Protocol

The Detection of Acute Risk of Self-injury Project: Protocol for an Ecological Momentary Assessment Study Among Individuals Seeking Treatment

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Abstract

Background: Nonsuicidal self-injury (NSSI) is a major mental health concern. Despite increased research efforts on establishing the prevalence and correlates of the presence and severity of NSSI, we still lack basic knowledge of the course, predictors, and relationship of NSSI with other self-damaging behaviors in daily life. Such information will be helpful for better informing mental health professionals and allocating treatment resources. The DAILY (Detection of Acute rIsk of seLf-injurY) project will address these gaps among individuals seeking treatment.

Objective: This protocol paper presents the DAILY project's aims, design, and materials used. The primary objectives are to advance understanding of (1) the short-term course and contexts of elevated risk for NSSI thoughts, urges, and behavior; (2) the transition from NSSI thoughts and urges to NSSI behavior; and (3) the association of NSSI with disordered eating, substance use, and suicidal thoughts and behaviors. A secondary aim is to evaluate the perspectives of individuals seeking treatment and mental health professionals regarding the feasibility, scope, and utility of digital self-monitoring and interventions that target NSSI in daily life.

Methods: The DAILY project is funded by the Research Foundation Flanders (Belgium). Data collection involves 3 phases: a baseline assessment (phase 1), 28 days of ecological momentary assessment (EMA) followed by a clinical session and feedback survey (phase 2), and 2 follow-up surveys and an optional interview (phase 3). The EMA protocol consists of regular EMA surveys (6 times per day), additional burst EMA surveys spaced at a higher frequency when experiencing intense NSSI urges (3 surveys within 30 minutes), and event registrations of NSSI behavior. The primary outcomes are NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior, with disordered eating (restrictive eating, binge eating, and purging), substance use (binge drinking and smoking cannabis), and suicidal thoughts and behaviors surveyed as secondary outcomes. The assessed predictors include emotions, cognitions, contextual information, and social appraisals.

Results: We will recruit approximately 120 individuals seeking treatment aged 15 to 39 years from mental health services across the Flanders region of Belgium. Recruitment began in June 2021 and data collection is anticipated to conclude in August 2023.

Conclusions: The findings of the DAILY project will provide a detailed characterization of the short-term course and patterns of risk for NSSI and advance understanding of how, why, and when NSSI and other self-damaging behaviors unfold among individuals seeking treatment. This will inform clinical practice and provide the scientific building blocks for novel intervention approaches outside of the therapy room that support people who self-injure in real time.

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KEYWORDS

nonsuicidal self-injury; suicidal thoughts and behaviors; real-time; experience sampling; ecological momentary assessment; digital interventions; mobile phone

Introduction

Background

Nonsuicidal self-injury (NSSI), the direct and deliberate damage of one's body tissue without suicidal intent (eg, cutting and hitting oneself), is a major mental health concern worldwide. Epidemiological surveys indicate that 1 in 5 individuals engage in NSSI before the age of 25 years [1-3], with 12-month rates in the 8% to 19% range [1,2] and many individuals reporting persistent NSSI for several years [4]. These rates are considerably higher among individuals seeking treatment [5-7], with more than half of adolescent inpatients and 1 in 10 emerging adult and adult outpatients reporting monthly NSSI [8,9]. Furthermore, the presence of NSSI predicts rehospitalization [10], is highly stigmatized [11], and is uniquely associated with an increased risk for psychiatric disorders [2,9,12-15] and suicidal thoughts and behaviors (STB). For instance, research shows that people who engage in NSSI are more likely to make a suicide attempt independent of mental disorders [16,17], with those engaging in repetitive persistent NSSI being most likely to attempt suicide and experience adverse psychosocial outcomes [18]. As such, there is an urgent need to better understand, predict, and prevent self-injury among people who frequently engage in these behaviors.

Unfortunately, we still lack basic knowledge of the descriptive nature of NSSI and how, why, and when self-injury unfolds in everyday life [19], a prerequisite for risk screening and intervention to prevent NSSI and clinically associated outcomes (eg, suicide attempts). This lack of progress is largely because most empirical studies have focused on establishing the prevalence and correlates of the presence and severity of NSSI using cross-sectional designs. Although longitudinal studies have been conducted, they typically used observation windows from months to years [19-21], providing a long-distance view of who is at greater risk of engaging in NSSI compared with others. However, such a nomothetic approach does not clarify *when* someone is at risk in the short term and in what daily life contexts they are more at risk and will thus not help clinicians to decide whether an individual is likely to self-injure within the next days and weeks. Making these decisions requires an idiographic approach and knowledge of the course, contexts of risk, and the relationship of NSSI with other self-damaging behaviors in daily life. Such information would be helpful for better informing mental health professionals and allocating treatment resources.

Similar to other frequently co-occurring self-damaging behaviors (eg, attempting suicide, binge eating, purging, and binge drinking) [2,13,22], NSSI cannot be ethically induced in the laboratory but occurs in people's everyday lives. Although studying NSSI as it unfolds in real time has historically been challenging, recent technological advancements have made it possible to do exactly this, which has the potential to substantially improve our understanding and inform prevention efforts [19,23]. Ecological momentary assessment (EMA; also called experience sampling, ambulatory assessment, or real-time monitoring) involves prompting individuals multiple times per day via their mobile phone to provide in-the-moment information on social appraisals, emotions, cognitions, and behavioral patterns as they are lived in the flow of daily life [24-26]. Prior research suggests that NSSI thoughts can change substantially across hours [27], essentially necessitating EMA to (1) capture these real-time changes and (2) enable the identification of factors that predict these changes in daily life.

Advancing insight into the course and contexts of elevated risk for NSSI thoughts (ie, *thinking about deliberately hurting oneself*), NSSI urges (ie, *a difficult-to-control desire to self-injure*), self-efficacy to resist NSSI (ie, *confidence in one's ability not to engage in self-injury*), and NSSI behavior (ie, *engagement in self-injury*) would uniquely inform researchers and clinicians about how self-injury unfolds and is experienced by those at highest risk. This *in-the-moment* information can transform our ability to prevent and manage NSSI among individuals seeking treatment by providing the scientific building blocks for novel digital interventions that support people who self-injure in real time [19,28,29]. The DAILY (Detection of Acute rIsk of seLf-injurY) project aims to address these gaps using a 28-day EMA protocol among individuals seeking treatment. This protocol paper presents the project's aims, design, and materials used. Figure 1 provides a graphical presentation of the primary objectives of the DAILY project.

