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The Real-Time Interplay Between Identity, Emptiness, and Nonsuicidal Self-Injury Ideation: An Ecological Momentary Assessment Study in Treatment-Seeking Individuals

Kristina Eggermont[1, 2], Laurence Claes[1, 2, 3], Koen Luyckx[1, 2, 4], Annabel Bogaerts[5], Inez Myin-Germeys[6], and Glenn Kiekens[1, 6, 7]

[1] Faculty of Psychology and Educational Sciences, KU Leuven
[2] Child and Youth Institute, KU Leuven
[3] Faculty of Medicine and Health Sciences (CAPRI), University of Antwerp
[4] UNIBS, University of the Free State
[5] Department of Psychology, Clinical Developmental Psychology Group, University of Amsterdam
[6] Department of Neurosciences, Center for Contextual Psychiatry, KU Leuven
[7] Department of Medical and Clinical Psychology, Tilburg University

Although research has shown that individuals with identity difficulties are at greater risk of nonsuicidal self-injury (NSSI), less is known about the associations between identity, emptiness, and NSSI ideation in daily life. This study addressed this gap using an ecological momentary assessment design with six daily EMA surveys for 28 days in a treatment-seeking sample of 123 adolescents and adults (mean age = 23.07, *SD* = 5.32), yielding a total of 14,776 longitudinal assessments (median compliance = 77.4%). Results showed that lower-than-usual momentary identity synthesis and higher-than-usual momentary identity confusion independently predicted within-person changes in the intensity of NSSI ideation. Even after controlling for negative affect, we found evidence for a cyclic identity–emptiness model in which identity and emptiness bidirectionally increase each other's intensity on a 2-hr time scale and subsequently predict higher intensity of NSSI ideation 2 hr later. Analyses comparing full- and half-longitudinal mediation models consistently confirmed the robustness of these findings for identity synthesis. The strength of these within-person associations was not moderated by the number of baseline borderline personality disorder symptoms, except for a higher within-person mean of emptiness. These findings highlight the potential value of ecological momentary interventions that target identity and feelings of emptiness in real time to prevent NSSI ideation among patients. Future research should further clarify the dynamic interplay between identity and emptiness in daily life and how these processes contribute to the emergence and maintenance of NSSI.

General Scientific Summary

This study explored how identity difficulties and emptiness predict nonsuicidal self-injury (NSSI) ideation in daily life. Using six daily surveys over 28 days in treatment-seeking adolescents and adults, we found that lower-than-usual identity synthesis and higher-than-usual emptiness intensify one another over a 2-hr time scale and subsequently predict increased NSSI ideation. These findings suggest that focusing on the real-time interplay between identity and emptiness could help mitigate NSSI ideation in treatment-seeking individuals.

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Kristina Eggermont https://orcid.org/0000-0002-5133-2641

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The experiment materials are available at https://osf.io/e75db/?view_only=153b1b0319294d2bbf10d90c5f38b8c8

Correspondence concerning this article should be addressed to Kristina Eggermont, Faculty of Psychology and Educational Sciences, KU Leuven, Tiensestraat 102 – Box 3717, 3000 Leuven, Belgium. Email: kristina.eggermont@kuleuven.be

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Nonsuicidal self-injury (NSSI) refers to the deliberate and direct injury to one's own body tissue without suicidal intent (International Society for the Study of Self-Injury, 2025) and has been recognized as a global mental health concern (Akbari et al., 2024). NSSI is prevalent among individuals seeking treatment (Glenn et al., 2017; Groschwitz et al., 2015), with half of adolescents and one in 10 adults reporting past-month NSSI (Millon et al., 2024; Ose et al., 2021). Most NSSI research relies on cross-sectional or long-term longitudinal designs, focusing on between-person nomothetic risk perspectives for NSSI (i.e., who is at greater relative risk). Although insightful, little is known about *when* individuals who self-injure are at higher short-term risk in daily life (Kiekens et al., 2021). Addressing this question is highly relevant for the clinical management of NSSI and requires a within-person perspective in which individuals are compared with themselves across multiple assessments (Piccirillo & Rodebaugh, 2019).

Ecological momentary assessment (EMA; also termed experience sampling method or ESM; Myin-Germeys et al., 2018) involves intensive repeated measurement in a naturalistic setting, resulting in intensive longitudinal survey data that allow to investigate associations at both between and within-person levels (Kaurin et al., 2023; Shiffman et al., 2008). Previous EMA studies have shown that NSSI ideation, conceptualized as both thoughts about NSSI engagement and NSSI urges, is a key precursor for the manifestation of NSSI behavior in daily life (Ammerman et al., 2017; Andrewes et al., 2017; Hughes et al., 2019; Nock et al., 2009). Prior work has indicated that treatment-seeking individuals with higher levels of NSSI ideation not only report more frequent NSSI behavior than those with lower levels of ideation but also are at an elevated risk of engaging in NSSI within the next 2 hr when experiencing higher-than-usual NSSI ideation (Kiekens et al., 2024). Therefore, obtaining a better understanding of the real-time risk factors for NSSI ideation should be considered a prerequisite for preventing NSSI behavior.

One well-established between-person risk factor for engaging in NSSI is identity (Verschueren et al., 2020). According to Erikson (1950, 1968), identity development entails a balance between a sense of identity synthesis (i.e., experiencing a stable, coherent and positive self, characterized by a personally relevant set of life goals, values, and beliefs) and a sense of identity confusion (i.e., experiencing a fragmented sense of self, characterized by difficulties in setting goals or making commitments). Although inversely related, these two identity dimensions are considered distinct constructs that can coexist within individuals (Schwartz et al., 2009). Over the course of normative development, most individuals eventually experience more identity synthesis than confusion and thus reach a somewhat stable, coherent, and positive identity. However, some individuals continue to have doubts about who they are and cannot integrate different parts of their identity in a coherent way, which can lead to pathological identity functioning. Although identity development is a key developmental task in adolescence and emerging adulthood, it extends beyond this phase and is considered a lifelong, continuous process (Erikson, 1968).

