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Childhood Emotional Neglect and Non-Suicidal Self-Injury Among Emerging Adults: Serial Mediation by Loneliness and Emotion Dysregulation

S. Sairah[1], Azhar Aziz[2], Andy Chandra[3]

[1,2,3] Department of Psychology, Faculty of Psychology, Universitas Medan Area, Medan, Indonesia.
Email: sairah@staff.uma.ac.id[1], azharaziz@staff.uma.ac.id[2], andy@staff.uma.ac.id[3]

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ABSTRACT
Non-suicidal self-injury (NSSI) is an important mental health concern among emerging adults and has been linked to adverse childhood experiences, including emotional neglect. However, the interpersonal and emotional processes associated with this relationship remain insufficiently understood, particularly in non-Western contexts. This study examined the direct and indirect associations among childhood emotional neglect, loneliness, emotion dysregulation, and NSSI in emerging adults. A cross-sectional quantitative design was employed with 386 participants aged 18–29 years recruited through online survey distribution. Participants completed standardized measures of childhood emotional neglect, loneliness, emotion dysregulation, and NSSI. Structural Equation Modeling (SEM) with 5,000 bootstrap resamples was used to test the hypothesized direct and indirect associations. Childhood emotional neglect was positively associated with loneliness, emotion dysregulation, and NSSI. Loneliness was positively associated with emotion dysregulation and NSSI, while emotion dysregulation was positively associated with NSSI. Significant specific indirect associations were observed through loneliness and emotion dysregulation, and the serial indirect association through loneliness followed by emotion dysregulation was also significant. These findings support the statistical plausibility of an attachment-informed interpersonal–emotion regulation framework linking childhood emotional neglect with NSSI. Given the cross-sectional design, the indirect associations should not be interpreted as evidence of temporal or causal mechanisms. The findings highlight loneliness and emotion dysregulation as relevant interpersonal and emotional correlates that may inform psychological assessment and future intervention development for emerging adults reporting emotional neglect and NSSI.

Keywords: Childhood Emotional Neglect, Non-Suicidal Self-Injury, Loneliness, Emotion Dysregulation, Emerging Adulthood.

I. Introduction

Non-suicidal self-injury (NSSI), broadly defined as the deliberate and direct injury of one's own body tissue without suicidal intent, remains an important mental-health concern among adolescents and young adults. Although NSSI is conceptually distinct from suicidal behavior, its occurrence has been associated with considerable psychological distress and heightened vulnerability to subsequent suicidal thoughts and

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behaviors (Victor & Klonsky, 2019; Wolff et al., 2019). This issue is particularly relevant during emerging adulthood, a developmental period extending from the late teens through the twenties and characterized by substantial changes in identity, autonomy, education, work, and interpersonal relationships (Arnett, 2016). For some young people, navigating these transitions while carrying unresolved emotional or interpersonal difficulties may increase reliance on maladaptive strategies for managing distress. The concern is also relevant in Indonesia. Hidayati et al. (2023), using the Inventory of Statements About Self-Injury (ISAS), surveyed 909 Indonesian university students aged 18–25 years and reported that 30% of the participants had engaged in NSSI. Among those reporting NSSI, 73.6% had self-injured within the previous year, while 60.1% had not disclosed their experiences, partly because of concerns about negative reactions or being perceived as seeking attention (Hidayati et al., 2023). Affect regulation was also reported as the most prominent function of NSSI in that study. These findings should not be interpreted as a population prevalence estimate for all Indonesian emerging adults because the participants were university students recruited through an online crowdsourcing approach. Nevertheless, they indicate that self-injury is a meaningful concern among Indonesian young adults and that a substantial proportion of affected individuals may remain outside formal or informal help-seeking pathways (Hidayati et al., 2023).

One developmental experience that may help explain vulnerability to later psychological difficulties is childhood emotional neglect (CEN). CEN refers to a persistent failure to adequately recognize, validate, and respond to a child's emotional needs. Unlike more visible forms of childhood maltreatment, emotional neglect is often characterized by the absence of expected emotional care rather than the presence of an overt abusive act. Its effects may therefore be less readily recognized while still being associated with later difficulties involving emotional awareness, interpersonal security, and psychological adjustment (Spinazzola et al., 2021; Wang et al., 2023). Recent evidence also suggests that emotional neglect deserves consideration as a distinct form of childhood adversity rather than being subsumed under a broad maltreatment category, because different maltreatment experiences may show different patterns of association with subsequent psychological outcomes (Calvo et al., 2024). The relationship between childhood maltreatment and NSSI is well documented, but the evidence is not entirely uniform across maltreatment subtypes. In a large systematic review and meta-analysis, Liu et al. (2018) found that childhood maltreatment overall was associated with NSSI, although emotional neglect showed a comparatively smaller association than emotional abuse and several other maltreatment experiences. Importantly, publication bias was also identified for the emotional-neglect estimate, suggesting that this specific relationship should be interpreted cautiously (Liu et al., 2018). More recent evidence provides additional support for an association: Calvo et al. (2024), synthesizing 46 studies involving more than 1.5 million adolescents, reported positive associations between NSSI and multiple forms of childhood maltreatment, including neglect. Thus, the literature supports the relevance of childhood adversity to NSSI, while simultaneously indicating that CEN should not be treated as a deterministic or uniformly strong predictor. This inconsistency raises a more informative question: rather than asking only whether CEN is related to NSSI, it is necessary to examine the psychological processes through which the two may be connected.

Attachment Theory provides the primary theoretical foundation for addressing this question. According to attachment perspectives, repeated interactions with caregivers contribute to internal working models regarding the availability and trustworthiness of others and the individual's own worthiness of care and support (Bowlby, 1969/1982; Dagan et al., 2018). When caregivers are consistently emotionally unavailable or insufficiently responsive, children may develop less secure expectations regarding interpersonal support. These expectations may remain relevant beyond childhood, particularly when individuals encounter relational stress and emotionally demanding circumstances during adolescence and emerging adulthood (Dagan et al., 2018). From this perspective, CEN is relevant not simply because it represents an adverse past experience, but because it may be associated with enduring patterns in how individuals experience relationships and manage emotional distress. Loneliness may represent one interpersonal expression of this process. Loneliness reflects a subjective discrepancy between the social or emotional connection individuals desire and the connection they perceive themselves as having;

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consequently, it is not equivalent to objective social isolation. Individuals whose emotional needs were repeatedly overlooked during childhood may experience difficulty trusting others, seeking support, or experiencing relationships as emotionally secure. Consistent with this proposition, Ho and Schermer (2024) found childhood emotional neglect to be a particularly strong predictor of loneliness in adulthood. Their findings also indicated variation according to sex and the parental figure involved, suggesting that the association is meaningful but not uniform across individuals (Ho & Schermer, 2024). Loneliness may therefore provide an interpersonal link through which earlier experiences of emotional unavailability remain relevant during emerging adulthood.

Interpersonal disconnection may, in turn, intersect with difficulties in regulating emotional experiences. Emotion dysregulation broadly encompasses difficulties identifying, accepting, and adaptively responding to emotions, maintaining behavioral control during distress, and accessing effective regulation strategies. Emotionally responsive relationships ordinarily provide opportunities for children to experience validation, co-regulation, and modeling of adaptive responses to distress. When these experiences are repeatedly limited, the development of effective emotional-regulation strategies may be compromised (Sloan et al., 2017; Spinazzola et al., 2021). At the same time, supportive interpersonal relationships continue to serve regulatory functions beyond childhood. Perceived disconnection from such relationships may therefore coincide with fewer interpersonal resources for managing difficult emotional states. The relevance of emotion dysregulation to NSSI has received substantial empirical support, although the strength of the association differs across components of emotion regulation. Wolff et al. (2019), in a systematic review and meta-analysis of 48 publications representing 49 independent samples, reported a significant overall association between emotion dysregulation and NSSI. However, the strongest associations were observed for limited access to regulation strategies, non-acceptance of emotional responses, impulse-control difficulties, and difficulties engaging in goal-directed behavior, whereas emotional awareness and clarity showed weaker associations (Wolff et al., 2019). This pattern is important because it indicates that emotion dysregulation should not be regarded as a single, uniform explanation for self-injury. Rather, particular difficulties in managing distress may be especially relevant to NSSI.