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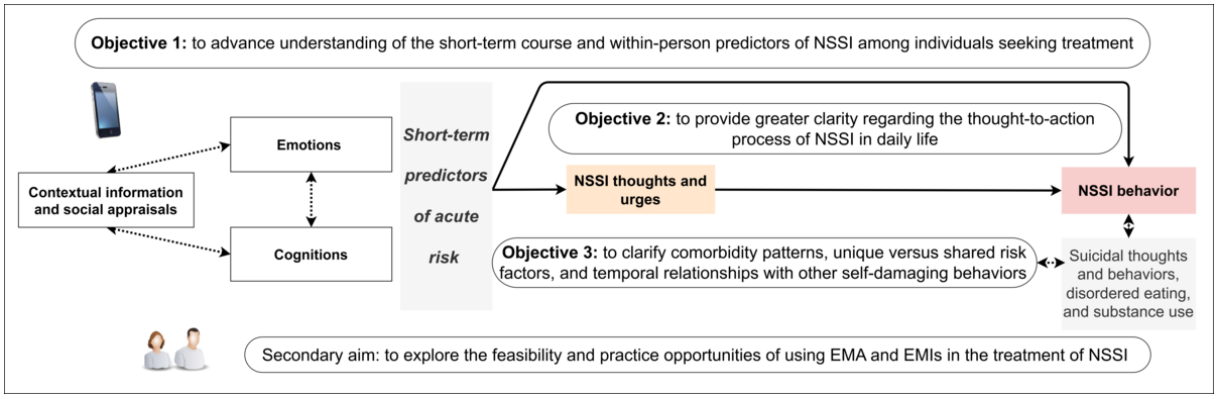
Figure 1. Graphical overview of the study objectives. EMA: ecological momentary assessment; EMI: ecological momentary intervention; NSSI: nonsuicidal self-injury.



Objectives

The first primary objective is to clarify the short-term course and within-person predictors of NSSI. Initial work among community samples suggests that NSSI thoughts are usually short-lived and moderate in intensity [30-32], with a higher risk of more intense and persistent NSSI thoughts toward the evening [32] and an average of 1.6 (SD 1.1) NSSI behaviors per week [30]. Surprisingly, however, the short-term clinical course of NSSI remains to be comprehensively investigated among individuals seeking treatment. The intensive nature of the longitudinal data we collect will allow for a detailed picture of the thought and behavioral patterns and help us to address several critical unanswered questions about the course of NSSI among individuals seeking treatment: how much do NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior (1) vary between people seeking treatment, (2) vary within people seeking treatment, (3) vary throughout the day and the week, and (4) covary and predict each other prospectively in daily life?

Guided by contemporaneous models of NSSI [33-35] and emerging work [36-38], we will evaluate contextual information, social appraisals, emotions, and cognitions as within-person risk and protective factors for cognitive and behavioral NSSI outcomes. We hypothesize that the risk of NSSI behavior will be higher when people are alone [30], after situations characterized by negative social appraisals and perceived conflict [39,40], and after increased negative and decreased positive affect [41]. Given that specific emotions may incrementally predict higher risk (eg, feeling stressed) [30,42] or protect more strongly against NSSI (eg, feeling relaxed) [27], the findings will also be analyzed using specific emotions as units of analysis. On the basis of the benefits and barriers model of NSSI [34,43], which argues for a unique role of self-critical thoughts in explaining NSSI behavior, we will evaluate the association between momentary fluctuations in self-critical thinking and NSSI urges and NSSI behavior. Building upon the emotional cascade model [35,44], which posits that reinforcing cyclic cascades between rumination and negative affect form a dynamic process in which self-injury is suggested to break this cycle by distracting from rumination, the utility of momentary ruminative thinking and the interplay with negative emotions in predicting NSSI behavior will be investigated. However, because the relevance of these theoretically inspired within-person risk factors for NSSI might differ between individuals [45,46], we will also determine variability in individual risk associations.

A second primary objective is to advance understanding of the transition from NSSI thoughts and urges to NSSI behavior. Although existing theoretical models of NSSI do not distinguish between NSSI thoughts or urges and NSSI behavior, contemporary "ideation-to-action" theories of suicide explicitly make this distinction [47] and suggest that the factors that lead to suicidal thoughts or urges are not necessarily the same factors that lead to behavior (ie, suicide attempts). Emerging evidence indicates that incorporating ideation-to-action thinking might be equally relevant for NSSI. For instance, preliminary work suggests that previously identified risk factors for NSSI behavior (eg, emotional factors) might uniquely predict NSSI thoughts but not the occurrence of NSSI behavior [27]. Inspired by the cognitive-emotional model of NSSI [33], we anticipate that momentary self-efficacy to resist NSSI will be a potent protective factor against NSSI behavior. People retrospectively report that the transition between NSSI thoughts or urges and NSSI behavior is typically <30 minutes [30,31], meaning that there might be a brief window of opportunity to intervene during these moments of acute risk for NSSI behavior. Therefore, in an attempt to inform and facilitate such intervention efforts, we will make a thought-to-action distinction and clarify the specificity of risk and protective factors to identify factors that increase or decrease the likelihood of transitioning from NSSI thoughts or urges to NSSI behavior in real time among individuals seeking treatment.

A third primary objective is to provide novel data on the co-occurrence of NSSI with other self-damaging behaviors in daily life that may represent different forms of behavior that serve the same function (ie, disordered eating, substance use, and STB) [13,30,48-51]. For example, previous daily diary studies found that 42% to 53% of the adolescents and emerging adults who engage in NSSI reported at least 1 episode of disordered eating and suicidal ideation [40,52], with suicidal thoughts being present on most days when adolescents engaged in NSSI [53]. Similarly, Nock et al [30] observed that NSSI thoughts co-occurred 13% to 18% of the time with thoughts of substance use and disordered eating. Therefore, disordered eating (ie, restrictive eating, binge eating, and purging),

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substance use (ie, binge drinking and smoking cannabis), and STB will be assessed as secondary outcomes. From a transdiagnostic approach, this will help to clarify comorbidity patterns, unique versus shared risk factors, and temporal relationships with other self-damaging behaviors in daily life [13,19,54]. In addition, it will allow us to address whether the dynamic characteristics of NSSI thoughts or urges (ie, an individual's within-person average and variability) and frequency of NSSI behavior—as observed in the EMA—predict changes in NSSI trajectories and the presence of comorbid self-damaging behaviors among individuals seeking treatment [55]. For instance, it may be that persistently high NSSI urges and frequent NSSI behavior increase the risk of STB [53]. Alternatively, there could also be a behavior shift such that a reduced frequency of NSSI leads some individuals to take up another behavior that serves a similar function.

Finally, a secondary aim is to evaluate the perspectives of individuals seeking treatment and mental health professionals regarding the feasibility, scope, and utility of digital self-monitoring and novel interventions. There is a growing awareness that the clinical implementation of EMA and ecological momentary interventions (EMIs), which use EMA to deliver support in real-time, provides new opportunities to make individuals more actively involved in their treatment and to better match treatments to their needs [19,24,56,57]. For instance, EMA could facilitate self-insight about relevant processes [19,58,59], whereas EMIs would allow for providing support outside of the therapy room in daily life. Initial findings indicate the acceptability and potential of EMIs for NSSI and suicide prevention [29,60,61], but, despite the clear clinical potential, this remains a largely underexplored area. Importantly, however, the development of EMIs will advance more rapidly and be more easily clinically implemented when a user-centered design is employed. Such a design actively involves and acknowledges end users from the initial stage of development to understand the goals, challenges, and motivations for future EMIs that seek to facilitate young people's recovery from self-injury and other self-damaging behaviors [62].