A substantial body of (mostly cross-sectional) research in community and clinical samples has established that low identity synthesis and high identity confusion are each significantly and uniquely associated with NSSI, above and beyond depressive symptoms, age, and gender (Verschueren et al., 2020). These identity dimensions have shown unique associations with NSSI (Buelens et al., 2023; Gandhi et al., 2017; Luyckx et al., 2015) and are theorized to influence psychopathology through distinct pathways (de Carvalho & Veiga, 2022). For instance, in a two-wave longitudinal study in high school students, Gandhi et al. (2017) found that adolescents who reported lifetime NSSI at Wave 1 and still engaged in NSSI 1 year later (at Wave 2), showed a significant increase in identity synthesis (possibly due to NSSI serving as an identity substitute), which was not accompanied by a decrease in identity confusion. Furthermore, in a three-wave longitudinal study in high school students, Buelens et al. (2023) found that, above and beyond trauma, identity confusion (and not identity synthesis) predicted the transition from no NSSI engagement to subthreshold NSSI disorder 1 year later. Verschueren et al. (2020) suggest that engaging in NSSI may be helpful when experiencing identity difficulties in two ways. First, NSSI may serve as a way to regulate distressing emotions that accompany identity difficulties. Second, NSSI engagement may offer an alternate sense of self ("I am a self-injurer") to those who are confused about their identity, which may provide temporary relief. However, studies examining the role of identity in NSSI ideation within individuals' daily life are scarce. In an EMA study in adolescents meeting at least three borderline personality disorder (BPD) criteria, Chung and Kaufman (2024) found that lower momentary self-concept clarity (measured by the item "At this moment, I have a clear sense of who I am") was concurrently positively associated with the intensity of self-harm wishes. Furthermore, Scala et al. (2018) found preliminary evidence of a temporal association such that lower-than-usual self-concept clarity (assessed with the item "Right now, I have a clear sense of who I am and what I am") incrementally predicted the presence of NSSI urges 2 hr later in an adult outpatient sample, controlling for prior urges. However, no research to date has examined whether identity synthesis and identity confusion independently predict NSSI ideation in daily life. Given that theoretical models and empirical evidence suggest that each dimension may contribute uniquely to psychopathology, this gap underscores the importance of investigating both identity synthesis and confusion as distinct momentary predictors of NSSI ideation.

If identity operates as a real-time risk factor for NSSI ideation, understanding the underlying processes that drive within-person risk represents a clinically important next step for investigation. One potential mechanism through which identity may

contribute to the manifestation of NSSI ideation at the within-person level is through feelings of emptiness. Emptiness has been characterized in the literature as a profound hollowness, lack of meaning, and disconnection from the self and others, suggesting a close link between identity and emptiness (Elsner et al., 2018; Miller et al., 2020; Price et al., 2022). Indeed, cross-sectional studies have found positive associations between the two concepts (Campbell et al., 2021; Elsner et al., 2018; Martin & Levy, 2022; Miller et al., 2020; Price et al., 2022). A longitudinal study conducted at 6-month intervals found that feelings of emptiness predicted identity instability, over and above their autoregressive effects (Jiménez et al., 2025). Nonetheless, the momentary temporal association between identity and emptiness remains unclear in the absence of short-term prospective research, limiting our understanding of how identity and emptiness might predict NSSI ideation in daily life. Kernberg (1985) described that when experiencing a disintegrated identity, individuals may feel a disconnection with the self, which may result in feelings of emptiness. These feelings may then lead to harmful thoughts to escape from these inner experiences or may lead to a more passive response in which the individual "undergoes" these feelings of emptiness—experiencing a profound inner void, emotional numbness, and a disconnection from daily engagements. Both responses inhibit active identity development and thus may result in more identity difficulties. Similarly, Blasco-Fontecilla et al. (2013) and Miller et al. (2020) proposed a model in which identity difficulties increase feelings of emptiness which may then lead to NSSI ideation. Yet, the validity and specificity of this identity–emptiness model have not been investigated in everyday life.

Notably, identity difficulties, chronic emptiness, and NSSI are prominently associated with BPD (Cipriano et al., 2017; Elsner et al., 2018; Kaufman & Meddaoui, 2021; Reichl & Kaess, 2021) and represent three of the nine diagnostic criteria for BPD in the *Diagnostic and Statistical Manual of Mental Disorders, fifth edition, text revision* Section II (*DSM-5-TR*; American Psychiatric Association [APA], 2022). However, research is limited on whether greater endorsement of BPD symptoms measured by single-time-point questionnaires corresponds to higher momentary levels and variability of state BPD symptoms (such as identity difficulties, feelings of emptiness, and NSSI) and their associations over time. Therefore, we will explore whether the number of BPD symptoms measured at baseline predicts the strength of components within the identity–emptiness model and its relation to NSSI ideation.

The Present Study

To address these gaps in the literature, the present study used intensive longitudinal data from the Detection of Acute Risk of Self-Injury (DAILY) project (Kiekens et al., 2023), an EMA study in treatment-seeking adolescents and (emerging) adults (see also Kiekens et al., 2024; Robillard et al., 2025). The objectives were to examine whether (a) momentary identity synthesis and identity confusion predict short-term changes in the intensity of NSSI ideation, (b) momentary identity synthesis/confusion and momentary emptiness bidirectionally predict short-term changes in each other's state, (c) emptiness accounts for the temporal association between momentary identity synthesis/confusion and NSSI ideation across hours, and (d) the number of BPD symptoms predicts the person-specific intensity of these associations. We present the findings of these objectives with identity synthesis and identity confusion as separate dimensions. The findings on identity difficulties as a composite are in Supplementary materials. Given the well-established prospective within-person association between negative affect and NSSI (Brown et al., 2022; Kuehn et al., 2022), we controlled for momentary negative affect in all mediation models predicting NSSI ideation.

Transparency and Openness

The initial research plan and hypotheses for the current study were postregistered (Eggermont et al., 2025, November 9) based on a template for EMA research (Kirtley et al., 2021b). Models requested by reviewers are noted in a deviation document, with all results presented in Supplementary materials. All materials and codes are made freely available on the Open Science Framework for transparency purposes through https://osf.io/e75db/overview?view_only=153b1b0319294d2bbf10d90c5f38b8c8. We report all data exclusions and all measures in the study. Given that we used existing data, the sample size for this study was limited to the available data. There were no manipulations in the present study. The Research Foundation Flanders funded the study, and ethics approval was received from the Ethics Committee Research UZ/KU Leuven. All procedures were conducted in accordance with the provisions of the World Medical Association Declaration of Helsinki.

Method

Participants and Procedure

The objectives of the DAILY project and all materials have been described in detail elsewhere (Kiekens et al., 2023). In what follows, we present relevant procedures and materials for the present study. Patients were selected based on the following inclusion criteria: age 15–39, sufficient Dutch language proficiency, experiencing past-month NSSI urges at intake, and receiving inpatient/outpatient treatment. They were recruited from mental health services in Flanders (Belgium), including nine inpatient settings, eight outpatient settings, and four hybrid care settings. Patients were informed about the study through their mental health professionals (i.e., referral sampling), study flyers, or information sessions given by researchers of the DAILY study. Data collection occurred in three phases: (a) a baseline assessment, (b) 28 days of EMA, and (c) follow-up surveys and/or an interview. In the present study, we used data collected in the first two phases. In the baseline assessment, several self-report questionnaires were completed by the patients, as well as a structured clinical interview for *DSM*–5 disorders. The second phase consisted of six regular daily EMA surveys for 28 days between 10 a.m. and 9:30 p.m. Additional surveys were conditionally triggered by intense NSSI urges but were not used for the purpose of the current objectives. The patients were financially compensated based on their compliance (between 20 and 100 euros) and received personalized feedback reports that were discussed in their therapy.

