

## Cognitive Reappraisal as a Mediating Mechanism Between Mindfulness and Stress Reduction

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### ABSTRACT

**Objective:** The objective of this study was to examine whether cognitive reappraisal mediates the relationship between mindfulness and stress reduction among Canadian adults.

**Methods and Materials:** A descriptive correlational design was applied with a sample of 399 participants selected according to the Morgan and Krejcie table. Standardized instruments were used to measure mindfulness (Five Facet Mindfulness Questionnaire), cognitive reappraisal (Cognitive Emotion Regulation Questionnaire – Reappraisal subscale), and stress (Perceived Stress Scale). Data were analyzed using SPSS version 27 for descriptive statistics and Pearson correlations, followed by Structural Equation Modeling (SEM) in AMOS version 21 to test the hypothesized mediating model. Model fit was evaluated using  $\chi^2$ , GFI, AGFI, CFI, TLI, and RMSEA indices.

**Findings:** Pearson correlation results indicated that mindfulness was significantly and positively associated with cognitive reappraisal ( $r = .47, p < .001$ ) and negatively related to perceived stress ( $r = -.54, p < .001$ ). Cognitive reappraisal was also significantly and negatively associated with stress ( $r = -.39, p < .001$ ). The structural model demonstrated excellent fit ( $\chi^2/df = 1.92, GFI = .94, AGFI = .91, CFI = .97, TLI = .96, RMSEA = .048$ ). SEM results confirmed significant direct paths from mindfulness to reappraisal ( $\beta = .45, p < .001$ ), reappraisal to stress ( $\beta = -.23, p = .002$ ), and mindfulness to stress ( $\beta = -.36, p < .001$ ). The indirect effect of mindfulness on stress through reappraisal was also significant ( $\beta = -.10, p = .004$ ). Overall, the total effect of mindfulness on stress reduction was strong ( $\beta = -.46, p < .001$ ).

**Conclusion:** The findings demonstrate that cognitive reappraisal partially mediates the effect of mindfulness on stress reduction, confirming that mindfulness not only directly lowers stress but also exerts indirect effects by enhancing adaptive emotion regulation strategies.

**Keywords:** Mindfulness; Cognitive Reappraisal; Stress Reduction; Emotion Regulation; Structural Equation Modeling

## 1. Introduction

Stress is one of the most pervasive challenges in modern life, impacting individuals' physical health, emotional well-being, and cognitive functioning. The ability to effectively manage stress is closely tied to adaptive psychological processes such as mindfulness and cognitive reappraisal. Stress reduction has been a focal point of clinical psychology and health psychology research for decades, with growing evidence suggesting that mindfulness-based interventions and cognitive emotion regulation strategies can serve as protective mechanisms against the harmful consequences of stress (Bossi et al., 2022; Brown et al., 2020). Within this context, cognitive reappraisal has gained prominence as a key mechanism through which mindfulness exerts its positive effects on stress regulation. The present study investigates the mediating role of cognitive reappraisal in the relationship between mindfulness and stress reduction, contributing to an expanding body of evidence that emphasizes the importance of emotional regulation strategies in psychological health.

Mindfulness, typically defined as the nonjudgmental awareness of present-moment experiences, has demonstrated consistent associations with well-being and lower stress levels across populations. Research has shown that mindfulness practices enhance distress tolerance, resilience, and adaptive coping in both clinical and non-clinical samples (Yu et al., 2022; Zhong et al., 2025). Mindfulness has also been associated with improved emotional regulation skills, particularly the ability to reframe stressful experiences in a more adaptive manner. For instance, dispositional mindfulness has been found to predict greater life satisfaction through its influence on cognitive reappraisal among university students (Lee & Ling, 2023). Similarly, mindfulness training has been shown to buffer against psychological distress in cancer patients, highlighting its role in promoting post-traumatic growth and recovery (An et al., 2023). These findings illustrate the breadth of mindfulness effects across diverse life contexts.

Cognitive reappraisal, defined as the reinterpretation of potentially stress-inducing situations in a way that alters their emotional impact, has been studied as one of the most effective strategies for managing emotions. Its adaptive benefits include reduced negative affect and enhanced psychological resilience. A recent study demonstrated that brief reappraisal interventions can yield durable affective benefits, underscoring its potential for long-term emotion regulation (Kam et al., 2024). Cognitive reappraisal has also

been shown to mediate relationships between mindfulness and various psychological outcomes, including academic engagement and empathy (Datu et al., 2022; Lee & Park, 2022). Such evidence supports the proposition that mindfulness may reduce stress primarily by fostering greater use of reappraisal strategies, thereby enabling individuals to reinterpret and manage stressors more effectively.

