Journal of Clinical Psychology

WILEY

RESEARCH ARTICLE

An Ecological Momentary Assessment Study of the Influence of Psychic Pain on Suicidal Ideation and Planning

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Received: 3 February 2025 | **Revised:** 19 May 2026 | **Accepted:** 24 May 2026

Funding: National Institutes of Health, Grant/Award Number: 1RF1MH120840-01

Keywords: burdensomeness | EMA | hopelessness | loneliness | psychache | psychic pain

ABSTRACT

Psychic pain (PsyPn) refers to intense emotional suffering that is experienced as both unbearable and irreversible. PsyPn has been shown in cross-sectional studies to be associated with greater depression, distress, and suicide risk. Although PsyPn is frequently discussed as a primary driver of suicide, few studies have evaluated its short-term predictive value for detecting changes in risk, and few have examined how PsyPn influences risk in interaction with other established factors, such as hopelessness. To address these gaps, the current study utilized ecological momentary assessment (EMA) to identify links between PsyPn, well-established psychosocial risk factors for suicide (hopelessness, loneliness, and burdensomeness), and the short-term emergence of suicidal ideation (SI) and planning. Thirty-nine adults across three clinical sites enrolled in the study after being identified during prescreen as being at elevated suicide risk. Subjects completed a baseline measure of vulnerability to PsyPn (Psychic Pain Scale), followed by an EMA protocol evaluating negative mental states, PsyPn, and SI and planning six times daily over a 14-day period. Multilevel modeling was used to estimate both within-and between-person associations between PsyPn, negative mental states, and SI and planning. Across suicide-related outcomes and timescales, PsyPn was associated with increased suicide risk, and greater PsyPn at both baseline and near-term levels amplified the influence of other daily living risk factors on suicide-related outcomes. The implications of these findings for suicide risk assessment and intervention are discussed, particularly in terms of informing specific targets and timescales of interventions.

Suicide is a leading cause of death that is influenced by a range of biopsychosocial factors (World Health Organization 2021, 2024). Although individuals diagnosed with mental health conditions are known to be at increased risk for suicide (Ferrari et al. 2014; Nordentoft 2011), suicide-related outcomes affect individuals across all age and demographic groups, and risk for eventual death by suicide can remain elevated following an initial attempt over a period of several decades (Nordentoft 2011; Suominen et al. 2004). While rising suicide mortality rates have been highlighted as a public health crisis over the past three decades, one recent study conducted in the United States found that over 16 million individuals endorsed serious thoughts of suicide within the past year, approximately 300 times the number of individuals who died by suicide during the same period (SAMHSA 2024). These findings highlight the clinical importance of evaluating not only behavioral outcomes related to suicide, but also the full range of

experiences of anguish, despair, and pain that contribute to vulnerability to suicide and that affect large segments of the population (Jobes et al. 2024). Psychic pain (also referred to as psychological pain, mental pain, or psychache) refers to experiences of intense, immersive emotional suffering that is perceived by the individual as being both unbearable and irreversible (Baryshnikov and Isometsä 2022; Charvet et al. 2022; Meerwijk and Weiss 2011; Orbach et al. 2003; Pachkowski et al. 2019). It has been conceptualized in the clinical literature as one of the most common drivers of suicidal thoughts and behaviors (e.g., Jobes 2023; Jobes et al. 2004; Shneidman 1985). The primacy of psychic pain in suicide was first argued by Edwin Shneidman (1985), who noted that suicide represents "...a movement away from something and that something is always the same: intolerable emotion, unendurable pain, or unacceptable anguish" (1993, 23). Growing interest in the topic of psychic pain has led to an increase in publications on the subject over the past three decades (Cheng et al. 2021), and debates over methods of defining, operationalizing, and assessing the construct in ecologically valid ways have become a central focus (e.g., Blandizzi et al. 2025; Charvet et al. 2022; Holden et al. 2001; Orbach et al. 2003). Existing measures of psychic pain draw from a range of theoretical backgrounds, primarily stemming from clinical and empirical scholarship related to the phenomenology of suicide and other self-destructive behaviors (Charvet et al. 2022; Holden et al. 2001; Lewis et al. 2021; Orbach et al. 2003). Major areas of content overlap pertain to experiences of unbearable intensity or overwhelm, feelings of hopelessness and helplessness, impairment in cognitive functioning due to psychic pain, and experiencing pain as intolerable (Charvet et al. 2022). Formulations of psychic pain as a "mental emergency" (Maltsberger 2004) serving to drive the near-term development of suicidal thoughts and actions are supported by qualitative studies of individuals' states of mind preceding suicidal behavior; statements such as " the pain was so intense that there's no way to get it to stop," "I couldn't seem to get beyond how painful life had become to me," (Tillman et al. 2022, 7), "there was... only pain," and "the pain grew and grew [and] I couldn't control it" (Nilsson et al. 2023, 78, 79) reflect experiences of pain as an intense, overwhelming, and intolerable mental state operating across both brief and extended periods of time. Overall, despite substantial attention within the domains of clinical theory, practice, and risk assessment, empirical research on the role of psychic pain as both an enduring dispositional risk factor as well as a short-term driver of suicide risk has lagged.

Cosci et al. (2022) highlighted the importance of psychic pain as a global person-centered outcome associated with suicide risk and mortality; indeed, the construct has been incorporated in most leading contemporary suicide assessment and treatment models (e.g., Jobes 2023; Klonsky and May 2015; Maltsberger 2004). Cross-sectional studies of psychic pain have typically found associations with greater depression, distress, and negative affect in both clinical and community samples (Campos and Holden 2015; Kealy et al. 2023; Lewis et al. 2021; Troister and Holden 2012), as well as greater physical health impairment (Alacreu-Crespo et al. 2020; Cosci et al. 2022), social disconnection (Kealy et al. 2023; Lewis et al. 2021), chronicity and severity of psychopathology (Lewis et al. 2021), and elevated risk for suicide-related outcomes (Blandizzi et al. 2025; Baryshnikov and Isometsä 2022). While many studies have evaluated direct associations between psychic pain and suicide risk, others have investigated psychic pain as an indirect or moderating influence affecting associations between other risk factors [e.g., social disconnection (Kealy et al. 2023) or trait disinhibition (Davis and Anderson 2023)] and suicide. Transdiagnostic phenomena such as hopelessness are known to influence risk both directly (Ribeiro et al. 2018) and indirectly, as factors which may amplify or mitigate the influence of other drivers of risk (Hagan et al. 2015). While previous literature supports a similar conceptualization of psychic pain, direct empirical evaluations of psychic pain as both a direct driver and indirect contributor to suicide risk have yet to be conducted.

In prospective studies, psychic pain has been found to predict the occurrence of suicidal ideation (SI) across timescales ranging from 4 weeks following initial assessment (Tsai et al. 2021) up to 4 years (Montemarano et al. 2018; see also Baryshnikov and Isometsä 2022). Lambert et al. (2020) found that psychic pain predicted the transition from non-attempter status to an initial suicide attempt over a 10-week period more accurately than depression, hopelessness, and SI severity rated at baseline. A naturalistic observational study of high-risk clinical subjects found that psychic pain decreased in severity over a 7-year period, in conjunction with improvements in resilience and reasons for living (Tillman and Lewis 2019), suggesting that vulnerability to psychic pain is malleable and represents a potentially modifiable target for treatment.

Across briefer time scales, ecological momentary assessment (EMA) studies have examined associations between short-term changes in suicidal thoughts and other risk factors, such as hopelessness, loneliness, and burdensomeness (Hallensleben et al. 2019; Jacobucci et al. 2023). Studies evaluating short-term changes in psychic pain and short-term fluctuations in suicide risk, however, have remained conspicuously absent from the literature. In fact, a recent review noted that there are at present "...[no] studies examining trait and state characteristics of psychological pain in psychiatric patients. In other words, it remains unknown whether experiencing psychological pain is a short-term predictor of suicidality or whether a lifetime tendency of experiencing psychological pain indicates a vulnerability to suicidality" (Baryshnikov and Isometsä 2022). Given the centrality of psychic pain in contemporary conceptual models of suicide and clinical risk assessment over the past several decades, this gap in the literature is surprising. Gaining a better understanding of the temporal relationship between psychic pain and suicide risk may increase the precision of existing risk assessment tools and intervention approaches and inform future empirical programs of study.

