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Suicide and Life-Threatening BEHAVIOR

ORIGINAL ARTICLE

An analysis of real-time suicidal ideation and its relationship with retrospective reports among young people with borderline personality disorder

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Abstract

Introduction: This study aimed to analyze the real-time variability of suicidal ideation intensity and the relationship between real-time and retrospective reports of suicidal ideation made on the Beck Scale for Suicidal Ideation (BSS), among young people with borderline personality disorder (BPD).

Methods: Young people (15–25-year olds) with BPD ($N = 46$), recruited from two government-funded mental health services, rated the intensity of their suicidal ideation six times per day for 7 days before completing the BSS.

Results: For 70% of participants, suicidal ideation changed in intensity approximately five times across the week, both within and between days. BSS ratings were most highly correlated with the highest real-time ratings of suicidal ideation. However, this was not significantly different from the relationship between the BSS and both the average and most recent ratings. Median ratings of suicidal ideation intensity were higher on the BSS compared with an equivalent question asked in real time.

Conclusion: Findings suggest that young people with BPD experience high levels of fluctuation in their intensity of suicidal ideation across a week and that retrospective reports of suicidal ideation might be more reflective of the most intense experience of suicidal ideation across the week.

KEYWORDS

early intervention, psychiatry, suicide, suicide attempt, youth

INTRODUCTION

Borderline personality disorder (BPD) is a severe mental disorder that usually emerges from puberty to young adulthood and is characterized, in part, by recurrent suicidal behavior (Bohus et al., 2021), with 8% of adults with BPD dying by suicide (Pompili et al., 2005). Almost all adolescents (95%–100%; <18 years; Goodman et al., 2017; Kaess et al., 2017) and young people (99.3%; 15–25 years; Chanen et al., 2022) with BPD have engaged in self-harm. Approximately, 75% of adolescents with BPD have attempted suicide over their lifetime, with two-thirds of young people (15–25 years) reporting a suicide attempt in the previous 12 months (Andrewes et al., 2017a, 2017b; Chanen et al., 2022).

Suicidal ideation has been identified as one of the most important indicators of risk for completed suicide (Batterham et al., 2013; Hubers et al., 2018). When assessing young people with BPD, clinicians rely on precise recall of the frequency and intensity of suicidal thoughts experienced, not only in the moment but also across the week. To standardize clinical screening for suicidal ideation, institutions commonly use self-report suicide assessment tools, such as the Beck Scale for Suicidal Ideation (BSS; Beck & Steer, 1991). This measure is designed to capture an individual's suicide risk by asking participants to select from one of three possible statements that best characterize their thoughts and feelings over the previous 7 days. However, suicidal ideation is now understood to be a dynamic experience that varies in intensity over the day and week. Yet, to the authors' knowledge, the degree to which the intensity of suicidal ideation varies in real time is yet to be measured in young people (15–25-year olds) with BPD. The dynamic nature of suicidal ideation suggests that important aspects of the experience of suicidal ideation might not be captured by a retrospective measure (Gratch et al., 2021; Kleiman et al., 2017). Additionally, despite the widespread use of measures such as the BSS, little is known about how well retrospective reports of the intensity of suicidal ideation correlate with the average levels of suicidal ideation in real time.

Ecological momentary assessment (EMA) is considered the gold-standard method for capturing affect and cognition (Armey, 2012) because it identifies real-time fluctuations in experiences and behaviors in an individuals' natural environment (Shiffman et al., 2008; Trull & Ebner-Priemer, 2013) and largely obviates the recall biases and problems with forgetting inherent in retrospective interviews and questionnaires (Shiffman et al., 2008). Despite its potential for collecting real-time instances of suicidal ideation and behaviors, EMA remains a relatively underutilized method of data collection in suicide research (Kivelä et al., 2022). Recent longitudinal research highlights the importance of using EMA to characterize the temporal dynamics of suicidal ideation, with recent findings suggesting that instability in suicidal ideation might be a phenotypic indicator for increased suicide risk (Oquendo et al., 2021; Wang et al., 2021). For instance, higher variability in suicidal ideation at baseline was found to be predictive of greater suicidal ideation severity at subsequent 3–6 month timepoints over 2 years ($N = 51$ patients with major depressive disorder; Oquendo et al., 2021) and rapid fluctuations in suicidal thinking was found to be a stronger predictor of posthospital suicide attempts than the average severity of thoughts ($N = 83$ inpatients; Wang et al., 2021).

