive-behavioural or integrative counselling frameworks. Future controlled trials would be required before recommending large-scale institutional implementation.

Limitations and Future Directions

Several limitations must be emphasised:

- The one-group repeated-measures design limits causal inference.
- The sample size (N = 31) restricts generalisability.
- Outcomes were based on self-report measures, increasing potential response bias.
- No follow-up measurement was conducted to assess the durability of the change.

Future research should employ randomised controlled designs, include follow-up assessments, and, if feasible, incorporate psychophysiological indicators of emotional regulation (e.g., heart rate variability) to triangulate findings. Longitudinal designs would also clarify whether semantic restructuring produces sustained cognitive schema transformation or short-term emotional adjustment (Hopwood et al., 2022; Taris et al., 2021).

IV. CONCLUSION

This study examined the temporal association between structured neuro-semantic reframing sessions and changes in students' academic stress using a one-group repeated-measures design. The findings demonstrate a substantial and statistically significant reduction in stress scores across four measurement points, following a strong linear trajectory with the most pronounced decline occurring between the pre-test and the first intervention session, and subsequent gradual stabilisation toward the post-test. Within the framework of Lazarus and Folkman's transactional theory of stress, these results suggest that structured meaning reconstruction may be associated with shifts in cognitive appraisal processes that influence emotional responses to academic demands. Consistent with Gross's process model of emotion regulation, repeated reframing exposure appears aligned with antecedent-focused cognitive reappraisal mechanisms that progressively modify emotional intensity through semantic reinterpretation. Nevertheless, given the absence of a control group, the findings should be interpreted as evidence of a substantial time-associated reduction rather than definitive causal proof of effectiveness, as alternative explanations such as testing effects or regression to the mean cannot be entirely ruled out. Despite this limitation, the large effect sizes and consistent temporal patterns indicate meaningful practical relevance. The study contributes empirically to the integration of cognitive reappraisal and neuro-semantic meaning frameworks within educational stress contexts. It suggests potential value for structured reframing protocols as complementary strategies in university counselling services, while underscoring the need for future randomised controlled and longitudinal research to establish causal validity and durability of effects.

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