Methods

Target Population and Recruitment

To investigate the objectives of the DAILY project, the target population is adolescents (aged 15-18 years), emerging adults (aged 19-29 years), and adults (aged 30-39 years) seeking treatment and their mental health professionals. They are recruited from mental health services across the Flanders region of Belgium, including 9 inpatient services, 8 outpatient services, and 4 services with a hybrid care model. Of these services, 11 focus on emotion dysregulation and mood disorders, 5 focus on social-emotional difficulties in transitioning from adolescence to emerging adulthood, 3 focus on eating disorders, and 2 are private practices. Potential eligible participants are informed about the study via mental health professionals, study flyers, and information moments at these mental health services. The inclusion criteria for patients are as follows: (1) being aged between 15 and 39 years, (2) having sufficient Dutch-language proficiency, (3) past-month NSSI thoughts/behaviors, and (4) receiving inpatient or outpatient treatment. Individuals with cognitive deficits that preclude comprehension of materials are excluded from participation. Although adult participants (aged ≥18 years) could opt to continue participation when they decided to stop treatment, a treating mental health professional had to be involved for minors (<18 years) during the entire monitoring period, meaning that participation automatically ended when they interrupted their treatment before the end of the 28-day EMA protocol. The inclusion criterion for mental health professionals is being a licensed psychiatrist, clinical psychologist, or mental health nurse.

Ethics Approval

All phases of the DAILY project were approved by the Ethics Committee Research UZ/KU Leuven on February 10, 2021 (s64989 and B3222020000343), and all procedures align with the 1964 Helsinki declaration and its later amendments.

Procedure and Protocol

The DAILY project consists of 3 phases, including a baseline assessment (phase 1), 28 days of EMA followed by a clinical session and feedback survey (phase 2), and 2 follow-up surveys and an optional interview (phase 3). Figure 2 provides a graphical overview of the project.

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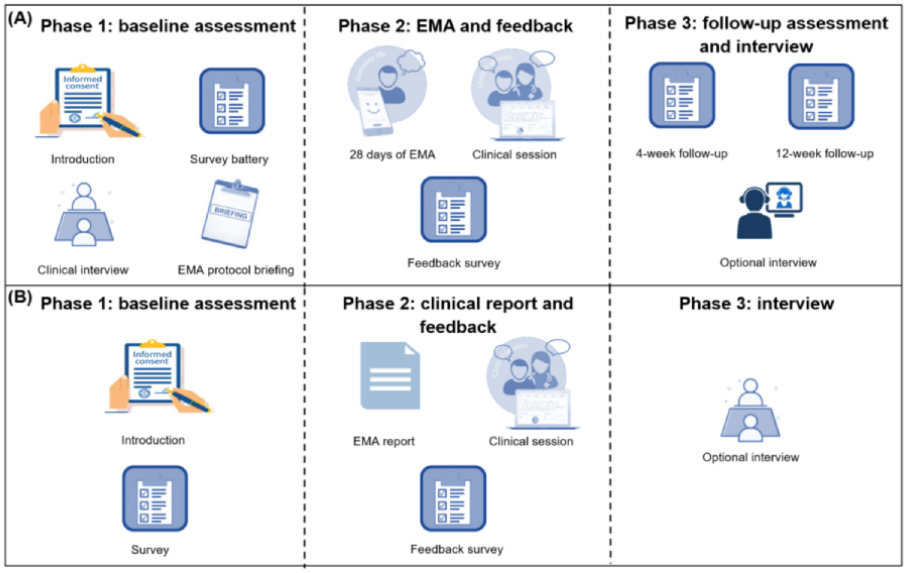
Figure 2. Graphical overview of the study procedures for (A) individuals seeking treatment and (B) mental health professionals. EMA: ecological momentary assessment.



Phase 1: In-Person Baseline Assessment of Individuals Seeking Treatment

In the first phase, a psychologist meets with the patient (hereinafter referred to as the participant) to give them detailed information, conduct the baseline assessment, and provide training on completing the EMA protocol. The informed consent process informs participants about the study demands and goals, the safety protocol, reimbursement scheme, the researchers' responsibility concerning risk monitoring, and the implications of this responsibility (ie, when the duty of care overrides the confidentiality principle). All participants provide written informed consent or assent. In addition, parents or legal caregivers provide written informed consent for minors aged 15 to 17 years. The baseline assessment consists of a survey battery and a clinical interview. Table 1 presents the constructs covered in the survey battery assessed via REDCap (Research Electronic Data Capture; Vanderbilt University) [63]. The clinical interview assesses the participants' history of NSSI and STB using the well-validated Self-Injurious Thoughts and Behaviors Interview [64,65]. In addition, the Structured Clinical Interview for DSM-5 [66], is used to assess common comorbid mental disorders, including major depressive disorder, alcohol use disorder, substance use disorder, panic disorder, generalized anxiety disorder, posttraumatic stress disorder, and eating disorders [2,15,22]. Interrater reliability will be examined within a subset of 20% of the diagnostic interviews (approximately 24 participants) by calculating the percentage of agreement and Cohen κ coefficients for overall diagnosis [67]. During the clinical interview, participants are asked about personal strategies that they consider helpful to resist engaging in NSSI and other self-damaging behaviors (see *Phase 2: Safety Measures and Risk Monitoring* section).

Phase 1 concludes with an orientation and training on completing the EMA protocol via m-Path, a user-friendly and secure smartphone app and platform created by researchers at KU Leuven that is General Data Protection Regulation (GDPR)–compliant for real-time and real-world data collection [68]. We assign all participants a study alias to ensure that no identifying information is shared with the software platform. All communication between participants' smartphones and the server is end-to-end encrypted and securely uploaded after each interaction [68]. Participants without a smartphone are loaned a device with a prepaid data plan for data collection. Study staff help participants to download the app on their phone (Android or IOS) or the loaned device (Android), discuss the EMA protocol's content and procedures, answer participants' questions, and initiate a practice EMA survey for the participant. Phase 1 takes approximately 3 to 4 hours to complete.

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Table 1. Overview of the variables assessed in the baseline survey battery and clinical interview.

