



Adolescent suicide risk and experiences of dissociation in daily life

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ABSTRACT

Dissociation is associated with risk for suicide in adults, but this link is not well studied in adolescents, in spite of their marked suicide risk. This study assessed adolescents' dissociative experiences in daily life and evaluated the association between dissociative experiences and suicide risk, including the independence of this relationship from related affective and clinical states and demographic characteristics. Clinically referred early adolescents ($N = 162$; aged 11–13) were assessed via multi-informant clinical interview, questionnaires, and 4-day ecological momentary assessment protocol. Adolescents were classified as being at elevated suicide risk using multi-informant, multi-method reports of suicide risk behavior and/or at elevated proximal risk using the 4-day EMA only. Suicide risk was associated with daily dissociative experiences, and this relationship was independent of daily negative and positive affect and co-occurring borderline personality symptoms. Gender differences emerged, such that the relationship between daily dissociative experiences and suicide risk was only significant in adolescent girls. Overall, findings suggest dissociation may be independently relevant to adolescent suicide risk, above and beyond effects of psychopathology and affective disturbance, and especially in girls. Daily dissociative experiences may help understand and detect suicide risk among early adolescents and warrant further research.

“The greatest hazard of all, losing one's self, can occur very quietly in the world, as if it were nothing at all.”

– Søren Kirkegaard, *The Sickness Unto Death*

1. Introduction

In the last decade, suicide has risen to the 2nd leading cause of death among adolescents (Curtin and Heron, 2019; Heron, 2016). Anonymous surveys suggest that three quarters of adolescents' suicidal ideation goes undisclosed, hampering prevention efforts (Pisani et al., 2012). In order to better understand, detect, and mitigate suicide risk, it is critical to identify risk markers reported by vulnerable adolescents more readily. The subjective phenomenon *dissociation*, with long-standing implication in suicide (Frankl, 1969; Janet, 1889; Oberndorf, 1950; Walzer, 1968), could be such a useful behavioral marker. Although the relevance of dissociation to suicide is established, conceptual and empirical precision is lacking about the structure of dissociation, its relevance to suicide risk in adolescents, and the incremental validity of its relation to suicide risk in a multivariate, psychopathology-informed context.

2. Phenomenology and structure of dissociation

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines dissociation broadly, as “disruptions and/or discontinuities in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior” (American Psychological Association, 2013). These disruptions or discontinuities in cognitive processes are presumed to give rise to subjectively perceivable feeling states, which can include *derealization*, a sense of unreality or detachment from the external world, and *depersonalization*, a sense of unreality or detachment from one's mind, self, or body, which can manifest as emotional and/or physical *numbness* (APA, 2013). Although dissociative presentations can be quite apparent clinically, articulating a firm conceptual boundary around dissociative experiences has proven challenging. The difficulty in describing dissociated states often leads even formal definitions to include metaphor or first-person examples (e.g., reality as “dream-like,” Simeon et al., 2008; “feeling dead or dead inside,” Walzer, 1968; “I am no one, I have no self,” APA, 2013). There are also prominent factor structure inconsistencies and a dearth of naturalistic studies. Dissociation has been most well characterized in adult samples using trait self-report measures (see two meta-analyses: Lyssenko et al., 2018; van Ijzendoorn and

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Schuengel, 1996). Even in these samples, the factor structure of dissociation remains heavily contested, with findings ranging from 1 to 4, and sometimes to 7 or more, factors (Holtgraves and Stockdale, 1997; Lyssenko et al., 2018; Ruiz et al., 2008; van Ijzendoorn and Schuengel, 1996). Studies in adolescent samples have relied thus far also on trait dissociation measures (e.g., Xavier et al., 2018; Kisiel and Lyons, 2001; Tolmunen et al., 2007), the most common of which appears unidimensional (Farrington et al., 2001). Only one study has assessed dissociation using ecological momentary assessment (EMA) methodology (Greene, 2018). Because this study assessed a narrow variant of dissociation (i.e., “peritraumatic dissociation” during chronic trauma exposure) and was conducted in adults, it does not clearly help understand the daily dissociative experiences that may be related to adolescent suicide risk.

Two potentially related states, not currently considered indicative of dissociation, warrant consideration for inclusion under the dissociation umbrella: *boredom* and *emptiness*. Stryngaris (2016) compared both boredom and emptiness to *numbness*, which is clearly established under the dissociation umbrella as an aspect of depersonalization (APA, 2013). As Stryngaris articulates, *numbness*, *boredom*, and *emptiness* are all clinically salient expressions of diffuse, difficult-to-label, absences of feeling. Boredom and emptiness have been used interchangeably (e.g., DSM-III borderline criteria; see Klonsky, 2008), and both are correlated with dissociative symptoms across age groups (e.g., in the context of borderline personality disorder; Aggen et al., 2009; Chabrol et al., 2002; Conway et al., 2012). Although they differ in some ways (e.g. Klonsky, 2008; Price et al., al., preprint), dissociation and emptiness share a particularly blurred boundary, both conceptually and phenomenologically. Theoreticians across decades (Kernberg, 1985; Laing, 1960; Zandersen and Parnas, 2019) have conceptualized emptiness, much like dissociation, as driven by a disruption in identity and self-perception and resulting in visceral and existential experiences of disembodiment and unreality. Clinically, case studies on emptiness have observed that verbatim descriptions of emptiness by clinical patients are imprecise and often overlap with patient reports of dissociative experiences (e.g., Elsner et al., 2018). In questionnaires, emptiness is measured using dissociation-like items, including “inner numbness,” “I am not real,” “out of touch with myself,” (Hazell, 1982) and “absent in my own life” (Price et al., al., preprint). In sum, the dissociation umbrella—already spanning derealization, depersonalization and numbness (APA, 2013)—may also cover boredom and, likelier, emptiness.

