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Real-time prediction of passive and active suicidal ideation in an adolescent clinical sample: Ecological momentary assessment of interpersonal risk factors and mediating mechanisms

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Abstract

Background. The distinction between passive and active suicidal ideation (SI) and their underlying etiologies remains poorly understood. The Interpersonal Theory of Suicide implicates guilt, loneliness, and hopelessness in these SI subtypes, but there is minimal work testing these relationships in real time, capturing clinically meaningful fluctuations in SI. We conducted the first ecological momentary assessment (EMA) study to distinguish between passive and active SI in adolescents, and the first study to evaluate moment-to-moment etiological factors and mediators of passive and active SI in this age group.

Methods. Participants (N = 104) were adolescent psychiatric inpatients (M_{age} = 15.1; 72.12% female). They completed an EMA protocol including measures of guilt, loneliness, hopelessness, and passive and active SI for four weeks post-discharge. Multilevel modeling was used to evaluate guilt and loneliness, respectively, as predictors of prospective passive and active SI, respectively. We also evaluated whether hopelessness mediated the interaction between guilt and loneliness in predicting future SI. Hopelessness was also evaluated as a mediator between passive and active SI.

Results. Guilt predicted prospective passive and active SI, respectively, whereas loneliness only predicted prospective passive SI. The interaction between guilt and loneliness did not predict active SI, and hopelessness did not mediate the association between guilt and active SI. Passive SI prospectively predicted active SI, but hopelessness did not mediate this association.

Conclusions. Findings suggest that passive and active SI may share overlap but also differences in their etiologies. Their relationship with etiological factors and mediators may differ as a function of temporal scale.

Introduction

National studies indicate that pediatric psychiatric emergency department visits and inpatient hospitalizations have increased over the past decade, primarily due to increases in suicidal thoughts and behaviors (STBs; Arakelyan et al., 2023; Bommersbach, McKean, Olfson, & Rhee, 2023). The proportion of mental health hospitalizations related to self-injurious thoughts and behaviors for youth aged 3–17 years rose from 30.7% in 2009 to 64.2% in 2019 (Arakelyan et al., 2023). Characterizing risk for suicide-related outcomes in the growing youth population in these acute care settings is therefore of increasing importance. This is particularly true for the post-discharge period, when risk for STBs is elevated. Indeed, approximately 37% of adolescents are re-hospitalized within 12 months of discharge (Barker et al., 2010; James et al., 2010).

Suicidal ideation (SI), a clinically important outcome in its own right (Kleiman, 2020), is a heterogeneous phenomenon, including both passive SI (wish for death) and active SI (the desire to kill oneself). Historically, the distinction and relation between passive and active SI has been understudied, with much of the existing research focusing on active SI, leaving passive SI relatively neglected (Liu, Bettis, & Burke, 2020). This is reflective of the widely held view that active SI is more serious than, and an escalation of, passive SI. However, in a recent study of individuals with a lifetime history of suicide attempts, 25% had experienced passive SI only (i.e., no lifetime history of active SI; Wastler, Bryan, & Bryan, 2022). Additionally, a recent meta-analysis found that passive and active SI are largely similar in the strength of their associations with psychiatric correlates and other suicide risk factors (e.g., sex, race, and psychiatric morbidity; Liu et al., 2020). Further, head-to-head comparisons of passive and active SI were largely

equivalent for various outcomes, including death by suicide. Complicating interpretation of these findings is the preponderance of cross-sectional studies. Collectively, this speaks to the need for longitudinal studies directly testing the assumption that passive SI temporally precedes active SI and elucidating their respective underlying etiologies.

The Interpersonal Theory of Suicide (ITS; Van Orden et al., 2010) provides a framework for studying the processes underlying risk for passive SI and how it may potentially lead to active SI. Regarding the etiology of passive SI, the ITS posits that thwarted belongingness (i.e., the feeling that one's psychological need for social connection is unmet) and perceived burdensomeness (i.e., feelings of liability and self-hatred; thinking that one's existence contributes negatively to others) are proximal predictors of passive SI. One major form of thwarted belongingness is loneliness, which has been associated with SI in a recent meta-analysis of longitudinal studies (McClelland et al., 2020). However, most studies did not differentiate between passive and active SI. In two studies that did, employing follow-up periods of two to three years in middle-aged and geriatric samples, a positive association was found between loneliness and prospective passive SI (Ayalon & Shiovitz-Ezra, 2011; Stolz et al., 2016). As for perceived burdensomeness, one notable manner in which it manifests is in the form of guilt (i.e., regret or grief about the negative impact of oneself on others). Indeed, one cross-sectional study with a sample of veterans found that guilt was very highly correlated with perceived burdensomeness (r = .72; Rogers et al., 2017). Further, guilt has been found in another cross-sectional study with veterans to be associated with SI (Bryan, Morrow, Etienne, & Ray-Sannerud, 2013). Similar cross-sectional associations between guilt and SI have been documented in adolescents (Conner et al., 2004; Sekowski et al., 2020).