Baseline assessment	Measure	Source	Items, n; response scale
Survey battery			
Sociodemographic information	Age, gender, education, profession, and sexual orientation	Items from Kiekens et al [2] and self-developed	6; mixed
Trait negative and positive affect	Positive and Negative Affect Schedule	Original [69] and Dutch translation [70]	20; 5-point Likert scale
Trait rumination	Ruminative Response Scale	Original [71] and Dutch translation [72]	22; 4-point Likert scale
Trait perseverative thinking	Perseverative Thinking Questionnaire	Original [73] and Dutch translation [74]	15; 5-point Likert scale
Trait self-criticism and self-reassurance	Forms of Self-Criticizing or Attacking and Self-Reassuring Scale	Original [75] and Dutch translation [76]	22; 5-point Likert scale
Trait emotion dysregulation	Difficulties in Emotion Regulation Scale-Short Form	Original [77] and Dutch translation [78]	18; 5-point Likert scale
Trait negative and positive urgency	UPPS-P[a] Impulsive Behavior Scale	Original [79] and Dutch translation [80]	26; 4-point Likert scale
Identity	Identity scale from the Erikson Psychosocial Stage Inventory	Original [81] and Dutch translation [82]	12; 5-point Likert scale
Depression, anxiety, and stress[b]	Depression, anxiety, and stress scales (past week)	Original [83] and Dutch translation [84]	21; 4-point Likert scale
NSSI[c] expectancies	Nonsuicidal Self-Injury Expectancy Questionnaire	Original [85] and Dutch translation: FBT[d]	25; 5-point Likert scale
Self-efficacy to resist NSSI in the next weeks and across contexts	Adapted Self-Efficacy to Avoid Suicide Action Scale; Self-Efficacy to Resist Nonsuicidal Self-Injury Scale	Original [86] and Dutch translation [27]; Original [87], and Dutch translation: FBT	6; 10-point scale; 24; 4-point Likert scale
Disordered eating behaviors and attitudes[b]	Eating Disorder Examination Questionnaire (version 6.0)	Original [88] and Dutch translation [89]	30; mixed
Positive body image	Body Appreciation Scale-2	Original [90] and Dutch translation [91]	10; 5-point Likert scale
Expectancies about eating	Subscales of the Eating Expectancy Inventory	Original [92] and Dutch translation [93]	28; 7-point Likert scale
Eating and body image self-efficacy	Eating Disorder Recovery Self-Efficacy Questionnaire	Original [94] and Dutch translation: FBT	23; 7-point Likert scale
Borderline personality disorder	McLean Screening Instrument for Borderline Personality Disorder	Original [95] and Dutch translation [96]	10; dichotomous scale
Damaging and impulsive behaviors[b]	Self-developed assessment of 13 behaviors	N/A[e]	13-26; mixed
Self-efficacy to resist drinking	Drinking Refusal Self-Efficacy Questionnaire-Revised	Original [97] and Dutch translation [98]	19; 6-point Likert scale
General self-efficacy	General Self-Efficacy Scale	Original [99] and Dutch translation [100]	10; 4-point Likert scale
Perceived social support	Multidimensional Scale of Perceived Social Support	Original [101] and Dutch translation [102]	16; 5-point Likert scale
Rejection	Perceived Rejection Scale of Adult Toolbox Social Relationship Scales	Original [103] and Dutch translation: FBT	8; 5-point Likert scale
Affinity with technology	Adapted Affinity for Technology Scale	Original [104] and Dutch translation: FBT	10; 7-point Likert scale
Clinical interview			
NSSI thoughts, NSSI behaviors, DSM-5[f] NSSI disorder, suicide ideation, suicide plan, suicide attempt, age of onset, frequency, recency, functions of NSSI, experience of pain during NSSI, and impact of NSSI[b]	Adapted Self-Injurious Thoughts and Behaviors Interview	Original [64] and Dutch translation [22]	29-41; mixed

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Baseline assessment	Measure	Source	Items, n; response scale
Self-efficacy to resist suicide[b]	Self-Efficacy to Avoid Suicide Action Scale	Original [86] and Dutch translation [27]	6; 10-point scale
Major depressive disorder, alcohol use disorder, substance use disorder, panic disorder, generalized anxiety disorder, posttraumatic stress disorder, and eating disorders	Structured Clinical Interview for DSM-5	Original [66] and Dutch translation [105]	18-310; mixed

[a]UPPS-P: urgency, premeditation, perseverance, sensation seeking, and positive urgency.

[b]Reassessed in the web-based follow-up surveys 4 and 12 weeks after the 28-day real-time monitoring period.

[c]NSSI: nonsuicidal self-injury.

[d]FBT: forward-backward translation.

[e]N/A: not applicable.

[f]DSM-5: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.

Phase 1: Web-Based Baseline Assessment of Mental Health Professionals

Each mental health professional also provides informed consent the first time and completes a brief survey assessing sociodemographic (age and gender) and professional information (profession, level of education, and years of experience). In addition, they can provide the research team with 1 to 3 additional EMA questions when considered relevant for a specific individual.

Phase 2: EMA Sampling Design and Content

The second phase starts on the morning after the baseline assessment. It involves a 28-day EMA protocol that consists of (1) six semirandom regular EMA surveys administered on average every 2 hours during waking hours between 10 AM and 9:30 PM, (2) three burst EMA surveys spaced at a higher frequency of 5 to 10 minutes apart in the 30 minutes after intense NSSI urges are reported in the regular EMA surveys (score of ≥5 on a 7-point item), and (3) event registrations via a push button to record the timing of NSSI behavior. Figure 3 shows the sampling schedule of the DAILY project, which includes a minimum of 168 regular EMA surveys and a theoretical maximum of 672 EMA surveys (when a burst sequence is triggered during each regular survey). To ensure that we capture people in their ongoing activities and to avoid retrospective reporting, participants must register responses to the regular EMA within 15 minutes of receipt and to the burst EMA surveys within 5 minutes of receipt. In case of nonresponse to the regular EMA surveys, 1 reminder is sent after 10 minutes. After the first day and each week subsequently, a team member telephoned the participants to check whether everything is going well, provide feedback about study compliance, and respond to concerns or difficulties concerning the app and the self-monitoring.

Table 2 presents the EMA constructs and items in the DAILY project, including emotions and cognitions (block A); contextual information and social appraisals (block B); NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior (block C); and the screening of other self-damaging behaviors and experienced momentary burden (block D, part 1). EMA items were as much as possible selected or modified from prior EMA studies and conventional survey questionnaires [27,86,90,106-108]. Questions are branched so that participants only have to complete relevant EMA items (eg, social appraisals are context specific). The order in which emotions and cognitions are presented is randomized within individuals across the EMA surveys (because these items are not conditional on each other). Specific emotions for negative and positive affect are selected because they represent all 4 quadrants of the affective circumplex defined by valence and arousal dimensions [109]. All continuous EMA items are assessed on 7-point rating scales ranging from not at all or absent to very much or very strong (Table 2). Although NSSI behavior is assessed retrospectively during each EMA survey (ie, “Since the last beep, have you deliberately hurt yourself without wanting to die?”), participants are instructed to register the timing of NSSI behavior through an event marker. This occurred on a wearable wireless device (Chill Band +; IMEC International) for the first 12 participants. However, owing to practical and technical issues with these devices, the remaining participants used an event registration push button in the m-Path app [68].

During each regular EMA survey, we also screened whether participants experienced thoughts, had an urge, or engaged in 6 other self-damaging behaviors, including restrictive eating, purging, binge eating, STB, binge drinking, and smoking cannabis (block D, part 1). If they answer ≥1 of these self-damaging behaviors affirmatively, additional items assess thoughts, urges, behavior engagement, and self-efficacy to resist the endorsed behavior(s) (block D, part 2, Table 3). Finally, participants rate the extent to which they consider an EMA survey burdensome. The regular EMA surveys include 28 to 31 items (excluding optional individual-specific questions), with 4 additional items for each of the other self-damaging behaviors endorsed on the screening item (Table 3). The burst EMA surveys include 21 to 22 items, assessing only emotions and cognitions (block A) and NSSI outcomes (block C).

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Figure 3. Graphical overview of the ecological momentary assessment (EMA) sampling schedule. (A) Six semirandom regular EMA surveys taken on average every 2 hours during waking hours between 10 AM and 9:30 PM. (B) Three burst EMA surveys spaced at a higher frequency of 5 to 10 minutes apart in the 30 minutes after intense nonsuicidal self-injury (NSSI) urges in the regular EMA surveys. (C) Event registrations via a push button to register the timing of NSSI behavio.