Taken together, these findings suggest a theoretically coherent, but not yet definitive, interpersonal-emotional pathway. CEN may be associated with insecure expectations about emotional availability and subsequent feelings of disconnection; greater loneliness may coincide with reduced perceived access to interpersonal support; and difficulties managing distress may, in turn, be associated with NSSI. Attachment Theory provides the developmental foundation for this sequence, while interpersonal and emotion-regulation perspectives help explain how relational and emotional difficulties may be expressed during emerging adulthood (Dagan et al., 2018; Ho & Schermer, 2024; Wolff et al., 2019). Importantly, alternative directions are also plausible. Emotion dysregulation may impair interpersonal functioning and contribute to loneliness, while NSSI itself may foster secrecy, stigma, or withdrawal. The proposed ordering should therefore be regarded as a theoretically specified statistical pathway rather than an established temporal sequence.

Three gaps follow from the existing evidence. First, studies linking childhood adversity with NSSI have often emphasized direct associations or examined individual psychological mechanisms separately, leaving the combined interpersonal and emotional pathway less clearly understood (Liu et al., 2018; Calvo et al., 2024). Second, loneliness and emotion dysregulation have each been associated with adverse psychological outcomes, yet their sequential roles in the CEN–NSSI relationship have received comparatively limited attention. Examining them simultaneously may provide a more integrated explanation than treating either mediator in isolation. Third, much of the theoretical and empirical literature informing these relationships has been generated outside Indonesia, whereas available Indonesian evidence demonstrates that NSSI is also present among emerging adults in this sociocultural context (Hidayati et al., 2023). Testing the proposed relationships in an Indonesian sample therefore broadens the cultural setting in which this theoretical model is evaluated without assuming in advance that the underlying psychological processes must differ between Western and non-Western populations.

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Accordingly, the present study examines the associations among childhood emotional neglect, loneliness, emotion dysregulation, and NSSI among emerging adults in Indonesia. Guided primarily by Attachment Theory and complemented by interpersonal and emotion-regulation perspectives, the study evaluates whether CEN is associated with NSSI directly and indirectly through loneliness and emotion dysregulation, including a serial indirect pathway from CEN to loneliness, from loneliness to emotion dysregulation, and subsequently to NSSI. Rather than proposing a new psychological construct, the study integrates theoretically related relationships that have largely been investigated separately into a single research model. The study is expected to make both theoretical and practical contributions. Theoretically, integrating interpersonal disconnection and emotion-regulation difficulties within an attachment-informed model may clarify why the association between CEN and NSSI is unlikely to be adequately explained by childhood adversity alone. It also provides an opportunity to evaluate whether a theoretically specified interpersonal-emotional pattern is statistically supported among Indonesian emerging adults. Practically, the findings may inform assessment and prevention efforts by indicating whether attention to a history of emotional neglect should be accompanied by assessment of current loneliness and difficulties regulating distress. Such information may be relevant to psychologists, counselors, university mental-health services, and other professionals working with young adults who report self-injurious behavior. Because the present study uses cross-sectional data, however, all direct and indirect relationships are interpreted as statistical associations; temporal ordering and causal mediation require confirmation through longitudinal or prospective research.

II. Literature Review and Hypothesis Development

2.1. Theoretical Foundation: An Attachment-Informed Interpersonal–Emotion Regulation Model

Attachment Theory provides the primary theoretical foundation for the present study. The theory proposes that repeated interactions with caregivers contribute to the development of internal working models concerning the self, others, and the expected availability of emotional support (Bowlby, 1969/1982). When caregivers respond consistently and sensitively to emotional needs, children are more likely to develop expectations that distress can be communicated and that support will be available. In contrast, repeated experiences of emotional unavailability or insufficient responsiveness may contribute to less secure expectations regarding interpersonal support and one's own worthiness of care (Dagan et al., 2018). Childhood emotional neglect (CEN) is particularly relevant within this framework because it involves the persistent absence of adequate emotional responsiveness, validation, and support. Its potential consequences may extend beyond the original caregiver–child relationship. Internalized expectations formed in early relationships may remain relevant when individuals establish friendships, intimate relationships, and other sources of social support during adolescence and emerging adulthood. Accordingly, CEN may be associated with later interpersonal difficulties even when the neglect itself is no longer occurring (Dagan et al., 2018; Ho & Schermer, 2024).

Attachment Theory alone, however, does not specify every proximal psychological process through which earlier emotional neglect may be associated with NSSI. The present study therefore integrates attachment principles with interpersonal and emotion-regulation perspectives. Within this integrated model, loneliness represents a proximal interpersonal correlate reflecting perceived emotional disconnection, whereas emotion dysregulation represents difficulty understanding, accepting, and adaptively managing emotional experiences. These constructs are theoretically connected because supportive relationships can provide opportunities for emotional validation and co-regulation, while perceived interpersonal disconnection may coincide with fewer relational resources for managing distress. The proposed model therefore follows an attachment-informed interpersonal–emotion regulation sequence: childhood emotional neglect → loneliness → emotion dysregulation → NSSI. This ordering does not imply that these variables necessarily unfold in a fixed causal sequence. Reciprocal and alternative pathways remain plausible,

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particularly between loneliness and emotion dysregulation. Instead, Attachment Theory provides the developmental foundation for specifying why an early adverse interpersonal experience may remain associated with later interpersonal and emotional functioning, while interpersonal and emotion-regulation perspectives provide the proximal mechanisms examined statistically in the present study.

2.2. Childhood Emotional Neglect and Non-Suicidal Self-Injury

CEN is characterized by persistent failures to recognize and adequately respond to a child's emotional needs. Because it primarily involves the absence of expected emotional care, it may be less observable than overt forms of maltreatment. Nevertheless, repeated emotional unavailability may be associated with difficulties developing secure interpersonal expectations and adaptive responses to distress (Spinazzola et al., 2021; Wang et al., 2023). From an attachment perspective, individuals exposed to CEN may develop internal working models in which emotional support is perceived as unreliable or unavailable. Such expectations may become particularly relevant when distress intensifies and adaptive interpersonal or emotional resources are limited (Dagan et al., 2018). NSSI has frequently been conceptualized as a behavior that can serve intrapersonal functions, including reducing intense negative affect, as well as interpersonal functions in some individuals (Sloan et al., 2017; Wolff et al., 2019). CEN may therefore be relevant to NSSI insofar as earlier emotional unavailability is associated with later difficulties obtaining support or managing distress.

Empirical evidence nevertheless indicates that this association should not be overstated. Liu et al. (2018), in a meta-analysis of 71 publications, found that childhood maltreatment overall was associated with NSSI (OR = 3.42), but the association for emotional neglect was considerably smaller (OR = 1.84) than that observed for emotional abuse (OR = 3.03). Moreover, publication bias was detected for emotional neglect, and its association became non-significant in some analyses accounting for co-occurring maltreatment subtypes (Liu et al., 2018). In contrast, the more recent systematic review and meta-analysis by Calvo et al. (2024) continued to identify childhood maltreatment, including neglect, as relevant to NSSI among adolescents. These findings suggest that CEN is associated with NSSI in some populations but is unlikely to operate as a strong or sufficient predictor in isolation. The mixed evidence strengthens the rationale for examining CEN within a broader psychological model rather than assuming a simple deterministic relationship. Attachment Theory predicts that repeated emotional unavailability may remain relevant to later coping and relational functioning, while the empirical literature suggests that additional interpersonal and emotional factors are likely to shape its association with NSSI. Accordingly, the present study tests the direct statistical association before examining potential indirect pathways.

H1: Childhood emotional neglect is positively associated with non-suicidal self-injury among emerging adults.

2.3. Childhood Emotional Neglect and Loneliness

Loneliness refers to the subjective perception that one's existing relationships do not provide the desired level of emotional or social connection. It is therefore distinct from objective social isolation: an individual may have frequent contact with other people and nevertheless experience relationships as emotionally insufficient. Attachment Theory provides a direct explanation for why CEN may be associated with loneliness. Early caregiver relationships constitute an important context in which individuals develop expectations regarding emotional availability, trust, and support (Bowlby, 1969/1982; Dagan et al., 2018). When emotional needs are repeatedly overlooked, individuals may become less confident that others will respond when support is needed. Such expectations may complicate later help-seeking, intimacy, and the subjective experience of interpersonal security.

Recent evidence supports this association. Ho and Schermer (2024) found emotional neglect to be the strongest neglect-related predictor of loneliness in adulthood. However, their results also showed variation according to sex and the parental figure involved, indicating that the relationship is not identical

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across individuals. Thus, CEN does not necessarily produce loneliness; rather, it may increase vulnerability to perceived interpersonal disconnection depending on other relational and individual factors. This qualification is consistent with an attachment perspective in which early experiences shape relational expectations without rigidly determining later outcomes. Emerging adulthood provides a particularly relevant developmental context because established family relationships coexist with expanding peer, educational, occupational, and intimate networks. Internalized expectations concerning emotional availability may therefore become salient as individuals negotiate increasingly autonomous relationships. On this theoretical and empirical basis, greater CEN is expected to correspond with greater loneliness.