As for the transition from passive SI to active SI, according to the ITS, this arises from the co-occurrence of thwarted belongingness and perceived burdensomeness through the mediating effect of hopelessness (Van Orden et al., 2010). More specifically, when individuals feel hopeless about their thwarted belongingness and perceived burdensomeness, they become motivated to act on their desire to die. Findings from a systematic review generally support an interaction between thwarted belongingness and perceived burdensomeness predicting SI (Ma, Batterham, Calear, & Han, 2016). However, most of the included studies involved cross-sectional analyses (Bryan, Morrow, Anestis, & Joiner, 2010; Christensen, Batterham, Soubelet, & Mackinnon, 2013; Christensen et al., 2014; Cukrowicz et al., 2013; Joiner et al., 2009; Monteith et al., 2013; Van Orden et al., 2008), and none specifically differentiated between passive and active SI.

Regarding hopelessness, a cross-sectional study of adolescents (Kim, Moon, Lee, & Kim, 2018) found it to mediate the association between thwarted belongingness and SI and the association between perceived burdensomeness and SI. Caution should be taken, however, in interpreting statistical mediation with cross-sectional data, given the often-biased estimates that may result, and a longitudinal design that allows for clean temporal separation between predictor, mediator, and outcome is required for inferring full temporal mediation (Maxwell & Cole, 2007; Winer et al., 2016). Additionally, the degree to which these mediational associations hold specifically for active SI remains unclear. Moreover, although guilt and loneliness have been respectively associated with hopelessness, no studies to our knowledge have looked at whether hopelessness mediates the association of guilt with SI, and only one has done so for the association of loneliness with SI (Joiner & Rudd, 1996), which found no support for the presence of mediation among adults.

Although the preponderance of cross-sectional studies precludes inferences regarding temporality, the long temporal intervals that are common in longitudinal research to date (e.g., two to three years) also pose notable challenges insofar as they may not reflect the timescale on which SI and its risk factors naturally occur. Specifically, SI has been shown to fluctuate greatly over short periods of time (Czyz, Horwitz, Arango, & King, 2019; Kleiman et al., 2017). Prior research has demonstrated that SI often fluctuates more than one standard deviation within days and between days (Czyz et al., 2019).

Ecological momentary assessment (EMA) is particularly well-suited for addressing this limitation of prior research. Although there has been a considerable growth of EMA studies of suicide, only a few have attempted to observe the distinction between passive and active SI (e.g., Gratch et al., 2021; Hadzic et al., 2020; Kivelä, Fried, van der Does, & Antypa, 2024; Wolf et al., 2025). Of those that cleanly differentiated between these two forms of SI, only one examined passive and active SI in relation to each other, finding passive SI prospectively to predict active SI (Kivelä et al., 2024). However, no EMA studies on passive and active SI were conducted with youth. Similarly, only a small number have investigated ITS constructs of hopelessness (e.g., Kivelä et al., 2024; Kleiman et al., 2017; Rath et al., 2019) and perceived burdensomeness and thwarted belongingness (e.g., Hadzic et al., 2020; Rath et al., 2019) in their relation to SI. Fewer still have investigated these associations with SI for specific forms of perceived burdensomeness (e.g., guilt; Mou et al., 2018) and thwarted belongingness (e.g., loneliness; Kivelä et al., 2024; Kleiman et al., 2017; Mou et al., 2018; Mournet et al., 2022; Wolf et al., 2025). Further, assessment of these constructs in youth has occurred in only one EMA study (Glenn et al., 2022), which found that family- and friend-related thwarted belongingness predicted overall SI at the next momentary timepoint. Finally, although a recent EMA study evaluated whether perceived burdensomeness and thwarted belongingness interact to predict active SI in an adult sample (Jacobucci, McClure, & Ammerman, 2023), it did not include a measure of passive SI, and to the best of our knowledge, there have been no EMA studies which have looked at the moderation or mediation components of the above model predicting active SI.