There is limited research employing EMA to quantify the variation in the intensity of suicidal ideation (e.g., Coppersmith et al., 2023; Forkmann et al., 2018; Hallensleben et al., 2019; Kleiman et al., 2017; Oakey-Frost et al., 2023; Rizk et al., 2019). These studies showed that adult females with BPD (Rizk et al., 2019, $N = 38$), psychiatric adult inpatients with MDD (Forkmann et al., 2018, $N = 74$; Hallensleben et al., 2019, $N = 74$), adults with a history of suicidal behavior (study 1, $N = 56$) or ideation (study 2, Kleiman et al., 2017, $N = 36$, Coppersmith et al., 2023, $N = 104$), and undergraduates with a history of suicidal ideation (Oakley-Frost et al., 2023, $N = 49$) varied in the intensity of their suicidal ideation over a 7- to 42-day period. Additionally, all studies showed high levels of between-person variability. Most research quantifying the fluctuations in the intensity of suicidal ideation (e.g., Forkmann et al., 2018; Hallensleben et al., 2019; Rizk et al., 2019; Oakley-Frost et al., 2023) have presented the mean square of successive differences (MSSD) without further explanation of what this number might mean in real terms. Although it is tempting to use MSSD to compare the variability of suicidal ideation among different studies, the different questions used in each study render this score incomparable. Kleinman and colleagues engaged in further analysis finding that 28%–29% of the time, an individual's ratings of suicidal ideation differed by at least one within-person standard deviation (SD). The use of 'within-person SD' as a measure of variability, however, is difficult to interpret, as it is unclear what one SD equates to in terms of a change in actual ratings. Additionally, while it is assumed that ratings changed from one response to the next within the same day in this study, this was not stated. The current study aimed to overcome the aforementioned problems by identifying the percentage of times ratings changed between identifiable Likert scale unit ratings, both within and between days.

The potential instability in suicidal ideation in youth with BPD also points to the inherent challenge in accurately identifying an average experience of suicidal

ideation intensity on a retrospective questionnaire, such as the BSS. Recall biases can reduce the accuracy of recall on retrospective questionnaires and are theorized to occur due to a reliance on cognitive shortcuts or heuristics that are used to aid our recall of experiences and events (Shiffman et al., 2008). One important heuristic is the peak-end rule, which proposes that the most intense and/or recent experience has a disproportionate influence on the recall of the construct of interest (Fredrickson, 2000). Research investigating the recall of pain intensity and related distress has supported this heuristic (see Fredrickson, 2000 for review; Schneider et al., 2011; Stone et al., 2005). Yet, less consistent evidence exists for its use in the recall of both nonpain-related affect and clinical symptoms. For instance, two studies reported that the retrospective ratings of positive and negative affect reported by adults with depression (Ben-Zeev et al., 2009) and psychotic symptoms reported by adults with schizophrenia (Ben-Zeev, McHugo, et al., 2012) were most highly associated with the average, rather than the peak ratings recorded in real time. Similarly, Forkmann et al. (2018) found that the BSS was highly correlated ($r > 0.7$) with the average intensity of ratings on a series of EMA questions (10x daily for 6 days) relating to active and passive suicidal ideation in adult inpatients with MDD. However, this correlation was not compared with the relationship between the BSS and the highest (peak) or most recent EMA ratings. In contrast, a large study ($N = 4322$) of medical interns compared ratings of depressive symptoms on the PHQ-9 with daily mood ratings collected over 2 weeks, finding that a combined "peak/end" daily mood score (average of most recent and worst score) had a stronger correlation with the PHQ-9 than average daily mood score (Horwitz et al., 2023). The latter finding supports previous research among undergraduate students, which found that retrospective ratings of affect intensity were more highly associated with the peak, than the average intensity of affect rated during a negatively valenced film clip (Fredrickson & Kahneman, 1993).