Clarification is also needed regarding distinctions between psychic pain and other negative cognitive and affective risk factors for suicide. This question has been explored in clinical writing and scholarship for decades; Shneidman (1985) for example differentiated the construct of *psychache* from negative affect, describing it as a common "stimulus" for suicide rather than an emotional experience. Shneidman (1993) argued that psychic pain functions as a separate factor which moderates other risk associations, rather than a quality or feature of negative affects themselves. This framing is echoed to a certain degree in other contemporary models, such as the Three Step Theory (3ST; Klonsky and May 2015). Psychic pain in the 3ST is posited to be a necessary-but-insufficient contributor to

the development of SI, while hopelessness *about* pain is conceptualized as a requirement for the emergence of SI (Klonsky and May 2015). Empirically, recent studies of Joiner's Interpersonal Psychological Theory of Suicide (IPTS; Joiner 2005) have found that experiences of thwarted belongingness and perceived burdensomeness were associated with both psychic pain and higher suicide risk (Brooks et al. 2024). Both the IPTS and 3ST emphasize the importance of considering both psychic pain and hopelessness as near-term drivers of suicidal thoughts and behaviors (e.g., Brooks et al. 2024; Klonsky and May 2015), though these theories vary in their framing of how psychic pain is related to other sources of risk, such as negative affect, environmental stressors, or perceptions of adversity or thwarted psychological needs. Empirical examinations of the ways in which experiences of pain interact with these factors would help to improve the clarity of these models and enable greater precision in risk estimations in the context of clinical assessment.

The impact of psychic pain as a primary driver of suicide, as well as its function as a modifier of associations between other high-risk states such as social isolation, loneliness (Brooks et al. 2024; Kealy et al. 2023), and burdensomeness (Brooks et al. 2024), has primarily been studied in the context of cross-sectional designs. However, similar to SI itself (Kleiman et al. 2017; Millner et al. 2017), negative mental states (like hopelessness and loneliness) are known to vary over time in response to changing external and internal contexts (e.g., Hallensleben et al. 2019; Jacobucci et al. 2023; Kleiman et al. 2017). The granular and dynamic ways in which psychic pain may be associated with suicide risk remain unclear.

The present study sought to address these gaps in knowledge in several ways. First, we aimed to clarify differences in trait (e.g., general vulnerabilities) versus state (e.g., near-term appraisal) manifestations of psychic pain in relation to changes in suicide risk. Given the prevalence and negative impact of serious suicidal thoughts in the general population (SAMHSA 2024), we chose to operationalize suicide risk in ideation terms as both intensity of SI as well as degree of planning for suicidal action. We further evaluated whether trait and state measures of psychic pain moderated the influence of other risk factors (hopelessness, perceived burdensomeness, and loneliness) on both SI and suicide planning (SP). Finally, we investigated links between psychic pain, hopelessness, and other negative experiences associated with the frustration of interpersonal needs and SI and SP across different timescales, both concurrently as well as prospectively (e.g., predicting lagged SI and SP responses using EMA).

To accomplish these objectives, we recruited subjects identified through prescreening as being at elevated risk for suicide. We first sought to replicate earlier EMA findings which demonstrated short-term links between negative mental state variables and suicide risk (e.g., Hallensleben et al. 2019; Jacobucci et al. 2023; Kleiman et al. 2017). We next examined the role of psychic pain in near-term changes in suicide risk, hypothesizing that (1) both trait and state measures of psychic pain would be associated with increased ratings of SI and SP; and (2) that both state and trait measures of psychic pain would moderate (amplify) associations between other negative mental states and SI and SP. We predicted that these relationships would hold for both concurrent associations as well as lagged (next entry) ratings of SI and SP.

1 | Method

1.1 | Participants

Thirty-nine subjects were recruited via flyers across three clinical sites located in the northeast region of the United States between March 2020 and October 2023. Recruitment sites included two university-affiliated mental health centers ($n = 14$) and a long-term residential treatment facility for adults with chronic, complex psychopathology ($n = 25$). Demographic and psychiatric history details for the sample are reported in Table 1. Subjects from the university-affiliated sites were significantly younger on average than those from the residential treatment facility (average age=21.64 [SD = 5.20] vs. 30.48 [SD = 10.02], $t[37] = -3.62$, $p = <0.01$, $d = 1.11$). Subjects from the residential treatment facility were also more likely to be prescribed mood stabilizing medications ($X^2[1, N = 39] = 20.11$,

TABLE 1 | Sample characteristics and total psychic pain scale ratings.

	N	%	*M*	SD
Age			27.31	9.55
Gender				
Female	25	65.79		
Male	6	15.79		
Transgender/Non-binary (TGNB)	8	20.05		
Ethnicity				
Eastern/Western European	26	68.42		
Asian	5	13.16		
Black or African American	3	7.89		
American Indian/Alaskan Native	1	2.63		
Other/decline to state	3	7.89		
Marital status				
Married	5	13.16		
Partnered	3	7.89		
Single	27	71.05		
Divorced	2	5.26		
Separated	1	2.63		
Employment status				
Full time	2	5.26		
Part time	2	5.26		
Unemployed	20	52.63		
Student	16	42.11		
Other	4	10.53		
Psychic pain scale (sum)			41.13	11.13
Prior suicide attempt ($n = 18$)			44.06	8.47
No prior suicide attempt ($n = 20$)			38.50	12.71

Note: Percentages are based on $n = 38$ subjects who completed the baseline measures. Employment status item allowed multiple response selection.

$p = <0.01$, Cramer's $V = 0.72$) compared to subjects from the university-affiliated sites. The 39 participants completed an average of 78.00 EMA records (SD = 4.98). This sample size allows for sufficient power (> 0.80) to detect large effects ($d = 0.8$) (Kleiman 2017).

1.2 | Measures

1.2.1 | Screening

1.2.1.1 | Suicidal Behavior Questionnaire-Revised (SBQ-R; Osman et al. 2001)

The SBQ-R is a 4-item measure evaluating current suicide risk. A cut-off score of > 7 has demonstrated good sensitivity and specificity for identifying those at-risk for suicidal behavior (Osman et al. 2001). A single item asking "In the past year, when you've had thoughts of killing yourself, did you think about how you might do this?" was added to evaluate consideration of method within the past 12 months. Subjects who endorsed consideration of method within the past year and who received a score of > 7 on the SBQ-R were determined to meet inclusion criteria for this study.

1.2.1.2 | MINI International Neuropsychiatric Interview (MINI 7.0.2, DSM-5; Sheehan et al. 1997)

The MINI is a well-validated semi-structured interview designed to assess psychopathology. The MINI was used to screen for diagnostic exclusion criteria, which included bipolar disorder (current manic episode), lifetime psychotic spectrum disorder, and current moderate to severe substance use disorder. Current depressive episode was evaluated as a covariate. The MINI was administered in this study by either doctoral level psychologists or graduate students in psychology or social work who received extensive training on the interview.

1.2.2 | Baseline Assessment

1.2.2.1 | Demographic Form

A demographic form was used to assess participant age, ethnicity, race, marital status, SES, education, and gender.

1.2.2.2 | Treatment History Interview (THI; Linehan and Heard 1987)

The THI is a widely used assessment of medical and psychiatric treatment history. The THI was used to obtain information about current medication prescription and use adherence. Current use of mood stabilizing medications was evaluated as a covariate in our main analyses.

1.2.2.3 | Psychic Pain Scale (PPS; Lewis et al. 2021)

The PPS is a 12-item self-report measure assessing experiences of emotional pain and distress. Items are rated on a 5-point Likert scale (*1 = I never experience such things* to *5 = I frequently experience such things*). Internal reliability for the total sum score in the present study was excellent ($\alpha = 0.91$).