The study sample consisted of 123 treatment-seeking individuals (M_{age} = 23.07, SD_{age} = 5.32) who completed a total of 14,800 regular EMA surveys with a median completion time of 86 s (Interquarile range = 62.0–128.0). The median compliance rate was 77.38% (Interquartile range = 59.23–88.10%), with an average of 120 assessments per patient. Only 24 assessments were submitted after 45 min, yielding 14,776 valid assessments (99.84%) for analysis. Table 1 shows the sociodemographic and clinical characteristics of the sample. The majority met criteria for at least one *DSM*–5 mental disorder (99.19%), with a median of 4 (range = 0–7) *DSM*–5 mental disorders being met. A total of 94 patients (74.80%) scored above the cutoff of the BPD screener. We did not assess information on ethnicity or culture.

Table 1
Sociodemographic and Clinical Characteristics of the Sample (N = 123)

Sociodemographic or clinical characteristic	*n* (%)/*Mdn* (range)
Age	
Adolescents (age 15–18 years)	26 (21.13%)
Emerging adults (age 19–29 years)	82 (66.67%)
Adults (age 30–39 years)	15 (12.19%)
Gender	
Female	107 (86.99%)
Male	8 (6.50%)
Nonbinary	8 (6.50%)
Highest educational level	
Primary school	25 (20.32%)
Secondary school	70 (56.91%)
College/university	28 (22.76%)
Professional status	
Sick leave (social benefits)	50 (40.65%)
Student	46 (37.40%)
Employed	9 (7.32%)
Unemployed	6 (4.88%)
Other	12 (9.76%)
Current *DSM*–5 mental disorders	
NSSI *DSM*–5 disorder (past 12 months)	88 (71.54%)
MDD (past month)	84 (68.29%)
GAD (past 6 months)	83 (67.48%)
PTSD (past month)	70 (56.91%)
PD (past month)	50 (40.65%)
ED (past 3 months)	46 (37.40%)
AUD (past 12 months)	33 (26.83%)
Other SUD (past 12 months)	49 (39.84%)
Any *DSM*–5 mental disorder	122 (99.19%)
Number of *DSM*–5 mental disorders	4 (0–7)
BPD cutoff (screener)	92 (74.80%)
Health care setting at enrolment	
Inpatient setting	45 (36.58%)
Outpatient setting	45 (36.58%)
Hybrid care setting	33 (26.83%)
Past-month NSSI thoughts	
1–4 times	14 (11.38%)
5–20 times	49 (39.84%)
21–50 times	48 (39.02%)
51–100 times	4 (3.25%)
+100 times	8 (6.50%)

Note. AUD = alcohol use disorder; BPD = borderline personality disorder; *DSM*–5 = *Diagnostic and Statistical Manual of Mental Disorders*–fifth edition; ED = eating disorder; GAD = generalized anxiety disorder; MDD = major depressive disorder; NSSI = nonsuicidal self-injury; PD = panic disorder; PTSD = posttraumatic stress disorder; SUD = substance use disorder.

Measurements

Time-Invariant Variables at Baseline

Borderline Personality Disorder Symptoms. Patients completed the Dutch McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Verschuere & Tibboel, 2011; Zanarini et al., 2003). The MSI-BPD is a 10-item self-report questionnaire screening for BPD symptoms based on the *DSM*–IV (APA, 2000). Response options are either "yes" or "no," resulting in a total score between 0 and 10. Zanarini et al. (2003) found that a cutoff score of 7 showed good to excellent sensitivity and specificity. The MSI-BPD has been translated into Dutch and showed good psychometric properties in this version as well (Verschuere & Tibboel, 2011).

Clinical Characteristics. *DSM*–5 mental disorders (i.e., major depressive disorder, generalized anxiety disorder, posttraumatic stress disorder, panic disorder, eating disorder, alcohol use disorder, substance use disorder) were assessed at baseline using the Dutch version of the Structured Clinical Interview for *DSM*–5 (SCID-5; Arntz et al., 2017; First et al., 2016). Interrater reliability of the SCID-5 was excellent, with agreement rates ranging between 92% and 100%, and the mean κ value being 0.95 (range = 0.84–1.00) in a 20% subsample (n = 25). Past-month NSSI thoughts and other NSSI variables (e.g., lifetime NSSI, lifetime methods, age of onset) were measured at baseline using the Dutch version of the Self-Injurious Thoughts and Behaviors Interview (SITBI; Kiekens et al., 2018; Nock et al., 2007). The Self-Injurious Thoughts and Behaviors Interview has previously demonstrated good construct validity with a κ ranging from 0.74 to 1.00, and strong interrater reliability for the presence and frequency of NSSI thoughts in the past year (κ range = 0.90–1.00; Fischer et al., 2014; Nock et al., 2007).

EMA/Time-Variant Variables

Momentary NSSI Ideation. NSSI ideation was conceptualized as the mean of retrospective NSSI thoughts and momentary NSSI urges (within-person correlation of .77; Kiekens et al., 2024). Both items were measured at every prompt. NSSI thoughts were assessed by the item "Since the last beep, have you considered deliberately hurting yourself without wanting to die?" on a 7-point scale ranging from *not at all* (0) to *very much* (6). Momentary NSSI urges were assessed by the following item: "Right now, how strong is the urge present to hurt yourself without wanting to die?" Participants could answer on a 7-point scale ranging from *absent* (0) to *very strong* (6).

Momentary Identity Synthesis and Confusion. Identity functioning was assessed at every prompt by two items: One item measured identity synthesis ("Right now, I know what I stand for"), and the other item measured identity confusion ("Right now, I doubt who I am"). These items have previously been used to assess momentary identity functioning (Kirtley et al., 2021a). Both items were answered on a 7-point scale, ranging from *not at all* (0) to *a lot* (6). The composite (used in the sensitivity analyses) was operationalized as the mean of both identity items at each prompt, with identity synthesis reverse-scored.

Momentary Emptiness. Emptiness was assessed at every prompt by the item "Right now, I feel empty." This item was answered on a 7-point scale ranging from *not at all* (0) to *a lot* (6).

Momentary Negative Affect. Negative affect was assessed at every prompt by five items indicating "Right now": "I feel anxious," "I feel stressed," "I feel irritated," "I feel sad," and "I feel insecure," which were answered on a 7-point scale ranging from *not at all* (0) to *a lot* (6). A composite for negative affect was calculated by the mean of these five negative emotions at each prompt. Using methods described by Shrout and Lane (2012), this composite of negative affect showed excellent between-person reliability ($R_{KR} = .99$, $R_{KRn} = .99$) and sufficient within-person reliability ($R_C = .78$, $R_{Cn} = .63$).