The BSS asks participants to identify the levels of suicidal ideation that best describe how the person has been feeling over the previous week. This suggests that the average, rather than the worst or most recent real-time experience of suicidal thoughts and behaviors, should correlate most highly with the BSS score. Yet, to the authors' knowledge, the influence of the peak-end rule in retrospective recall has not been explored in relation to the recall of suicidal ideation among individuals with BPD. In support of the peak-end heuristic, retrospective bias has been well established in the recall of affect (Ebner-Priemer et al., 2006) and clinical symptoms (Ben-Zeev, McHugo, et al., 2012; Ben-Zeev, Young, & Depp, 2012; de Beurs et al., 1992; Gloster et al., 2008; Stein & Corte, 2003), with findings that the intensity of these experiences was recalled as more intense when compared with ratings in real time.

The current study aimed to (i) investigate the variability of the intensity in suicidal ideation across a week in young people with BPD and (ii) understand the association between the total BSS score and the average, highest (peak), and most recent (end) ratings on the EMA.

METHODS

Participants

Participants were recruited from two government-funded youth mental health services in western metropolitan Melbourne, Australia, as part of a larger randomized controlled trial of early intervention for young people aged 15–25 years (inclusive) (ACTRN12610000100099 Chanen et al., 2015; Chanen et al., 2021). Participants had a Structured Clinical Interview for DSM-IV-TR Axis II diagnosis of BPD (SCID-II, First et al., 1997) and had not previously received evidence-based BPD treatment or ever met the DSM-IV criteria for Schizophrenia Spectrum Disorder, Bipolar I or II. The only inclusion criterion, specific to the current study, was the completion of at least seven suicidal ideation questions on the EMA protocol, spanning four or more days. This criterion ensured that the average ratings, identified over the week with EMA, were comparable with the retrospective reports on the BSS. From a pool of 107 young people (Andrewes et al., 2016), 46 were eligible for this study.

Measures

Demographic information. Age, sex, social disadvantage status, relationship status, number of dependents, place of birth, school completion status, indigenous, and employment status were collected at baseline. Social disadvantage rank was measured according to an individual's Australian postcode (Vinson, 2007) and then divided into tertiles (low, medium, and high).

Baseline diagnosis, including mental state and personality disorders, were diagnosed using the SCID Axis I-Patient Edition (SCID-I/P First et al., 1996) and SCID-II (First et al., 1997), respectively.

Baseline depression severity was rated using the Montgomery–Åsberg Depression Rating Scale (MADRS; Montgomery & Asberg, 1979). Symptoms are rated on a 7-point Likert scale, with a total score ranging from 0 to 60. This scale exhibits good interrater reliability with an ICC (3,1) of 0.93 (Williams & Kobak, 2008).

Baseline BPD severity was measured with the Borderline Personality Disorder Severity Index (BPD-SI) (Arntz et al., 2003). All subscales exhibit good interrater reliability, with an ICC (3,1) of 0.93 and a median Cronbach's α of 0.69 across all subscales (Arntz et al., 2003).

Baseline history of Self-Harm and Suicide Ideation and Behaviors were measured with the Suicide Attempt Self-Injury Interview, standard version (SASII; Linehan et al., 2006a). The SASII has been validated in cohorts of participants from multiple clinical settings (Linehan et al., 2006b).

Real-time Suicidal Ideation was captured with the question "At the moment, are you having thoughts about wanting to die?" (response scale: 1 "no thoughts," 2 "some thoughts," 3 "moderate thoughts," 4 "strong thoughts," and 5 "very strong thoughts"). This question was administered with the EMA electronic diary program for mobile phones, called Mobiletype© (Reid et al., 2009), as part of a larger survey.