3. Relevance to adolescent suicide risk

The relevance of dissociation to suicide is generally accepted. Dissociation was so commonly observed in connection with suicide (e.g., Frankl, 1969; Janet, 1889; Oberndorf, 1950), that it was once even considered the unconscious enactment of suicide itself (Walzer, 1968). Today, dissociation is conceptualized instead as one of several responses to chronic and acute stress, with both normative and pathological manifestations (Şar, 2014). Elevations among adults hospitalized for imminent suicide risk have recently led dissociation to be proposed as part of the acute suicidal state (Galynker et al., 2016). There is not yet causal evidence linking dissociation to suicide, but initial findings suggest that repeated suicide attempts may be motivated by a desire to feel something (even pain) instead of numbness and emptiness (Blasco-Fontecilla et al., 2015). Dissociative disorders have been associated with suicide attempts in a community sample of Turkish adult women (Şar et al., 2007a) and in clinical samples above and beyond effects of co-occurring diagnoses (Foote et al., 2008; for review see Şar, 2011). Dimensional severity of dissociative experiences is consistently elevated among adults who have attempted suicide, according to a meta-analysis (Calati et al., 2017). Emptiness has specifically attracted attention in the context of the suicidal process, showing elevations in both the acute prodrome, as well as the aftermath, of adult

suicide attempts (Blasco-Fontecilla et al., 2013; Chesley, 2003; Ellison et al., 2016; Elsner et al., 2015; Schnyder et al., 1999).

For adolescents, the relevance of dissociation to suicide risk is less established. Turkish high school students who attempted suicide reported stronger dissociative symptoms than their peers with no history of suicidal behavior (Zoroğlu et al., 2003). In another Turkish sample, adolescents diagnosed with a dissociative disorder were significantly likelier to report having attempted suicide than clinical and non-clinical control youth, but this effect was not significant after controlling for gender and depression severity (Kiliç et al., 2017). In clinical youth samples, suicide risk and suicide history were associated with only some measures of dissociation, but not others (Kisiel and Lyons, 2001; Orbach et al., 1995). The relevance of dissociation to adolescent suicide risk thus requires confirmation, especially during the transition to adolescence (ages 11–13), the period when suicide risk begins to rise (Curtin and Heron, 2019) and when dissociation may be under-reported and/or under-assessed (Steinberg, 1996).

4. Dissociation and suicide in a transdiagnostic landscape

The processes involved in suicide risk unfold against a complex backdrop of mechanisms of other negative outcomes, especially psychopathology. Most maladaptive psychological processes confer risk for multiple different negative outcomes (Insel et al., 2010), but they may predict each outcome for outcome-specific reasons (Nolen-Hoeksema and Watkins, 2011; Vine and Aldao, 2014). Identifying risk processes specific to suicide is especially difficult because suicide is associated with psychopathology pervasively, yet imprecisely (Nock et al., 2019). As Nock et al. (2019) explain, the high prevalence of psychopathology among suicide decedents (close to 95%; see Cavanagh et al., 2003) makes it hard to isolate specific psychopathological processes related directly, uniquely, and non-spuriously to suicide. At the same time, they note that psychopathology itself is a poor predictor of suicide, because so few cases of psychopathology (relative to all cases of psychopathology) end in suicide.

To improve the specificity of suicide risk models, Nock et al. (2019) have called for strategic use of multivariate models to account for potential psychopathology confounds. One especially likely potential confound is borderline personality disorder (BPD). The BPD presentation prominently features both dissociation and suicide (see Conway et al., 2012; Scalabrini et al., 2017), and BPD is one of the most common diagnoses associated with dissociative presentations in psychiatric and other contexts (Lyssenko et al., 2018; Şar et al., 2003; Şar et al., 2007b). Additionally, BPD symptoms appear to parsimoniously represent common psychopathology variance across disorder types in early adolescents (Vine et al., al., under review), recommending a BPD covariate as an efficient tool for factoring out broad effects of psychopathology in this period. For these reasons, to understand the specificity of the dissociation-suicide link among youth, it is a priority to determine its independence from co-occurring BPD symptoms.

Furthermore, the utility of dissociation as a marker of suicide risk depends also on differentiating dissociation from related states. Negative and positive affect play robust, mechanistic roles in emotional disorders (Scott et al., al., in press), and explain important variance in suicide risk (Rojas et al., 2015; Yamokoski et al., 2011). In dimensional studies, dissociative experiences correlate with elevated negative affect and reduced positive-to-negative affect ratio (Ertubo et al., 2018; Simeon et al., 2003). Although dissociation is formally defined as a disruption in cognitive processing (APA, 2013), its assessment relies on subjective perceptions of the dissociated feeling state. To our knowledge, no studies have attempted to differentiate dissociation from affective states in the context of suicide risk. To determine the viability of considering dissociation an independent marker of adolescents' suicide risk, it is important to isolate adolescents' tendencies to report a dissociated feeling state from their tendencies to report other states.

5. The current study

We examined the relationship between early adolescents' experiences of dissociation and suicide risk. Importantly, the entire sample could be considered at nontrivial suicide risk, given its adolescent age range (Heron, 2016) and presence of psychopathology (Cavanagh et al., 2003). We identified those at heightened suicide risk relative to their also-at-risk peers based on existing histories of suicide- or self-harm-related ideation or behavior (e.g., Paul et al., 2015; for meta-analysis see Ribeiro et al., 2016). Goals of the study were to: (1) characterize the latent structure and prevalence of dissociation experiences in this early adolescent clinical sample; and (2) evaluate the relationship between adolescents' dissociation and suicide risk status and probe its independence above and beyond effects of psychopathology and affective variables. To further pursue calls for multivariate modeling of suicide risk (Nock et al., 2019), our final aim was (3) to explore contextual effects of demographic characteristics on dissociation in suicide risk.