Statistical Analyses

All analyses were performed in Mplus Version 8.6 (Muthén and Muthén, 1998-2017) and RStudio Version 2024.09.1. Regarding preliminary analyses, we investigated descriptive statistics (e.g., means and standard deviations). For the EMA variables, we examined total variance (variance estimated across time and across individuals), intraclass correlations, and within-person root mean square of successive differences (Revelle, 2024). Furthermore, we calculated within- and between-person correlations between identity synthesis, identity confusion, and emptiness.

The primary objectives were examined by means of multilevel vector autoregressive (MVAR) models within the Dynamic Structural Equation Modeling framework (McNeish & Hamaker, 2020). All models included autoregressive effects for each variable. To address the first objective, two MVAR models were estimated to examine the within-person associations between identity$_{T-2\ hr}$ and NSSI ideation$_T$. The first model included identity synthesis, and the second included identity confusion. For the second objective, two MVAR models were run to examine the within-person associations between identity synthesis/confusion$_{T-2\ hr}$ and emptiness$_T$, and emptiness$_{T-2\ hr}$ and identity synthesis/confusion$_T$.

For the third objective, we ran two within-person full-longitudinal mediation models (1-1-1), one including identity synthesis and the other one including identity confusion (McNeish & MacKinnon, 2025). These models examined the effect of identity synthesis/confusion$_{T-4\ hr}$ on NSSI ideation$_T$ via emptiness$_{T-2\ hr}$ using three waves while controlling for negative affect$_{T-2\ hr}$ on NSSI ideation$_T$. If evidence of a bidirectional association between the dimensions of identity functioning and emptiness emerged for the second objective, two additional mediation models were explored with identity synthesis$_{T-2\ hr}$ or confusion$_{T-2\ hr}$ as mediator in the association between emptiness$_{T-4\ hr}$ and NSSI ideation$_T$, again using three waves and controlling for negative affect$_{T-2\ hr}$ on NSSI ideation$_T$. In addition, as requested by the reviewers, alternative model constellations were conducted to compare between: (a) half- (mediation over one time lag, two waves) versus full-longitudinal mediation models (mediation over two time lags, three waves; Cole & Maxwell, 2003; Mitchell & Maxwell, 2013; Selig & Preacher, 2009); (b) models operationalizing identity as a composite score versus the two separate theoretical dimensions of identity synthesis and confusion; and (c) full-longitudinal mediation models that, in addition to the substantive pathways of interest, also included an autoregressive mediation pathway (identity$_{T-4\ hr}$ → identity$_{T-2\ hr}$ → NSSI ideation$_T$ and emptiness$_{T-4\ hr}$ → emptiness $_{T-2\ hr}$ → NSSI ideation$_T$) while still controlling for negative affect$_{T-2\ hr}$ on NSSI ideation$_T$. In the Results section, we present the full-longitudinal mediation specification—including only the substantive pathways of interest and controlling for negative affect—to maintain temporal precedence, ensuring that the predictor (X) precedes the mediator (M) and the mediator (M) precedes the outcome (Y) (McNeish & MacKinnon, 2025; Selig & Preacher, 2009). However, relevant discrepancies across model constellations are noted and discussed, and interested readers are referred to Supplementary materials.

Finally, for the fourth objective, we investigated whether the total baseline number of BPD symptoms moderated as a Level 2 predictor the cross-regressive slopes between identity synthesis/confusion, emptiness, and NSSI ideation (i.e., research questions 1–2). These models also accounted for potential predictive effects of BPD symptoms regarding between-person variation in person-specific means, autoregressive slopes, and residual within-person variances.

Autoregressive parameters for identity synthesis/confusion, emptiness, negative affect, and NSSI ideation were included in all models to account for the self-predictive effect of these variables over time. By default, all models included random intercepts and random slopes for momentary variables. We specified an unrestricted covariance structure for random effects of intercepts and slopes, with residual variances being person-specific when possible. Time-variant variables were latent person-mean centered and time-invariant variables (i.e., total number of BPD symptoms at baseline) were grand-mean centered. Bayesian estimation was used with noninformative priors based on Markov Chain Monte Carlo using Gibbs sampling. To account for the semirandom sampling and for missing data, dynamic structural equation modeling uses a Kalman filter approach (McNeish & Hamaker, 2020). Finally, we evaluated whether there was a linear effect of time (operationalized in days since starting the EMA period) for within-person associations across all variables. If this effect was significant, it was added as a Level 1 covariate in subsequent models evaluating within-person effects (McNeish & Hamaker, 2020). Point estimates were obtained by taking each parameter's median of the posterior distributions. Statistical significance was evaluated by estimating 95% Bayesian credibility intervals (CrIs) around each point estimate, implying a 95% probability that the true comparison value is not 0. Each MVAR model was estimated using a minimum of 2,500 iterations with a thinning parameter of 20. Model convergence was assessed by verifying whether the potential scale reduction was close to 1 (Zhou et al., 2021). All reported estimates are unstandardized, except for within- and between-person correlations.

Results

Preliminary Analyses

Table 2 presents the descriptive and variability statistics for the time-variant variables in this study. NSSI ideation was observed (score higher than 0 on a 0–6 scale) during most assessments ($M_{i[Proportions]} = 60.60\%$), as were identity synthesis ($M_{i[Proportions]} = 76.96\%$), identity confusion ($M_{i[Proportions]} = 83.99\%$), and emptiness ($M_{i[Proportions]} = 81.12\%$). Individual means for NSSI ideation were generally low ($M_{i[Mean]} = 1.55$). Individual means for momentary identity synthesis ($M_{i[Mean]} = 2.17$) were higher but also on the lower end of the scale, whereas individual means for momentary identity confusion ($M_{i[Mean]} = 3.15$) and feelings of emptiness ($M_{i[Mean]} = 2.79$) were somewhat higher (see Table 2). The sample mean score for the number of BPD symptoms at baseline was 7.66 ($SD = 1.94$;