1.2.3 | Ecological Momentary Assessment (EMA)

Subjects were asked to complete a series of surveys via smartphone evaluating different aspects of their daily mood, affects, behaviors, social experiences, and suicide risk. Subjects completed six surveys per day for 14 days. These six daily surveys included three event-contingent surveys, which could follow any interpersonal interaction of the subject's choosing during each day that lasted 3 min or longer. For the present study, the relevant event-contingent EMA survey questions included two items pertaining to suicide-related outcomes (for SI, an item asking "*Since the last survey, did you have any thoughts of ending your life?*" rated on a 5-point scale ranging from *1=Not at all* to *5=Constantly*, and for SP an item asking "*Since the last survey, did you have any plans for ending your life?*" rated on a 5-point scale ranging from *1=Nothing specific* to *5=Very specific plan*) and four items related to negative mental states and psychic pain (for negative mental states, three items stating "*Since the last survey, I have felt... like a burden vs. hopeless* vs. *alone/lonely*," and for psychic pain an item stating "*Since the last survey, I have been in emotional pain*", all rated on a 5-point scale ranging from *1=very slightly or not at all* to *5=extremely*). Although a range of terms have been used across measures of psychic pain—including *mental pain*, *psychological pain*, and *psychache* (Baryshnikov and Isometsä 2022; Comendador et al. 2026; Shneidman 1999)—we opted to use the term "emotional pain" in our EMA protocol to maintain consistency with the terminology used during the baseline assessment (the PPS directs respondents to consider their experiences of "strong emotions"; Lewis et al. 2021). In addition, consistent with the recommendations of Meerwijk and Weiss (2011), we aimed to prioritize terminology that provided conceptual clarity for respondents, avoided jargon, and closely approximated terms previously identified as reflecting the construct of psychic pain in qualitative studies of individuals with lived experience (e.g., Bolger 1999). The multi-level reliability of the three items assessing negative mental states was adequate at the within-person level ($\alpha = 0.77$) and between-person level ($\alpha = 0.92$). Subjects were also asked to complete three signal-contingent surveys prompted at 9 a.m., 2 p.m., and 7 p.m. daily, which included identical questions addressing each of the variables listed above. Finally, subjects were asked to complete event-contingent surveys every time they experienced SI during the EMA period, as soon as possible after onset of their ideation. This survey included the items listed above pertaining to SI and SP. These SI-contingent entries were utilized in analyses of lagged associations between negative mental state variables, psychic pain, and suicide.

1.3 | Procedures

To be eligible for participation in the study, subjects were required to report a past year history of SI characterized by high severity (e.g., meeting established clinical risk cut-off scores on the SBQ-R and confirming they had considered a specific method for suicidal action within the past year). Potential subjects were excluded if they reported a lifetime history of psychotic spectrum disorders, bipolar disorder with current manic episode, current moderate to severe substance use disorder, or sleep or circadian rhythm disorders (not including

insomnia) during the screening process.[1] In total, $n = 96$ potential subjects were screened across the three recruitment sites, out of which $n = 39$ were determined to be eligible for inclusion and provided informed consent. After attending an in-person enrollment and study orientation meeting (held virtually when necessary due to the COVID-19 pandemic), subjects completed the baseline measures by accessing a Qualtrics survey from their personal devices. This was followed by a 14-day EMA protocol, which involved daily tracking of psychological functioning via an app-based survey hosted by LifeData (www.lifedata.net), which subjects downloaded and accessed using their personal smartphones. All subjects received a $30 gift card after completing baseline measures and a $70 gift card after completing the EMA measures. Subjects were eligible to receive an additional $25 gift card at the end of the study if they completed at least 80% of the EMA surveys. Data, in conjunction with an appropriate data sharing agreement, are available at https://nda.nih.gov/edit_collection.html?id=3497.

1.4 | Data Analytic Plan

Multilevel modeling (MLM) in SAS Studio (PROC MIXED; Littell et al. 1996) with restricted maximum likelihood estimation (REML) was used to model within-person and between-person associations while accounting for dependencies in the repeated measures data to obtain proper standard errors (Bryk and Raudenbush 1992; Snijders and Bosker 1999). The small amount of missing data was treated as missing at random. Lagged variables were calculated from the previous timepoint. Lagged variables were replaced as missing data if the duration between records was too small (<3 min), too large (>12 h), and the nightly lag connecting the last record of yesterday to the first record of today.[2] Following standard multilevel practice, all repeated measures were separated into between-person and within-person components (Hofmann and Gavin 1998; Schwartz and Stone 1998). All between-person variables were sample-centered to facilitate interpretation of model parameters as representative to the prototypical participant. All within-person variables were person-centered to facilitate interpretation as fluctuations from that person's average score. Interactions were probed by calculating simple intercepts and slopes at ±1 SD from the sample means using estimate statements in SAS. Interactions with confidence bands were plotted using R studio following recommendations from Howard (2021). The two main outcomes were EMA based suicidal ideation and suicide planning.

2 | Results

In total, 39 subjects provided informed consent and enrolled in the study; one subject participated in the screening and EMA portion of the study but did not complete baseline measures (final $n = 38$ for all analyses involving PPS total score). Eighteen subjects reported a lifetime history of a suicide attempt. Subjects in the EMA portion of the study provided 3042 entries, with a median of 80 ratings ($M = 78.00$, SD = 4.98); approximately 95% of the sample provided 50 or more EMA ratings. The average length of time between EMA entries across participants was 3.58 h (SD = 4.74 h). Approximately 82% (2493) of all EMA entries included ratings of suicidality, and 95% of subjects ($n = 37$) reported at least one instance of suicidal ideation and/or planning during the study period. The mean EMA SI severity rating was 2.02 (SD = 1.30). The intra-class correlation coefficient (ICC) indicated that for SI, 61% of variance occurred at the between-person level (i.e., level two), compared to the variance at the within-person (level 1) level and error. The mean EMA SP severity rating was 1.65 (SD = 1.01); the ICC indicated that for SP, 61% of variance also occurred at the between-person level.

The following variables were evaluated as covariates during the baseline assessment, and were found to be unrelated to SI or SP: age ($\gamma_{SI} = -0.03$, SE = 0.02, $p > 0.05$; $\gamma_{SP} = -0.02$, SE = 0.01, $p > 0.05$), gender ($\gamma_{SI\_F} = -0.72$, SE = 0.40, $p > 0.05$; $\gamma_{SI\_TGNB} = 0.13$, SE = 0.53, $p > 0.05$; $\gamma_{SP\_F} = -0.66$, SE = 0.35, $p > 0.05$; $\gamma_{SP\_TGNB} = -0.16$, SE = 0.41, $p > 0.05$), current mood stabilizer use ($\gamma_{SI} = 0.25$, SE = 0.35, $p > 0.05$; $\gamma_{SP} = 0.20$, SE = 0.20, $p > 0.05$), and current depressive episode ($\gamma_{SI} = 0.55$, SE = 0.37, $p > 0.05$; $\gamma_{SP} = 0.47$, SE = 0.28, $p > 0.05$). There was a moderate but non-significant difference in PPS sum scores between subjects with versus without a lifetime suicide attempt history ($t[36] = 1.57$, $p = 0.13$, $d = 0.52$; see Table 1).

2.1 | Negative Mental States Predicting Suicidal Ideation and Planning

First, we sought to replicate previous findings from the literature showing positive within-person associations between negative mental states and increased SI, both concurrently and during subsequent (lagged) entries (Table 2). Intensity of SI at the time of the negative mental state category rating was included in each model as a covariate. At the within-person level, feeling burdensome, hopeless, and lonely were each positively associated with concurrent ratings of SI. Thus, short-term escalations in these negative mental states relative to a participant's own typical experience were related to greater severity of SI. No lagged associations were found for the three negative mental state variables. At the between-person level, feeling more burdensome, hopeless, and lonely overall (compared to other subjects) during the study period was positively associated with greater SI.