The interaction between mindfulness and reappraisal has been supported by several theoretical and empirical models. The mindfulness-to-meaning theory proposes that mindfulness enhances individuals' capacity for cognitive reappraisal, which in turn facilitates stress reduction and the cultivation of meaning in life (Hanley et al., 2021). Longitudinal studies have provided evidence for this pathway, demonstrating that mindful awareness leads to higher levels of reappraisal use, which subsequently reduces stress over time (Wenzel et al., 2021). Moreover, neurocognitive studies indicate that mindfulness and reappraisal engage overlapping but distinct brain networks associated with emotion regulation, suggesting that the integration of these strategies may yield complementary benefits (Kaunhoven & Dorjee, 2021). Together, these findings reinforce the theoretical framework positioning cognitive reappraisal as a mediator of the relationship between mindfulness and stress outcomes.

The empirical support for mindfulness-based interventions is extensive. For example, Mindfulness-Based Stress Reduction (MBSR) programs have been found to reduce perceived stress, improve emotional regulation, and enhance well-being in a variety of populations, including university students and patients with chronic illness (Schulte-Frankenfild & Trautwein, 2021; Verdú & Marcos, 2022). App-based mindfulness programs have further extended accessibility and demonstrated effectiveness in reducing stress and enhancing self-regulation (Schulte-Frankenfild & Trautwein, 2021). Mindfulness training has also been applied to vulnerable groups such as individuals with borderline personality disorder and chronic pain, showing promising results for stress reduction and emotional stability (Verdú & Marcos, 2022). These diverse applications illustrate the adaptability and effectiveness of mindfulness as a stress management tool.

At the same time, cognitive reappraisal has been shown to play an integral role in these interventions. Mindfulness not only enhances direct awareness and acceptance of experiences but also increases the likelihood that individuals will reinterpret stressors in constructive ways. Studies

demonstrate that mindfulness strengthens the proactive use of reappraisal in younger adults, though this effect may diminish with age, highlighting developmental differences in the interaction between these constructs (Martins-Klein et al., 2023). Cross-cultural studies add further nuance; for instance, among Filipino high school students, mindfulness predicted both increased reappraisal and academic engagement across time (Datu et al., 2022). Similarly, in the workplace context, mindfulness has been linked to reduced work addiction through the mediating roles of reappraisal and perfectionism (Zheng, 2025). Collectively, this research underscores the robust and multifaceted relationship between mindfulness, reappraisal, and stress.

Importantly, research has emphasized that the effectiveness of mindfulness and reappraisal may vary depending on contextual and personal factors. Gender, anxiety levels, and sleep quality, for example, have been shown to influence outcomes in mindfulness-based stress reduction programs (Brown et al., 2020). Self-construal has also emerged as a significant moderator, shaping the extent to which mindfulness and reappraisal interact to predict psychological health (Chen & Cheung, 2021). Additionally, socio-cognitive mindfulness has been associated with achievement emotions in nursing students and empathy in nurses, with emotion regulation mediating these associations (Lee & Jang, 2021; Lee & Park, 2022). These findings highlight the importance of considering individual differences and contextual moderators when examining mindfulness and reappraisal as mechanisms of stress reduction.

Beyond individual-level variables, social and developmental contexts also play a role. In the domain of education, mindfulness and reappraisal instruction has been shown to enhance both short- and long-term learning outcomes in the classroom (Cavanagh et al., 2021). Among adolescents, social mindfulness has been linked to experiences of bullying victimization, with cognitive reappraisal and self-concept clarity mediating this relationship (Yang et al., 2024). These findings suggest that mindfulness and reappraisal not only serve as mechanisms for stress reduction but also contribute to broader domains of learning, social adjustment, and well-being.