6. Methods

6.1. Subjects

Participants were 162 clinically referred adolescents aged 11–13 ($M_{\text{age}} = 12.03$ years, $SD = 0.92$). They were recruited, with their primary caregivers, from pediatric primary care and ambulatory psychiatric clinics in an urban, academic hospital-based setting. To ensure impairment of a transdiagnostic nature, adolescents were oversampled¹ for emotion dysregulation based on the maximum score (parent- or adolescent-reported) from the Personality Assessment Inventory—Adolescent Version—Affective Instability subscale ($M = 13.05$, $SD = 2.90$; scores > 11 indicating clinical significance; Morey, 2007). Eligible adolescents had $IQ > 70$, were free of organic neurological medical conditions, current mania, and current psychotic episodes, and were currently receiving psychiatric or behavioral treatment for any mood or behavior problem. Half of adolescents (47%) were female; 60% identified as racial/ethnic minorities (41% African American; 16.7% biracial; 6% American Indian/Alaskan Native; 4% Hispanic). Most (94%) participating caregivers were female ($M_{\text{age}} = 39.84$; $SD = 7.25$; 48% racial/ethnic minority; 88% were biological mothers). One third (66%) of households reported not having any employed caregivers.

6.2. Procedures

Adolescents and caregivers completed questionnaires and adolescent-focused clinical interviews as part of a larger protocol. To minimize participant burden, adolescents and caregivers were interviewed simultaneously by two clinicians in separate rooms, with maximum scores for each symptom retained. Ten percent of interviews were double-scored from video, showing high inter-rater reliability (average ICC = 0.88). In the week following the laboratory visit, adolescents and caregivers each completed a brief EMA component of the study. Each participant was prompted to complete surveys 10 times over 4 days on study-provided smartphones. Prompts were time-based to maximize compliance and avoid school hours, and spanned consecutive days: 2 weekdays (4 pm, 8 pm) and 2 weekend days (12 pm, 4 pm, 8 pm).

¹ Oversampling was conducted such that $> 85\%$ of adolescents would fall in the clinical range on PAI scores (i.e., 12 or greater), while the remaining 15% were allowed to fall anywhere on the PAI range. This strategy was designed to produce a small comparison group of nonclinical adolescents for addressing hypotheses pertinent to the original study providing these data. In the final sample, 89% of the adolescents fell into the clinical range (observed range 12–18), while the remaining 11% displayed a range of nonclinical scores (observed range 1–11).

Compliance rates were high, with 88.8% adolescents and 90.1% caregivers completing 8 or more prompts. All procedures were approved by the Human Research Protection Office and conducted in an ethical manner. Informed assent and consent were obtained from each adolescent and caregiver, respectively.

6.3. Measures

6.3.1. Possible indicators of daily life experiences of dissociation

Five potential indicators of dissociation were drawn from the adolescents' EMA. Three questions had a yes/no format: *Since [last prompt] ... have you felt spaced out or numb? ... have you felt as though you were in a dream? ... have you had thoughts about whether or not you even existed?* Two questions initially used a 4-point Likert scale (0 = not at all; 3 = a lot) and asked, *During the past 15 min, how much have you felt ...empty?* and *...bored?* Any answer other than "not at all" was coded as an endorsement.

6.3.2. Elevated suicide risk

Four suicide risk-relevant symptoms were drawn from both adolescent and caregiver reports on the Depression module of the *Kiddie Schedule for Affective Disorders and Schizophrenia* (K-SADS-PL; Kaufman et al., 1997), a semi-structured interview for assessing the presence and severity of affective and other psychiatric disorders in 6–18-year-olds. The symptoms used were: *recurrent thoughts of death, suicidal ideation, suicidal acts, and non-suicidal acts*. Clinicians rated each symptom on a 3-point scale (0 = absent; 1 = subthreshold; 2 = threshold), with ratings of either 1 or 2 considered endorsements for present purposes. The *Childhood Interview for DSM-IV Borderline Personality Disorder* (CI-BPD; Zanarini, 2003), a semi-structured interview for diagnosing adolescent BPD, provided one relevant item reported by both the adolescent and caregiver separately: *recurrent suicidal behavior, gestures, or threats, or self-mutilation behaviors*. Clinicians rated this and other CI-BPD symptoms in the past 2 years (0 = absent; 1 = subthreshold; 2 = threshold); ratings of 1 or 2 were considered endorsements.

Suicide risk items were also drawn from the *Childhood Behavior Checklist* (CBCL) and *Youth Self-Report* (YSR) questionnaires (Achenbach, 1991). The relevant CBCL (caregiver-reported) items were: *he/she deliberately harms self or attempts suicide and talks about killing self*. The relevant YSR (adolescent-reported) items were: *I deliberately try to hurt or kill myself and I think about killing myself*. Ratings of 1 or 2 were considered endorsements. Items refer to the past 6 months (0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true).

Lastly, the EMA assessments provided suicide risk-related items (all dichotomous, focused on the period since the last prompt). Two adolescent-reported EMA items asked whether they *had thoughts about killing yourself or hurting yourself*, and whether they *had told someone you were going to kill yourself or hurt yourself*. A caregiver-reported EMA item asked whether the adolescent had *told someone he/she was going to kill him/herself or hurt him/herself*.

A binary *suicide risk composite* was created to reflect the history of any suicidal or self-harm-related ideation or behavior, per either the adolescent's or the caregiver's report on any measure (i.e., clinical interviews, questionnaires, EMA).² To provide an estimate of more proximal suicide risk, an alternative, *4-day binary suicide risk indicator* reflected only the endorsements of the above EMA items.

² Note that most relevant items did not separate thoughts from behaviors, nor did they separate suicide-related from non-suicidal self-harm-related thoughts or behaviors, making the composite index both the most feasible and most appropriate.

6.3.3. Psychopathology and affective covariates

A *nonredundant BPD severity* index was created by summing the severity of CI-BPD symptoms unrelated to either dissociation or suicide risk (i.e., omitting dissociation, emptiness, and suicide/self-harm). The final nonredundant BPD severity index therefore reflected symptom severity related to anger, affective instability, efforts to avoid abandonment, impulsivity in areas besides suicidal behavior, and unstable/intense interpersonal relationships.

Estimated *average daily affect* was calculated using the EMA. At each prompt, adolescents reported how much they had felt a variety of affective states over the last 15 min (0 = not at all; 3 = a lot). Same-valanced states were averaged at each timepoint to create averages of negative affect (NA; *sad, angry, nervous, ashamed, guilty*) and positive affect (PA; *happy, relaxed, excited, energetic, proud*), and scores were averaged again across timepoints to reflect each participant's daily NA and PA.