Next, we evaluated within-person associations between each negative mental state and SP, both concurrently and during subsequent (lagged) entries. Intensity of SP at the time of the negative mental state category rating was included in each model as a covariate. At the within-person level, feeling burdensome, hopeless, and lonely was positively associated with concurrent ratings of SP. Higher ratings of hopelessness during the prior rating event were found to predict SP severity; no lagged associations were found for either burdensomeness or loneliness. At the between-person level, all three categories were positively associated with SP, suggesting that subjects who generally experienced greater negative mental state experiences during the 2-week study period (compared to other subjects) were more likely to experience greater SP.

Given the consistency of findings across negative affect categories, in subsequent moderation models the mean EMA

TABLE 2 | Fixed effects predicting suicidality.

	SI	SI + lagged	SP	SP + lagged
Within-person fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 burden	0.31 (0.04)**	0.26 (0.04)**	0.19 (0.03)**	0.14 (0.02)**
Level-2 burden	0.81 (0.13)**	0.81 (0.13)**	0.62 (0.10)**	0.62 (0.10)**
Level-1 burden (lag)		0.002 (0.03)		−0.03 (0.01)
Level-1 SI (lag)		0.20 (0.04)**		
Level-1 SP (lag)				0.33 (0.05)**
Within-person fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 hopeless	0.41 (0.04)**	0.36 (0.04)**	0.23 (0.03)**	0.17 (0.02)**
Level-2 hopeless	0.78 (0.09)**	0.78 (0.10)**	0.55 (0.08)**	0.55 (0.08)**
Level-1 hopeless (lag)		−0.01 (0.02)		−0.03 (0.02)*
Level-1 SI (lag)		0.16 (0.04)**		
Level-1 SP (lag)				0.30 (0.05)**
Within-person fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 lonely	0.31 (0.05)**	0.24 (0.04)**	0.17 (0.03)**	0.12 (0.02)**
Level-2 lonely	0.64 (0.12)**	0.64 (0.13)**	0.44 (0.10)**	0.44 (0.10)**
Level-1 lonely (lag)		−0.002 (0.03)		−0.03 (0.02)
Level-1 SI (lag)		0.21 (0.04)**		
Level-1 SP (lag)				0.34 (0.05)**
Within-person fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 NMS	0.49 (0.05)**	0.45 (0.06)**	0.27 (0.04)**	0.22 (0.03)**
Level-2 NMS	0.86 (0.11)**	0.87 (0.12)**	0.62 (0.09)**	0.61 (0.09)**
Level-1 NMS (lag)		−0.02 (0.03)		−0.06 (0.02)**
Level-1 SI (lag)		0.15 (0.03)**		
Level-1 SP (lag)				0.32 (0.05)**
Within-person fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 EMA pain	0.42 (0.05)**	0.36 (0.04)**	0.23 (0.03)**	0.18 (0.02)**
Level-2 EMA pain	0.72 (0.11)**	0.75 (0.11)**	0.52 (0.09)**	0.52 (0.09)**
Level-1 EMA pain (lag)		−0.005 (0.03)		−0.04 (0.02)**
Level-1 SI (lag)		0.15 (0.04)**		
Level-1 SP (lag)				0.31 (0.05)**
EMA pain (Lv1) moderating within-person NMS: fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 NMS	0.31 (0.05)**	0.27 (0.06)**	0.18 (0.04)**	0.12 (0.04)**
Level-2 NMS	0.58 (0.21)*	0.56 (0.22)*	0.42 (0.17)*	0.43 (0.17)*
Level-1 NMS (lag)		−0.02 (0.04)		−0.05 (0.02)*
Level-1 EMA pain	0.22 (0.04)**	0.21 (0.04)**	0.12 (0.03)**	0.11 (0.02)**
Level-2 EMA pain	0.21 (0.19)	0.24 (0.20)	0.12 (0.15)	0.10 (0.16)
Level-1 EMA pain (lag)		−0.003 (0.03)		−0.02 (0.02)
Level-1 SI (lag)		0.14 (0.04)**		
Level-1 SP (lag)				0.32 (0.05)**
Level-1 NMS* EMA pain	0.09 (0.02)**	0.09 (0.02)**	0.06 (0.01)**	0.07 (0.01)**
Level-2 NMS*Level-2 EMA pain	0.17 (0.10)	0.18 (0.11)	0.19 (0.08)*	0.20 (0.09)*
Level-1 NMS_lag*EMA pain (lag)		−0.04 (0.02)*		−0.02 (0.01)
PPS pain (Lv2) moderating EMA pain: fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 EMA pain	0.40 (0.04)**	0.35 (0.04)**	0.22 (0.03)**	0.17 (0.02)**
Level-2 EMA pain	0.66 (0.17)**	0.69 (0.18)**	0.58 (0.14)**	0.57 (0.15)**

(Continues)

TABLE 2 | (Continued)

	SI	SI + lagged	SP	SP + lagged
Level-2 PPS	0.006 (0.02)	0.005 (0.02)	−0.01 (0.01)	−0.01 (0.01)
Level-1 EMA pain (lag)		−0.006 (0.03)		−0.04 (0.02)*
Level-1 SI (lag)		0.14 (0.04)**		
Level-1 SP (lag)				0.30 (0.05)**
Level-1 EMA pain*PPS	0.02 (0.00)**	0.01 (0.00)**	0.005 (0.003)	0.003 (0.00)
Level-2 EMA pain*PPS	0.006 (0.01)	0.006 (0.01)	0.002 (0.01)	0.003 (0.01)
Level-1 EMA pain (lag)*PPS		0.004 (0.00)		−0.001 (0.00)
PPS pain (Lv2) moderating within-person NMS: fixed effects	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Level-1 NMS	0.47 (0.05)**	0.43 (0.05)**	0.26 (0.04)**	0.22 (0.03)**
Level-2 NMS	0.84 (0.17)**	0.82 (0.17)**	0.70 (0.14)**	0.67 (0.14)**
Level-2 PPS	0.001 (0.01)	0.002 (0.01)	−0.01 (0.01)	−0.01 (0.01)
Level-1 NMS (lag)		−0.02 (0.03)		−0.06 (0.02)**
Level-1 SI (lag)		0.14 (0.03)**		
Level-1 SP (lag)				0.31 (0.05)**
Level-1 NMS*PPS	0.02 (0.01)**	0.01 (0.01)*	0.006 (0.00)	0.002 (0.00)
Level-2 NMS*PPS	0.002 (0.01)	0.004 (0.01)	−0.0004 (0.01)	0.001 (0.01)
Level-1 NMS (lag)*PPS		0.003 (0.00)		− 0.002 (0.00)

Note: Level-1 variables person-centered; Level-2 variables sample centered. All models include a random intercept and estimated Level 1 residual variance (not shown). Abbreviations: EMA = ecological momentary assessment; EMA Pain = Near-term ratings of psychic pain assessed by EMA; (lag) = lagged variable one event rating prior to endorsement of suicidality via EMA; Negative Mental States = Mean of negative mental state ratings via EMA of burdensomeness, hopelessness, and loneliness; PPS Pain = General vulnerability to pain assessed by the Psychic Pain Scale sum score at baseline; γ = unstandardized estimate.
**$p < 0.01$.; *$p < 0.05$.

ratings of burdensomeness, hopelessness, and loneliness were combined and averaged for each entry and used as a general "negative mental state" variable (NMS) for parsimony. The aggregated NMS variable was found to predict intensity of both concurrent SI ($\gamma = 0.49$, SE = 0.05, $p < 0.001$) and SP ($\gamma = 0.27$, SE = 0.04, $p < 0.001$) ratings, as well as subsequent SP ratings (after controlling for SP severity concurrent with NMS; $\gamma = -0.06$, SE = 0.02, $p < 0.001$). Subjects who in general reported greater NMS severity during the 2-week study period (level 2) similarly were more likely to report greater SI ($\gamma = 0.86$, SE = 0.11, $p < 0.001$) and SP ($\gamma = 0.625$, SE = 0.09, $p < 0.001$) overall compared to other subjects.