Retrospective Suicidal Ideation was assessed using the BSS, a self-report measure comprising 21 items, with a 3-point Likert response scale, that identifies the intensity, pervasiveness, and characteristics of suicidal ideation. In the current study, items 1–19 were used as these specifically refer to suicidal ideation experienced over the previous week. This measure has shown good reliability (Cronbach's $\alpha = 0.98–0.96$ Barnhofer et al., 2009; Steer et al., 1993), adequate convergent validity, and is significantly correlated with the Suicide Probability Scale (Bisconer & Gross, 2007) and the Adult Suicidal Ideation Questionnaire (Bisconer & Gross, 2007).

Procedure

Ethics was obtained from the Melbourne Health Human Research Ethics Committee (HREC2010.055). Following written informed consent, participants completed a demographic and diagnostic interview and were trained to complete the EMA survey on a mobile phone. Participants were prompted to complete this survey six times per day for 7 days, with prompts randomized within 2 h time blocks between 10 am and 10 pm. Participants were given 15 min to begin and 8 min to complete the survey, after which time they were locked out. Responses that crossed a priori thresholds indicating imminent risk of suicide automatically triggered an alert and the participant received a call from a senior clinical psychologist or psychiatrist for a risk assessment and any additional clinical follow-up or referral to emergency services that might be required. This alert was triggered if the participant indicated that, since the last prompt, they had experienced suicidal ideation during a self-harm event, had plans to act upon these thoughts, and had less than full control over their thoughts to kill themselves. If participants did not complete at least one survey per day, the phone was left with them for a second week to ensure sufficient data collection. On the seventh day of adherence to the EMA protocol, participants completed the BSS. Participants were reimbursed $40, regardless of their EMA adherence rate.

Data analytic approach

An assessment of normality, linearity, homoscedasticity and univariate outliers, was performed (Tabachnick & Fidell, 2013). Spaghetti plots of the EMA data were used to identify any trend in missing data that occurred both over time and in the relationship between the intensity of suicidal ideation and the number of subsequent unanswered surveys. Only responses to the second week of surveys were compared with the BSS for the four participants who used Mobiletype© for 2 weeks.

The intraclass correlation (ICC) was calculated and subtracted from 1 to identify the proportion of total variability that was accounted for by within-person variability. The percentage of times a change in ideation occurred by 1 unit or more on the Likert scale was then calculated by dividing the number of times a change of at least 1 unit occurred by the total number of possible changes (N-1). The percentage of times that changes in the intensity of ideation occurred within 1 day was calculated by identifying the number of times a change occurred within 1 day and dividing this by the number of changes that occurred within a week. The root mean square of successive differences (RMSSD) was identified as an additional measure of within-person variability over the week and within each day (ST-RMSSD; Jahng et al., 2008). This was analyzed as a comparison measure for future studies using the same EMA question. The RMSSD is preferred over the SD as a measure of instability because it simultaneously takes account of temporal dependency, amplitude, and frequency (Ebner-Priemer et al., 2009). Although this measure is sensitive to missing data, it can be used despite missing data if the correlation between the SD and mean square of successive differences (MSSD) is high (>0.7; Ebner-Priemer et al., 2009). To identify if there were any trends in the ratings over the week, MSSD was compared with two times the SD ($2*\sigma^2$; Jahng et al., 2008). Equivalency suggests a first-order autocorrelation of zero, meaning that an individual's rating of suicidal ideation is independent of any factors that may lead to an increase or decrease in the intensity of ideation over the week (Jahng et al., 2008).

A Pearson's correlation was completed to identify the relationships between the average, most recent, and highest response to the EMA question "At the moment, are you

having thoughts about wanting to die?" and both the total BSS score, as well as the most comparable question on the BSS, question 2: "which statement best describes how you have been feeling in the last week? 0. I have no wish to die; 1. I have a weak wish to die; 2. I have a moderate to strong wish to die." Correlations were compared using Fisher's r-to-z-score transformation. Cohen's *d* or *r* was reported for effect size (Cohen, 1988), with strengths interpreted as small <0.2, medium = 0.2–0.5, large = 0.8 (Cohen, 1988).