H2: Childhood emotional neglect is positively associated with loneliness among emerging adults.

2.4. Loneliness and Non-Suicidal Self-Injury

Loneliness has been associated with multiple indicators of psychological distress, including depressive symptoms, suicidal ideation, and poorer psychological well-being (McClelland et al., 2020; Wang et al., 2022). From an interpersonal perspective, perceived disconnection may be particularly consequential when individuals experience distress but perceive few emotionally dependable relationships from which support can be obtained. This association may be relevant to NSSI because interpersonal support can provide alternative means of communicating, tolerating, and regulating distress. When individuals perceive such resources as unavailable, self-injury may occur alongside other maladaptive strategies for coping with overwhelming emotional states. This interpretation is compatible with evidence that NSSI can serve both intrapersonal and interpersonal functions, although the functions and motivations associated with NSSI vary substantially across individuals (Sloan et al., 2017; Wolff et al., 2019). At the same time, the direction of the association cannot be assumed. NSSI may itself contribute to loneliness through concealment, perceived stigma, fear of judgment, or withdrawal from relationships. Likewise, depression or other psychological difficulties may contribute simultaneously to loneliness and NSSI. Consequently, loneliness should not be treated as an established causal antecedent of NSSI. In the present cross-sectional study, the proposed relationship represents a theoretically specified association consistent with the interpersonal component of the research model.

H3: Loneliness is positively associated with non-suicidal self-injury among emerging adults.

2.5. Childhood Emotional Neglect and Emotion Dysregulation

Emotion dysregulation refers to difficulties understanding, accepting, and adaptively responding to emotional experiences. Effective emotion regulation develops partly within interpersonal contexts. Caregivers can assist children by recognizing emotional cues, validating emotional experiences, modeling adaptive responses, and providing support while distress is being managed. These repeated interactions contribute to opportunities for learning how emotions can be identified, tolerated, expressed, and regulated. CEN may interfere with these opportunities. When emotional experiences are repeatedly ignored, minimized, or inadequately addressed, children may receive less guidance in understanding emotional states and developing adaptive strategies for responding to them. From the attachment-informed model adopted here, emotional unavailability is therefore relevant not only to expectations about relationships but also to the interpersonal context in which regulatory capacities develop (Dagan et al., 2018; Spinazzola et al., 2021).

Empirical research generally supports associations between childhood maltreatment and subsequent emotion-regulation difficulties, but the relationship is probabilistic rather than deterministic. Individuals exposed to similar childhood experiences can differ substantially in later functioning because of temperament, supportive relationships, coping resources, subsequent environments, and other developmental experiences. This variability is theoretically important: CEN may create vulnerability to

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emotion dysregulation without making dysregulation inevitable. The present study therefore treats emotion dysregulation as a psychological correlate potentially associated with CEN rather than as an unavoidable consequence of neglect. Consistent with the proposed attachment-informed emotion-regulation pathway, greater CEN is expected to be associated with greater difficulties regulating emotions.

H4: Childhood emotional neglect is positively associated with emotion dysregulation among emerging adults.

2.6. Loneliness and Emotion Dysregulation

Interpersonal relationships can serve important emotion-regulation functions throughout development. Supportive interactions may help individuals label difficult emotions, obtain reassurance, reinterpret stressful events, and tolerate negative affect. Conversely, perceived interpersonal disconnection may coincide with reduced access to these interpersonal regulatory resources. Loneliness may therefore be associated with emotion dysregulation because individuals who experience relationships as emotionally insufficient may have fewer perceived opportunities for co-regulation and support during distress. Consistent with this proposition, contemporary research on emerging adulthood increasingly emphasizes that emotion regulation occurs not only within individuals but also through interpersonal processes and perceived social support (Yilmaz Coban & Vural Yuzbasi, 2026). Recent research among emerging adults also indicates that loneliness varies alongside emotion-regulation patterns and perceived social support, further supporting the interdependence of interpersonal and emotional functioning (Sanchis-Sanchis et al., 2026).

Nevertheless, evidence does not establish a single direction of influence. Emotion dysregulation may itself undermine interpersonal functioning through heightened emotional reactivity, difficulty communicating needs, or maladaptive responses during conflict, thereby contributing to loneliness. Indeed, some evidence has modeled emotion dysregulation as a predictor rather than an outcome of loneliness. The relationship may therefore be reciprocal. The ordering adopted in the present study is theoretically rather than temporally based. CEN is positioned as an earlier adverse interpersonal experience, loneliness as a proximal indicator of perceived interpersonal disconnection, and emotion dysregulation as an emotional correlate associated with reduced interpersonal regulatory resources. The model tests whether the observed covariance is consistent with this ordering; it does not establish that loneliness temporally causes emotion dysregulation.

H5: Loneliness is positively associated with emotion dysregulation among emerging adults.

2.7. Emotion Dysregulation and Non-Suicidal Self-Injury

Emotion-regulation perspectives provide one of the strongest theoretical explanations for NSSI. Self-injury may function, for some individuals, as an attempt to reduce intense negative affect, interrupt unwanted emotional states, or regain a sense of control when adaptive regulation strategies are perceived as unavailable or ineffective (Sloan et al., 2017). The empirical evidence for this association is substantial. Wolff et al. (2019), in a systematic review and meta-analysis encompassing 48 publications and 49 independent samples, found a significant overall association between emotion dysregulation and NSSI (pooled OR = 3.03). The association remained significant after adjustment for publication bias (OR = 2.40). Importantly, however, not all components of emotion dysregulation were equally associated with NSSI. Limited access to effective regulation strategies, non-acceptance of emotional responses, impulse-control difficulties, and difficulties engaging in goal-directed behavior showed stronger associations than difficulties involving emotional awareness or clarity (Wolff et al., 2019).

These differences indicate that emotion dysregulation is neither a unitary nor sufficient explanation for NSSI. Individuals may engage in self-injury for different intrapersonal or interpersonal reasons, and many people experiencing emotion-regulation difficulties do not engage in NSSI. Emotion dysregulation is

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therefore conceptualized here as one important correlate within a broader network of developmental, interpersonal, and emotional factors. Despite these qualifications, theory and accumulated empirical evidence consistently support an association between greater difficulties regulating emotions and NSSI.

H6: Emotion dysregulation is positively associated with non-suicidal self-injury among emerging adults.

2.8. Indirect Role of Loneliness

The direct association between CEN and NSSI may provide only a partial account of how earlier emotional experiences remain relevant to self-injury. Attachment Theory suggests that emotionally unavailable caregiving may shape expectations concerning whether other people are dependable sources of emotional support (Bowlby, 1969/1982; Dagan et al., 2018). These expectations may subsequently be reflected in difficulties experiencing relationships as emotionally satisfying, thereby increasing vulnerability to loneliness. Loneliness, in turn, has been associated with psychological distress and may coincide with reduced perceived access to interpersonal resources during periods of intense negative affect. This provides a theoretically coherent indirect pathway in which CEN is associated with NSSI partly through perceived interpersonal disconnection. The pathway is also consistent with evidence that emotional neglect predicts later loneliness (Ho & Schermer, 2024), while loneliness is associated with multiple adverse psychological outcomes. However, the proposed mediation is statistical rather than causal. Cross-sectional indirect effects cannot establish that CEN temporally produces loneliness and that loneliness subsequently produces NSSI. Instead, the analysis evaluates whether covariance among the three constructs is consistent with the attachment-informed interpersonal pathway specified by the research model.

H7: Loneliness statistically mediates the association between childhood emotional neglect and non-suicidal self-injury among emerging adults.

2.9. Indirect Role of Emotion Dysregulation

A second indirect pathway concerns emotion regulation. Emotionally responsive caregiving provides repeated opportunities for children to receive validation and assistance in managing distress. CEN may limit these opportunities and thereby be associated with later difficulties accessing adaptive regulatory strategies. In turn, emotion dysregulation has a well-established association with NSSI (Wolff et al., 2019). This pathway is also consistent with earlier evidence reviewed by Liu et al. (2018), in which emotion dysregulation emerged as one candidate mediator linking childhood maltreatment or neglect with NSSI. Importantly, however, the evidence reviewed by Liu et al. was largely cross-sectional, and emotional neglect showed a weaker and less consistent direct association with NSSI than several other maltreatment subtypes. This pattern provides a particularly important rationale for examining an indirect pathway: the psychological significance of CEN may be expressed partly through later regulatory difficulties rather than exclusively through a strong direct association with NSSI. Accordingly, the present model evaluates whether emotion dysregulation statistically accounts for part of the association between CEN and NSSI. As with the loneliness pathway, this indirect effect is interpreted as covariance consistent with the theoretical model rather than evidence of a demonstrated causal mechanism.