Table 2
Descriptive and Variability Statistics for the Time-Variant Variables

Time-variant variable	*M* iPercentage present across EMA surveys (*SD*, range)	*M* iMode (*SD*, range)	*M* iMean (*SD*, range)	*M* iSD (*SD*, range)	Total variability (95% CI)	ICC (95% CI)
NSSI ideation	60.60% (33.24, 0.65–100)	1.06 (1.59, 0–6)	1.55 (1.15, 0–5.18)	1.19 (0.43, 0.05–2.16)	2.89 (2.597–3.306)	.46 (.396–.525)
Identity synthesis	76.96% (31.22, 2.94–100)	2.12 (1.73, 0–6)	2.17 (1.32, 0.03–6)	1.07 (0.48, 0–5.48)	3.10 (2.711–3.638)	.57 (.508–.631)
Identity confusion	83.99% (26.62, 0.77–100)	3.08 (2.16, 0–6)	3.15 (1.59, 0.01–5.93)	1.20 (0.49, 0.09–2.41)	4.21 (3.636–4.994)	.61 (.550–.671)
Emptiness	81.12% (25.33, 0–100)	2.48 (2.15, 0–6)	2.79 (1.29, 0–5.74)	1.45 (0.51, 0–2.63)	3.98 (3.602–4.519)	.425 (.364–.490)
Negative affect	95.30 (12.37, 15.18–100)	2.59 (1.65, 0–6)	2.75 (1.07, 0.17–5.59)	1.02 (0.36, 0.23–2.08)	2.29 (2.033–2.655)	.51 (.447–.575)

Note. ICC represents the proportion of the total variance that is accounted for by between-person variance. ICC = intraclass coefficient; NSSI = nonsuicidal self-injury; CI = confidence interval; EMA = ecological momentary assessment.

range 1–10). Intraclass correlations ranged from .425 for feelings of emptiness to .61 for identity confusion.

The root mean square of successive difference values indicated significant within-patient variability in identity synthesis ($M_{i[Means]}$ = 1.23), NSSI ideation ($M_{i[Means]}$ = 1.30), identity confusion ($M_{i[Means]}$ = 1.37), and emptiness ($M_{i[Means]}$ = 1.60), demonstrating a sawtooth pattern throughout time. Figure 1 illustrates this within-person variability across a randomly selected group of individuals.

The within- and between-person correlations between identity synthesis and identity confusion were −.28 (95% CrI = −.298, −.267) and −.70 (95% CrI = −.787, −.593), respectively. The correlations between identity synthesis and emptiness were −.15 (95% CrI = −.161, −.129) at the within-person level and −.27 (95% CrI = −.445, −.099) at the between-person level, whereas the within- and between-person correlations between identity confusion and emptiness were .25 (95% CrI = .230, .261) and .53 (95% CrI = .383, .647), respectively.

Do Higher-Than-Usual Identity Synthesis and Lower-Than-Usual Confusion Predict NSSI Ideation 2 hr Later?

We examined the within-person temporal effects between the two dimensions of momentary identity functioning and NSSI ideation. Identity synthesis$_{T-2\ hr}$ predicted a decrease in NSSI ideation$_T$ (B = −.10; 95% CrI = −.151, −.051) beyond its autoregressive effect (B = .42; 95% CrI = .371, .462), whereas identity confusion$_{T-2\ hr}$ predicted an increase in NSSI ideation$_T$ (B = .09; 95% CrI = .066, .123) beyond its autoregressive effect (B = .41; 95% CrI = .366, .455). Given that identity synthesis and confusion both predicted NSSI ideation beyond the autoregressive effect of NSSI ideation, a multivariate MVAR model was run to examine the independent effects of the two identity dimensions. This model revealed that identity synthesis (B = −.06; 95% CrI = −.085, −.035) and identity confusion (B = .08; 95% CrI = .055, .111) each uniquely predicted changes in the intensity of NSSI ideation 2 hr later, controlled for the autoregressive effect of NSSI ideation (B = .40; 95% CrI = .353, .444).

Is There a Bidirectional Association Between Identity Synthesis/Confusion and Emptiness?

Next, we examined the 2-hr within-person associations between identity synthesis/confusion and emptiness (Table 3). Results of a first MVAR model including identity synthesis revealed bidirectional temporal associations, with higher-than-usual identity synthesis predicting decreased feelings of emptiness (B = −.11; 95% CrI = −.149, −.075), and higher-than-usual emptiness predicting decreased identity synthesis up to 2 hr later (B = −.04; 95% CrI = −.060, −.013). Results of a second MVAR model including identity confusion revealed a bidirectional association as well, with higher-than-usual identity confusion predicting increased feelings of emptiness (B = .15; 95% CrI = .110, .187) and higher-than-usual emptiness predicting increased identity confusion up to 2 hr later (B = .11; 95% CrI = .079, .143).

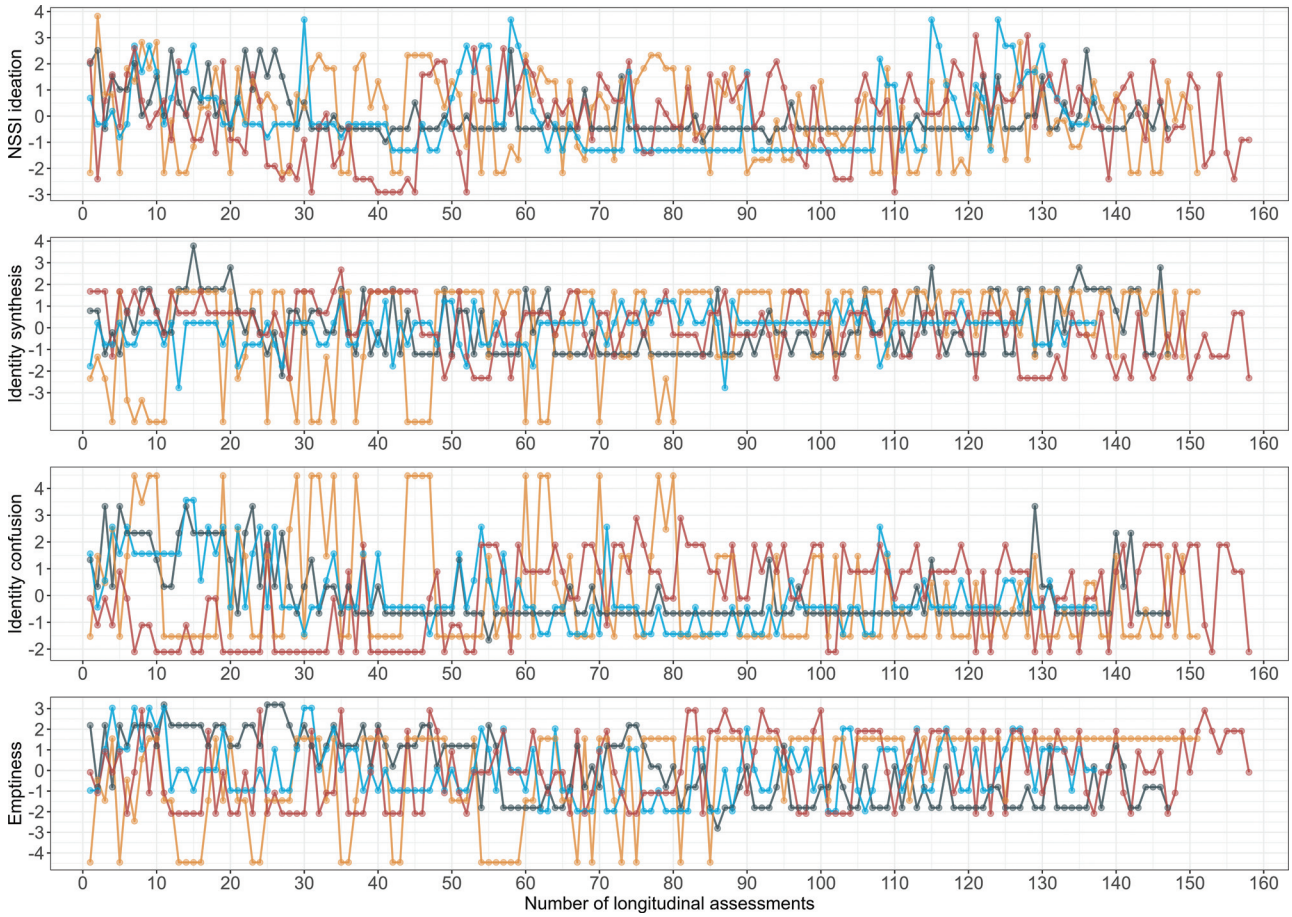
Is There Evidence for a Cyclic Identity–Emptiness Model Predicting NSSI Ideation?