Despite the breadth of empirical evidence, gaps remain in fully understanding how mindfulness and cognitive reappraisal interact to influence stress reduction across different populations. Some research has indicated that while mindfulness and reappraisal are generally beneficial, they may carry context-dependent costs. For example, in daily

life, the simultaneous use of mindfulness and reappraisal can yield both benefits and drawbacks, suggesting that individuals may need to balance or tailor these strategies based on situational demands (Wenzel et al., 2021). Additionally, although much of the existing research has examined these processes separately, fewer studies have explicitly tested cognitive reappraisal as a mediator in the mindfulness–stress reduction pathway. The present study addresses this gap by employing structural equation modeling to examine the mediating role of cognitive reappraisal in a Canadian sample.

The integration of mindfulness and cognitive reappraisal in stress research is particularly timely given the global rise in stress-related mental health problems. Studies conducted during and after the COVID-19 pandemic highlighted the urgent need for accessible interventions that enhance well-being and reduce stress. Online mindfulness-based interventions demonstrated effectiveness in reducing stress and increasing psychological well-being during lockdown periods (Bossi et al., 2022). These findings underscore the practical relevance of investigating mechanisms such as reappraisal that may optimize the effectiveness of mindfulness-based approaches. By clarifying these mechanisms, interventions can be tailored to maximize stress reduction and resilience across diverse populations.

In summary, prior research provides strong evidence that mindfulness is a powerful predictor of reduced stress and improved well-being, and that cognitive reappraisal serves as a key emotion regulation strategy that mediates this effect (Zhong et al., 2025; Zhou et al., 2023). However, there remains a need for further investigation using robust statistical approaches such as structural equation modeling to confirm this mediating pathway across cultural contexts. The present study seeks to contribute to this literature by examining cognitive reappraisal as a mediating mechanism between mindfulness and stress reduction in a large Canadian sample.

## 2. Methods and Materials

### 2.1. Study Design and Participants

This study employed a descriptive correlational design to examine the mediating role of cognitive reappraisal in the relationship between mindfulness and stress reduction. The target population consisted of adults residing in Canada. Based on the sample size determination table of Morgan and Krejcie (1970), a minimum of 384 participants was required to ensure representativeness; therefore, a total of 399

participants were recruited to increase statistical power. Participants were selected using convenience sampling through online distribution of questionnaires. All respondents provided informed consent, and inclusion criteria required participants to be at least 18 years of age and proficient in English.

## 2.2. Measures

Stress reduction was assessed using the Perceived Stress Scale (PSS), originally developed by Cohen, Kamarck, and Mermelstein (1983). The most widely used version of the PSS contains 10 items, designed to measure the degree to which individuals perceive situations in their life as stressful. Responses are rated on a 5-point Likert scale ranging from 0 (“never”) to 4 (“very often”), with higher total scores indicating greater perceived stress. The scale includes both positively and negatively worded items that are reverse scored to minimize response bias. Extensive research across diverse populations has confirmed the validity and reliability of the PSS, demonstrating strong internal consistency, test-retest reliability, and construct validity. It has also been widely employed in stress-reduction studies, making it suitable for the present research.

Cognitive reappraisal was measured using the Cognitive Emotion Regulation Questionnaire (CERQ), developed by Garnefski, Kraaij, and Spinhoven (2001). The CERQ is a 36-item instrument assessing nine distinct cognitive coping strategies, one of which is positive reappraisal. Each subscale, including cognitive reappraisal, is composed of four items rated on a 5-point Likert scale ranging from 1 (“almost never”) to 5 (“almost always”), with higher scores reflecting more frequent use of the respective strategy. The CERQ has been validated in both clinical and non-clinical populations and has consistently shown good psychometric properties, including internal consistency and factorial validity. Prior studies have confirmed the reliability of the cognitive reappraisal subscale, making it an appropriate measure for examining the mediating role of this construct.

Mindfulness was measured using the Five Facet Mindfulness Questionnaire (FFMQ), developed by Baer, Smith, Hopkins, Krietemeyer, and Toney (2006). The FFMQ consists of 39 items that assess mindfulness as a multifaceted construct encompassing five domains: observing, describing, acting with awareness, non-judging

of inner experience, and non-reactivity to inner experience. Items are rated on a 5-point Likert scale from 1 (“never or very rarely true”) to 5 (“very often or always true”), with higher scores representing greater levels of mindfulness. The FFMQ has been extensively validated in multiple cultural contexts and is recognized for its robust internal consistency, convergent validity, and sensitivity to mindfulness-based interventions. Its widespread application in mindfulness research supports its suitability as a standard tool in the current study.