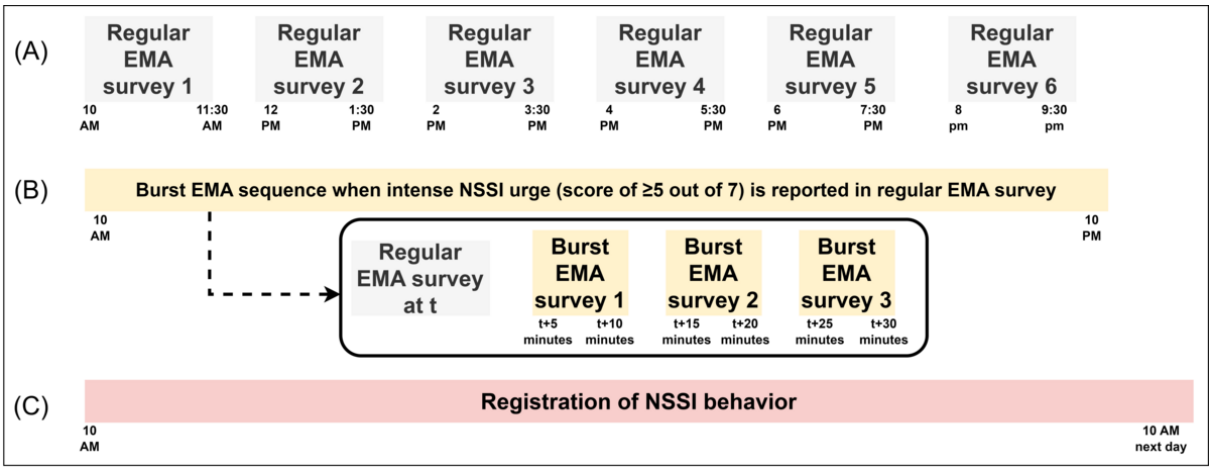

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Table 2. Ecological momentary assessment (EMA) constructs and items.

EMA constructs[a]	Items	Response category
Block A: emotions and cognitions (17 items)		
Momentary negative affect	• [Right now]: "I feel anxious," "I feel stressed," "I feel irritated," "I feel sad," and "I feel insecure"	• 7-point scale (ranging from not at all to very much)
Momentary positive affect	• [Right now]: "I feel cheerful" and "I feel relaxed"	• 7-point scale (ranging from not at all to very much)
Momentary emptiness	• [Right now]: "I feel empty"	• 7-point scale (ranging from not at all to very much)
Momentary loneliness	• [Right now]: "I feel lonely"	• 7-point scale (ranging from not at all to very much)
Momentary emotion dysregulation	• [Right now]: "My emotions are overwhelming me"	• 7-point scale (ranging from not at all to very much)
Momentary rumination	• [Right now]: "I am repeatedly thinking about the same problem"	• 7-point scale (ranging from not at all to very much)
Momentary self-criticism	• [Right now]: "I am disappointed in myself"	• 7-point scale (ranging from not at all to very much)
Momentary other-criticism	• [Right now]: "I am disappointed in others"	• 7-point scale (ranging from not at all to very much)
Momentary body image	• [Right now]: "I am satisfied with the way I look" and "I feel at ease in my body"	• 7-point scale (ranging from not at all to very much)
Momentary identity	• [Right now]: "I doubt who I am" and "I know what I stand for"	• 7-point scale (ranging from not at all to very much)
Block B: contextual information and social appraisals (5-7 items)		
Momentary situational context	• "Where are you?"	• (a) At home; (b) at a friend's or family's place; (c) school or work; (d) car, train, bus; (e) other indoors; (f) other outdoors
Momentary activity	• "What were you doing just before the beep?" • (If g) "Please describe briefly what you are doing"	• (a) Nothing, (b) work or studying, (c) household chores, (d) conversation, (e) leisure active (eg, sports), (f) leisure passive (eg, watching television), (g) something else
Momentary appraisal of activity	• "I enjoy this activity"	• 7-point scale (ranging from not at all to very much)
Momentary social context	• "Are you alone or with others?" • (If b) "Who are you with physically?" • (If c) "Who are you with online?"	• (a) Alone, (b) others physically, (c) others on the web • (a) Partner, (b) family, (c) friends, (d) colleagues, (e) acquaintances, (f) other patients, (g) unfamiliar people
Momentary appraisal of social context	• (If a): "I like being alone" • (If b): "I enjoy the company of these people" • (If c): "I feel connected to those I am online in contact with"	• 7-point scale (ranging from not at all to very much) • 7-point scale (ranging from not at all to very much) • 7-point scale (ranging from not at all to very much)
Block C: NSSI[b] (4-5 items)		
Retrospective thoughts	• "Since the last beep, have you considered deliberately hurting yourself without wanting to die?"	• 7-point scale (ranging from not at all to very much)
Momentary urge	• "Right now, how strong is the urge present to hurt yourself without wanting to die?"	• 7-point scale (ranging from absent to very strong)
Retrospective behavior	• "Since the last beep, have you deliberately hurt yourself without wanting to die (for example, cut, scratched, or hit yourself)?"	• (a) No, (b) yes

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EMA constructs[a]	Items	Response category
Retrospective behavior (method)	• (If b): "How have you self-injured?"	• (a) Cutting or carving, (b) scratching, (c) hitting, (d) burning, (e) biting, (f) head banging, (g) wound interfering, (h) other method (describe briefly)
Momentary self-efficacy to resist	• "Right now, how confident are you that you can resist engaging in NSSI?"	• 7-point scale (ranging from not at all to very)
Block D (part 1): screen other self-damaging thoughts or behaviors and interference (2 items)		
Screen comorbid thoughts or behaviors	• "Indicate all other behaviors you thought about or engaged in since the last beep, or for which you have an urge right now"	• (a) Restrictive eating, (b) binge eating, (c) vomiting deliberately, (d) killing myself, (e) binge drinking, (f) using cannabis, (g) none of these
Interference	• "This beep disturbed me."	• 7-point scale (ranging from not at all to very much)

[a]Blocks A to D are assessed in the regular EMA surveys. Blocks A and C are only assessed in the burst EMA surveys.

[b]NSSI: nonsuicidal self-injury.

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Table 3. Ecological momentary assessment of other self-damaging behaviors[a].

Block D (part 2): Other self-damaging behaviors and items	Response category
Restrictive eating (4 items)	
Retrospective thoughts	
Since the last beep, have you thought about eating less to control your weight?	7-point scale (ranging from not at all to very much)
Momentary urge	
Right now, how strong is the urge to eat less to control your weight?	7-point scale (ranging from absent to very strong)
Retrospective behavior	
Since the last beep, have you eaten less to control your weight?	(a) No, (b) yes
Momentary self-efficacy to resist	
Right now, how confident are you that you can resist eating less to control your weight?	7-point scale (ranging from not at all to very)
Binge eating (4 items)	
Retrospective thoughts	
Since the last beep, have you thought about eating an unusually large amount of food?	7-point scale (ranging from not at all to very much)
Momentary urge	
Right now, how strong is the urge to eat an unusually large amount of food?	7-point scale (ranging from absent to very strong)
Retrospective behavior	
Since the last beep, have you experienced a binge-eating episode?	(a) No, (b) yes
Momentary self-efficacy to resist	
Right now, how confident are you that you can resist eating an unusually large amount of food?	7-point scale (ranging from not at all to very)
Purging (4 items)	
Retrospective thoughts	
Since the last beep, have you thought about vomiting deliberately?	7-point scale (ranging from not at all to very much)
Momentary urge	
Right now, how strong is the urge to vomit deliberately?	7-point scale (ranging from absent to very strong)
Retrospective behavior	
Since the last beep, have you vomited deliberately?	(a) No, (b) yes
Momentary self-efficacy to resist	
Right now, how confident are you that you can resist vomiting deliberately?	7-point scale (ranging from not at all to very)
Suicidality (4 items)	
Retrospective thoughts	
Since the last beep, have you thought about killing yourself?	7-point scale (ranging from not at all to very much)
Momentary urge	
Right now, how strong is the urge to kill yourself?	7-point scale (ranging from absent to very strong)
Retrospective behavior	
Since the last beep, have you made a suicide attempt?	(a) No, (b) yes
Momentary self-efficacy to resist	
Right now, how confident are you that you can resist attempting suicide?	7-point scale (ranging from not at all to very)
Binge drinking (4 items)	
Retrospective thoughts	
Since the last beep, have you thought about consuming an unusually large amount of alcohol?	7-point scale (ranging from not at all to very much)
Momentary urge	