The present study used EMA to investigate factors underlying the within-day progression of SI among psychiatrically hospitalized adolescents during the first month following inpatient discharge. First, we tested loneliness and guilt, respectively, as prospective predictors of passive SI. In the interest of thoroughness, we also evaluated whether they prospectively predicted active SI, a more distal outcome within the ITS. Next, we evaluated the moderated mediational component of the model, according to which the interaction between loneliness and guilt is associated with prospective active SI through the mediation of hopelessness. Again, for thoroughness, we assessed this moderated mediation model with passive SI as the outcome. In contrast to the model predicting active SI, we hypothesized that the moderated mediation would not be significant with passive SI as the outcome, as this is not supported by the ITS. Finally, we evaluated whether hopelessness mediated the prospective association between passive SI and active SI.

Methods

Participants

Participants were adolescents (N = 104) recruited from a pediatric psychiatric inpatient unit. The sample was 72.12% female (M_{age} = 15.1,

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SD_{age} = 1.44), 73.1% White, 13.5% Black, 3.9% Asian, 1.0% Native American or Alaskan Native, 8.7% multiracial, and 19.2% Hispanic. This sample is largely representative of the area in which the recruiting site is based, with the exception of more than double the percentage of Black participants compared to the local population. Eligibility criteria included (1) assent be obtained from each adolescent and consent from one of their parents/legal guardians, (2) adolescents be 13–17 years old, and (3) adolescents have access to a smartphone following discharge. Exclusion criteria were inability to provide valid responses due to severe psychosis or developmental disability, IQ < 70, and the adolescent being in state custody.

Procedure

Study procedures were approved by the Mass General Brigham Institutional Review Board. At baseline, participants completed measures of depression (PROMIS Pediatric Short Form v2.0 – Depressive Symptoms 8a; Pilkonis et al., 2011, 2014), STBs (Columbia Suicide Severity Rating Scale [C-SSRS]; Posner et al., 2011), non-suicidal self-injury (NSSI; Self-Injurious Thoughts and Behavior Interview – Revised [SITBI-R]; Fox et al., 2020), and a diagnostic interview (Mini International Neuropsychiatric Interview for Children and Adolescents [MINI-Kid]; Duncan et al., 2018). Immediately after discharge, participants completed a 4-week EMA protocol that included signal contingent surveys administered at random intervals five times daily via a smartphone application (www.metricwire.com), querying about momentary guilt, loneliness, hopelessness, and passive and active SI. Although our target was for participants to complete three surveys per day, we intentionally sent five per day so as to provide participants with multiple opportunities to achieve the target of three while accommodating developmentally normative daily events that may reasonably prevent participants from answering surveys at a given moment (e.g., after-school extracurricular activities). Signal contingent surveys were spread across blocks of approximately 15 hours, which varied slightly based on participant-reported wake and sleep times to best capture participant waking hours. Surveys were sent at least 150 minutes apart, and participants were allotted 90 minutes to respond per survey before expiration. Adolescents were compensated for participation according to a payment structure that incentivized increased survey compliance.

Measures

Risk factor variables

Measures of loneliness, guilt, and hopelessness were administered five times daily in signal-contingent surveys. They were assessed using single-item prompts within the larger EMA survey: "Right now, how [affective label] do you feel?" Response options were provided on an 11-point Likert scale from 0 ("not at all") to 10 ("extremely"). "Lonely" and "guilty" were drawn from the Positive Affect and Negative Affect Schedule for Children (PANAS-C; Laurent et al., 1999), which has demonstrated strong convergent and discriminant validity in cross-sectional contexts (Hughes & Kendall, 2009) and the ability to reliably measure between- and within-person differences in EMA (Haney et al., 2023). Hopelessness was measured by taking the inverse of responses to "hopeful," also drawn from the PANAS-C, as empirical findings suggest hopelessness and hopefulness are extremely negatively correlated as both state and trait variables, on the order of $r = -.75$ (Dunn et al., 2020) and $r = -.85$ (Drinkwater, Denovan, Dagnall, & Williams, 2023), respectively. A similar term (i.e., "hopeless") has demonstrated the ability to reliably capture between- and within-person differences in EMA (e.g., Kleiman et al., 2017).

Passive and active SI

Measures of passive and active SI were administered five times daily in signal-contingent surveys. Like the risk factor variables, they were assessed using single-item prompts within the larger EMA survey. Passive SI was assessed with the question, "Right now, how strongly do you wish you weren't alive anymore?" Active SI was assessed with the question, "Right now, how strongly do you want to kill yourself?" Response options to both questions were provided on an 11-point Likert scale from 0 ("not at all") to 10 ("extremely"), with higher responses indicating more severe levels of SI severity.