A Wilcoxon-signed rank test was used to compare median scores from question 2 on the BSS with the EMA question. Although comparable in both their wording and meaning, the response scales differed so the 4-point EMA scale was truncated to a 3-point scale (0–2) with EMA responses of 3, 4, and 5 all scored as 2.

RESULTS

Sample characteristics

Most participants were female (87%), with 82% experiencing moderate-to-high levels of socioeconomic disadvantage. The most commonly co-occurring disorders were mood disorders and avoidant and antisocial personality disorders. Over 70% of participants reported engaging in nonsuicidal self-injury (NSSI) and almost 60% reported a suicide attempt in the previous 12 months (Table 1).

Characteristics of EMA data

The adherence rate for the EMA question was 58%, which is equivalent to an average response rate of 16 times over the week (range, 7–41). An average of 3.32 (range, 1–6) surveys were answered per participant, per day. The mean number of days over which the surveys were answered was 6.3 (range, 4–7), suggesting that results were indicative of the average levels of suicidal ideation over the week. Individual spaghetti plots showed no trend for missing data over time and no relationship between the severity of ideation and the number of subsequent unanswered surveys. Data were thus considered to be missing at random.

The presence and variability of suicidal ideation over the week

The EMA data showed that 70% of participants ($N = 32$) reported changes in their levels of ideation over the week (see Figure 1) and 54% of the total variability was attributable to within-person variability (1-ICC). Participants

TABLE 1 Demographic and clinical characteristics for total sample.

Demographic and clinical characteristics	No. (%)
	Total sample
	(*N* = 46)
Demographics	
Sex, Female	40 (87.0%)
Age, mean (SD)	18.4 (2.8)
Functioning	
Social disadvantage status[a]	
Low	8 (17.4%)
Medium	27 (58.7%)
High	11 (23.9%)
Indigenous/First nations	1 (2.2%)
School completion status[b]	7 (15.2%)
Employment status	
Full-time employment	3 (6.5%)
Homemaker or student	13 (28.3%)
Part-time employment (11–30 hrs)	1 (2.2%)
Medical or psychiatric leave	23 (50.0%)
Unemployed	6 (13.0%)
Diagnosis	
Mental state disorder	
Any Mood disorder	36 (78.3%)
Any Anxiety Disorder	34 (73.9%)
Any Somatoform Disorder	7 (15.2%)
Any Eating Disorder	5 (10.9%)
Personality disorders	
Avoidant	13 (28.3%)
Antisocial[c]	11 (23.9%)
Paranoid	8 (17.4%)
Depressive	5 (10.9%)
Passive aggressive	6 (13.0%)
Narcissistic	2 (4.4%)
Schizotypal	1 (2.2%)
Histrionic	1 (2.2%)
Obsessive compulsive	1 (2.2%)
Symptom Severity	
No. BPD criteria met	5.7 (1.1)
BPD severity (BPDSI)	36.3 (13.9)
Depression severity (MADRS)	27.6 (10.7)
History of deliberate self-harm	
Life-time experience of self-harm[d]	41 (89.1%)
NSSI[e] in previous 12 months	31 (67.4%)
Suicide attempt in previous 12 months	26 (56.5%)
NSSI[e] on EMA	11 (23.9%)
BSS score (SD)	12.3 (8.0)

[a]Rated according to the participants' residential postcode (Vinson, 2007).

[b]Participants 18 years and over.

[c]Diagnosis made ignoring criterion B that requires $t \leq 18$ years of age (Chanen et al., 2021).

[d]Self-harm = NSSI and suicide attempts.

[e]NSSI = nonsuicidal self-injury.