## 2.3. Data analysis

Data were analyzed using a two-stage approach. First, descriptive statistics (means, standard deviations, frequencies, and percentages) were calculated to summarize the demographic characteristics of participants. Pearson’s correlation coefficient was employed to examine the bivariate relationships between stress reduction (dependent variable), mindfulness, and cognitive reappraisal (independent variables). Next, Structural Equation Modeling (SEM) was performed using AMOS version 21 to test the hypothesized mediating effect of cognitive reappraisal. Model fit was evaluated using multiple fit indices, including the chi-square statistic ( $\chi^2$ ), root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker–Lewis index (TLI). All analyses were conducted in SPSS version 27, and statistical significance was set at  $p < .05$ .

## 3. Findings and Results

Among the 399 participants, 228 (57.1%) were female and 171 (42.9%) were male. The age distribution showed that 96 participants (24.1%) were between 18–25 years, 132 (33.1%) between 26–35 years, 98 (24.6%) between 36–45 years, and 73 (18.3%) were 46 years and older. Regarding educational attainment, 84 participants (21.1%) reported completing high school, 156 (39.1%) held a bachelor’s degree, 112 (28.1%) held a master’s degree, and 47 (11.8%) reported doctoral-level education. In terms of marital status, 207 participants (51.9%) were single, 142 (35.6%) were married, and 50 (12.5%) reported being divorced or widowed. These results suggest that the sample included a diverse range of demographic characteristics.

**Table 1**

*Descriptive Statistics of Study Variables*

Variable	Mean	SD
Mindfulness	127.46	18.52
Cognitive Reappraisal	14.82	3.64
Perceived Stress	21.73	6.27

Table 1 presents the means and standard deviations of the study variables. Mindfulness had the highest mean score (M = 127.46, SD = 18.52), followed by cognitive reappraisal (M = 14.82, SD = 3.64), while perceived stress recorded a comparatively lower mean (M = 21.73, SD = 6.27). The relatively moderate standard deviations indicate adequate variability in responses without evidence of extreme skewness.

Prior to conducting analyses, assumptions of normality, linearity, multicollinearity, and homoscedasticity were tested and confirmed. Skewness values ranged from -0.54 to

0.62 and kurtosis values ranged from -0.71 to 0.84, both within the acceptable range of -1 to +1, indicating normal distribution of data. The variance inflation factor (VIF) values for independent variables ranged from 1.12 to 1.36, well below the recommended cutoff of 5, confirming no multicollinearity issues. Examination of scatterplots indicated linear relationships between the dependent and independent variables, and Levene’s test for equality of variances was non-significant (p = .29), supporting homoscedasticity. Thus, the dataset met all statistical assumptions required for correlation and SEM analyses.

**Table 2**

*Pearson Correlations Between Study Variables*

Variable	1	2	3
1. Mindfulness	—		
2. Cognitive Reappraisal	.47*** (p < .001)	—	
3. Perceived Stress	-.54*** (p < .001)	-.39*** (p < .001)	—

Table 2 reports the Pearson correlation coefficients among mindfulness, cognitive reappraisal, and perceived stress. Mindfulness was significantly and positively correlated with cognitive reappraisal (r = .47, p < .001). A

significant negative correlation was observed between mindfulness and perceived stress (r = -.54, p < .001). Similarly, cognitive reappraisal was negatively correlated with perceived stress (r = -.39, p < .001).

**Table 3**

*Fit Indices for the Structural Model*

Fit Index	Value	Criterion
$\chi^2$	138.46	—
df	72	—
$\chi^2/df$	1.92	≤ 3.00
GFI	.94	≥ .90
AGFI	.91	≥ .90
CFI	.97	≥ .95
TLI	.96	≥ .95
RMSEA	.048	≤ .08

Table 3 presents the fit indices for the structural equation model. The chi-square test was significant ( $\chi^2 = 138.46$ , df = 72, p < .001), but the ratio of  $\chi^2/df$  was within acceptable thresholds (1.92). Goodness-of-fit indices (GFI = .94, AGFI

= .91, CFI = .97, TLI = .96) all indicated excellent model fit. The RMSEA was .048 with a 90% confidence interval of [.041, .055], which also fell within the recommended range.