Figure 2 presents a summary of the significant pathways and indirect effects from the full-longitudinal mediation models, with all path values depicted in Supplementary Table 1. A first model showed that higher-than-usual identity synthesis$_{T-4\ hr}$ prospectively predicted a decrease in emptiness$_{T-2\ hr}$ (B = −.12; 95% CrI = −.168, −.079), which in turn prospectively predicted an increase in NSSI ideation$_T$ (B = .036; 95% CrI = .011, .060), above and beyond the effect of negative affect$_{T-2\ hr}$. The direct effect of identity synthesis$_{T-4\ hr}$ on NSSI ideation$_T$ was not significant (B = −.027; 95% CrI = −.058, .006), indicating full mediation via emptiness$_{T-2\ hr}$ (Figure 2a). Conversely, higher-than-usual identity confusion$_{T-4\ hr}$ prospectively predicted an increase in emptiness$_{T-2\ hr}$ (B = .178; 95% CrI = .135, .219), which in turn prospectively predicted an increase in NSSI ideation$_T$ (B = .031; 95% CrI = .007, .055), above and beyond the effect of negative affect$_{T-2\ hr}$. The direct effect of identity confusion$_{T-4\ hr}$ on NSSI ideation$_T$ remained significant (B = .038; 95% CrI = .013, .066), indicating partial mediation via emptiness$_{T-2\ hr}$ (Figure 2b).

Given evidence of a bidirectional association between the dimensions of identity functioning and emptiness, we investigated two additional full-longitudinal mediation model with identity synthesis$_{T-2\ hr}$ or identity confusion$_{T-2\ hr}$ as mediator in the prospective association between emptiness$_{T-4\ hr}$ and NSSI ideation$_T$. Higher-than-usual emptiness$_{T-4\ hr}$ predicted a decrease in identity synthesis$_{T-2\ hr}$ (B = −.044; 95% CrI = −.071, −.018), which in turn negatively predicted NSSI ideation$_T$ (B = −.046; 95% CrI = −.074, −.018), above and beyond the effect of negative affect$_{T-2\ hr}$. The direct effect between emptiness$_{T-4\ hr}$ and NSSI ideation$_T$ was significant (B = .032; 95% CrI = .008, .057), indicating partial mediation via identity synthesis$_{T-2\ hr}$ (Figure 2c). Conversely, while emptiness$_{T-4\ hr}$ prospectively predicted identity confusion$_{T-2\ hr}$ (B = .125; 95%

Figure 1

Within-Person Variability Across a Randomly Selected Group of Participants



Note. Time series plots of NSSI ideation, momentary identity synthesis, momentary identity confusion, and momentary feelings of emptiness during 28 days of EMA. The colored lines represent five randomly selected patients with a compliance of at least 80% to illustrate within-person variability on an hourly basis (median of 2.2 hr apart; interquartile range = 1.73–3.19). Values are person-mean centered (comparing each patient's hourly level of the specific variable with their person-specific mean). NSSI = nonsuicidal self-injury; EMA = ecological momentary assessment. See the online article for the color version of this figure.

CrI = .089, .160), this, in turn, did not predict NSSI ideation$_T$ (B = .024; 95% CrI = −.009, .055). The direct effect from emptiness$_{T-4}$ hours to NSSI ideation$_T$ was significant (B = .043; 95% CrI = .018, .070; Figure 2d).

Considering the alternative mediation model constellations presented in Supplementary Table 2 and the corresponding supplementary figures, two patterns emerged that are consistent with the main models presented. First, the mediational pathways in models involving momentary identity synthesis remained consistently significant in both directions across all model specifications. Similarly, the indirect effect between identity confusion and NSSI ideation via emptiness remained significant in all model

Table 3

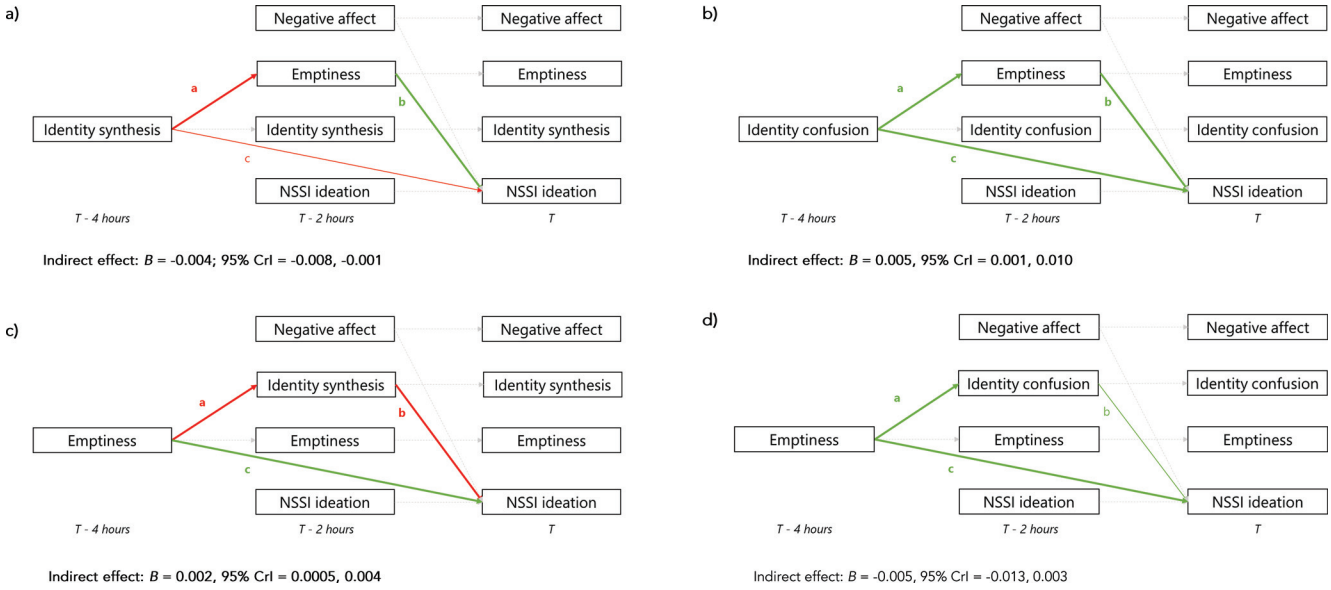
Within-Person Effects for the Bidirectional Temporal Association Between Identity Synthesis/Confusion and Emptiness