6.4. Analytic plan

The above indicators were computed, and preliminary descriptive and bivariate correlational analyses conducted in SPSS v.24 (SPSS, Inc., Chicago, IL). To account for non-normal distributions of zero-inflated categorical indicators, subsequent analyses used the weighted least squares mean and variance adjusted estimator in MPlus (Version 8.0.0.1; Muthén & Muthén, 1998–2011). Main analyses proceeded in three phases, following a conventional model-building approach. (1) First, a latent between-persons dissociation factor was identified using confirmatory factor analysis (CFA), a two-parameter logistic item response theory (IRT) model, and χ^2 difference testing. Specifically, we began by testing the appropriateness of using all 5 potential dissociation indicators (*spaced/numb, dream, exist, empty, bored*) to inform a latent dissociation construct, and then we trimmed the set of indicators as needed on the basis of fit. (2) Second, the final latent dissociation factor was regressed on the suicide risk variables. This was initially done without covariates, and then three psychopathology and affective covariates were added to the model (nonredundant BPD symptom severity, average daily NA and PA). (3) Lastly, models were re-run incorporating demographic characteristics (gender and minority race/ethnicity) for a more nuanced multivariate perspective on dissociation and suicide risk. Model fit was assessed as follows: IRT models were evaluated using difficulty and discrimination coefficients and item characteristic curves; non-IRT models were evaluated using convention fit indicators for structural equation models, with the following considered indicators of good fit: non-significant χ^2 likelihood ratio test; Comparative Fit Index (CFI) and/or Tucker-Lewis Index (TLI) $> = 0.95$; and/or Root Mean Square Error of Approximation (RMSEA) < 0.05 (McDonald and Ho, 2002).³

7. Results

7.1. Preliminary analyses

7.1.1. Descriptive statistics

The suicide risk composite identified 99 (61.1%) adolescents at elevated suicide risk ($n = 68$ by adolescent report; $n = 89$ by caregiver report). Over half ($n = 58$; 58.6%) were identified by both dyad members; 31 were identified by caregiver report only and 10 by adolescent report only. Of the 68 adolescents who reported elevated risk, 43 (63.2%) did so in one measurement modality only, typically ($n = 40$; 93.0%) during the clinical interview. The majority of those identified were female ($n = 9$; 81.8%) and of non-minority racial/

ethnic status ($n = 7$; 63.6%). Frequencies of specific items composing the final composite are in Table 1 (see also Supplement 1).

The 4-day risk indicator identified a total of 11 (6.8%) adolescents (Table 1). Of these, most ($n = 9$; 81.8%) were identified by adolescent report only; one was identified based on both parties' reports; one was identified by caregiver EMA only. The majority of those identified were female ($n = 9$; 81.8%) and of non-minority racial/ethnic status ($n = 7$; 63.6%). Ten of the 11 adolescents at 4-day risk were also at elevated risk according to the suicide risk composite.

Most potential dissociation items were endorsed by only a minority of participants (17–36% of adolescents), except for boredom (endorsed by 91% of adolescents). Most adolescents who endorsed the 4 less common items (*spaced/numb, dream, exist, empty*) did so only once during the 4-day EMA (see Table 2 and table note). More detailed frequencies are in Supplement 1.

7.1.2. Bivariate correlations

Dissociation indicators, except for boredom, correlated with one another significantly (r s 0.22 to 0.39; Table 2). The suicide risk composite correlated significantly with *empty*, and the 4-day risk indicator correlated with *spaced/numb, dream, exist, and empty* with effect sizes ranging from small to medium. Psychopathology and affective covariates were associated as expected with most key variables. Female gender was associated with suicide risk and several dissociation indicators, while minority race and/or ethnicity was inversely associated with suicide risk.

7.2. Main analyses

7.2.1. Latent structure of dissociation

Given the low frequency of most dissociation experiences within-subjects (Table 2 note), possible dissociation indicators were dichotomized to represent for each adolescent whether the experience was reported at all during the EMA.⁴ A between-persons measurement model of dissociation informed by all five possible dichotomous indicators had good fit overall, $\chi^2(5) = 3.25$, $p = 0.662$, RMSEA = 0.00[.00,.09], CFI = 1.00, TLI = 1.03. However, consistently with preliminary analyses, the *bored* indicator was not informative of the latent construct, as indicated by nonsignificant factor loading ($\beta = 0.29$, $SE = 0.15$, $p = 0.055$), nonsignificant variance explained ($R^2 = 0.09$, $SE = 0.09$, $p = 0.914$), and nonsignificant IRT parameters (difficulty and discrimination). Results demonstrated that *bored* was not a useful indicator of the latent dissociation construct at any level of dissociation severity. By contrast, the IRT model confirmed that the other 4 potential indicators were informative of latent trait dissociation over a range of dissociation severities. Item response patterns revealed that the *empty* indicator discriminated best among adolescents with lower severity trait dissociation, and the *exist* indicator discriminated best among those with higher severity dissociation. Additional background, results, and interpretation for IRT analyses can be found in Supplement 2.

Bored was therefore dropped from the measurement model, and the resulting 4-indicator model fit the data equally well, $\chi^2(2) = 2.34$, $p = 0.310$, RMSEA = 0.03[.00,.16], CFI = 1.00, TLI = 0.99, $\Delta\chi^2(3) = 0.91$, $p = 0.823$. All four indicators loaded significantly and had significant variance explained. The 4-indicator measurement model (Fig. 1) was thus retained to represent dissociation in subsequent analyses.⁵

⁴ Count-based instead of dichotomous versions dissociation indicators were tried, but these produced a poorly fitting measurement model, $\chi^2(2) = 17.79$, $p < .001$, RMSEA = .22, CFI = .89, TLI = 0.69.

⁵ Multi-level between/within-persons model solutions were explored; however, these fit the data poorly and indicated that all meaningful variance is at the between-persons level. This is unsurprising, given the low frequency with

³ A deidentified dataset containing variables used for the present analyses is stored at the Open Science Framework at [website redacted during blind review].