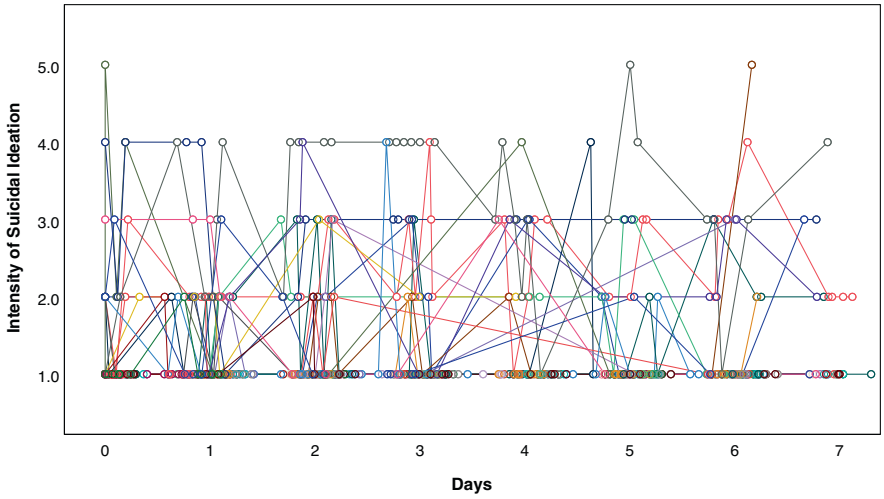

FIGURE 1 Time series plots illustrating individual instability of suicidal ideation across 7 days of data collection.

identified experiencing suicidal ideation, on average between 2 and 3 days a week (SD = 2.49) in real time (identified on 38% of responses).

On average, approximately every 2 days (25% of the time; σ = 22%, range = 0%, 67%) participants reported a change in their ideation ratings by at least one unit (e.g., a change from no thoughts to some thoughts, or moderate thoughts to strong thoughts; see Figure 1 for time series plot of ratings). This equated to a change in ratings by one unit or more, an average of 4.5 times (σ = 5.35 range, 0.00–21.00) over the week. When changes in the intensity of ideation occurred, on average, 63% of the time (σ = 20%; range, 25%–100%) they occurred within the same day, rather than across 2 days. The intraindividual SD (0.61) was significantly correlated ($r = 0.87$, $p < 0.001$) with the MSSD (0.61), suggesting that missing data did not significantly affect the reliability of the MSSD (Ebner-Priemer et al., 2009). Additionally, no trends in the ratings were identified over the week. The RMSSD was 0.58 (range, 0.00–2.19) across the week and 0.42 (range, 0.00–1.35) within each day.

The relationship between retrospective and real-time ratings of suicidal ideation

Moderate correlations were identified between the total BSS score and the average ($r = 0.49$, $p < 0.001$), the most recent ($r = 0.35$, $p = 0.02$), and the peak ($r = 0.57$, $p < 0.001$) EMA rating. The correlation between the average EMA rating and the BSS total score did not significantly differ from the correlation between the most recent EMA rating and the BSS total score ($z = 0.77$, $p = 0.22$) or from the correlation between the peak EMA rating and the BSS total score ($z = -0.45$, $p = 0.31$). A significant correlation was found between the average and peak ratings ($r = 0.7$, $p < 0.001$) and average and most recent ratings ($r = 0.59$, $p < 0.001$) on the EMA.

Moderate correlations were also identified between question 2 on the BSS ("wish to die") and the average ($r = 0.39$, $p = 0.01$), most recent ($r = 0.43$, $p = 0.003$), and peak ($r = 0.49$, $p = 0.001$). The correlation between the average EMA rating and question 2 on BSS total score did not differ significantly from the correlation between the most recent EMA rating and question 2 on BSS ($z = 0.22$, $p = 0.42$) or from the correlation between the peak EMA rating and the question 2 on the BSS ($z = -0.56$, $p = 0.28$).

A Wilcoxon-signed rank test revealed that the severity of participant's wish to die was significantly higher when reported on the BSS, compared with the EMA, with a medium effect size ($z = -5.006$, $p < 0.001$, $d = 0.52$).