2.2 | Direct Associations Between Trait and State Psychic Pain and Suicidal Ideation and Planning

We next evaluated direct associations between general (trait) vulnerability to psychic pain (using the PPS) and reports of psychic pain in daily life (using EMA) in relation to SI and SP, evaluating both concurrent and lagged associations. For general vulnerability to psychic pain, higher PPS scores were positively associated with more severe SI ($\gamma = 0.05$, SE = 0.01, $p < 0.001$) and SP ($\gamma = 0.03$, SE = 0.01, $p < 0.01$) on average during the subsequent 2-week EMA period.

At the within-person level, short-term (EMA) escalations of psychic pain were positively associated with concurrently-rated SI ($\gamma = 0.42$, SE = 0.05, $p < 0.01$) and SP ($\gamma = 0.23$, SE = 0.03, $p < 0.01$), as well as lagged outcomes for SP ($\gamma = -0.04$, SE = 0.02, $p < 0.01$), although in a negative direction. Specifically, lower (not higher) EMA pain predicted greater subsequent SP severity, after controlling for SP severity at the time of the EMA pain rating (Table 2). While counter to expectations, this finding may signal a sensitivity to sudden escalations in pain over short periods of time as a driver of SP specifically. Finally, aggregated (between-person) ratings of EMA pain during the 2-week study period were associated with overall greater frequency of SI ($\gamma = 0.72$, SE = 0.11, $p < 0.01$) as well as greater SP ($\gamma = 0.52$, SE = 0.09, $p < 0.01$).

2.3 | Psychic Pain as a Moderator of Associations Between Negative Mental States and Suicidal Ideation and Planning

For SI and SP, we evaluated ratings of psychic pain in daily life (via EMA) as a moderator of the within-person associations between NMS and suicide-related outcomes. For SI, greater psychic pain in daily life moderated (specifically, amplified) the concurrently-rated within-person association of greater NMS and increased SI (Figure 1). A lagged association was also found, wherein greater severity of SI was predicted paradoxically both by higher EMA pain and lower NMS severity during the previous rating period (controlling for concurrent SI severity; see Figure 2). While not hypothesized, this association may suggest that experiences of pain that are followed by escalations in NMS severity (e.g., movement from low intensity to high) may precipitate increases in SI in vulnerable individuals. Alternately, this finding may suggest that diffuse experiences of pain that emerge in absence of more clearly defined, granular mental states (e.g., feeling pain but not directly associating it

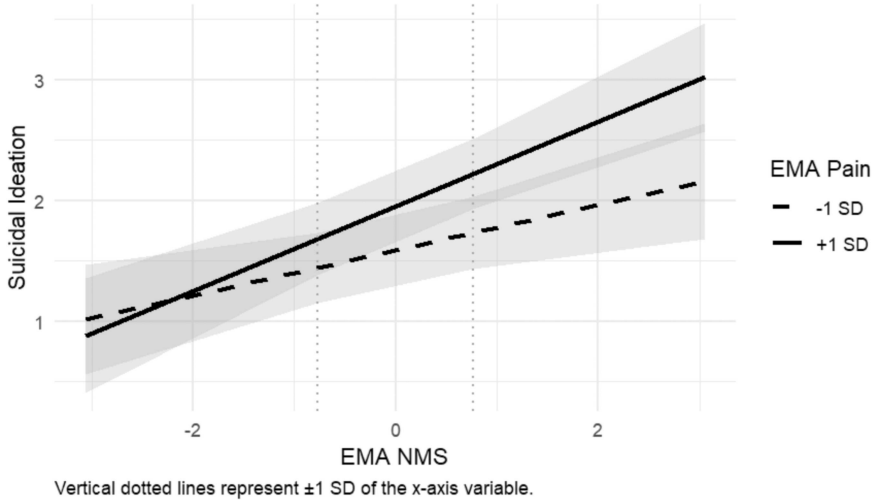

FIGURE 1 | Recent changes (Level 1 EMA) in psychic pain moderates associations between within-person changes in negative mental states and suicidal ideation.

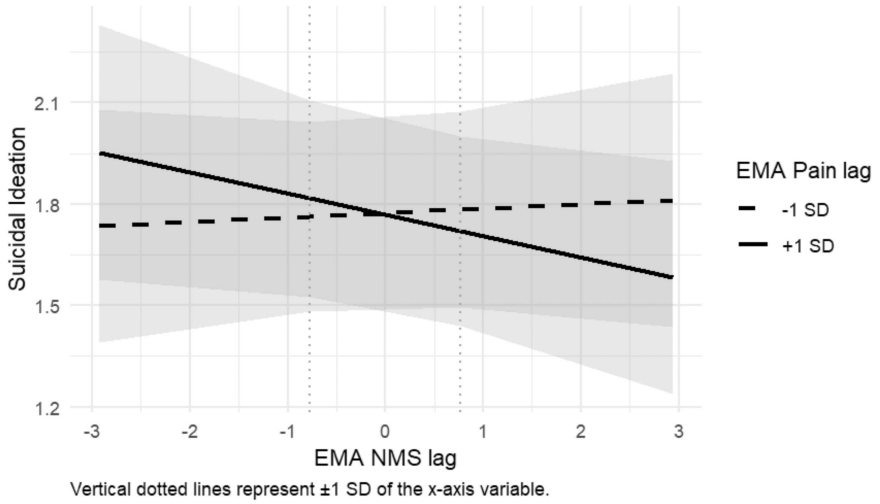

FIGURE 2 | Psychic pain (Level 1 EMA) moderates prospective associations between negative mental states (when rated concurrently with psychic pain) and next-event ratings of suicidal ideation.

with loneliness, burdensomeness, or hopelessness) may create barriers to effectively processing the experience or engaging with others for help or support.

Similar findings emerged in the prediction of SP: greater ratings of psychic pain in daily life (via EMA) moderated the within-person association of NMS and increased SP, with psychic pain intensifying the impact of recent NMS on concurrently rated SP. In contrast to SI, there were no lagged effects for EMA pain and NMS on subsequent SP ratings. Finally, higher overall (between-person) EMA psychic pain was found to intensify the association between greater NMS during the study period and higher overall levels of SP (Figures S1 and S2).

We then evaluated general vulnerability to psychic pain (evaluated at baseline using the PPS) as a between-person moderator of the within-person relationship between ratings of psychic pain in daily life (via EMA) and suicidality. Greater vulnerability to psychic pain (PPS) was found to moderate the within-person association of EMA pain and SI when rated concurrently, though similar findings were not found for SP or for any of the lagged models (Figure S3). Individuals who rated themselves as more vulnerable to psychic pain at baseline (PPS) reported greater severity of SI in the context of elevated EMA pain compared to those subjects who described themselves as less vulnerable to pain at baseline.

Finally, we evaluated general vulnerability to psychic pain (PPS) as a between-person moderator of the near-term (EMA) relationship between NMS and SI and SP. Greater vulnerability to psychic pain (PPS) was found to moderate the within-person associations between NMS and SI when rated concurrently, although similar results did not emerge for SP or for the lagged models (Figure S4). Thus, similar to SI, greater vulnerability to psychic pain (PPS) amplified the influence of near-term NMS on concurrent SI, while vulnerability to pain did not increase the salience of NMS on concurrent elevations in SP or during subsequent rating periods for either outcome.

3 | Discussion

Most contemporary theories of suicide emphasize two critical points, namely (1) that suicidality arises in the context of

unbearable internal states, which compromise capacities for self-regulation, cognitive flexibility, and future orientation, and (2) that suicidal thoughts vary, sometimes drastically, over time, with risk for suicidal action fluctuating accordingly across timescales ranging from moments to decades. In the present study, we sought to expand understanding of suicide risk with consideration given to both points, namely with the goal of evaluating how experiences of unbearable psychic pain influence suicide risk both directly and within the context of other dysregulating negative mental states; and on what timescale(s) experiences of psychic pain may operate to escalate suicide risk in vulnerable individuals.