Table 1
Frequencies of variables composing the suicide risk composite indicator.

Suicide Risk-Relevant Items:	Number (n) of adolescents with elevated suicide risk, as reported ^c by:	
	Adolescents	Parents
EMA^a		
Suicide/self-harm thoughts	9	–
Suicide/self-harm statements	3	2
Any/either EMA item	10	2
Clinical Interview		
CI-BPD suicide/self-harm behaviors	44	52
K-SADS thoughts of death	39	74
K-SADS suicidal ideation	32	41
K-SADS suicidal acts	18	17
K-SADS non-suicidal acts	27	20
K-SADS non-suicidal acts only (no death/suicide endorsed on K-SADS)	3	1
Any/either interview	56	78
Questionnaire^b		
YSR/CBCL suicide/self-harm acts	16	20
YSR suicidal thoughts	20	–
CBCL suicidal statements	–	23
YSR/CBCL thoughts/statements only (no acts)	6	11
Any/either questionnaire item	23	31

^a At any given EMA timepoint, 134 (82.7%) to 156 (96.3) adolescents responded to the suicide/self-harm questions; at any EMA timepoint, 113 (69.8%) to 130 (80.2%) parents responded to the adolescent suicide/self-harm question.
^b Ns for questionnaire items ranged from 146 to 141, depending on the item.
^c Adolescent and parent reports of suicide risk were correlated positively with each other (questionnaires: $r = 0.40, p < 0.001$; interviews: $r = 0.57, p < 0.001$; EMA: $r = 0.20, p = 0.009$).

Table 2
Descriptive statistics and bivariate correlations among study variables.

	M (SD) or N (%)	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Female	76 (46.9%)											
2. Minority status	97 (59.9%)	–0.09										
3. Spaced/numb	43 (26.5%)	0.22**	–0.11									
4. Dream	39 (24.1%)	0.02	–0.01	0.35***								
5. Exist	27 (16.7%)	0.01	0.03	0.22**	0.33***							
6. Empty	59 (36.4%)	0.21**	–0.06	0.39***	0.32***	0.21**						
7. Bored	147 (90.7%)	0.00	–0.13	0.10	0.03	0.09	0.11					
8. Suicide risk	99 (61.1%)	0.24**	–0.19*	0.02	0.15 ³	0.09	0.26**	0.10				
9. 4-day risk	11 (6.8%)	0.19*	–0.13	0.23**	0.19*	0.27***	0.26**	0.09	0.22*			
10. Daily NA	0.22 (0.30)	0.28***	–0.27**	0.39***	0.34***	0.22**	0.48***	0.11	0.27**	0.30***		
11. Daily PA	1.59 (0.69)	–0.39***	0.19*	–0.22**	–0.00	–0.03	–0.31	–0.20*	–0.18*	–0.24**	–0.32***	
12. BPD	5.86 (2.73)	0.11	0.16*	0.03	0.22**	0.07	0.16*	0.06	0.35***	0.13 ³	0.19*	–0.10

Note. Female is coded such that 1 = female, 0 = male. Minority status is coded 1 = minority (i.e., African American, American Indian/Alaskan Native, and/or biracial), 0 = white. Dissociation and suicide risk indicators are coded such that 1 = presence of the construct; 0 = absence. BPD = nonredundant BPD symptom severity (i.e., sum of CI-BPD symptoms omitting symptoms related to suicide and dissociation). Modal frequency of endorsements of most dissociation indicators was once: spaced/numb endorsed once by $n = 17$ (39.5% of endorsers); dream endorsed once by $n = 21$ (53.8% of endorsers); exist endorsed once by $n = 17$ (63.0% of endorsers); empty endorsed once by $n = 26$ (44.1% of endorsers). Bored endorsed once by $n = 18$ (12.2% of endorsers); endorsed 4 or more times by $n = 96$ (65.3% of endorsers).

^a $p < 0.10$.
^{*} $p < 0.05$.
^{**} $p < 0.001$.
^{***} $p < 0.001$.

7.2.2. Dissociation and suicide risk

The dissociation factor was regressed on the suicide risk composite. This produced good fit to the data, $\chi^2(5) = 9.12, p = 0.105$, RMSEA = 0.07[.11,.14], CFI = 0.96, TLI = 0.92, and the path from suicide risk to dissociation was significant, $\beta = 0.35, SE = 0.12, p = 0.002$. Standardized factor loadings were similar to the measurement model (spaced/numb 0.70, SE = 0.10; dream 0.77, SE = 0.09; exist

(footnote continued)

which adolescents reported dissociation experiences within subjects.

0.59, SE = 0.13; empty 0.78, SE = 0.08; all $ps < 0.001$).

Covariates were then added to the model using the following strategy (see Fig. 2). To distinguish dissociation from other clinically-relevant states in daily life, average NA and PA from the EMA protocol were added as additional dependent variables, in the same position as dissociation. To distinguish suicide risk from related forms of clinical impairment, nonredundant BPD symptom severity was added as an additional independent variable, in the same position as suicide risk. Theoretically relevant correlations were then specified: suicide risk with nonredundant BPD symptoms; the affective states (NA, PA, and dissociation) with each other. Initially this model fit less than adequately, $\chi^2(14) = 32.60, p = 0.003$, RMSEA = 0.09[.05,.13], CFI = 0.92, TLI = 0.85. Comparing observed to model-implied correlations suggested allowing two correlations among the dissociation indicators. These were added sequentially, each time significantly improving fit (correlating dream with exist, $\Delta\chi^2(1) = 6.54, p = 0.001$; then dream with spaced/numb, $\Delta\chi^2(1) = 6.54, p = 0.001$). The resulting model (Fig. 2) fit the data acceptably, $\chi^2(12) = 22.17, p = 0.036$, RMSEA = 0.07[.02,.12], CFI = 0.96, TLI = 0.90. Importantly, the relationship from suicide risk to dissociation was significant despite inclusion of psychopathology and affective covariates, $\beta = 0.24, SE = 0.10, p = 0.017$.⁶

Regressing the dissociation factor on the 4-day suicide risk indicator in place of the suicide risk composite also provided exceptional fit, $\chi^2(5) = 4.52, p = 0.478$, RMSEA = 0.00[.00, 0.10], CFI = 1.00, TLI = 1.01, and the path from 4-day suicide risk to dissociation was similarly significant, $\beta = 0.72, SE = 0.15, p < .001$. After adding the nonredundant BPD and affective covariates to the model, $\chi^2(12) = 21.90, p = 0.039$, RMSEA = 0.07[.02,.12], CFI = 0.95,

TLI = 0.89, the path from 4-day suicide risk to dissociation again remained significant, $\beta = 0.37, SE = 0.10, p < 0.001$.