**Table 4**

*Total, Direct, and Indirect Path Coefficients in the Structural Model*

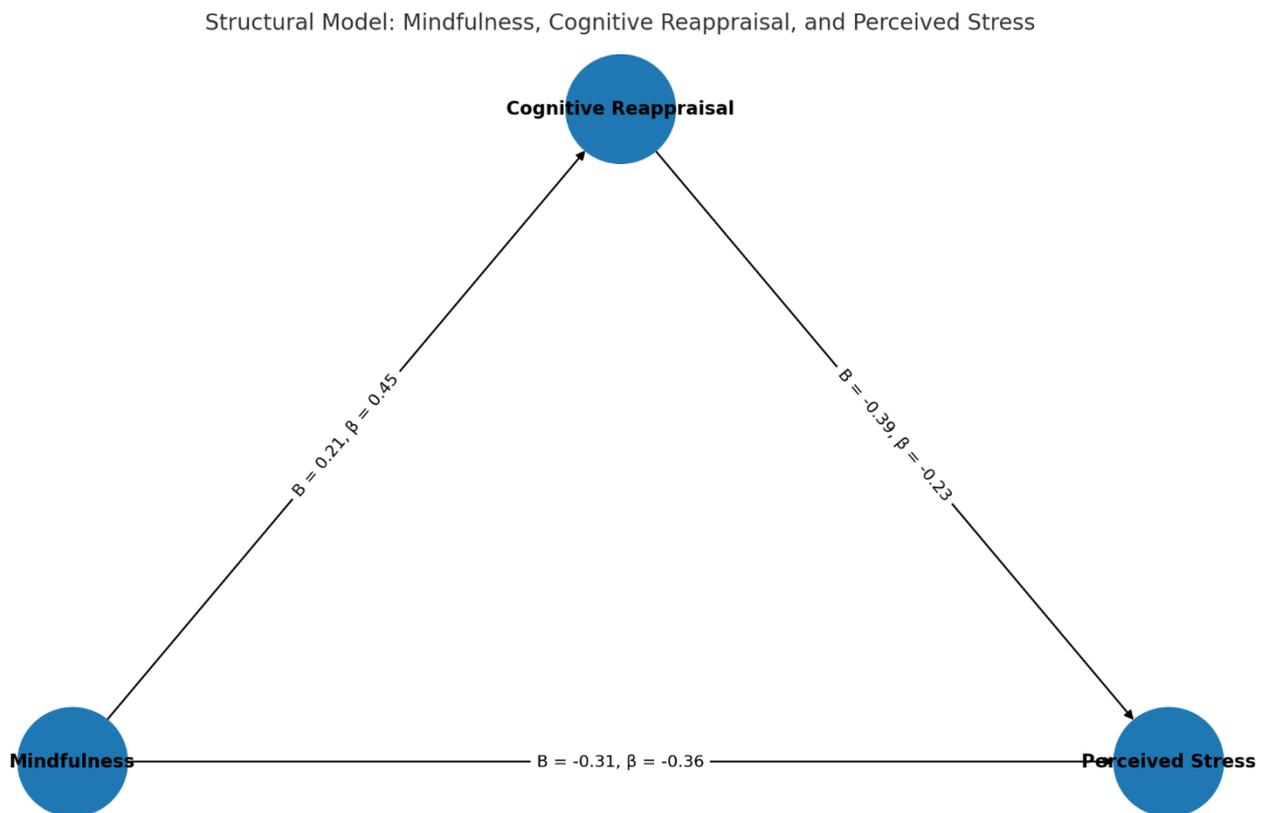
Path	b	S.E.	$\beta$	p
Mindfulness → Cognitive Reappraisal	0.21	0.04	.45	< .001
Cognitive Reappraisal → Stress	-0.39	0.12	-.23	.002
Mindfulness → Stress (direct)	-0.31	0.07	-.36	< .001
Mindfulness → Stress (indirect via Reappraisal)	-0.08	0.03	-.10	.004
Mindfulness → Stress (total)	-0.39	0.06	-.46	< .001

Table 4 reports the total, direct, and indirect path coefficients for the tested structural model. The direct path from mindfulness to perceived stress was significant ( $\beta = -.36, p < .001$ ), indicating that higher mindfulness directly reduced stress. The path from mindfulness to cognitive reappraisal was also significant ( $\beta = .45, p < .001$ ), as was

the path from cognitive reappraisal to stress ( $\beta = -.23, p = .002$ ). The indirect effect of mindfulness on stress through reappraisal was significant ( $\beta = -.10, p = .004$ ), with the total effect of mindfulness on stress estimated at  $\beta = -.46 (p < .001)$ .