Data analytic plan

Data cleaning and preparation were conducted using R and R Studio (R Core Team, 2023).

Correlations

To account for the nested structure of the data (observations nested within individuals), we estimated multi-level correlations using Mplus Version 8.10 (Muthén & Muthén, 2023). Mplus uses latent variable decomposition for multilevel modeling and all correlations presented are standardized effects. We investigated the bivariate contemporaneous associations among all main study variables, including hopelessness, loneliness, guilt, passive SI, and active SI at the within-person level. Within-person associations can be interpreted as "in moments when someone was feeling higher levels of [state], they were also feeling higher levels of [state]."

Direct prospective prediction of SI

To examine prospective associations among guilt, loneliness, passive SI, and active SI, a series of multilevel models (MLMs) were estimated using the lme4 package in R (Bates, Mächler, Bolker, & Walker, 2015). Prior to model estimation, all predictors were centered such that within-person variables were person mean centered (reflecting within-person deviations from each individual's average) and all between-person variables (presented in Supplemental Material) were person means. To examine the unique effects of guilt and loneliness, as well as their interaction, on passive and active SI, we estimated two separate MLMs. The first model predicted passive SI at time T + 1 using within-person predictors of guilt and loneliness at time T (person mean-centered), their interaction term, and passive SI at time T (person mean-centered). Time since first survey (centered on the midpoint of the study) and weekend (binary coded 0 or 1) were included as covariates. All models included a random intercept. The second model had the same structure, but instead the outcome was active SI at time T + 1. All analyses were restricted to within-day associations to avoid predictions of states overnight. All effects reported for these models are unstandardized.

Prediction of active SI through the mediating effect of hopelessness

In the final set of analyses, we were interested in whether hopelessness served a mediating role between the observed effects from the models above and active SI. We used the lavaan package in R (Rosseel, 2012) to estimate a series of within-person temporal mediation models. Similar to Mplus, lavaan uses latent variable

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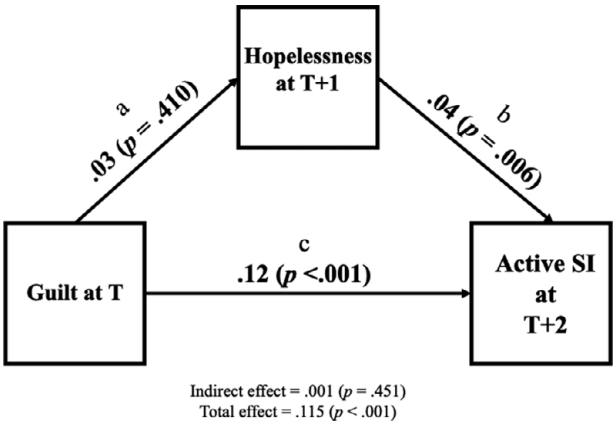

Figure 1. Within-person temporal mediation model of guilt, hopelessness, and active suicidal ideation.
Note: $N = 94$ (N Observations = 1847). T = Time. SI=Suicidal Ideation. Models are estimated controlling for time and weekend (vs. weekday). All effects are unstandardized.

decomposition. Significant estimates obtained in the model for which guilt, loneliness, and their interaction at time T predicted active SI at T + 1 were used to determine appropriate variables for the mediation model. For example, if the interaction term is significant, the interaction of guilt and loneliness at time T will predict active SI at T + 2 mediated by hopelessness at T + 1. If guilt and loneliness are significant, but not their interaction, we would estimate two separate temporal mediation models predicting active SI at T + 2 mediated by hopelessness at time T + 1, one with guilt at time T as the predictor (illustrated in Figure 1) and one with loneliness at time T as the predictor.

Finally, given the purported link between passive SI, hopelessness, and active SI, we estimated a temporal mediation model examining whether passive SI at time T, predicts active SI at T + 2, mediated by hopelessness at T + 1 (illustrated in Figure 2). Again, all analyses were restricted to within-day associations, and time and weekend were included as covariates. All effects reported for these models are unstandardized.