Leading scholars within the field of suicidology, recognizing the central importance of psychic pain, have historically advocated for caution in distinguishing experiences of pain both empirically and conceptually from other forms of interpersonal and affective vulnerability, particularly hopelessness (e.g., Klonsky and May 2015; Shneidman 1993). In contemporary models of suicide, psychic pain represents an extreme subjective state associated not only with negative mental states reflecting the frustration of core psychological needs, but an overall experience of agitation and anguish that together feels both unbearable and irreversible (Charvet et al. 2022; Meerwijk and Weiss 2011; Orbach et al. 2003). In the present study, we evaluated both direct associations between psychic pain and suicide-related outcomes as well as the role of psychic pain as a moderating influence on other psychosocial risk factors. We first replicated earlier findings demonstrating significant positive concurrent associations between negative mental states and SI (specifically for hopelessness, loneliness, and burdensomeness; Kleiman et al. 2017), and extended these studies by demonstrating the effects of these risk states on suicide planning (in addition to ideation). We found across most instances that experiences of psychic pain moderated these associations, such that elevated pain amplified the concurrent effects of negative mental states on suicide risk. These effects further held across different operationalizations (e.g., short-term fluctuations vs. general vulnerability) of psychic pain. Self-reported vulnerability to psychic pain assessed using the PPS (Lewis et al. 2021) upon entry to the study identified those subjects who subsequently went on to show greater proneness to SI (but not SP) under conditions of more severe negative mental state experiences during the following 2-week period. Over the course of the study, ratings of pain anchored in specific daily living event contexts (EMA) functioned as an indicator of elevated suicide proneness under the same conditions, whether aggregated to identify those subjects who reported more severe ideation and planning overall during the study compared to other subjects (between-person) or escalations in reference to subjects' own individual typical experiences occurring over a period of hours (within-person). Such findings provide needed empirical support for the conceptualization of psychic pain as a phenomenon that should be differentiated from other risk states associated with frustrated psychological and interpersonal needs (e.g., Baryshnikov and Isometsä 2022), and highlights the importance of incorporating assessments of vulnerability to and frequency of experiences of pain in everyday life.

In addition to illustrating the differences and interplay between psychic pain and related risk states, our findings provide important preliminary information regarding the timescales under which psychic pain influences escalations in suicide risk. A majority of existing studies of psychic pain have used cross-sectional designs and past history of suicidal thoughts and behaviors as the primary outcome or grouping variable (e.g., Holden et al. 2001; Kealy et al. 2023; Lewis et al. 2021); prospective studies have often utilized timeframes which, while informative, have limited clinical applicability (e.g., predicting SI 2 years following baseline assessment; Troister and Holden 2012). Given that suicide-related outcomes are known to evolve rapidly—at times, crystallizing in as little as an hour or two before suicidal action is taken (Millner et al. 2017)—evidence regarding the role of psychic pain as a proximal predictor of risk has been conspicuously absent (Baryshnikov and Isometsä 2022). The present study provides important empirical demonstrations of the utility of assessing not only self-appraised vulnerability to experiences of psychic pain, but also short-term fluctuations which illustrate more dynamic risk processes. Our between-person findings (from the PPS as well as aggregated, sample-centered EMA entries) suggest that individuals who overall report a tendency to experience more severe psychic pain—compared to other subjects, even within this intentionally-selected high-risk sample—are prone to experiencing more severe SI and SP. Our within-person findings (EMA ratings) extend these findings by showing that even brief escalations in experiences of psychic pain serve as a signal of imminent risk.

By utilizing a sampling schedule that enabled evaluation of subtle within-person shifts over brief periods of time, we identified two patterns of associations that were not hypothesized but may offer valuable insights for future empirical inquiry. Specifically, although higher levels of momentary (EMA) pain were associated with greater concurrent suicide planning, lagged models indicated that lower (EMA) pain predicted greater planning during the subsequent rating period. When considered together, these results provide preliminary evidence for the harmful impact of drastic fluctuations in pain intensity over short periods of time on suicide risk. Specifically, movement from a state of unusually low pain (alleviation) to a state of more intense-than-usual pain (escalation) may be associated with increases in planning behaviors. A similar pattern emerged for instability in our composite negative mental state variable, such that a temporary reprieve from experiences of loneliness, burdensomeness, and hopelessness (even in the context of elevated momentary pain) at one timepoint followed by a sharp escalation at the subsequent rating period predicted increased severity of SI. Collectively, these findings join a growing body of research highlighting the importance of tracking instability and volatility in psychological drivers of suicide risk, rather than relying on more linear estimates of presence or intensity. These findings also underscore the importance of bolstering self-regulation capacities in therapeutic interventions for high-risk individuals (e.g., Cain et al. 2026).

The present findings carry important implications for clinical practice. Our results highlight the importance of assessing psychic pain as part of a comprehensive suicide risk assessment, given both its direct impact on serious suicidal thoughts (Jobes et al. 2024) as well as its amplification of the salience of other psychosocial sources of risk. For example, clinicians using the

Suicide Status Form as part of the Collaborative Assessment and Management of Suicidality (CAMS) framework (Jobes 2023) should attend particularly to patient ratings of psychic pain as a potential near-term driver of suicide risk, particularly when pain ratings are elevated along with other SSF assessment categories pertaining to negative mental states, such as hopelessness. The findings of the present study illustrate that psychic pain is not only a dispositional vulnerability but also a time-varying prospective indicator of risk, making its ongoing monitoring essential. In addition, as a target of therapeutic intervention, psychic pain represents a phenomenon that is of mutual importance and meaning to both patients and providers. Shneidman (1993) emphasized the importance of "psychache" as a signal indicating that core psychological needs are not being met, suggesting that aligning with suicidal patients around the therapeutic goal of reducing pain and addressing these unmet needs should be the primary goal of therapeutic intervention. Risk evaluations focused on vulnerability to psychic pain, using measures like the PPS (Lewis et al. 2021), could be employed using a therapeutic assessment approach in which at-risk individuals are encouraged to elaborate on their experiences of pain and frustrated psychological needs with providers, facilitating the development of communication, trust, and alliance (e.g., Anonymous 2020; Lewis 2024; Rudd 2023).

3.1 | Limitations

While the present study has many strengths, notably our enrollment of high-suicide risk subjects, there are limitations that must be acknowledged. First, our sample was relatively small; however, we note that our sample size is comparable to other studies of suicide using EMA (e.g., Kleiman et al. 2017). It is possible that our EMA analyses may have been underpowered to detect certain interaction or moderation effects, particularly those expected to be small to moderate in magnitude. Although the sample and repeated-measures design provided adequate power to detect larger main effects, tests of moderation generally require substantially greater statistical power due to reduced effect sizes and increased model complexity. Future studies with larger samples and/or longer EMA sampling periods may be better positioned to detect more subtle interactive processes. While our sample size may have limited our ability to detect additional between-person effects (raising the possibility of Type I error), our within-person analyses were well powered, with 3042 observations (and with 2493 of those observations including ratings of suicidality). Second, our sample carried limited racial and ethnic diversity, which reduces the generalizability of our findings to more diverse populations. Third, the majority of our subjects were in residential treatment ($n = 25$). While this highly specific clinical population may limit the generalizability of our results, the severity and transdiagnostic nature of our sample is unique and necessary for investigating constructs such as psychic pain and suicide. Future research should include larger and more diverse samples across a variety of clinical settings. While our findings contribute some clarification regarding distinctions between psychic pain and conceptually related negative mental states like hopelessness, important definitional elements of psychic pain as a broader construct remain in need of clarification; for example, future studies may utilize interviews with suicidal individuals to clarify lived experiences of psychic pain (Charvet et al. 2022), or employ experience sampling designs to investigate perceptions of pain and its unique qualities, such as subjective overwhelm or irreversibility (Orbach et al. 2003). Finally, while our decision to evaluate momentary pain using the term "emotional pain" was guided by both measurement consistency and terminology drawn from lived experience research contexts (Bolger 1999), future studies relying on single-item assessments of the construct of psychic pain should consider a range of factors (including theoretical frameworks and conceptual clarity) when determining how best to assess momentary experiences of psychic pain in ways that are both efficient and valid.