DISCUSSION

To the authors' knowledge, this is the first study to analyze the variability of suicide ideation across a 1-week period among young people with BPD and investigate the relationship between retrospective (using the BSS) and real-time ratings of suicidal ideation. Two major findings arose from this study.

The first major finding was the high frequency of suicidal ideation and high variability in the intensity of these thoughts over a 7-day period. Young people with BPD reported the presence of suicidal ideation, on average, 2–3 days in a week. The intensity of suicidal ideation experienced was also found to vary within and between days for most young people with BPD. A change in the intensity of ideation (e.g., from moderate thoughts to strong thoughts) occurred approximately five times over the week. In the majority of cases (63%) these changes occurred within the same day, rather than across 2 days. Consistent with research investigating adults with MDD

and BPD (Forkmann et al., 2018; Rizk et al., 2019), the range of RMSSD indicated that participants differed widely in the instability of their ideation over the week. This was also illustrated by the range in the number of unit changes in ideation intensity per person, across the week (range 0–21) and within each day (range 0–5). These findings indicate that suicidal ideation is a dynamic and rapidly changeable experience for young people with BPD. Yet, the between-person variability suggests that the levels of fluctuations are highly variable in young people with BPD, with 30% experiencing no fluctuations in suicidal ideation across the week. These findings also highlight the limited utility of retrospective questionnaires, such as the BSS to provide an accurate depiction of the dynamic nature of a young person's experience of suicidal ideation across the week. The absence of any insight, provided by retrospective measures, into the variability in suicidal ideation across the week has the potential to lessen their utility given emerging research in inpatients that higher variability in suicidal ideation is a stronger predictor of subsequent suicide attempts than the average severity of suicidal ideation (Wang et al., 2021).

The second major finding was that both the total BSS score and BSS question 2 ("which statement best describes how you have been feeling in the last week? 0. I have no wish to die; 1. I have a weak wish to die; 2. I have a moderate to strong wish to die") were most strongly and linearly correlated with the peak EMA rating of suicidal ideation over the week. Despite this, the strength of this correlation was not significantly greater than the correlations found between the BSS (the total score and question 2) and both the average and most recent EMA ratings of suicidal ideation. Failure to detect a significant difference between these correlations might be due to the small sample size, which resulted in insufficient statistical power to reliably detect differences. It is also possible that the BSS total score and BSS question 2 equally reflect the average, peak, and most recent ratings on the EMA data. The pattern of these findings lends some support for the "peak" aspect of the peak-end rule (Fredrickson, 2000) and suggests that ratings on the BSS might be more reflective of the most intense experience of suicidal ideation. This is consistent with research investigating the intensity of depression symptoms (Horwitz et al., 2023), pain, and related distress (e.g., Schneider et al., 2011). Our comparison of the median rating on an equivalent question on the BSS and EMA also supports this finding, with results showing that participants retrospectively rate the intensity of their suicidal ideation as more intense when compared with their ratings in real time. The latter finding is consistent with research conducted among outpatient adults with BPD (Ebner-Priemer & Trull, 2009) and with OCD (Gloster et al., 2008) as well as community samples of adults with a range of mental state disorders (Ben-Zeev et al., 2009; Ben-Zeev, McHugo, et al., 2012; Ben-Zeev, Young, & Depp, 2012; de Beurs et al., 1992; Stein & Corte, 2003), which found that affect and clinical symptoms were higher in intensity and severity when rated retrospectively, compared with real-time reports. Overall, the current findings suggest that a retrospective, standardized, self-report screen of suicidal ideation among young people with BPD might be susceptible to recall the most intense rather than the average levels of suicidal ideation.

The clinical impact of findings showing that both total BSS score and BSS question 2 were most strongly and linearly correlated with the peak EMA rating of suicidal ideation over the week, and findings that participants retrospectively rated the intensity of their suicidal ideation as more intense when compared with their ratings in real-time, is that a retrospective screen for suicidal ideation might result in an inaccurate estimation of a young person's risk for suicide. Inaccuracies of this nature might lead to inappropriate clinical intervention to prevent suicide. For example, a clinician might use emergency and/or inpatient services more frequently than is warranted in response to a retrospective screen which represents an individual's single most intense moment of suicidal ideation over the previous week.