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Block D (part 2): Other self-damaging behaviors and items	Response category
Right now, how strong is the urge to consume an unusually large amount of alcohol?	7-point scale (ranging from absent to very strong)
Retrospective behavior	
Since the last beep, have you consumed an unusually large amount of alcohol?	(a) No, (b) yes
Momentary self-efficacy to resist	
Right now, how confident are you that you can resist consuming an unusually large amount of alcohol?	7-point scale (ranging from not at all to very)
Cannabis use (4 items)	
Retrospective thoughts	
Since the last beep, have you thought about smoking cannabis?	7-point scale (ranging from not at all to very much)
Momentary urge	
Right now, how strong is the urge to smoke cannabis?	7-point scale (ranging from absent to very strong)
Retrospective behavior	
Since the last beep, have you smoked cannabis?	(a) No, (b) yes
Momentary self-efficacy to resist	
Right now, how confident are you that you can resist smoking cannabis?	7-point scale (ranging from not at all to very)

[a]These other self-damaging behaviors are only assessed when screened positively in block D (part 1; Table 2) in the regular ecological momentary assessment surveys.

Phase 2: Safety Measures and Risk Monitoring

Participants are provided a 1-page information sheet with the contact information of the research team (study-specific telephone number and email address) as well as suicide and crisis hotlines during the baseline enrollment (phase 1). Although research suggests no reactivity or iatrogenic effects of repeated questioning about self-injurious thoughts and behaviors [110-112], there should be a proper safety protocol that not only matches participants' needs [113] but also does not inadvertently defeat the study's observational purpose [19,114]. Therefore, several measures are in place to support and safeguard participants' safety during the EMA period. First, an automatic pop-up screen with resources is shown at the end of a regular EMA survey whenever a participant indicates an intense urge for NSSI or any other self-damaging behavior (response 6 or 7 on a 7-point scale). This pop-up item contains either standard resources that signpost participants to relevant support organizations, family and friends, and their mental health professional or the personal resources provided by the participant during phase 1 (randomized within individuals across surveys with an equal probability of 0.5).

Second, a safety protocol is activated whenever a participant reports having attempted suicide or is at imminent risk for attempting suicide, operationalized as having an intense urge to attempt suicide (response 6 or 7 on a 7-point scale) combined with momentary low self-efficacy to resist this suicidal urge (responses 1-3 on a 7-point scale). A second automatic pop-up screen is triggered whenever this response pattern occurs, encouraging participants to provide more in-the-moment information within an open text field. After submitting this item (even when left blank), this response pattern issues an alert to the research team (ie, flagged email to the study account that is consistently monitored during recruitment hours). This information is then shared via telephone with clinical staff members on duty at the care facility for inpatients, after which they take appropriate action. The participating mental health professional also receives an email with this information. When the safety alert concerns an outpatient, a licensed clinical psychologist from the research team conducts the risk assessment by telephone. For minors, the parents or legal guardians are also contacted by telephone when a minor participant cannot be reached or when the clinical psychologist of the research team considers this necessary after a risk assessment.

Phase 2: Feedback Report, Clinical Session, and Feedback Surveys

After the EMA period, a feedback report is shared with the mental health professional to be discussed during a regular therapy session. The report contains person-specific data on (1) general psychological functioning (ie, emotions and cognitions) and contextual information (eg, distribution of time alone vs with others face-to-face or on the web and activities in daily life); (2) the course of NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior; and (3) the occurrence and intensity of other self-damaging thoughts and behaviors during the 28-day monitoring period. The section on general functioning includes pie charts displaying the proportion of time that someone spends across different contexts and box plots showing the median and variability of emotional and cognitive states. The section on NSSI provides information on the distribution and single-day average of NSSI thoughts, urges, and self-efficacy to resist NSSI (box plot and time series graphs). For example, high-risk days are operationalized as days on which the single-day average urge of NSSI is high (ie, mean response between 5-7 on a 7-point scale), coupled with low single-day average self-efficacy to resist NSSI (ie, mean response between 1-3 on a 7-point scale). In addition, the frequency of NSSI behaviors and types of methods are

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described, and NSSI urges are visualized across different situational, activity, and social contexts (bar charts). We also provide information about the occurrence of other self-damaging behaviors during the 28-day monitoring period. If the enrolled mental health professional cannot discuss the EMA feedback report (eg, because of treatment dropout or organizational issues), the patient can decide to have this session with another mental health professional or a clinical psychologist from the research team.

After the clinical session, an email is sent containing a link to a survey that assesses patients' and mental health professionals' experience of EMA and their perspectives on the EMA feedback report (Table 4). In case of nonresponse, 2 weekly reminders are sent. At this initial stage, we explore intrapersonal (ie, self-reflection and insight, self-efficacy, and subjective experiences) and interpersonal changes (ie, working alliance and helpful aspects during the clinical session) associated with the experience of EMA and the use of the EMA feedback report in treatment. The feedback survey also includes open questions assessing attitudes about self-monitoring, the content of the items, the feasibility of EMA, and the potential of EMIs for NSSI and other self-damaging behaviors (Table 4).

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Table 4. Overview of constructs assessed in the feedback survey.