All findings presented in text are of within-person associations (we have included results at the between-person level in Supplemental Materials). Of note, within-person effects represent moment-to-moment fluctuations in psychological processes, where even smaller changes can be practically meaningful, given they reflect immediate, proximal influences on clinical outcomes. This interpretive context differs from between-person comparisons of stable traits, where larger effect sizes might be expected for meaningful individual differences. We therefore will use the following ranges to discuss the magnitude of the effects: small < .10; .10 ≤ medium < .30; .30 ≤ large. These are adjusted for the within-person nature of the findings (Edershile, Szücs, Dombrovski, & Wright, 2024; Edershile & Wright, 2025).

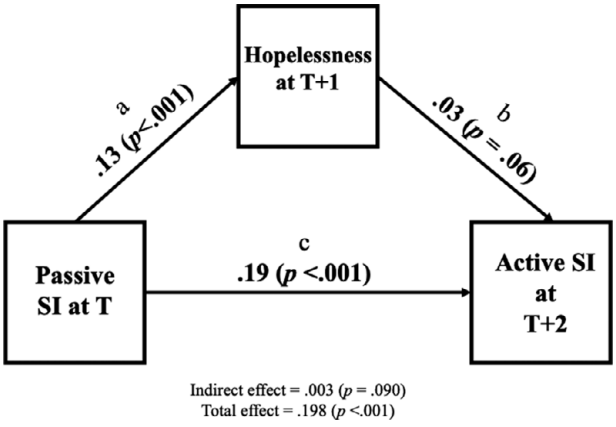

Figure 2. Within-person temporal mediation model of passive suicidal ideation, hopelessness, and active suicidal ideation.
Note: $N = 94$ (N Observations = 1847). T = Time. SI=Suicidal Ideation. Models are estimated controlling for time and weekend (vs. weekday). All effects are unstandardized.

Results

The demographics and descriptive statistics for all study variables are presented in Table 1. The lifetime prevalence of self-injurious thoughts and behaviors was high: 95.2% endorsed passive SI, 94.2% endorsed active SI, 72.1% endorsed at least one suicide attempt, and 84.6% endorsed NSSI. Intra-class correlations (ICCs) demonstrated that approximately 31% of the variance in passive SI is attributable to within-person variability, whereas within-person variability accounts for approximately 33% of the variance in active SI. Across 104 participants, 5,196 total surveys were recorded throughout the EMA period ($M_{observations}$ = 50.0 per participant; $SD_{observations}$ = 35.25; Min = 1; Max = 139).

Correlations

Correlations among all main study variables can be found in Table 2. At the within-person level, hopelessness, loneliness, guilt, passive SI, and active SI were positively and significantly associated with one another. Specifically, hopelessness, loneliness, and guilt were all positively associated with both passive SI and active SI at medium effects. Passive SI and active SI were positively associated with one another at a large effect. Between-person correlations are reported in Supplemental Table 1.

Direct prospective prediction of passive and active SI

Table 3 displays results examining the unique effects of guilt and loneliness at time T and their interaction, controlling for contemporaneous SI, on passive and active SI at T + 1 (two models), over and above between-person effects. At the within-person level, guilt had a significant unique effect on passive SI at T + 1 (β = .09, 95% CI [.06–.12], p < .001) as did loneliness (β = .04, 95% CI [.02–.06], p = .001). The interaction of guilt and loneliness on passive SI at T + 1 was not significant. Additionally, at the within-person level, guilt had a significant unique effect on active SI at T + 1 (β = .06, 95% CI [.03–.08], p < .001), whereas loneliness did not. The interaction of guilt and loneliness on active SI at T + 1 was also not significant. Neither time since submitting the first survey nor weekend days (vs. weekdays) were significantly associated with either passive SI or active SI. A version of these models excluding controls for contemporaneous SI is displayed in Supplemental Table 2.

Prospective prediction of active SI through the mediating effect of hopelessness

The nonsignificant interaction effect of loneliness*guilt on active SI precluded the test of moderated mediation through hopelessness. Given the significant effect of guilt on active SI, we tested a full

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Table 1. Demographic and descriptive characteristics of the sample