A strength of this study is its inclusion of acutely unwell young people, who were attending frontline public mental health services. The participants were well characterized in terms of their psychopathology, functioning, and self-harm history, with gold-standard measures used to assess these outcomes. Consequently, the findings are likely to be generalizable to real-world clinical samples of young people with BPD. The adherence rates (58%) are also similar to other comparable EMA studies (Czyz et al., 2018, 69%; Kleiman et al., 2017, 63%), despite no financial incentives being offered to increase adherence.

One notable limitation is that the EMA protocol asked individuals to identify the intensity of suicidal thoughts at the "moment" the prompt was answered, rather than since the previous prompt. This means that many momentary experiences of suicidal ideation might have been missed. Consequently, while our findings indicate that relying on the BSS might lead to inaccurate conclusions about an individual's real-time experience of suicidal ideation across the week, further research is required before drawing the conclusion that answers to questions on the BSS represent a true overestimation of the intensity of suicidal ideation experienced in real time. Another limitation is the different wording of questions included in the EMA and BSS which makes it possible that the difference between the mean ratings on both measures might be reflective of slight variations in the questions, rather than a true difference in ratings. Another limitation is the relatively

small sample size in this study, which might have reduced the statistical power, thereby increasing the probability of a type II error. It is also possible that the clinical intervention that followed high ratings of real-time suicidal thoughts might have altered subsequent ratings of suicidal ideation. However, findings from a large study ($N=434$) of adolescents and adults from inpatient and emergency services, respectively, suggest that this is unlikely due to limited evidence that a response-contingent intervention precipitated a change in subsequent reported levels of suicidal ideation (Bentley et al., 2023).

Future research that aims to more comprehensively compare the BSS with real-time responses might include the screening questions from the BSS (questions 1–5) in the EMA survey, as these screening questions are highly correlated with the BSS total score. To accurately compare the presence and intensity of suicidal ideation in real time vs the BSS, daily prompts, employing the BSS (q 1–5) should ask participants to identify the statement that best describes how they have been feeling since their response to the previous questionnaire (see Horwitz et al., 2023 for an example of this protocol). The latter protocol would ensure that BSS and EMA cover the same time frame. A longitudinal design might also be employed to investigate whether patterns of instability of the intensity of suicidal ideation indicate higher or lower levels of future risk for suicide attempts. Such a study might also utilize EMA to assess the predictive validity of the BSS. Future research might also aim to understand how the patterns of variation in suicidal ideation correspond to changing levels of risk for suicide. If particular patterns of variation in suicidal ideation are found to be important indicators of risk for suicide, this information could be harnessed in smartphone technology to help clinicians accurately identify changes in the risk for suicide in real time. Given the potential for EMA to be used as a clinical tool for identifying risk for suicide, additional research is also required to determine the optimal format for an EMA protocol. This would include the number of questions and frequency of prompts that might be acceptable to young people with BPD, facilitating higher response rates.

This study provides preliminary insights into the dynamic nature of suicidal thoughts and the association between retrospective and real-time reports of suicidal ideation among young people with BPD. The high levels of fluctuation in the intensity of suicidal ideation within each day and across the week suggest that variability in the intensity of suicidal ideation might be an important component of suicide risk in youth with BPD, which cannot be identified by a retrospective measure. The trend of the correlations between real-time suicidal ideation and BSS scores also suggests that retrospective ratings correlate more strongly with the most intense experience of suicidal ideation over the week. While further research comparing these measures is warranted, this preliminary finding also suggests that retrospective reports of suicidal ideation might be limited in their ability to fully capture the experience of suicidal ideation among young people with BPD and should be interpreted in conjunction with additional clinical data.

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CONFLICT OF INTEREST STATEMENT

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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