Survey battery	Measure and example item	Source	Items, n; response scale
Self-insight and reflection in general[a]	Adapted Self-Reflection and Insight Scale: "The self-monitoring made me more aware of my feelings and thoughts"	Original [116] and Dutch translation: FBT[b]	8; 6-point Likert scale
Self-efficacy in general	Adapted Self-Efficacy Scale: "By what I learned about myself through the self-monitoring, I feel that I am better able to solve difficult problems if I try hard enough"	Original [99] and Dutch translation [100]	10; 4-point Likert scale
Self-insight and reflection with respect to NSSI[c] and other self-damaging behaviors[a]	Adapted Self-Reflection and Insight Scale: (1) experience of EMA[d]: "The self-monitoring made me more aware of my triggers for self-injury" and (2) use of EMA in therapy: "Discussing the monitoring results together with my clinician made me more aware of my triggers for self-injury"	Original [116] and Dutch translation: FBT	10; 6-point Likert scale
Self-efficacy resisting NSSI and other self-damaging behaviors	Adapted Self-Efficacy Scale: (1) experience of EMA: "By what I learned about myself through the self-monitoring, I now know better what to do when I am experiencing an urge to self-injure" and (2) use of EMA in therapy: "By discussing the monitoring results together with my clinician, I now know better what to do when I am experiencing an urge to self-injure"	Original [99] and Dutch translation [100]	10; 4-point Likert scale
Effect of discussing EMA results in therapy on the working alliance[a]	Adapted Working Alliance Inventory (short version): (1) task: "Discussing the results together helped us to understand which changes I need to make," (2) bond: "I feel my clinician understands me better because of the monitoring results," and (3) goal: "Discussing the results together makes me feel we are both working toward the same goals in therapy"	Original [117] and Dutch translation: FBT	12; 6-point Likert scale
Helpful aspects during clinical session[a]	Questions assessing any helpful or hindering aspects of the session and experience of clinician and therapeutic session as engaging and supportive, open and authentic, empathic, explorative, confrontational, and making positive progress: "I believe that my problems can be addressed through therapy"	Original [118] and Dutch translation [119]	40; mixed
Subjective experiences of EMA	Questions assessing (1) negative experience: "The self-monitoring questions caused me stress," (2) positive experience: "I enjoyed the self-monitoring," (3) learning experience: "I would describe the self-monitoring as a learning experience," and (4) facilitates self-regulation: "The self-monitoring questions helped me to structure my thoughts"	Self-developed	12; 5-point Likert scale
Expectations of feedback and compensation	Questions assessing the overall and relative importance of receiving study findings, personal feedback, and financial compensation	Items from Kiekens et al [19] and self-developed	11; mixed
Qualitative feedback	Questions assessing attitudes about self-monitoring, content of the items, length of questionnaires, experience and feasibility of self-monitoring, utility and potential effect on the therapy process, and utility and scope of future interventions	Self-developed	10; open questions

[a]Clinician version also included these questions.

[b]FBT: forward-backward translation.

[c]NSSI: nonsuicidal self-injury.

[d]EMA: ecological momentary assessment.

Phase 3: Follow-up Surveys After 1 and 3 Months and (Optional) Interviews About Experiences and Attitudes Toward EMA and EMIs

Phase 3 includes 2 brief web-based follow-up surveys after 4 and 12 weeks and an optional interview. The surveys assess past-week psychological distress and the presence of NSSI and other self-damaging behaviors since completing the self-monitoring (first survey) or between the follow-up surveys (second survey; see questionnaires indicated with subscript in Table 1). In case of nonresponse, 2 weekly reminders are sent. The qualitative interviews assess more in depth the experiences of using EMA and the utility, content, and design of future EMIs for NSSI among a voluntary subsample of individuals seeking treatment (online after the feedback session) and mental health professionals (on site after they have participated with at least

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2 patients in the study). The interview guides can be consulted on the project's Open Science Framework (OSF) page [115].

Participant Incentives and Engagement

Participants are recognized as valued contributors to the research and receive financial incentives, information about the overall findings, and feedback on their data. Patients are financially compensated via a structured financial scheme when (1) the feedback survey (if the EMA report was discussed) and (2) at least 1 of the follow-up surveys are completed: €35 (approximately US $38) if compliance with the monitoring protocol is >33% (or >55 EMA surveys), €70 (approximately US $76) if compliance is >65% or (>109 EMA surveys), and €100 (approximately US $109) if compliance is >83% (or >139 EMA surveys). Otherwise, patients receive €20 (approximately US $22) in financial compensation. In addition, personalized feedback reports are provided so that relevant information can be fed back into the therapy room. Patients can also opt in to receive updates on the general findings of the project. Finally, mental health professionals receive €10 (approximately US $11) as compensation for completing the feedback survey after the clinical session in which they discuss the EMA feedback report. We do not provide a financial incentive for participation in the interviews (phase 3).

Research Training and Well-being

All research activities are performed by clinically trained research staff. Risk monitoring of people who frequently self-injure requires good-quality training in working with individuals who engage in NSSI and are at increased risk for suicide [19]. Therefore, research staff who interact with participants and are part of the risk-monitoring team are licensed clinical psychologists who have received additional training that covered how to support participants during an acute suicidal crisis. In addition, although there is a psychologist *on call* outside of office hours, responsibility is always shared with the first and second authors (GK: PhD level and good clinical practice certified and LC: PhD level and cognitive behavioral therapist), who are available for supervision by telephone during recruitment hours. Finally, there are regular debriefings to ensure the well-being of all team members throughout the study's data collection period.

Statistical Analyses

Overview

The psychometric properties of baseline measures (eg, Cronbach α), EMA multi-item scales (eg, multilevel reliability [120]), and interrater reliability of diagnostic interviews (a subset of 20% of the sample, approximately 24 participants) will be reported. To accommodate the hierarchical structure of the EMA data (eg, observations nested within individuals), our 3 primary aims will be analyzed by using a combination of statistical techniques. First, descriptive statistics (eg, means, modes, SDs, intraclass coefficients, and correlations) will be used to describe the sample in terms of baseline characteristics; compliance rates; presence; comorbidity patterns; and moment-to-moment variability of NSSI outcomes across minutes, hours, days, and weeks. Second, we will use dynamic structural equation modeling (DSEM), which integrates three modeling approaches [121,122]: (1) time series analysis, which allows for modeling the lagged relation between repeated measures in a single participant; (2) multilevel modeling, which takes the higher-order data structure into account and models these relationships for multiple participants while capturing variability within and between persons over time; and (3) structural equation modeling, which takes measurement error into account and allows for multiple outcome variables, latent variables, and mediation effects [123].

Using DSEM will clarify the extent to which momentary factors at time point t_{-1} (eg, negative affect) predict NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior (or other self-damaging behaviors) at time point t, above and beyond the lagged version of the outcome variable (ie, the autoregressive parameter) and confounding variables at time point t_{-1} (eg, NSSI urges in the prediction of NSSI behavior). We will attempt to include random intercepts (predictors and outcomes) and random slopes (predictors) for momentary variables, with an unrestricted correlation structure if models converge (the maximum number of iterations is 50,000 by default). The time interval (Tinterval) statement will account for unequally spaced intervals owing to missing data and random sampling within blocks, with missing data handled using a Kalman filter approach [122]. Given that all participants have a recent history of NSSI but do not necessarily engage in other self-damaging behaviors, models that investigate within-person associations with disordered eating, substance use, and STB will be based on a subsample of participants that show variation in these secondary outcomes.

Third, we will use group iterative multiple model estimation (R package *gimme* [124]) to assess between-person variability in risk associations. Group iterative multiple model estimation estimates a unified structural equation model that includes lagged and contemporaneous relations in a network model [124,125] and accurately recovers group-, subgroup-, and individual-level associations in time series data. Fourth, fully idiographic modeling will be applied based on each participant's time series data to identify the most relevant factors for each individual without overfitting models [126,127]. Elastic net regularization will be used as a statistical classification approach, which produces sparse models through coefficient penalization with k-fold cross-validation (R package *glmnet* [128]). Fifth, survival analysis will be used to investigate the factors that predict the transition from intense NSSI urges to behavior [129]. Importantly, however, as the analysis of intensive longitudinal data is a burgeoning field, newly available methods will also be considered (eg, continuous-time and Markov switching models [130-133]).

Finally, the secondary objective will be analyzed using a mixed methods approach. We will use thematic analysis to evaluate open-ended questions and interview data regarding end users' experiences and perspectives [134]. Quantitative questionnaire data will be analyzed using descriptive statistics and regression analyses to explore associations with demographic and clinical characteristics.