⁶ See online supplemental materials (Supplement 3) for testing with an additional control variable representing adolescents' psychopathology using the CBCL/YSR Total Problems scale, which did not contribute information above and beyond nonredundant BPD symptoms and did not diminish the robustness of the suicide risk-dissociation relationship.

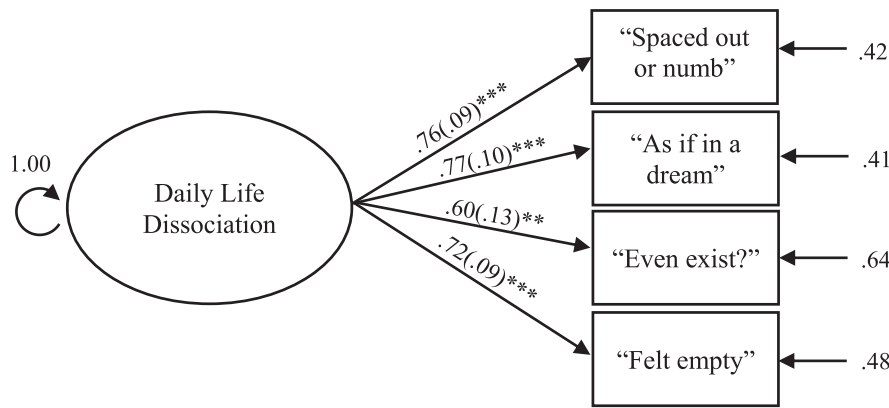


Fig. 1. Final dissociation measurement model. Model-explained variance in dissociation indicators was significant: *spaced/numb*, $R^2 = 0.57(0.14)***$; *dream*, $R^2 = 0.59(0.15)***$; *exist*, $R^2 = 0.36(0.15)*$; *empty*, $R^2 = 0.52(0.13)***$. * $p < 0.05$. ** $p < 0.001$. *** $p < 0.001$.

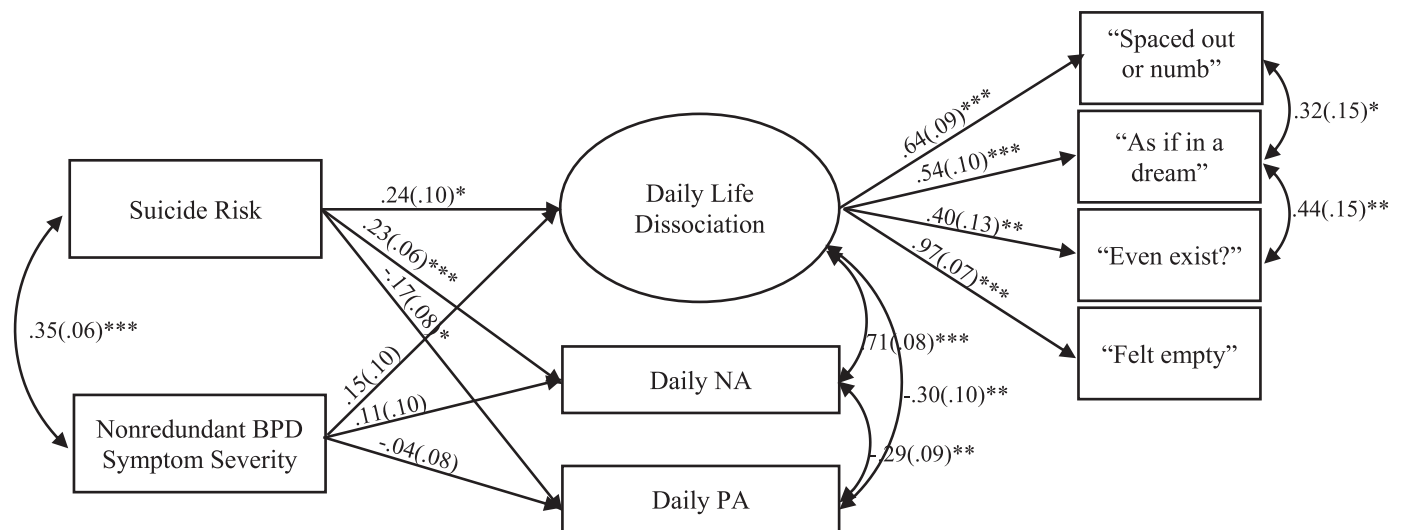


Fig. 2. Regression of dissociation on elevated suicide risk status, accounting for related forms of affective experience and nonredundant BPD symptoms. Model coefficients are standardized betas with standard errors. * $p < 0.05$. ** $p < 0.001$. *** $p < 0.001$.

7.2.3. Dissociation and suicide risk in the context of demographics

The main model (Fig. 2) was rerun with gender and minority racial/ethnic status added as independent variables (correlated with suicide risk, nonredundant BPD symptoms, and one another), predicting dissociation, NA and PA. With the suicide risk composite as the risk indicator, this model fit the data well, $\chi^2(18) = 28.11, p = 0.060$, RMSEA = 0.06[.00,.10], CFI = 0.97, TLI = 0.91 (model coefficients in Table 3, Panel A). It was notable that with demographic characteristics in the model, the relationship between composite suicide risk and dissociation dropped to non-significance. A post hoc multiple-group analysis was conducted to examine whether this pathway was moderated by female gender, which had been associated with both suicide risk and dissociation indicators (Table 2). The multiple-group model fit the data well, $\chi^2(33) = 39.67, p = 0.197$, RMSEA = 0.05[.00,.10], CFI = 0.97, TLI = 0.93. Among girls, the suicide-risk-dissociation path was significant, while among boys, the path was nonsignificant (Table 3, Panels B and C); however, the magnitude of this group difference did not reach significance, Wald $\chi^2(1) = 1.60, p = 0.206$.