H8: Emotion dysregulation statistically mediates the association between childhood emotional neglect and non-suicidal self-injury among emerging adults.

2.10. Serial Indirect Roles of Loneliness and Emotion Dysregulation

Examining loneliness and emotion dysregulation as separate mediators may still provide an incomplete account of the relationship between CEN and NSSI. Attachment Theory suggests that early

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experiences of emotional availability contribute to expectations about whether support can be obtained from others, whereas interpersonal and emotion-regulation perspectives suggest that supportive relationships remain important resources for managing emotional distress. Integrating these perspectives provides a theoretical basis for considering interpersonal disconnection and emotion-regulation difficulties sequentially rather than independently. The proposed sequence begins with CEN as an early adverse interpersonal experience. Persistent emotional unavailability may contribute to insecure expectations regarding support and emotional connection (Dagan et al., 2018). During emerging adulthood, these expectations may correspond with greater loneliness, as suggested by evidence linking childhood emotional neglect with later perceived disconnection (Ho & Schermer, 2024). Loneliness may then coincide with reduced access to perceived interpersonal support and co-regulation, potentially contributing to greater difficulties managing distress. Finally, emotion dysregulation is expected to be associated with NSSI, consistent with substantial meta-analytic evidence (Wolff et al., 2019).

The serial model therefore extends beyond testing whether loneliness *or* emotion dysregulation independently accounts for the CEN–NSSI association. It examines whether the data are statistically consistent with an integrated pathway in which an adverse early interpersonal experience is associated first with perceived interpersonal disconnection and subsequently with emotion-regulation difficulties associated with NSSI. This integration constitutes the principal theoretical contribution of the proposed research model. The proposed ordering is not the only plausible explanation. Emotion dysregulation may increase loneliness by disrupting interpersonal functioning, loneliness and dysregulation may reinforce one another, and NSSI may itself alter interpersonal experiences. Moreover, cross-sectional data cannot establish temporal precedence among these constructs. Consequently, a significant serial indirect effect would indicate that the observed covariance structure is consistent with the theoretically specified sequence; it would not demonstrate a developmental or causal chain.

Based on the integrated attachment-informed interpersonal–emotion regulation model, the principal serial mediation hypothesis is proposed:

H9: Childhood emotional neglect has a significant positive indirect association with non-suicidal self-injury through loneliness and emotion dysregulation in serial order among emerging adults.

2.11. Research Framework

The proposed research framework integrates the direct and indirect associations specified in H1–H9. Childhood emotional neglect is positioned as the antecedent variable, loneliness and emotion dysregulation as theoretically ordered statistical mediators, and NSSI as the outcome variable. Attachment Theory provides the primary developmental foundation of the model, while interpersonal and emotion-regulation perspectives explain the proposed proximal relationships among loneliness, emotion dysregulation, and NSSI. The framework does not introduce new constructs, dimensions, or measurement indicators. Rather, it integrates theoretically supported relationships derived from prior attachment, interpersonal, emotion-regulation, and NSSI research into a unified model for empirical testing among Indonesian emerging adults. Accordingly, Figure 1 is presented as the Research Framework of the study.

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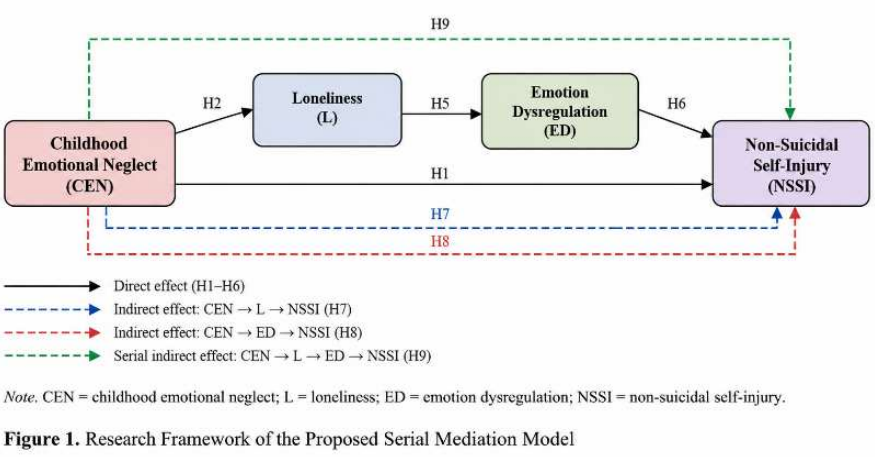


Figure 1. Research Framework of the Proposed Serial Mediation Model

III. Research Method

3.1. Research Design

This study employed a quantitative, cross-sectional correlational design to examine the associations among childhood emotional neglect (CEN), loneliness, emotion dysregulation, and non-suicidal self-injury (NSSI) among emerging adults. Data were collected between March and May 2025. The design was selected because the primary objective was to evaluate theoretically specified relationships among psychological constructs assessed within the same period rather than to establish developmental change or temporal causality. Structural Equation Modeling (SEM) was employed to test the proposed research framework. SEM was appropriate because the model required the simultaneous estimation of multiple direct and indirect associations among theoretically related constructs while accounting for measurement error (Kline, 2023). Specifically, the analysis examined six direct paths (H1–H6), two specific indirect paths (H7–H8), and one serial indirect path (H9). Given the cross-sectional nature of the data, temporal precedence among CEN, loneliness, emotion dysregulation, and NSSI cannot be established. Accordingly, the terms *direct effect*, *indirect effect*, and *mediation* refer to statistical relationships specified within the SEM framework and should not be interpreted as evidence of causal or developmental processes. The ordering of the variables was theoretically derived from the attachment-informed interpersonal–emotion regulation framework described in the preceding section.

3.2. Participants and Sampling

The target population comprised emerging adults aged 18–29 years residing in Medan and surrounding areas of North Sumatra, Indonesia. Recruitment included university-based and community-based young adults and was conducted through university networks, WhatsApp groups, Instagram, and community-based online networks. The age range of 18–29 years was theoretically defined according to the emerging-adulthood framework. Arnett et al. (2014) describe emerging adulthood as a developmental period extending approximately from ages 18 to 29 years, characterized by substantial transitions in identity, education, employment, relationships, and increasing independence. DOI The lower age boundary also ensured that participants were legal adults capable of providing their own informed consent. Thus, the age criterion was not selected solely for recruitment convenience but reflected the developmental population addressed by the research question.

A non-probability convenience and voluntary sampling strategy was employed because a complete sampling frame of emerging adults in the target geographical population was not available. Participants were

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eligible when they: (1) were 18–29 years old; (2) resided in North Sumatra during the data-collection period; (3) voluntarily provided informed consent; and (4) were able to understand and independently complete the Indonesian-language questionnaire. Responses were excluded when questionnaires were incomplete, predetermined attention-check criteria were not satisfied, or observations met the prespecified criterion for multivariate outliers. These criteria were applied during data screening before the primary SEM analysis.

3.3. Sample Size Determination

Sample adequacy was considered before structural-model estimation using both statistical-power and SEM-related considerations. An a priori power analysis was conducted using G*Power version 3.1.9.7 as a complementary procedure. The calculation assumed a medium effect size (f^2 = .15), α = .05, and statistical power of .95. Because G*Power does not directly estimate the sample requirement for the complete latent-variable serial mediation model specified in this study, the power analysis was not treated as the sole justification for sample adequacy. A more conservative target of at least 300 participants was adopted by considering the complexity of the proposed SEM and the need for stable parameter estimation (Hair et al., 2022; Kline, 2023). A total of 421 responses were initially obtained. During data screening, 18 responses were excluded because the questionnaires were incomplete, nine because they failed the predetermined attention-check criteria, and eight because they were identified as multivariate outliers using Mahalanobis distance (p < .001). The final analytical sample therefore consisted of 386 participants, exceeding the prespecified target for the proposed analysis. The adequacy of the sample was considered not only quantitatively but also in relation to the study population. All retained participants met the specified developmental age criterion and geographical eligibility requirements. Nevertheless, because recruitment was non-probabilistic, statistical adequacy of the sample size should not be interpreted as evidence that the sample was representative of all emerging adults in North Sumatra or Indonesia.