**Figure 1**

*Model with Beta Coefficients*



**4. Discussion and Conclusion**

The findings of the present study demonstrated that mindfulness was negatively correlated with perceived stress and positively associated with cognitive reappraisal, while

cognitive reappraisal itself was significantly linked to greater stress reduction. Structural equation modeling confirmed that cognitive reappraisal functioned as a mediator in the relationship between mindfulness and stress reduction, thereby supporting the hypothesized pathway.

These results indicate that mindfulness reduces stress both directly and indirectly by fostering the use of adaptive cognitive emotion regulation strategies such as reappraisal. The mediation model suggests that individuals with higher mindfulness are more likely to reinterpret stressful experiences in constructive ways, which in turn alleviates perceived stress.

These findings align with theoretical propositions from the mindfulness-to-meaning framework, which posits that mindful awareness facilitates reappraisal processes that transform negative experiences into opportunities for growth (Hanley et al., 2021). The evidence from this study reinforces the idea that mindfulness and reappraisal are not isolated constructs but interdependent processes that interact dynamically to reduce stress. Prior longitudinal data have demonstrated similar results, where mindfulness training promoted reappraisal use, which in turn led to long-term reductions in psychological distress (Wenzel et al., 2021). Our results therefore add further support to the claim that mindfulness exerts its beneficial effects on stress through emotion regulation pathways.

The positive association between mindfulness and reappraisal observed in this study echoes results from cross-cultural research. For example, mindfulness was found to enhance life satisfaction among Malaysian undergraduates through the mediating role of cognitive reappraisal (Lee & Ling, 2023). Likewise, among Filipino adolescents, mindfulness predicted greater use of reappraisal strategies, which subsequently fostered higher levels of academic engagement (Datu et al., 2022). Our Canadian sample reflects a similar pattern, suggesting that the mindfulness–reappraisal–stress relationship is robust across diverse cultural settings. Such consistency indicates that the mediating role of reappraisal is not limited to specific cultural or developmental contexts but may represent a universal psychological process.

The results also resonate with clinical studies showing that mindfulness-based interventions contribute to reductions in stress partly by enhancing reappraisal abilities. Research conducted with patients experiencing chronic pain and borderline personality disorder has shown that MBSR programs promote stress regulation by increasing the use of adaptive coping strategies such as reappraisal (Verdú & Marcos, 2022). Similarly, an online mindfulness-based intervention during the COVID-19 pandemic effectively reduced stress while simultaneously improving well-being, suggesting that digital mindfulness programs may influence underlying emotion regulation strategies (Bossi et al., 2022).

Our findings mirror these intervention outcomes, reinforcing the centrality of reappraisal as a mediator.

Neurocognitive evidence further supports the conclusion that mindfulness strengthens cognitive reappraisal processes. Studies examining brain potential markers of emotion regulation have shown that mindfulness-based training enhances both early and late neural indicators of reappraisal use, underscoring the complementary nature of these processes (Kaunhoven & Dorjee, 2021). The current findings, though behavioral in nature, are consistent with these neural correlates and suggest that mindfulness fosters a readiness to cognitively reframe stressful situations. This convergence of behavioral, clinical, and neurocognitive evidence underscores the robustness of the mediating pathway identified in the present study.

Our findings also add nuance to debates on the relative advantages and disadvantages of mindfulness and reappraisal in everyday life. While some research suggests that these strategies can sometimes impose cognitive costs or be less effective under certain conditions, particularly when used simultaneously (Wenzel et al., 2021), our results indicate that when reappraisal functions as a mediator, it enhances rather than diminishes the stress-reducing benefits of mindfulness. This suggests that mindfulness may prepare individuals to deploy reappraisal more selectively and effectively, reducing the likelihood of maladaptive costs associated with overuse.

Importantly, the study contributes to understanding contextual moderators of mindfulness and reappraisal. Previous research highlights that factors such as gender, anxiety, and sleep quality may influence mindfulness outcomes (Brown et al., 2020), while interdependent self-construal moderates the strength of mindfulness–reappraisal links (Chen & Cheung, 2021). In the present study, although moderators were not directly examined, the results suggest that the mindfulness–reappraisal–stress pathway is sufficiently robust to emerge in a general Canadian sample. This finding adds weight to the argument that mindfulness and reappraisal provide a broad-based framework for stress management that may operate across demographic boundaries.