	Identity synthesis model		Identity confusion model	
	Identity synthesis$_T$ prediction	Emptiness$_T$ prediction	Identity confusion$_T$ prediction	Emptiness$_T$ prediction
Within-person effect	B (95% CrI)	B (95% CrI)	B (95% CrI)	B (95% CrI)
Identity synthesis$_{T-2\,hr}$	**.34 (.291, .386)**	**−.11 (−.149, −.075)**		
Identity confusion$_{T-2\,hr}$			**.34 (.303, .383)**	**.15 (.110, .187)**
Emptiness$_{T-2\,hr}$	**−.04 (−.060, −.013)**	**.41 (.370, .457)**	**.11 (.079, .143)**	**.39 (.343, .430)**

Note. Within-person effects are bolded if the credibility interval does not include zero (95% probability that the true value of the effect is nonzero). B = median point estimate; 95% CrI = 95% credibility interval.

Figure 2

Within-Person Full Longitudinal Mediation Effects with NSSI Ideation as the Outcome Variable and Identity, Emptiness, and Negative Affect as the Independent or Mediating Variables



Note. Figures 2a and 2b display the models with either identity synthesis (2a) or identity confusion (2b) predicting NSSI ideation, mediated by emptiness. Figures 2c and 2d display the models with emptiness predicting NSSI ideation, mediated by either identity synthesis (2c) or identity confusion (2d). Red arrows represent negative values, whereas green arrows represent positive values. Arrows and indirect effects are bolded if the CrI does not include zero (95% probability that the true value of the effect is nonzero; see Supplementary Table 1). Autoregressive effects and the effect of negative affect on NSSI ideation were all positive and significant but are dashed for illustrative purposes. NSSI = nonsuicidal self-injury; CrI = credibility interval. See the online article for the color version of this figure.

constellations. Second, the indirect effect between identity confusion and NSSI ideation via emptiness remained nonsignificant in all model constellations. Given these differences in patterns between the two dimensions of identity functioning, caution is warranted when interpreting the results of the composite longitudinal mediation models.

Do BPD Symptoms at Baseline Predict the Within-Person Effects of Identity Functioning, Emptiness, NSSI Ideation, and Their Temporal Associations?

Finally, the total number of BPD symptoms did not predict meaningful variation in random effects between patients, with one exception across models. The total number of BPD symptoms at baseline positively predicted the within-person mean of emptiness (*B* in the .15–.16 range) throughout the EMA period (Supplementary Tables 3 and 4).

Discussion

This EMA study investigated associations between two dimensions of identity functioning (confusion and synthesis), emptiness, and NSSI ideation among adolescents and (emerging) adults seeking treatment. Four main findings warrant discussion. First, momentary identity synthesis and confusion each uniquely predicted changes in the intensity of NSSI ideation over 2 hr. Second, we found evidence for a cyclic identity–emptiness model in which identity and emptiness bidirectionally increased each other's intensity. Third, this identity–emptiness cycle subsequently predicted changes in the intensity of NSSI ideation after controlling for negative affect. Analyses comparing alternative mediation model specifications consistently confirmed the robustness of these findings for identity synthesis but not for identity confusion. Fourth, we found evidence suggesting the generality of this identity–emptiness model, as no temporal associations in these models were significantly different in strength for patients with more BPD symptoms at baseline. Each of these findings has theoretical and clinical implications.

A first key finding was that identity synthesis and identity confusion independently functioned as real-time predictors of NSSI ideation. Greater momentary identity synthesis predicted a reduction in the intensity of NSSI ideation, whereas greater momentary identity confusion predicted an increase in NSSI ideation 2 hr later. These findings align with previous literature positing distinct pathways for identity synthesis and confusion in shaping psychosocial outcomes (de Carvalho & Veiga, 2022; Erikson, 1968). Furthermore, this suggests that interventions targeting NSSI (ideation) should go beyond reducing risk factors, such as identity confusion, and also focus on enhancing identity synthesis. For example, Schmeck et al. (2023) found that facilitating identity integration and differentiation of the self by means of adolescent identity treatment (Foelsch et al., 2014) was effective in reducing NSSI among adolescents.

Second, the bidirectional temporal association between identity and emptiness on the within-person level confirmed previous hypotheses suggesting that identity difficulties may lead to feelings of emptiness (D'Agostino et al., 2020; Martin & Levy, 2022; Miller et al., 2020). At the same time, our findings showed that greater emptiness also predicted consecutive changes in identity functioning. To the best of our knowledge, this is the first study examining the prospective association between identity and emptiness in daily life, supporting the bidirectional relationship hypothesized in literature (Kernberg, 1985; Martin & Levy, 2022; Miller et al., 2020). Importantly, this real-time association was observed across a 2-hr interval, underscoring its salience on an hourly timescale. Further research is needed to replicate and deepen our understanding of this dynamic. For instance, narrative methods could be used to explore the lived experience of the identity–emptiness cycle.