3.4. Participant Characteristics

The final sample comprised 386 emerging adults, including 248 women (64.2%) and 138 men (35.8%), with a mean age of 21.84 years (SD = 2.71). Most participants were undergraduate students (71.5%), whereas 28.5% were employed young adults or recent graduates. Because participation was voluntary and recruitment was conducted primarily through online networks, the sample may disproportionately represent individuals with internet access, familiarity with online questionnaires, and greater willingness to disclose sensitive psychological experiences. The predominance of undergraduate students and women should therefore be considered when interpreting the generalizability of the findings.

Table 1. Demographic Characteristics of Participants (N = 386)

Characteristic	Category	n	%
Gender	Women	248	64.2
	Men	138	35.8
Participant status	Undergraduate students	276	71.5
	Employed/recent graduates	110	28.5
Age (years)	Mean (SD)	21.84 (2.71)	—

3.5. Measures

a. Instrument Translation and Cultural Adaptation

All measures were administered in Indonesian. Instruments requiring linguistic adaptation underwent a forward–backward translation procedure to promote semantic, conceptual, and cultural equivalence between the original and Indonesian versions. The initial translations were independently

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reviewed by two bilingual psychology researchers. Back-translation was subsequently conducted by a separate bilingual researcher who had not participated in the initial translation. The original, translated, and back-translated versions were compared, and discrepancies were discussed until conceptual equivalence was reached. The adaptation process emphasized preservation of the psychological meaning of each item rather than literal word-for-word equivalence. Two experts in Clinical Psychology subsequently evaluated the translated measures for item clarity, conceptual consistency, and cultural appropriateness. A pilot study involving 35 emerging adults was conducted before the main data collection to evaluate readability and preliminary internal consistency. Cronbach's alpha coefficients across the measures ranged from .82 to .91. Minor wording adjustments were made when necessary to improve comprehension without intentionally altering the construct represented by the original items. No new psychological construct or dimension was created during the adaptation process.

b. Childhood Emotional Neglect

Childhood emotional neglect was assessed using the five-item Emotional Neglect subscale of the Childhood Trauma Questionnaire–Short Form (CTQ-SF) developed by Bernstein and Fink (1998). The CTQ-SF contains five maltreatment domains, with five items representing emotional neglect. PubMed Central (PMC) The Emotional Neglect subscale assesses retrospective perceptions of inadequate emotional support, affection, understanding, and emotional availability during childhood. Participants responded using a five-point Likert-type scale ranging from 1 (never true) to 5 (very often true). Consistent with the original scoring procedure, positively worded emotional-care items were reverse-scored before calculation of the subscale score. The five items were then summed, producing a possible score ranging from 5 to 25, with higher scores indicating greater reported childhood emotional neglect. The response format and scoring range are consistent with the established CTQ-SF scoring procedure. PubMed Central (PMC) Only the Emotional Neglect subscale was included in the present research model; the Emotional Abuse, Physical Abuse, Sexual Abuse, Physical Neglect, and Minimization/Denial components of the full CTQ-SF were not analyzed as study variables. In the present sample, the five-item Emotional Neglect subscale demonstrated good internal consistency (Cronbach's $\alpha = .89$).

c. Loneliness

Loneliness was assessed using the 20-item UCLA Loneliness Scale Version 3 (UCLA-LS V3) developed by Russell (1996). The scale assesses subjective loneliness and dissatisfaction with perceived interpersonal connectedness rather than objective social isolation. Participants indicated how frequently they experienced each statement using four response categories ranging from 1 (never) to 4 (often). The scale contains both positively and negatively worded items. Positively worded items were reverse-scored so that higher values consistently represented greater loneliness. Item scores were subsequently summed to produce the overall loneliness score. The original validation of UCLA-LS Version 3 demonstrated high internal consistency across different populations ($\alpha = .89–.94$), one-year test–retest reliability of $r = .73$, and evidence of convergent and construct validity (Russell, 1996). Taylor & Francis Online The instrument's official documentation also confirms the 20-item, four-response-category structure. In the present sample, the Indonesian version demonstrated excellent internal consistency (Cronbach's $\alpha = .91$).

d. Emotion Dysregulation

Emotion dysregulation was assessed using the 36-item Difficulties in Emotion Regulation Scale (DERS) developed by Gratz and Roemer (2004). The DERS conceptualizes emotion dysregulation as a multidimensional construct represented by six dimensions: (1) nonacceptance of emotional responses, (2) difficulties engaging in goal-directed behavior, (3) impulse-control difficulties, (4) lack of emotional awareness, (5) limited access to emotion-regulation strategies, and (6) lack of emotional clarity. Participants responded to the 36 statements using a five-point response scale ranging from 1 (almost never) to 5 (almost always). Positively keyed items were reverse-scored in accordance with the original scoring procedure so that

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higher scores consistently represented greater emotion-regulation difficulties. Item scores were then combined according to the specified scoring procedure, with higher overall scores indicating greater emotion dysregulation. The six DERS dimensions were retained conceptually in describing the construct. The manner in which these dimensions were represented in the CFA and SEM—whether as individual indicators, parcels, first-order factors, or another specified measurement structure—must correspond exactly with the measurement model actually estimated in AMOS. In the present sample, the DERS demonstrated excellent internal consistency (Cronbach's α = .93).

e. Non-Suicidal Self-Injury

Non-suicidal self-injury requires particularly careful operationalization in the present study because the original Self-Harm Inventory (SHI) developed by Sansone, Wiederman, and Sansone (1998) is not an NSSI-specific instrument. The original SHI is a 22-item dichotomous self-report inventory developed to assess a broad range of intentional self-harming and self-destructive behaviors. Its content includes direct self-injury but also suicide attempt, overdose, disordered-eating-related behaviors, medication misuse, and other self-destructive behaviors. Wiley Online Library Accordingly, the present study did not interpret the complete original SHI score as an NSSI score. Only those administered SHI items that met the study's operational definition of NSSI—intentional and direct injury to one's own body tissue without suicidal intent—were eligible for inclusion in the NSSI indicator. Behaviors involving suicidal intent or behaviors that did not satisfy the operational definition of direct NSSI were not interpreted as NSSI.Participants reported whether each retained behavior had occurred during the previous 12 months, using a dichotomous response format (0 = no, 1 = yes). Endorsed NSSI behaviors were summed so that higher scores represented endorsement of a greater number of NSSI behaviors during the specified period. For complete measurement transparency, the final manuscript must identify the exact SHI item numbers retained as NSSI indicators and the exact items excluded from the NSSI score. This information should correspond directly with the questionnaire administered and the variables used in the statistical analysis. In the present sample, the retained measure yielded Cronbach's α = .87.

3.6. Data Collection Procedure

Ethical approval was obtained from the Research Ethics Committee of Universitas Medan Area before participant recruitment. Data collection was conducted from March to May 2025. Recruitment announcements containing a brief description of the study and an electronic questionnaire link were distributed through university networks, WhatsApp groups, Instagram, and community-based online networks. Before accessing the questionnaire, potential participants received information concerning the purpose of the research, eligibility criteria, voluntary nature of participation, confidentiality, potential emotional discomfort associated with sensitive questions, and their right to discontinue participation without penalty. Electronic informed consent was obtained before participants proceeded to the questionnaire. Participants then completed demographic questions and the psychological measures. Completion required approximately 15–20 minutes.

Responses were collected anonymously, and personally identifying information was not included in the analytical dataset. Attention-check items were embedded in the questionnaire as part of the data-quality procedure. Research data were stored in a password-protected electronic database accessible only to the research team. Given the sensitive nature of questions concerning childhood adversity and self-injurious behavior, participants were informed that they could discontinue the survey if they experienced discomfort and were provided with information encouraging them to seek appropriate professional psychological support when needed.

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3.7. Data Analysis

Data were analyzed using IBM SPSS Statistics 27 and IBM SPSS Amos 24. Analyses proceeded sequentially through data screening, descriptive analysis, measurement-model evaluation, and structural-model testing. First, data screening was conducted to identify incomplete responses, attention-check failures, missing values, distributional characteristics, and potential multivariate outliers. Multivariate outliers were evaluated using Mahalanobis distance with $p < .001$ as the screening criterion. Descriptive statistics and bivariate correlations were subsequently calculated for the principal study variables. Second, the psychometric adequacy of the measures was evaluated before structural relationships were interpreted. Internal consistency was examined using Cronbach's alpha, with coefficients ≥ .70 considered acceptable. Confirmatory Factor Analysis (CFA) was used to evaluate whether the observed indicators adequately represented their intended constructs. Standardized factor loadings were examined together with overall model fit. Convergent validity was evaluated using Composite Reliability (CR) and Average Variance Extracted (AVE). Discriminant validity was evaluated using the prespecified criterion applied to the measurement model. Importantly, any item removal or model respecification undertaken during CFA should be reported explicitly in the Results section together with its theoretical and statistical justification.