Demographics	% (*n*/*N*) or *M* (*SD*)
Age (years)	15.1 (1.4)
Sex (female)	72.1% (75/104)
Gender	
Male	24.3% (25/103)
Female	45.6% (47/103)
Nonbinary	10.7% (11/103)
Transgender	9.7% (10/103)
Other/prefer to self-identify	9.7% (10/103)
Race[a]	
White	73.1% (76/104)
Black or African American	13.5% (14/104)
Asian	3.9% (4/104)
Native American or Alaskan Native	1.0% (1/104)
Multiracial	8.7% (9/104)
Ethnicity	
Hispanic	19.2% (20/104)
Sexual orientation[a]	
Heterosexual	36.9% (38/103)
Gay/Lesbian	9.7% (10/103)
Bisexual	24.3% (25/103)
Questioning/unsure	11.7% (12/103)
Other/Prefer to self-identify	17.5% (18/103)
Psychiatric diagnoses	**% (*n*/*N*)**
Attention-deficit/hyperactivity disorder	47% (47/100)
Alcohol use disorder	11.2% (11/98)
Anorexia nervosa	27% (27/100)
Binge eating disorder	4% (4/100)
Bipolar disorder	5.9% (6/102)
Bulimia nervosa	6% (6/100)
Conduct disorder	8% (8/100)
Generalized anxiety disorder	39% (39/100)
Obsessive compulsive disorder	12% (12/100)
Oppositional deviant disorder	21% (21/100)
Post-traumatic stress disorder	12% (12/100)
Social anxiety disorder	28% (28/100)
Substance use disorder	31.3% (31/99)
Depression and self-injurious thoughts and behaviors	**% (*n*/*N*) or *M* (*SD*)** **Range**
Depressive symptoms	27.7 (8.2) 0–40
Lifetime passive suicidal ideation	95.2% (99/104)
Lifetime active suicidal ideation	94.2% (98/104)
Lifetime suicide attempt	72.1% (75/104)
Lifetime non-suicidal self-injury	84.6% (88/104)

(*Continued*)

Table 1. (*Continued*)

Ecological momentary assessment variables	*M* (*SD*)	Range
Guilt	1.9 (1.9)	0–10
Loneliness	3.2 (2.2)	0–10
Hopelessness	5.9 (2.3)	0–10
Passive suicidal ideation	1.6 (2.2)	0–10
Active suicidal ideation	1.1 (1.8)	0–10

Note: $N = 104$.
[a]Sum of percentages exceeds 100% due to rounding.

Table 2. Standardized contemporaneous within-person correlations of ecological momentary assessment variables

Variable	1	2	3	4	5
1. Guilt	–				
2. Loneliness	.23 [.19, .25]	–			
3. Hopelessness	.10 [.08, .14]	.15 [.11, .18]	–		
4. Passive suicidal ideation	.28 [.25, .30]	.25 [.23, .27]	.18 [.16, .21]	–	
5. Active suicidal ideation	.26 [.24, .28]	.18 [.16, .21]	.15 [.12, .18]	.71 [.70, .72]	–

Note: $N = 104$ (N Observations = 5196).
All correlations significant at $p < .05$.
95% confidence intervals are indicated within brackets.

temporal within-person mediation model in which guilt at time T predicted active SI at T + 2 mediated by hopelessness at T + 1 (displayed in Figure 1). Results indicated that guilt had a significant direct effect on active SI two timepoints later ($\beta = .12$, $p < .001$), but guilt did not significantly predict hopelessness at the next momentary timepoint ($\beta = .03$, $p = .410$). Hopelessness, on the other hand, significantly predicted active SI at the next timepoint ($\beta = .04$, $p = .006$). The indirect effect of guilt on active SI through hopelessness was not significant ($\beta = .001$, $p = .451$), suggesting that guilt directly predicts active SI two timepoints later but does not operate through the mediating effect of hopelessness at the next momentary timepoint. Supplemental Figure 1 displays a between-person effects version of this model.

The temporal mediation model in which passive SI at time T predicted active SI at T + 2 mediated by hopelessness at time T + 1 is presented in Figure 2. Results indicated that passive SI had a significant direct effect on active SI two timepoints later ($\beta = .19$, $p < .001$), as well as a significant effect on hopelessness at the next momentary timepoint ($\beta = .13$, $p < .001$). Hopelessness was not a significant predictor of active SI at the next timepoint ($\beta = .03$, $p = .06$). The indirect effect of passive SI on active SI through hopelessness was not significant ($\beta = .003$, $p = .090$). Supplemental Figure 2 displays a between-person effects version of this model.