The study also has implications for academic and professional contexts. Previous work has shown that mindfulness and reappraisal interventions in classroom settings enhance both immediate and long-term learning outcomes (Cavanagh et al., 2021). Our findings suggest that the stress-reduction benefits of mindfulness and reappraisal may indirectly support learning and performance by

alleviating stress-related cognitive load. Similarly, in healthcare settings, mindfulness and reappraisal have been shown to improve empathy and achievement emotions among nurses and nursing students (Lee & Jang, 2021; Lee & Park, 2022). The present results confirm that the same underlying mechanisms—mindfulness fostering reappraisal to reduce stress—could underlie these broader professional benefits.

Furthermore, our findings align with workplace studies showing that mindfulness reduces maladaptive outcomes such as work addiction through mediators including cognitive reappraisal (Zheng, 2025). They also mirror findings from athletic populations, where mindfulness enhanced distress tolerance via reappraisal and related constructs such as mental toughness (Zhong et al., 2025). By demonstrating similar patterns in a Canadian community sample, our study suggests that the mindfulness–reappraisal–stress pathway is applicable in both high-performance and everyday contexts.

It is also noteworthy that the present findings correspond with evidence that mindfulness supports proactive reappraisal benefits in younger adults but less so in older populations (Martins-Klein et al., 2023). While age differences were not analyzed in this study, the consistent mediation pathway observed here raises important questions about developmental variations in how mindfulness fosters reappraisal. Such questions warrant closer investigation in future work. Additionally, evidence from adolescent studies linking social mindfulness, bullying victimization, and reappraisal (Yang et al., 2024) suggests that similar mediating processes operate early in development, strengthening the case for universality of the mindfulness–reappraisal–stress mechanism.

Taken together, the findings of this study provide strong evidence that cognitive reappraisal mediates the relationship between mindfulness and stress reduction. This extends the current literature by confirming the pathway in a large, non-clinical Canadian sample and by employing robust statistical approaches such as SEM to establish mediation. The convergence with prior studies across clinical, educational, workplace, and developmental settings underscores the importance of integrating mindfulness and reappraisal in models of stress regulation.

## 5. Limitations & Suggestions

Despite these contributions, several limitations should be acknowledged. First, the cross-sectional design limits causal

inference. Although the SEM results provide statistical support for the mediating role of reappraisal, longitudinal or experimental designs are necessary to confirm the directionality of these relationships. Second, the reliance on self-report measures introduces the possibility of response bias, including social desirability and self-perception errors. Third, while the sample size was robust, participants were recruited using convenience sampling and may not fully represent the broader Canadian population. Demographic diversity was present, but factors such as socioeconomic status, cultural background, and clinical history were not controlled for, which may limit generalizability. Finally, potential moderators such as gender, cultural orientation, or baseline anxiety were not examined, leaving open questions about individual differences in the strength of the mindfulness–reappraisal–stress relationship.

Future studies should employ longitudinal and experimental designs to establish causal relationships between mindfulness, reappraisal, and stress. Randomized controlled trials that incorporate mindfulness training and reappraisal-focused interventions could provide stronger evidence of mediation. Neuroimaging approaches may also be used to explore the neural mechanisms underpinning the observed relationships, building on prior findings of overlapping networks. Future work should also examine developmental and cultural moderators, investigating whether the mediation pathway differs across age groups, genders, and cultural contexts. Additionally, workplace and educational environments provide promising avenues for testing applied interventions, particularly in high-stress populations such as healthcare workers and students. Integrating qualitative approaches could further illuminate how individuals subjectively experience the interplay between mindfulness and reappraisal in their daily lives.

From a practical perspective, the findings highlight the importance of designing interventions that integrate both mindfulness and reappraisal training. Clinicians may consider combining mindfulness practices with cognitive-behavioral techniques that explicitly teach reappraisal skills, thereby maximizing stress reduction outcomes. Educators and employers can incorporate mindfulness and reappraisal workshops to foster resilience, reduce burnout, and promote well-being in academic and workplace settings. Digital platforms also represent a promising medium for delivering such interventions, ensuring accessibility to diverse populations. Overall, the integration of mindfulness and cognitive reappraisal strategies can serve as a powerful tool

for reducing stress and promoting psychological health in clinical, educational, and organizational domains.

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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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### Authors' Contributions

All authors equally contributed in this article.

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