Third, SEM was employed to test the complete structural model corresponding to the nine hypotheses and the Research Framework. The following direct structural paths were estimated simultaneously: CEN → NSSI (H1); CEN → loneliness (H2); loneliness → NSSI (H3); CEN → emotion dysregulation (H4); loneliness → emotion dysregulation (H5); and emotion dysregulation → NSSI (H6). Three specific indirect associations were subsequently evaluated: CEN → loneliness → NSSI (H7); CEN → emotion dysregulation → NSSI (H8); and CEN → loneliness → emotion dysregulation → NSSI (H9). Model fit was evaluated using multiple indices, including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). CFI and TLI values ≥ .90 and RMSEA and SRMR values ≤ .08 were treated as indicators of acceptable fit when interpreted collectively rather than as rigid universal cutoffs (Kline, 2023). Indirect associations were tested using 5,000 bootstrap resamples with 95% bias-corrected confidence intervals. An indirect association was considered statistically significant when its bootstrap confidence interval did not contain zero. Standardized structural coefficients (β), standard errors, p values, and confidence intervals were reported for the relevant structural paths. The proportion of explained variance (R^2) was additionally reported for endogenous constructs. Because all substantive variables were assessed cross-sectionally, statistically significant indirect associations were interpreted as evidence that the observed covariance structure was consistent with the hypothesized theoretical model, rather than as evidence of temporal or causal mediation. Alternative, reciprocal, and reverse relationships cannot be excluded by the present research design.

IV. Result and Discussion

4.1. Results

a. Data Screening and Preliminary Analysis

A total of 421 responses were initially collected. Data screening was conducted before hypothesis testing to evaluate data quality and the assumptions relevant to subsequent analyses. Eighteen responses were excluded because more than 10% of questionnaire data were incomplete, nine were excluded because participants failed the predetermined attention-check criteria, and eight were identified as multivariate outliers based on Mahalanobis distance at $p < .001$. The final analytical sample therefore consisted of 386 participants. Among retained cases, item-level missingness was low, ranging from 0.3% to 1.7% across indicators. Missing values were handled using the expectation-maximization procedure. Univariate distributions were considered acceptable, with skewness ranging from –0.42 to 0.91 and kurtosis from –0.68

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to 1.21. Multivariate normality was additionally examined using Mardia's normalized coefficient, which remained below 5.00.

Because the principal constructs were assessed using self-report measures within the same survey, potential common method variance was examined as a preliminary diagnostic. Harman's single-factor test indicated that the first unrotated factor accounted for 32.6% of the total variance. Thus, no single factor accounted for the majority of observed variance. This test was treated only as a preliminary diagnostic rather than definitive evidence that common method bias was absent. Descriptive statistics, internal consistency coefficients, and bivariate correlations are presented in Table 2.

Table 2. Descriptive Statistics, Reliability, and Correlations Among Study Variables

Variable	M	SD	Skewness	Kurtosis	1	2	3	4	α
Childhood Emotional Neglect	2.74	0.81	0.38	−0.41	—				.88
Loneliness	2.58	0.69	0.21	−0.36	.42***	—			.90
Emotion Dysregulation	3.02	0.72	0.17	−0.28	.47***	.51***	—		.92
Non-Suicidal Self-Injury	1.86	0.64	0.91	1.21	.39***	.43***	.56***	—	.86

All study variables were positively correlated in the theoretically expected direction. CEN was positively correlated with loneliness ($r = .42$, $p < .001$), emotion dysregulation ($r = .47$, $p < .001$), and NSSI ($r = .39$, $p < .001$). Loneliness was positively associated with emotion dysregulation ($r = .51$, $p < .001$) and NSSI ($r = .43$, $p < .001$). The strongest bivariate association was observed between emotion dysregulation and NSSI ($r = .56$, $p < .001$). These correlations provided preliminary support for the expected direction of the hypothesized relationships. However, bivariate correlations do not account for the simultaneous relationships among constructs; consequently, hypothesis testing was based on the structural model rather than on correlations alone.

b. Measurement Model

Confirmatory Factor Analysis (CFA) was conducted before evaluation of the structural model to determine whether the observed indicators adequately represented the four theoretically distinct constructs: CEN, loneliness, emotion dysregulation, and NSSI. The four-factor measurement model demonstrated acceptable fit to the observed data, $\chi^2/df = 2.18$, CFI = .944, TLI = .936, RMSEA = .055, and SRMR = .048. Considered collectively, these indices supported proceeding to structural-model estimation.

Table 3. Measurement Model Fit Indices

Fit Index	Criterion	Obtained Value
χ^2/df	< 3.00	2.18
CFI	≥ .90	.944
TLI	≥ .90	.936
RMSEA	≤ .08	.055
SRMR	≤ .08	.048

All retained standardized factor loadings were statistically significant ($p < .001$), ranging from .60 to .86. Composite Reliability (CR) exceeded .70 and Average Variance Extracted (AVE) exceeded .50 for each construct, providing evidence of internal consistency and convergent validity.

Table 4. Measurement Properties of the Study Constructs

Construct	Retained Indicators	Standardized Loading Range	CR	AVE
Childhood Emotional Neglect	5	.66–.83	.89	.62
Loneliness	8	.64–.86	.91	.58
Emotion Dysregulation	12	.61–.84	.93	.55
Non-Suicidal Self-Injury	7	.60–.81	.87	.52

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Important: the term "Retained Indicators" is preferable to simply "Items" here until we verify exactly why UCLA changed from 20 administered items to 8 CFA indicators and DERS from 36 to 12. The manuscript must explicitly explain this reduction and identify the retained indicators. Otherwise, reviewer No. 7 remains unanswered. Discriminant validity was evaluated using the Heterotrait–Monotrait ratio (HTMT). As shown in Table 5, all HTMT values were below .85. The largest value was observed between emotion dysregulation and NSSI (HTMT = .73), remaining below the prespecified threshold. These results supported the empirical distinctiveness of the four constructs.

Table 5. HTMT Ratios Among Study Constructs

Construct	1	2	3	4
Childhood Emotional Neglect	—			
Loneliness	.54	—		
Emotion Dysregulation	.61	.68	—	
Non-Suicidal Self-Injury	.50	.57	.73	—

Taken together, the factor loadings, CR, AVE, and HTMT results provided support for the reliability, convergent validity, and discriminant validity of the measurement model. Structural relationships were therefore examined subsequently.

c. Structural Model and Hypothesis Testing

The structural model was estimated to test the complete network of direct relationships specified in the Research Framework. The model demonstrated acceptable fit: $\chi^2/df = 2.26$, CFI = .938, TLI = .929, RMSEA = .057, and SRMR = .052.

Table 6. Structural Model Fit Indices

Fit Index	Criterion	Obtained Value
χ^2/df	< 3.00	2.26
CFI	≥ .90	.938
TLI	≥ .90	.929
RMSEA	≤ .08	.057
SRMR	≤ .08	.052

The model explained 18% of the variance in loneliness (R^2 = .18), 38% in emotion dysregulation (R^2 = .38), and 43% in NSSI (R^2 = .43). Thus, the complete set of predictors included in the model accounted for a substantial proportion of individual differences in NSSI within the present sample, although a majority of its variance remained unexplained by the model.

Table 7. Structural Path Coefficients and Hypothesis Testing

hypothesis	Structural Path	β	SE	C.R.	p	Decision
H1	CEN → NSSI	.16	.054	2.97	.003	Supported
H2	CEN → Loneliness	.42	.052	7.64	< .001	Supported
H3	Loneliness → NSSI	.18	.055	3.24	.001	Supported
H4	CEN → Emotion Dysregulation	.31	.058	5.42	< .001	Supported
H5	Loneliness → Emotion Dysregulation	.38	.057	6.71	< .001	Supported
H6	Emotion Dysregulation → NSSI	.41	.052	7.88	< .001	Supported

All six hypothesized direct associations were statistically significant and positive. CEN was positively associated with NSSI (β = .16, p = .003), supporting H1. CEN was also positively associated with loneliness (β = .42, p < .001) and emotion dysregulation (β = .31, p < .001), supporting H2 and H4, respectively. Loneliness

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was positively associated with NSSI (β = .18, p = .001), supporting H3, and with emotion dysregulation (β = .38, p < .001), supporting H5. Finally, emotion dysregulation was positively associated with NSSI (β = .41, p < .001), supporting H6. Among the three direct predictors of NSSI included simultaneously in the model, emotion dysregulation showed the largest standardized path coefficient (β = .41), followed by loneliness (β = .18) and CEN (β = .16). This comparison describes the relative magnitude of standardized associations within the present model and sample and should not be interpreted as evidence of relative causal importance.

d. Statistical Indirect Effects

Specific and serial indirect associations were examined using 5,000 bootstrap resamples with 95% bias-corrected confidence intervals. An indirect association was considered statistically significant when its bootstrap confidence interval did not contain zero.