Discussion

In this study, we sought to evaluate momentary prospective predictors of passive and active SI within the ITS framework. We also tested the moderated mediation component of the ITS model with active SI as the outcome within a fully prospective design. To our knowledge, this is the first EMA study to distinguish between

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Table 3. Guilt and loneliness prospectively predicting passive and active suicidal ideation (controlling for SI at time T)

	Passive suicidal ideation (T + 1)[a]			Active suicidal ideation (T + 1)[b]		
Variable	Estimate	95% CI	*p*	Estimate	95% CI	*p*
Within-person effects						
Guilt (T)	.09	.06–.12	<.001	.06	.03–.08	<.001
Loneliness (T)	.04	.02–.06	.001	.01	−.01–.03	.443
Loneliness* guilt (T)	−.01	−.02–.00	.086	.00	−.01–.01	.400
Suicidal ideation (T)	.33	.29–.36	<.001	.35	.32–.39	<.001
Between-person effects						
Guilt	.68	.47–.89	<.001	.63	.48–.78	<.001
Loneliness	.14	−.05–.32	.144	.06	−.07–.19	.353
Time effects						
Time since first survey	.00	.00–.00	.712	.00	.00–.00	.109
Weekend	.02	−.08–.00	.709	.03	−.05–.11	.450

Note: $N = 99$ (N Observations = 3307). CI=Confidence Intervals. T = Time. All effects are unstandardized. The interaction effect for the active SI model is −.004. The time effect for the passive SI model is .00005 and .0002 for active SI.
[a]Controlled for passive suicidal ideation (T).
[b]Controlled for active suicidal ideation (T).

passive and active SI as outcomes in youth. Moreover, it is the first EMA study to evaluate the moderated mediational component of the ITS. Overall, we found partial support for the ITS account of passive and active SI. We discuss several notable findings below.

Consistent with our hypotheses, loneliness and guilt both prospectively predicted passive SI with relatively modest effects. In contrast, there was only partial support for these same predictors in relation to prospective active SI. That is, only guilt was a significant predictor of this outcome, also with a relatively modest effect. Within the ITS, the constructs of which loneliness and guilt are proxies (i.e., thwarted belongingness and perceived burdensomeness, respectively) are more proximally related to passive SI and distally related to active SI. The weaker support in the current study for loneliness and guilt, respectively, in relation to active SI may in part be a reflection of their hypothesized more distal relation to this outcome (Van Orden et al., 2010).

The moderated mediation component of the ITS was not supported in our analyses. Specifically, the interaction between loneliness and guilt did not prospectively predict active SI, which precluded tests of mediation. Furthermore, even though guilt had a medium-sized effect predicting future active SI directly, hopelessness did not mediate this relationship. The nonsignificant moderation effect stands in contrast to prior literature of non-EMA studies, which generally found evidence in favor of the interaction proposed by the ITS (Chu et al., 2017). Although past studies have not distinguished between passive and active SI, this difference from the current study does not seem to explain the present findings, because the interaction between loneliness and guilt did not significantly predict either passive or active SI. Furthermore, the lack of a significant interaction term is unlikely to be an issue of power, given that the estimates were essentially zero and are within narrow 95% confidence intervals. Adding confidence to this null finding is that a recent EMA study, with an adult sample that was recruited online, similarly did not find the interaction between thwarted belongingness and perceived burdensomeness to predict future active SI (Jacobucci et al., 2023). Past non-EMA findings were largely based on mean-level between-persons analyses, whereas the current study employed within-person analyses of the SI component of the ITS, and it cannot be assumed that findings from one would generalize to the other. Moreover, differences between the prior literature and the present findings may indicate that the associations between ITS variables related to SI may vary as a function of the temporal scale in which they are evaluated (Pérez-Edgar, Gunther, & Vallorani, 2025; Ram et al., 2014). More specifically, our findings may be a reflection of the temporal scale in which hopelessness relates to the association between loneliness, guilt, and SI subtypes. The possibility that hopelessness results from *chronic* feelings of thwarted belongingness or perceived burdensomeness is posited by the ITS, according to which hopelessness arises when both thwarted belongingness and perceived burdensomeness are perceived as "unchanging" (Van Orden et al., 2010). That stability or perception of invariability in an undesirable state leads to hopelessness over time is supported in early models of hopelessness (e.g., "learned helplessness"; Seligman, 1972). Within the context of the broader ITS literature, the present findings are informative for our understanding of the temporal scale across which these ITS constructs interrelate. In the case of hopelessness, a longer timescale may be necessary to observe its mediating effect.

An alternative possibility to be explored in future research is that extreme short-term variability in constructs such as guilt and loneliness may be risk factors for suicidal outcomes. Of relevance here, high variability SI has been associated with risk for future SI and has been suggested as a risk factor for suicidal behavior (Oquendo et al., 2021).