Third, mediation analyses revealed that the identity–emptiness cycle predicted greater intensity of NSSI ideation over time above and beyond the well-established effect of negative affect on NSSI thoughts and urges (Brown et al., 2022). Beyond negative affect, higher-than-usual identity confusion showed both direct and indirect effects on NSSI ideation via emptiness, whereas identity synthesis predicted NSSI ideation only indirectly through emptiness. Conversely, higher-than-usual emptiness also had an indirect effect on NSSI ideation over time through identity confusion and synthesis. Several alternative model specifications were investigated, revealing that the mediation effects involving identity synthesis remained significant across all models—even after including a lag-1 X → Y association in the half-longitudinal mediation model or a second mediation pathway via the autoregressive effect in the full-longitudinal mediation models. This underscores the robustness and clinical importance of the identified identity synthesis-emptiness cycle in relation to NSSI ideation. A different pattern emerged for identity confusion, which—across all model constellations—did predict NSSI ideation via emptiness but did not mediate the pathway from emptiness to NSSI ideation. This likely reflects the distribution of indirect effects across multiple temporal pathways (in the multiple-mediator model) and the fact that identity confusion, as a negatively valenced construct, competes with negative affect and emptiness in predicting NSSI ideation, thereby showing no incremental predictive validity. The fact that the direct effects were somewhat stronger in the half- than in the full-longitudinal mediation models illustrates that the strength of these pathways depends on the temporal distance between assessments. Future studies could use continuous-time models to capture how the strength of these dynamic associations evolves across different timescales, providing a more precise understanding of the timing and duration of risk processes in daily life across varying timescales (Ryan et al., 2018). Taken together, these findings point to the distinct roles of both momentary identity difficulties and emptiness in predicting the intensity of NSSI ideation, emphasizing the clinical importance of targeting these factors in real-time. Ecological momentary approaches such as just-in-the-moment adaptive interventions (Wang & Miller, 2020) may be particularly promising, as they allow interventions to be delivered precisely when individuals experience higher-than-usual identity difficulties or feelings of emptiness.

Fourth, we found that BPD symptoms at baseline did not predict the strength of any within-person effect observed in the EMA study, except for a higher within-person mean of emptiness throughout the EMA study. Several explanations could be considered for the occurrence of these results. A first explanation may be found in the skewed distribution of BPD symptoms at baseline. Around 75% of the participants scored above the cutoff score of the BPD screener (i.e., they had a total score of 7–10 within a range of 1–10), and it is possible that within this range of high BPD scores, the amount of BPD symptoms endorsed (e.g., 7 vs. 9 symptoms) is no longer relevant in predicting within-person effects over time. A second possible explanation for the absence of moderation effects of BPD symptoms is our use of the total BPD symptom score as the predictor of within-person effects. Given the heterogeneity of BPD, it is possible that only certain aspects (such as identity disturbance) are relevant predictors rather than the overall symptom total. Unfortunately, due to sample size restrictions, we were unable to examine individual BPD symptoms as separate predictors in this study. This represents an important future research direction. A third possible explanation may be that no predictive effects were found because of treatment effects occurring during the EMA period. Of note, the majority of the participants was treated with dialectical behavior therapy (Linehan, 1993), which explicitly targets NSSI. A fourth explanation may be that the identified identity–emptiness model is generally valid and not specific for patients with greater BPD symptomatology. In line with this hypothesis, a previous EMA study did not find compelling evidence that the momentary average of self-concept clarity was higher in a BPD group compared with an anxiety disorder group (Scala et al., 2018). In addition, D'Agostino et al. (2020) noted that feelings of emptiness occur across various psychological disorders and not only in BPD.

As a more general implication, this study highlights the usefulness of EMA research in unraveling momentary manifestations of identity and emptiness. Our findings revealed that although identity synthesis, identity confusion, and emptiness are strongly correlated between individuals, these associations are much weaker within individuals across moments. This suggests that, although intertwined on a general level, these constructs might manifest independently in daily life. This is particularly relevant in the context of the recent dimensional models of personality disorders in the *DSM*–5–TR (APA, 2022) and *International Classification of Diseases, 11th edition* (*ICD-11*; World Health Organization [WHO], 2024). By not only focusing on what personality *is* (i.e., personality traits) but also on what personality *does* (i.e., personality functioning), these models emphasize the need to study dynamics of personality pathology (Ringwald et al., 2021). By exploring momentary manifestations of identity and emptiness (two indicators of personality functioning), this study contributes to future research opportunities in this domain. Another interesting direction for future research would be to explore how environmental aspects, such as social context, influence momentary manifestations of identity and emptiness, given that personality pathology unfolds within the interpersonal context (Pincus, 2018).

The findings of the present study should be interpreted in light of certain limitations. First, since our sample included a majority of female participants and consisted of individuals in treatment with a maximum age of 39 years, the findings cannot be generalized to other populations or age categories. This study did not include information on participants' ethnicity or culture, which

should be addressed in future research. Second, the present study focused only on NSSI ideation. Future EMA studies could explore whether identity functioning and emptiness lead directly to NSSI behaviors as well or play a role in the transgression from NSSI ideation to NSSI behavior. Furthermore, future research should investigate whether our findings extend to other self-damaging thoughts and behaviors such as suicidal ideation, disordered eating, and substance use. For instance, Meddaoui et al. (2025) found that identity pathology was indirectly related to suicidal ideation 2 months later through emptiness. A third limitation concerns the measurement of identity in the present study. Identity was operationalized based on identity synthesis and identity confusion, which are dimensions described in normative identity development (Erikson, 1950, 1968). The more pathological expression of identity problems, for example, "lack of identity" (Kaufman et al., 2015), was not taken into account in this study. One necessary direction for future research is the development and psychometric validation of a robust state identity measure, ideally measuring a range of both normative identity experiences (synthesis and confusion) and more pathological experiences (e.g., lack of identity). Future research could also examine whether temporal dynamics of identity items (such as the degree of within-person variation in identity synthesis over time) could serve as indications of (pathological) identity functioning. Fourth, there is still no consensus in research on the exact conceptualization of emptiness, leaving room for various interpretations. Emptiness can be viewed as an emotion, as a state of no or low positive affect, as a dysfunctional avoidance strategy (e.g., to cope with the distress of identity incoherence), or even as a physical sensation of hollowness in the context of schizophrenia (D'Agostino et al., 2020; Zandersen & Parnas, 2019). Hence, we cannot exclude that participants in this study have interpreted the item "I feel empty" in different ways. Finally, there is an overall shortage of validated items for measuring psychological constructs using EMA (Wright & Zimmermann, 2019). Therefore, further research is needed to develop state measures of psychological constructs, such as identity functioning and emptiness.

Despite these limitations, the present study offers the most detailed investigation to date of how identity functioning and feelings of emptiness temporally interact as a process predicting changes in the intensity of NSSI ideation among treatment-seeking individuals. This was consistently observed, even when controlling for negative affect and when identity was operationalized as a composite measure. Sensitivity analyses underscored the importance of using full-longitudinal mediation models to establish temporal precedence between predictors, mediators, and NSSI ideation, thereby avoiding conflation of temporal effects.

Conclusion

The present EMA study provides clinically relevant information about the real-time interplay between identity functioning, emptiness, and NSSI ideation in individuals seeking treatment. The key finding of this study is that we found evidence for a cyclic identity–emptiness model, in which identity functioning (especially identity synthesis) and emptiness bidirectionally predicted each other on a time interval of 2 hr. When activated, this pernicious cycle in turn increased the intensity of NSSI ideation 2 hr later, above and beyond the effect of momentary negative affect. Further research using even denser intensive longitudinal studies and narrative methods are warranted to gain a deeper understanding of this complex interplay.

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