Using the 4-day suicide risk indicator in place of the suicide risk composite, the model with demographics showed adequate fit, $\chi^2(18) = 27.38, p = 0.072$, RMSEA = 0.06[.00,.10], CFI = 0.96, TLI = 0.91, and 4-day suicide risk remained a significant predictor of dissociation, $\beta = 0.33, SE = 0.10, p = 0.001$ (full coefficients in

Table 3, Panel D).

8. Discussion

This study adds much-needed precision to the investigation of dissociation experiences as correlates of adolescent suicide risk. First, our results help characterize dissociation in adolescents’ daily lives. Among these clinically referred youth, during the sampled 4-day EMA period, dissociation experiences appeared much less universally than boredom, but more frequently than acute suicide-related thoughts and behaviors (Tables 1 and S1). Whereas the discarded item *bored* was endorsed by 91% of adolescents, the final dissociation indicators were endorsed by a minority (17–36%) during the 4-day EMA, and typically only once by each endorser. Perhaps due to this imbalance, the final latent dissociation factor was not informed by *boredom*. This irrelevance of boredom echoes Stryngaris’s (2016) conclusion that boredom, despite some similarities, is distinguishable from emptiness and numbing because of its potential importance in signaling motivational dysfunction. The reason for the high prevalence of boredom in our sample was unclear; boredom prevalence could have been due to being a developmentally normative experience among 11–13-year-olds, and/or due to true motivational dysfunction (ADHD symptoms were broadly distributed in this sample; Vine et al., al., under review). Future

Table 3

Effects of demographic characteristics on the link between suicide risk and dissociation, in three models: (1) using the composite suicide risk indicator in the full sample (Panel A); (2) using the composite suicide risk indicator in a multiple-group analysis by gender (Panels B and C); and (3) using 4-day suicide risk indicator in the full sample (Panel D).

	A. Full sample (N = 162)			B. Girls (n = 76)			C. Boys (n = 86)			D. Full sample w/ 4-day suicide risk (N = 162)		
	β	SE	p	β	SE	P	β	SE	p	β	SE	p
Suicide risk ^a												
→ Dissociation	0.17	0.10	0.091	0.29	0.14	0.043	0.04	0.17	0.819	0.33	0.10	0.001
→ NA	0.11	0.07	0.126	0.21	0.12	0.097	0.05	0.10	0.583	0.21	0.10	0.040
→ PA	-0.04	0.08	0.632	-0.16	0.10	0.093	0.01	0.12	0.939	-0.15	0.08	0.075
BPD												
→ Dissociation	0.16	0.11	0.148	0.21	0.16	0.202	0.11	0.16	0.502	0.18	0.10	0.077
→ NA	0.17	0.10	0.108	0.20	0.19	0.296	0.06	0.07	0.432	0.18	0.11	0.090
→ PA	-0.08	0.08	0.315	-0.23	0.10	0.020	0.08	0.10	0.437	-0.07	0.08	0.354
Female gender												
→ Dissociation	0.21	0.09	0.148	n/a	n/a	n/a	n/a	n/a	n/a	0.19	0.10	0.049
→ NA	0.22	0.07	0.003	n/a	n/a	n/a	n/a	n/a	n/a	0.20	0.08	0.009
→ PA	-0.36	0.06	0.000	n/a	n/a	n/a	n/a	n/a	n/a	-0.34	0.06	0.000
w/ Suicide risk	0.24	0.07	0.000	n/a	n/a	n/a	n/a	n/a	n/a	0.19	0.09	0.033
w/ BPD	0.11	0.07	0.148	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.07	0.148
Minority race												
→ Dissociation	-0.07	0.11	0.540	-0.03	0.14	0.841	-0.14	0.18	0.416	-0.063	0.10	0.534
→ NA	-0.26	0.08	0.001	-0.30	0.12	0.015	-0.25	0.12	0.046	-0.25	0.08	0.001
→ PA	0.17	0.07	0.023	0.29	0.10	0.006	0.08	0.12	0.527	0.15	0.07	0.033
w/ Suicide risk	-0.19	0.07	0.011	-0.06	0.12	0.621	-0.27	0.09	0.004	-0.13	0.08	0.096
w/ BPD	0.16	0.08	0.035	0.11	0.11	0.329	0.23	0.10	0.022	0.15	0.08	0.035

Note. Female is coded such that 1 = female, 0 = male. Minority race is coded 1 = minority (i.e., African American, American Indian/Alaskan Native, and/or biracial), 0 = white. Suicide risk indicators are coded such that 1 = elevated risk; 0 = not elevated risk. BPD = nonredundant BPD symptom severity (i.e., sum of CI-BPD symptoms omitting symptoms related to suicide and dissociation). Coefficients are standardized. Significant effects are boldfaced.

^a Except as otherwise noted (Panel A), *Suicide risk* refers to the suicide risk composite indicator informed by EMA, clinical interview, and questionnaires.

replications could confirm the structure of dissociation among adolescents, including the apparent relevance of emptiness but not boredom, and configural invariance across normative vs. clinical samples.