Table 8. Direct, Specific Indirect, Serial Indirect, and Total Effects

Effect	β	95% Bias-Corrected CI	Decision
Direct: CEN → NSSI	.16	[.05, .27]	Significant
H7: CEN → Loneliness → NSSI	.08	[.03, .14]	Supported
H8: CEN → Emotion Dysregulation → NSSI	.13	[.07, .20]	Supported
H9: CEN → Loneliness → Emotion Dysregulation → NSSI	.07	[.03, .12]	Supported
Total indirect association	.28*	[.19, .37]	Significant
Total association	.44*	[.33, .55]	Significant

The specific indirect association between CEN and NSSI through loneliness was statistically significant (β = .08, 95% CI [.03, .14]), supporting H7. Thus, the data were consistent with an interpersonal indirect pathway in which greater reported CEN corresponded with greater loneliness, which was in turn associated with greater NSSI. The specific indirect association through emotion dysregulation was also statistically significant (β = .13, 95% CI [.07, .20]), supporting H8. Among the two single-mediator indirect pathways, the standardized indirect association involving emotion dysregulation was numerically larger than that involving loneliness. Most importantly, the hypothesized serial indirect association CEN → loneliness → emotion dysregulation → NSSI was statistically significant (β = .07, 95% CI [.03, .12]), supporting H9. The confidence interval did not contain zero, indicating that the observed covariance structure was statistically consistent with the theoretically proposed serial pathway. The direct CEN → NSSI association remained statistically significant after loneliness and emotion dysregulation were incorporated into the model (β = .16, 95% CI [.05, .27]). Thus, the statistical association between CEN and NSSI was not entirely accounted for by the two proposed mediators. Importantly, these findings do not establish that CEN temporally causes loneliness, that loneliness subsequently produces emotion dysregulation, or that emotion dysregulation subsequently causes NSSI. Because all substantive variables were measured cross-sectionally, the indirect estimates represent statistical indirect associations consistent with the proposed model. Temporal and causal mediation would require longitudinal or experimental evidence.

4.2. Discussion

The present study examined the associations among childhood emotional neglect, loneliness, emotion dysregulation, and NSSI among Indonesian emerging adults within an attachment-informed interpersonal–emotion regulation framework. Three main findings emerged. First, CEN was positively associated with loneliness, emotion dysregulation, and NSSI. Second, both loneliness and emotion dysregulation were independently associated with NSSI, with emotion dysregulation displaying the largest direct standardized association with NSSI in the structural model. Third, CEN showed significant specific indirect associations with NSSI through loneliness and emotion dysregulation, as well as a significant serial indirect association through loneliness followed by emotion dysregulation. Collectively, the findings support

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the statistical plausibility of the proposed research framework while remaining subject to the temporal limitations inherent in cross-sectional data.

a. Childhood Emotional Neglect and NSSI

The positive association between CEN and NSSI supported H1 and is broadly consistent with evidence linking childhood maltreatment with later self-injurious behavior. However, the magnitude of the direct structural association in the present model was relatively modest (β = .16) after loneliness and emotion dysregulation were considered simultaneously. This pattern is noteworthy in light of previous meta-analytic evidence showing that emotional neglect is associated with NSSI but may exhibit a weaker and less consistent relationship than some other forms of childhood maltreatment (Liu et al., 2018). More recent meta-analytic evidence nevertheless continues to support an association between childhood maltreatment, including neglect, and NSSI (Calvo et al., 2024). Rather than contradicting previous mixed findings, the present result may help clarify them. CEN may be relevant to NSSI not primarily as an isolated direct correlate but as one developmental experience embedded within broader interpersonal and emotional processes. The persistence of a significant direct path alongside significant indirect paths indicates that loneliness and emotion dysregulation statistically accounted for part, but not all, of the CEN–NSSI association. Attachment Theory provides a coherent interpretation of this pattern. Repeated emotional unavailability from caregivers may contribute to internal working models characterized by uncertainty regarding whether others will be emotionally responsive and whether one's emotional needs are worthy of attention (Bowlby, 1969/1982; Dagan et al., 2018). Such expectations may remain relevant during emerging adulthood, when individuals increasingly rely on peer, intimate, educational, and occupational relationships for emotional support. The present results are compatible with this theoretical account, although they do not establish the developmental sequence proposed by the theory.

b. Childhood Emotional Neglect and Loneliness

CEN showed a moderate positive association with loneliness (β = .42), supporting H2. This result is consistent with the proposition that emotional neglect may have consequences extending beyond the original caregiver–child relationship. Individuals whose emotional needs were repeatedly overlooked may subsequently experience uncertainty about the availability of emotional support or difficulty experiencing later relationships as sufficiently responsive. The finding is particularly consistent with Ho and Schermer (2024), who reported that emotional neglect was strongly associated with loneliness in adulthood. However, their results also indicated that associations varied according to sex and parental figure. Thus, neither their findings nor those of the present study suggest that CEN inevitably results in loneliness. Instead, early emotional experiences may represent one factor contributing to vulnerability to later perceived interpersonal disconnection. This distinction is theoretically important because loneliness reflects subjective insufficiency of interpersonal connection, not simply the number of available social contacts. Emerging adults may therefore participate actively in university, employment, friendship, or family networks while still experiencing their relationships as emotionally insufficient.

c. Loneliness and NSSI

Loneliness was positively associated with NSSI (β = .18), supporting H3, and also formed a significant specific indirect pathway between CEN and NSSI (β = .08), supporting H7. These results suggest that interpersonal disconnection may be relevant to understanding why earlier emotional adversity is associated with self-injurious behavior. One possible interpretation is that individuals experiencing loneliness perceive fewer emotionally dependable relationships as available during periods of distress. Under such circumstances, interpersonal strategies for seeking reassurance, communicating distress, or obtaining emotional support may be perceived as less accessible. This interpretation is consistent with literature linking loneliness with broader psychological distress and adverse mental-health outcomes (Loades et al., 2020; McClelland et al., 2020). However, the observed relationship may not operate exclusively from loneliness to NSSI. Individuals

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who engage in NSSI may conceal their behavior because of fear of judgment or stigma, potentially contributing to withdrawal or perceived disconnection. Psychological difficulties such as depressive symptoms may also contribute to both loneliness and NSSI. Consequently, the present findings support an association and statistical indirect pathway but cannot establish the direction of interpersonal influence.

d. Childhood Emotional Neglect and Emotion Dysregulation

CEN was positively associated with emotion dysregulation (β = .31), supporting H4. This finding is consistent with the attachment-informed view that caregivers contribute not only to children's expectations about relationships but also to the interpersonal context in which emotion-regulation capacities develop. Emotionally responsive caregiving can provide opportunities for children to identify emotional states, receive validation, observe adaptive responses, and experience co-regulation during distress. In emotionally neglectful contexts, such opportunities may occur less consistently. Over time, this may correspond with greater difficulty identifying, accepting, or adaptively responding to emotional experiences. Importantly, the association observed here was probabilistic rather than deterministic. CEN explained only part of the variability in emotion dysregulation, and individuals with similar childhood experiences may develop differently depending on later supportive relationships, coping resources, temperament, and other developmental experiences.

e. Loneliness and Emotion Dysregulation

Loneliness was positively associated with emotion dysregulation (β = .38), supporting H5. This path is particularly important because it links the interpersonal and emotional components of the proposed serial model. Supportive interpersonal relationships can function as resources for emotion regulation by providing reassurance, validation, perspective, and opportunities for co-regulation. Perceived interpersonal disconnection may therefore correspond with fewer perceived resources for managing distress. In the present sample, greater loneliness was indeed associated with greater emotion-regulation difficulties even when CEN was included in the same structural model. Nevertheless, this path requires especially cautious interpretation. Emotion dysregulation may also contribute to loneliness by impairing communication, increasing emotional reactivity, or creating difficulties maintaining satisfying interpersonal relationships. The positive structural path observed here therefore supports the theoretical ordering specified in the research framework but does not establish that loneliness temporally precedes emotion dysregulation.