3.2 | Conclusions

Despite being featured prominently in the literature on suicide for much of the past century, empirical evaluations of psychic pain as a driver of suicide have been limited by reliance on cross-sectional designs and static, distal self-report methodologies. As approaches to the empirical study of suicide increasingly incorporate methods which highlight the variable and complex nature of both suicidal thoughts and related risk factors over time, the need to expand understanding of the influence of psychic pain on suicide risk with consideration of timing and context remains pressing. The present study addressed this need through its demonstration of how vulnerability to psychic pain, granular changes in escalation in pain over time, and interactions between pain and other sources of risk each affect the emergence and course of serious suicidal thoughts in high-risk individuals. Findings must be replicated across samples with greater heterogeneity in terms of demographic characteristics and clinical severity, with consideration of how additional mitigating factors—such as capacities for self-regulation or the availability of social support within the environment—may influence the associations found in the present study.

Acknowledgments

This work was supported by the National Institutes of Health [1RF1MH120840-01, 2019]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in National Institute of Mental Health Data Archive at https://nda.nih.gov/edit_collection.html?id=3497.

Endnotes

[1]The parent project from which data for the current study is drawn (1RF1MH120840-01) aimed to examine the influence of daily sleep disturbance on short-term changes in interpersonal functioning, self-regulation capacities, and suicide risk; sleep and circadian rhythm disorders were therefore evaluated during the screening process to determine eligibility for inclusion in the study.

[2]We explored a nightly carryover effect (last record of yesterday to first record of today) by aggregating previous day records into an average score, and then examining how previous day averages were associated with next day morning records. As no lagged effects were significant, we opted to omit these analyses, and also opted against implementing a three-level model, which would add complication despite the daily level not yielding significant findings.

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Supporting Information

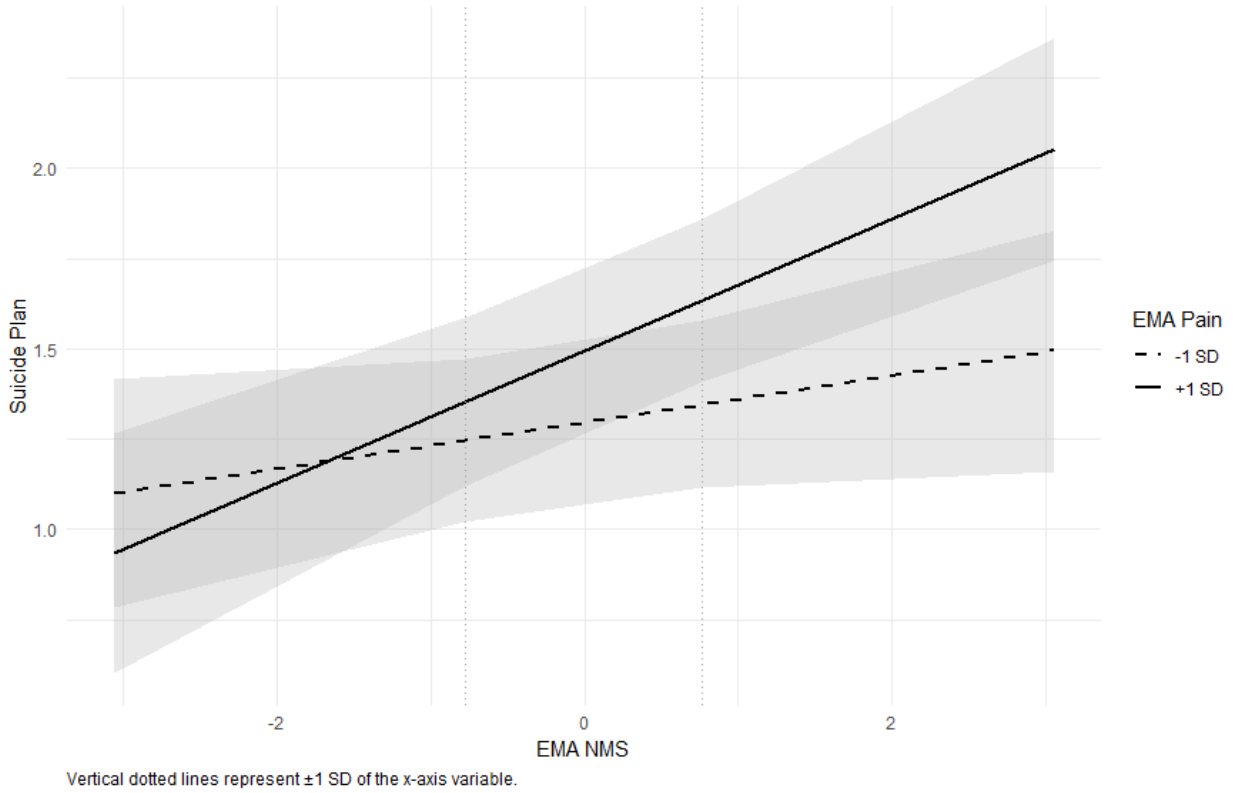
Additional supporting information can be found online in the Supporting Information section.

Figure S1: Recent (Level 1 EMA) changes in psychic pain moderate association of within-person changes in negative mental states and suicidal planning.

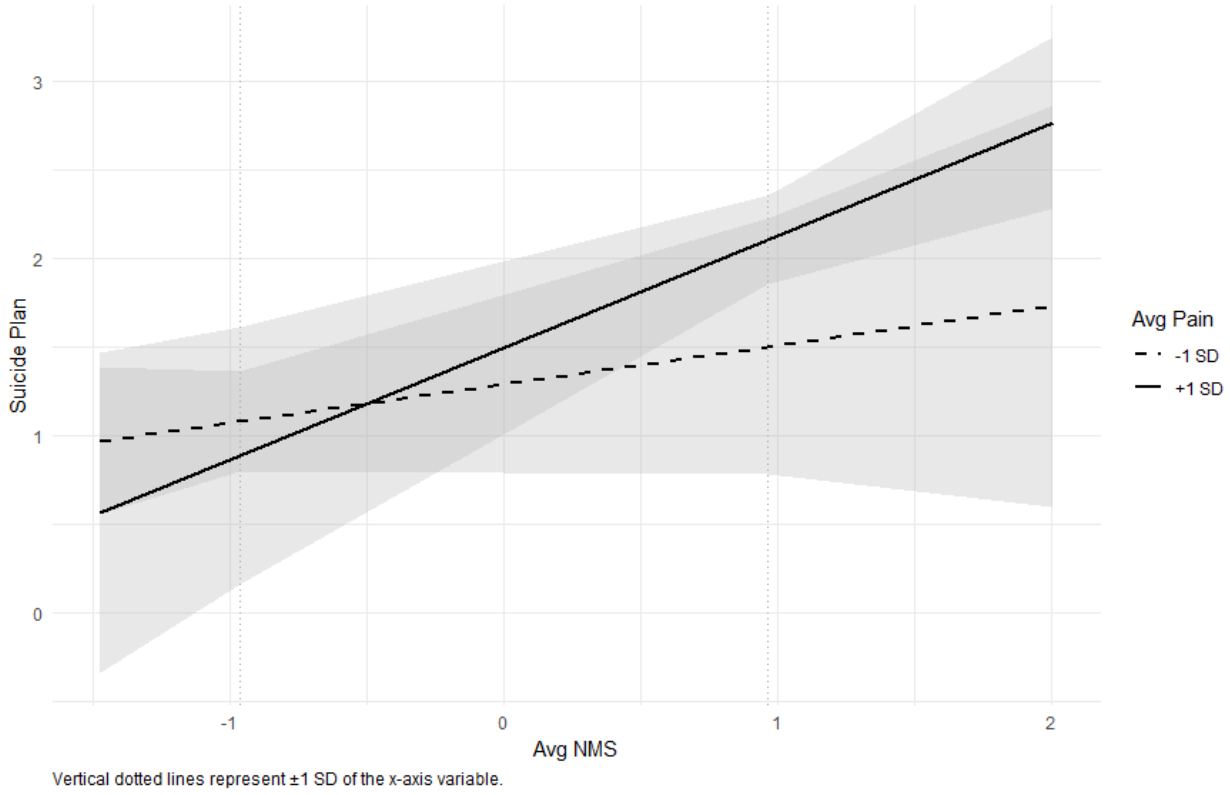
Figure S2: Average (Level 2 EMA) psychic pain moderates between-person associations between average negative mental state severity and suicidal planning.