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Expected Sample Size

We intend to recruit 120 individuals seeking treatment. Analyses that include 100 to 120 participants will yield sufficient statistical power (≥0.80) to detect within-person effects as small as 0.07 to 0.09 in multilevel autoregressive models. These power calculations were conducted using Monte Carlo simulations with the following conservative estimates [135]: a 1:0.67 ratio of random intercept to within-person residual deviation, a 1:0.25 ratio of random intercept to random slope SD, first-order and slope-intercept correlations of 0.5, and compliance of 60% to the regular EMA surveys. Recent studies have used pooled machine learning models with fewer observations and participants [127]. In addition, it has been shown recently that as few as 60 assessments from 25 individuals allow robust estimation of general, shared, and person-specific temporal associations in intensive longitudinal data [136].

Open Science Statement

All materials of the DAILY project can be consulted on the project's OSF page [115]. We will make the analysis plan, materials, and code of results in scientific publications available on the OSF page [137]. In addition, preprints will be uploaded on the PsyArXiv platform to ensure that findings are available to the wider research community. We do not have institutional review board approval to make the master data set publicly available, but we will make deidentified data available upon request for reproducibility purposes.

Results

The study is funded by a postdoctoral fellowship from the Research Foundation Flanders (Belgium) awarded to the first author (June 2020: 12ZZM21N; Multimedia Appendix 1). The recruitment of participants began in June 2021 and data collection is anticipated to conclude in August 2023.

Discussion

Principal Findings

The DAILY project is expected to advance scientific knowledge of (1) the short-term course and within-person risk and protective factors of NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior among individuals seeking treatment; (2) the transition from NSSI thoughts and urges to NSSI behavior; and (3) the comorbidity patterns, unique versus shared risk factors, and temporal relationships of NSSI with other self-damaging behaviors. Such information will inform clinical practice about how, why, and when self-injury and other self-damaging behaviors unfold in the everyday lives of individuals seeking treatment. Building upon these findings, we will explore the experiences and perspectives of end users (ie, people with lived experience and their mental health professionals) about the feasibility, scope, and utility of EMA and EMIs as digital clinical tools in treatment. This will provide the scientific building blocks for novel intervention approaches outside of the therapy room to support individuals who self-injure in real time. For instance, a sophisticated EMI that shows promise for dynamic behaviors such as NSSI and STB is just-in-time adaptive interventions [29,138,139]. This highly innovative intervention design adapts the provision of support in terms of type, intensity, and timing to an individual's changing status and context to facilitate real-time interventions when and where they are needed most in everyday life and in ways that are appropriate and evidence based [140].

Limitations

Although EMA is a powerful methodology that can now more readily be used to provide previously unavailable information about the course, within-person predictors, comorbidity patterns, and clinical outcomes of NSSI in daily life [19], it is crucial to consider the implications and limitations of the protocol used and the design when interpreting the project's findings. First, although measures are in place to ensure that recruitment is inclusive and geographically representative, with recruitment sites spread across the entire Flanders region of Belgium, it should be acknowledged that we use convenience sampling, with the targeted sample comprising individuals currently receiving mental health treatment. This implies that the findings should not be generalized to nonclinical populations because the short-term course of NSSI will likely differ in severity for community samples. Relatedly, adolescents can only participate from the age of 15 years, meaning that the findings are not generalizable to early adolescents (aged 10-14 years) and should be studied in this population. Second, the intensive sampling scheme matches the project's research objectives but involves a higher burden than traditional longitudinal studies (typically 1-5 surveys months to years apart) and most EMA studies (typically lasting 1 week) [26]. Although scholars have observed increased burden with longer questionnaires but not with increased sampling frequency among community samples [141], it should be investigated to what extent the current EMA sampling scheme and duration were considered feasible by all individuals seeking treatment. Third, we implemented safety measures for NSSI and other self-damaging behaviors (including the monitoring of suicide risk) based on prespecified cutoffs of momentary urges and low self-efficacy to resist a behavior. Future research would benefit from evaluating risk thresholds and the utility of different safety measures (eg, personal vs standard message and human-led vs automatic action) at varying risk levels for self-damaging behaviors.

Fourth, we operationalize NSSI and other self-damaging behaviors comprehensively (ie, thoughts, urges, and behavior) and assess a broad range of theoretically relevant factors (emotions, cognitions, contextual information, and social appraisals); however, as a consequence, most constructs rely on single EMA items that were selected from prior EMA studies or modified from conventional survey questionnaires to keep the workload for participants under control [141]. However, against the backdrop of a lack of psychometrically validated items for assessing psychological constructs with EMA [142] and a need to develop standardized measures [143], we will calculate the multilevel reliability of composite constructs (eg, negative affect) and made all EMA items (for the original Dutch items see the OSF page) publicly available [107]. Fifth, we provided additional (shorter) EMA surveys when participants report intense NSSI urges and contact participants and clinical staff when there is an increased suicide risk, which might result in underreporting of NSSI urges and STB. Sixth, because all

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participants receive mental health treatment, there might be structural changes in the descriptive patterns of self-damaging thoughts and behaviors across the monitoring period. We will evaluate this, and if the assumption of stationarity is violated, we will include days since study enrollment as a covariate for the outcome under investigation. Finally, we may miss moments leading up to self-damaging behaviors in the late evening and overnight as no EMA surveys are scheduled after 10 PM. Although we can assess to what extent this is the case for NSSI behavior (as people could register self-injury via the push button in the m-Path app), future research might benefit from sampling schemes adapted to people's sleep and wake-up times.

Conclusions

Notwithstanding the limitations, the findings of the DAILY project will provide a detailed characterization of the course and patterns of risk for NSSI during treatment by considering NSSI thoughts, NSSI urges, self-efficacy to resist NSSI, and NSSI behavior in the daily lives of individuals seeking treatment. This will help to increase our understanding of how NSSI unfolds across minutes, hours, days, and weeks. Filling these critical knowledge gaps using EMA will lay the foundation for, and guide, the development of novel interventions that support people when and where it matters most in daily life [29,138]. This scientific endeavor may facilitate young people's recovery from self-injury and ultimately could help us prevent loss of life.

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Data Availability

Data sharing is not applicable to this paper as no data sets were analyzed.

Conflicts of Interest

MKN receives publication royalties from Macmillan, Pearson, and UpToDate. He has been a paid consultant in the past 3 years for Microsoft Corp, the Veterans Health Administration, and COMPASS Pathways, as well as for legal cases regarding a death by suicide. He has stock options in Cerebral Inc. He is an unpaid scientific advisor for Empatica, Koko, and TalkLife.

Multimedia Appendix 1

Peer review reports from Fonds voor Wetenschappelijk Onderzoek – Vlaanderen (FWO)/ Research Foundation Flanders (Belgium). [PDF File (Adobe PDF File), 880 KB-Multimedia Appendix 1]

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Abbreviations

DAILY: Detection of Acute rIsk of seLf-injurY
DSEM: dynamic structural equation modeling
DSM-5: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
EMA: ecological momentary assessment
EMI: ecological momentary intervention
GDPR: General Data Protection Regulation
NSSI: nonsuicidal self-injury
OSF: Open Science Framework
REDCap: Research Electronic Data Capture
STB: suicidal thoughts and behaviors

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