We also found that hopelessness did not account for the association between passive and active SI. This again could be due to the temporal scale on which this relationship was assessed and does not exclude the possibility that this association exists outside of within-person and within-day transitions between SI subtypes. Additionally, this null finding is important within the context of our mixed findings that, whereas guilt was prospectively related to both passive and active SI, loneliness only predicted prospective passive SI. Collectively, these findings support the view that passive and active SI may have overlap but also notable differences in their etiologies (Wastler et al., 2023). For example, Wastler et al. (2023) tested the conceptualized distinction between passive and active SI

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by evaluating the latent structure of suicidal thought content in two large samples of adults. Their findings supported a two-factor model of SI, in which thoughts aligned with passive and active SI loaded respectively onto two correlated, but separable, factors.

The clinical implications of the current findings are also worth noting. Past work has found that passive and active SI are similarly valuable predictors of future suicidal behavior (Liu et al., 2020). Therefore, it is important to account for the antecedents of both forms of SI. However, given that the greatest risk for future suicidal behavior may be found in individuals with concurrent passive and active SI (Wastler et al., 2022), guilt, more than loneliness, may be a particularly useful clinical target insofar as its alleviation may help to prevent or reduce both passive and active SI. Treatments for guilt (e.g., trauma-informed guilt reduction therapy [TrIGR]; Norman, Wilkins, Myers, & Allard, 2014) are often designed especially to help those who have experienced trauma and have been shown to be effective in reducing post-traumatic stress disorder symptoms among veterans (Norman et al., 2022; Serfioti, Murphy, Greenberg, & Williamson, 2024). Given that veterans are already at an increased risk for STBs (Hoffmire, Kemp, & Bossarte, 2015; Schafer et al., 2022), interventions oriented toward the alleviation of guilt symptoms in this population may be particularly effective for SI. However, whether TrIGR and other treatments targeting guilt may reduce passive and active SI in at-risk populations has yet to be empirically evaluated. Future work should investigate the effectiveness of these treatments across a temporally fine-grained scale, where suicide intervention efforts may be most critical (West, Walsh, & Morganstein, 2022).

The findings of this study should be interpreted with consideration for its limitations. First is the very high representation of females in the sample. Although this precluded evaluations of sex differences, recent large-scale studies of pediatric hospitalizations for mental health in general and STBs specifically also yielded sex differences, with greater female representation (Arakelyan et al., 2023; Bommersbach et al., 2023; Lindsey, Sheftall, Xiao, & Joe, 2019; Plemmons et al., 2018). Furthermore, studies of temporal trends in acute psychiatric care among youth indicate that increases in STB-related hospitalizations over time are significantly higher for girls (Arakelyan et al., 2023; Plemmons et al., 2018). Nonetheless, future studies should ensure greater sex balance in their samples to permit evaluation of the degree to which momentary relations among ITS constructs differ by sex. Additionally, these results were found among an inpatient sample with high levels of SI. Although this is important for studying clinically elevated SI at high temporal resolution in an ethical manner, caution should be taken when generalizing these findings to community populations. Additionally, as this is the first EMA study to evaluate ITS models of passive and active SI in youth, future studies are needed to test these associations in older age groups before findings can be generalized to adult populations. We note that the ordering of our variables, particularly for our mediation models, were driven by existing theories, particularly the ITS, which is a strength of the current study. However, it is possible, even likely, that all psychological states of interest, including guilt, loneliness, hopelessness, passive SI, and active SI are related in various temporal ways, including causal, contemporaneous, and byproducts of other psychological processes. While our EMA design allowed us to examine within-person processes over time, the complex temporal relationships between these psychological states likely unfold over varying timescales that extend beyond our sampling intervals. We encourage future research to systematically examine alternative variable orderings and longer temporal lags to contribute to a more comprehensive understanding of the dynamic processes underlying SI. Finally, analyses were based on single items in EMA. Future studies may consider using multiple items for the measurement of the same construct.

In conclusion, this study aimed to evaluate ITS factors in the etiology of passive and active SI at a moment-to-moment level among recently psychiatrically hospitalized adolescents. We found support for certain components of the ITS related to SI but did not find evidence of moderated mediation. By capturing naturally dynamic SI risk factors and outcomes on a momentary timescale and distinguishing cleanly between two types of SI, our findings shed light on how ITS constructs are associated on a temporally fine-grained scale and contribute to the current understanding of both the shared and distinct components of passive and active SI etiology. Such an understanding is crucial for enhancing our ability to predict and prevent SI and downstream suicidal behavior, particularly among adolescents at greatest clinical risk.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/S0033291725102547.

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