Figure S3: Trait vulnerability to psychic pain (PPS) moderates the association between recent (Level 1 EMA) changes in psychic pain and suicidal ideation.

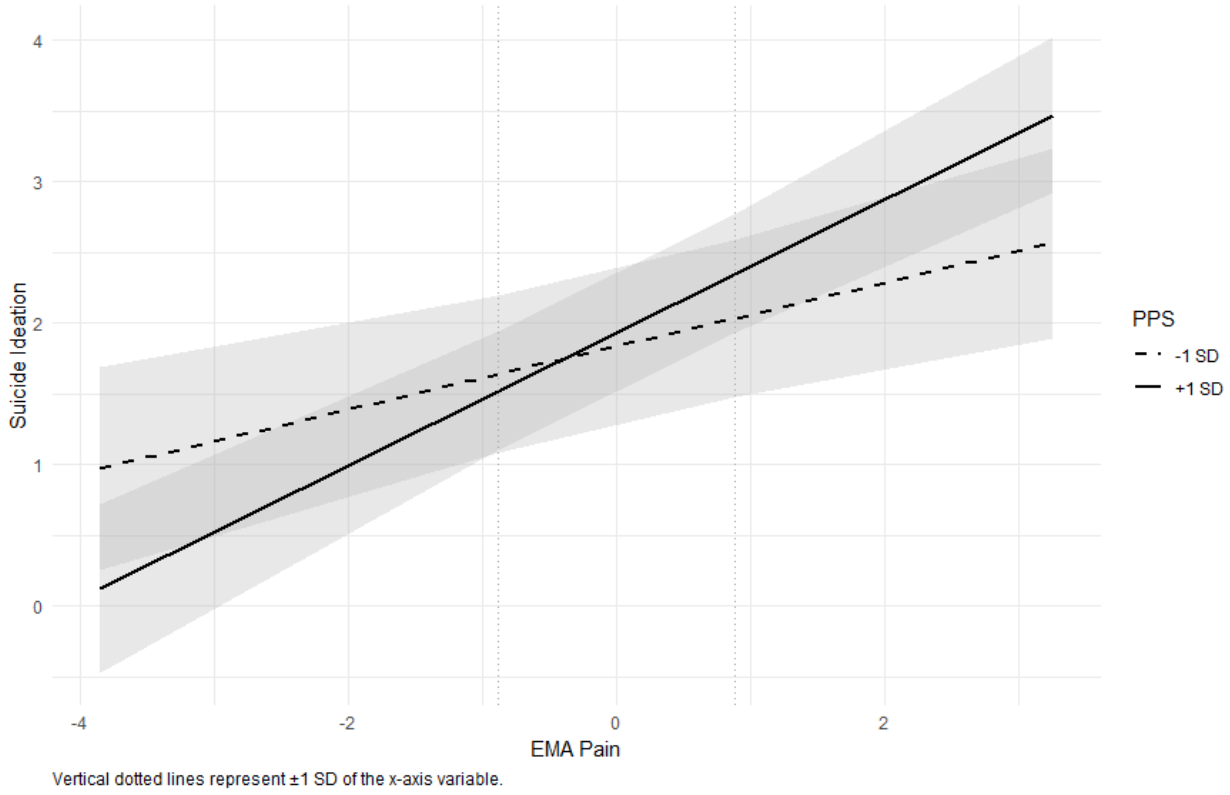
Figure S4: Trait vulnerability to psychic pain (PPS) moderates associations between recent (Level 1 EMA) changes in negative mental states and suicidal ideation.



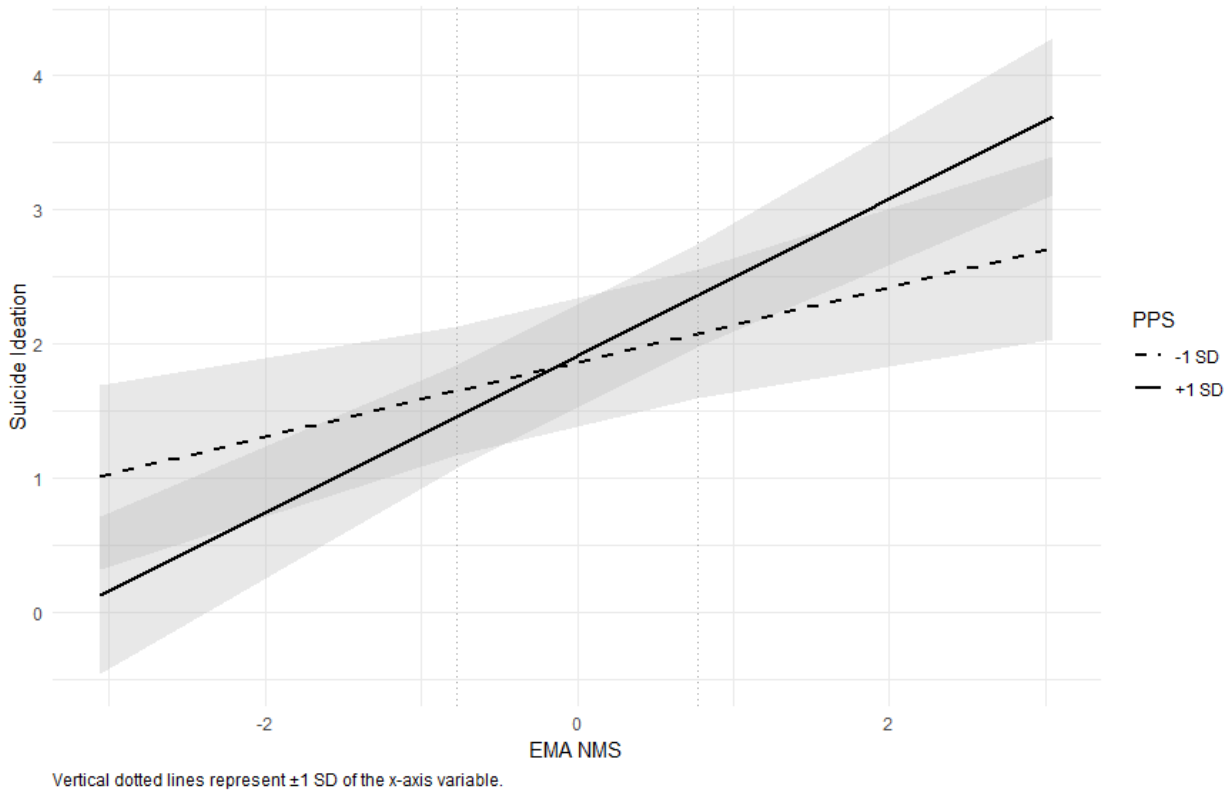
Supplemental Figure S1. Recent (Level 1 EMA) changes in psychic pain moderate association of within-person changes in negative mental states and suicidal planning



Supplemental Figure S2. Average (Level 2 EMA) psychic pain moderates between-person associations between average negative mental state severity and suicidal planning



Supplemental Figure S3. Trait vulnerability to psychic pain (PPS) moderates the association between recent (Level 1 EMA) changes in psychic pain and suicidal ideation



Supplemental Figure S4. Trait vulnerability to psychic pain (PPS) moderates associations between recent (Level 1 EMA) changes in negative mental states and suicidal ideation