f. Emotion Dysregulation and NSSI

Emotion dysregulation demonstrated the largest standardized direct association with NSSI among the predictors in the model (β = .41), supporting H6. This finding is consistent with the systematic review and meta-analysis by Wolff et al. (2019), which identified a substantial association between difficulties in emotion regulation and NSSI. The result also supports functional interpretations of NSSI in which self-injury may occur, for some individuals, in the context of attempts to alter, interrupt, or manage intense emotional states when adaptive regulation strategies are perceived as insufficient. Importantly, Wolff et al. (2019) demonstrated that different components of emotion dysregulation do not relate equally strongly to NSSI, emphasizing that emotion dysregulation should not be treated as a singular or sufficient explanation for self-injury. The current β = .41 should therefore not be interpreted as evidence that emotion dysregulation is the "most important cause" of NSSI. It simply represents the largest standardized direct association among the predictors included in this particular model and sample.

g. Specific Indirect Role of Emotion Dysregulation

The indirect association CEN → emotion dysregulation → NSSI was statistically significant (β = .13), supporting H8. Notably, this indirect estimate was numerically larger than the corresponding indirect association through loneliness alone (β = .08). This pattern is theoretically meaningful. Previous research has suggested that emotional-regulation difficulties may be one psychological process through which childhood

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maltreatment is associated with NSSI (Liu et al., 2018; Wolff et al., 2019). The present findings extend this evidence by showing that emotion dysregulation remained statistically relevant when loneliness and the direct CEN–NSSI association were simultaneously represented within the same model. However, the indirect relationship remains statistical rather than temporal. Retrospectively reported CEN and contemporaneously measured emotion dysregulation and NSSI cannot establish that emotion-regulation difficulties developed after CEN or before NSSI.

h. Serial Indirect Association

The principal contribution of the study concerns H9. The serial indirect association CEN → loneliness → emotion dysregulation → NSSI was statistically significant (β = .07, 95% CI [.03, .12]). This result indicates that the covariance among the four constructs was consistent with the integrated attachment-informed interpersonal–emotion regulation sequence proposed in the Research Framework. This finding extends models in which loneliness and emotion dysregulation are considered separately. Within the present framework, CEN represents an early adverse interpersonal experience, loneliness represents current perceived interpersonal disconnection, and emotion dysregulation represents difficulty managing emotional experiences. Their integration provides a more differentiated account of the CEN–NSSI association than a model focused exclusively on a direct relationship.

The serial result also provides partial empirical support for the theoretical integration proposed in this study. Attachment Theory explains why emotionally unavailable caregiving may remain relevant to later expectations regarding interpersonal support, whereas interpersonal and emotion-regulation perspectives explain how perceived disconnection and difficulties managing distress may be associated with NSSI. The theoretical contribution therefore lies not in proposing new psychological constructs but in integrating established constructs within a single empirically tested framework. At the same time, the serial pathway should not be described as evidence of a developmental mechanism. Emotion dysregulation could precede or contribute to loneliness, the two processes may reinforce each other over time, and NSSI itself may influence subsequent interpersonal functioning. Longitudinal studies comparing alternative directional models are required before the temporal ordering proposed here can be supported.

V. Conclusion

The present study examined the associations among childhood emotional neglect (CEN), loneliness, emotion dysregulation, and non-suicidal self-injury (NSSI) among emerging adults within an attachment-informed interpersonal–emotion regulation framework. The findings showed that CEN was positively associated with loneliness, emotion dysregulation, and NSSI. Loneliness and emotion dysregulation were also positively associated with NSSI, with emotion dysregulation showing the largest standardized direct association with NSSI among the predictors included in the structural model. Beyond these direct relationships, the findings supported the proposed indirect pathways. CEN showed significant specific indirect associations with NSSI through loneliness and through emotion dysregulation. More importantly, the serial indirect association through CEN → loneliness → emotion dysregulation → NSSI was statistically significant. This pattern suggests that examining interpersonal disconnection and emotion-regulation difficulties together provides a more differentiated account of the association between childhood emotional neglect and NSSI than considering CEN as an isolated correlate.

The findings therefore provide empirical support for the statistical plausibility of the proposed attachment-informed interpersonal–emotion regulation framework among Indonesian emerging adults. They do not, however, establish a developmental or causal sequence. Because all substantive variables were assessed cross-sectionally, the significant indirect associations cannot demonstrate that CEN causes loneliness, that loneliness temporally precedes emotion dysregulation, or that emotion dysregulation subsequently causes NSSI. The model should instead be understood as one theoretically specified representation of the observed relationships. Future research should test the proposed ordering using

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longitudinal and repeated-measure designs and directly compare it with theoretically plausible alternatives, including CEN → emotion dysregulation → loneliness → NSSI and reciprocal relationships between loneliness and emotion dysregulation. Replication in clinical and more diverse community samples, together with multi-method assessment and cross-cultural designs, would further clarify the generalizability and temporal structure of these relationships.

The primary theoretical contribution of this study lies in integrating developmental, interpersonal, and emotion-regulation processes within a single research framework. Rather than proposing new psychological constructs, the study extends existing literature by positioning Attachment Theory as the developmental foundation linking CEN with later interpersonal and emotional functioning, while loneliness and emotion dysregulation represent theoretically distinguishable proximal correlates associated with NSSI. This integration is important because the findings suggest that the association between CEN and NSSI cannot be fully represented by a simple direct relationship. Although CEN remained directly associated with NSSI, significant indirect associations were also observed through loneliness and emotion dysregulation. The results therefore support a more differentiated theoretical account in which earlier emotional adversity, current perceived interpersonal disconnection, and difficulties regulating distress are statistically interconnected.

The significant serial indirect association provides further support for this integration. The observed covariance structure was consistent with a model in which CEN was associated with greater loneliness, loneliness was associated with greater emotion dysregulation, and emotion dysregulation was subsequently associated with greater NSSI. This finding extends approaches that examine interpersonal and emotion-regulation processes separately by demonstrating that both can be incorporated within the same structural framework. At the same time, the findings refine rather than confirm the temporal assumptions of the proposed framework. Attachment Theory provides a theoretically plausible developmental foundation, but the present cross-sectional evidence cannot demonstrate that the proposed sequence actually unfolds over time. Emotion dysregulation may contribute to interpersonal difficulties and loneliness, loneliness and dysregulation may reinforce one another, and NSSI itself may affect subsequent interpersonal functioning. Future longitudinal studies should therefore compare competing directional models rather than assuming that the serial ordering identified here represents the only plausible developmental pathway. The study also extends the empirical setting of this literature by testing the proposed framework among emerging adults in Indonesia. This provides evidence that the hypothesized relationships are observable within the present Indonesian sample. However, the study did not measure cultural orientation or directly compare cultural groups. Consequently, the findings should not be interpreted as demonstrating that collectivism, family harmony, emotional restraint, or other cultural characteristics account for the observed relationships. Direct measurement of culturally relevant constructs will be necessary before culture can be incorporated as an explanatory or moderating mechanism.

The findings have potential implications for psychological assessment and prevention among emerging adults reporting NSSI. Assessment may benefit from extending beyond the presence or frequency of self-injurious behavior to include relevant developmental, interpersonal, and emotional domains. In particular, a reported history of childhood emotional neglect may warrant careful assessment of current loneliness, perceived social connectedness, and difficulties regulating emotional distress. Emotion dysregulation may deserve particular clinical attention because it showed the largest standardized direct association with NSSI among the predictors included in the present model. Assessment could therefore consider difficulties accepting negative emotions, maintaining behavioral control during distress, and accessing adaptive emotion-regulation strategies. Nevertheless, this finding should not be interpreted as indicating that emotion dysregulation is the strongest causal determinant of NSSI, as the present design does not permit causal comparison.

The significant role of loneliness additionally indicates that interpersonal functioning should not be overlooked. Individuals may remain socially active while experiencing their relationships as emotionally insufficient. Assessment of NSSI may therefore benefit from considering the perceived quality and emotional availability of social relationships rather than relying solely on objective indicators such as the number or

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frequency of social contacts. At the prevention level, the findings identify social connectedness and emotion regulation as relevant domains for future intervention research. Programs incorporating interpersonal support, emotional awareness, emotional acceptance, distress tolerance, and adaptive coping strategies may be appropriate candidates for evaluation among emerging adults with histories of emotional neglect or NSSI. University counseling services and other young-adult mental-health settings may be particularly relevant contexts for such work given the developmental population examined in this study. These implications should nevertheless remain proportionate to the evidence. The present study does not demonstrate that interventions targeting loneliness or emotion dysregulation will reduce NSSI. Such conclusions require prospective and controlled intervention studies. The current findings are therefore most appropriately used to inform assessment priorities and future intervention development, rather than to establish treatment effectiveness.

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