Second, this study adds precision to the relationship of dissociation to suicide risk. We probed the independence of that relationship in a multivariate context, accounting for associations between relevant psychopathology and affective covariates, and we found dissociation experiences to be reliably and robustly related with adolescents' suicide risk. The survival of this relationship when accounting for negative and positive affect suggests dissociation is a distinct quality of experience related to suicide for reasons other than its valence. Its survival when accounting for nonredundant BPD symptoms further suggests that dissociation is uniquely relevant to suicide risk, even outside of the clinical syndrome hallmarked by both symptoms. Supplemental analyses incorporating an additional general psychopathology covariate (Supplement S3) further underscore the independence of the suicide-dissociation relationship. This independence is important, given the need to move beyond psychopathology-based models of suicide risk to identify psychological processes with unique or incremental value for understanding suicide-specific risk, apart from risk for other maladaptive outcomes (Nock et al., 2019). It is noteworthy that the present results replicated using the 4-day-risk indicator, drawn from behaviors reported during the same 4 days during which dissociation occurred. This suggests dissociation may have incremental validity as a marker not only of relatively distal, but of more proximal suicide risk as well. Our findings thus build on the small body of research (Foote et al., 2008; Kiliç et al., 2017) testing whether dissociation has suicide-specific importance, and we contribute evidence supporting this notion. Future research is needed to fully articulate the specificity of dissociation to suicide risk, including in the context of other relevant psychopathologies, such as posttraumatic stress disorder, panic disorder, and psychosis (e.g., Cox and Swinson, 2002; Ford and Gomez, 2015; Justo et al., 2018; Swart et al., 2019).

Interestingly, in the context of psychopathology and affective covariates, the latent factor structure of dissociation changed. In the measurement model of dissociation (Fig. 1), as well as in the initial regression on suicide risk, dissociation factor loadings were similar

across indicators (0.6 s and 0.7 s). To our knowledge this is the first study to consider empirically whether emptiness belongs under the dissociation umbrella, and it yielded nuanced results that could stimulate future research on this topic. The findings of our measurement model support the continued consideration of emptiness as a possible facet of dissociation. At the same time, the multivariate final model distinguishes emptiness somewhat; this model suggests that emptiness may have even greater incremental relevance to suicide risk than the other dissociation indicators. After psychopathology and affective covariates were added to the model (Fig. 2), the indicator *empty* became most informative of the latent factor (loading 0.97), while the other three indicators (spaced/numb, dream, and exist) weakened. Based on this finding, the "emptiness" question appears most informative of the latent dissociation construct in this multivariate, suicide-specific context. Future replications are needed to confirm the reliability of the subjective feeling of emptiness as an especially precise marker of suicide risk in adolescent samples. If so, "emptiness" may be fruitful to incorporate into ambulatory assessments, which can capitalize on the widespread availability of personal technologies in adolescent life to study, detect, and mitigate suicide risk (e.g., Torous et al., 2018, Kleiman et al., 2017; Kleiman et al., 2019).

Importantly, incorporating demographics into the main model suppressed the dissociation-suicide risk effect. The positive association between female gender and suicide suggested the key suppressor was gender, so we tested moderation by gender *post hoc* to determine whether the suicide risk-dissociation effect was present mainly among girls. The moderation did not reach significance (likely a power issue), but the within-gender patterns differed as expected: the suicide risk-dissociation path was significant in girls but not boys. Further underscoring the presence of the effect among girls, we found no suppression by demographics when using the 4-day risk indicator, probably because virtually all the adolescents identified by the 4-day indicator were girls. More research is needed to interpret the present gender findings, which could either reflect a third variable problem, or contribute real clinical information, perhaps that dissociation in daily life has special utility for understanding suicide risk in girls. Previous studies have reliably failed to find gender differences in the severity of self-reported trait

dissociative symptoms, in both adolescent (Farrington et al., 2001) and adult populations (van Ijzendoorn and Schuengel, 1996). By contrast, in our sample, two of the dissociation indicators were correlated with female gender (*spaced out/numb, empty*). Future studies could clarify the role of gender in adolescents' daily experiences of dissociation and its relationship to suicide risk.

Our composite variable categorizing suicide risk would not have been suited to modeling mechanistic pathways to distinct suicide-related outcomes, but this was not our intention. Suicide and self-injurious behavior have many important distinctions in their causes, psychological functions, and consequences (Muehlenkamp, 2005; Whitlock et al., 2013), so it is for good reason that mechanistic research increasingly distinguishes them. Our suicide risk composite collapsed thoughts, ideation, plans, and acts, obscuring these distinctions that other researchers have usefully maintained (Klonsky et al., 2018). At the same time, collapsing across these distinctions allowed us to maximize the identification of adolescents at elevated risk, likely reducing false negatives. Given the robustness of suicide- and self-harm-related thoughts and actions as predictors of future suicide attempt (Ribeiro et al., 2016), the composite was an optimal strategy for sorting the already-generally-at-risk adolescents into risk levels. For the current goal to preliminarily describe adolescents' dissociation experiences and their incremental relevance to suicide risk within a clinical context, this method was more than adequate. Future studies capable of distinguishing the various self-harm-related phenomena could investigate whether dissociation is differentially related to suicide- vs. self-harm-related experiences, and how it relates to the critically important ideation-to-action transition (see Klonsky et al., 2018).

Results must be interpreted within the context of the limitations of an archival, correlational, between-persons analysis. This study used data collected from a larger study focused on adolescent emotion dysregulation and was limited to a pre-existing set of items for creating dissociation and suicide risk composites; future work may seek to more comprehensively assess these constructs. Because of the infrequency of dissociation endorsements, the present data were best served by modeling dissociation indicators as dichotomous individual differences (e.g., each adolescent either did/did not endorse *empty* at least once in the 4 days). Extensions of this work using EMA methods with longer/denser sampling could incorporate within-persons modeling of dissociation, which could apply state-of-the-art dynamic models designed for other types of affect (e.g., Scott et al., al., in press). Future within-persons studies could verify whether the structure and intensity of dissociation vary within-person over time, and how these dynamics may be clinically informative. Critically, such studies could test three, non-mutually-exclusive characterizations of the temporal link between dissociation and suicidal experiences: (1) that dissociation precedes suicide-related thoughts or behavior, and may have causal or mechanistic effects in elevating suicide risk or contributing to suicidal behavior; (2) that dissociation co-occurs with suicide risk elevations, perhaps being a facet of the acute suicidal state as recently proposed (Galynker et al., 2016); and (3) that dissociation is a lingering after-effect, like a cognitive-affective 'scar,' of having previously engaged in suicidal or related thoughts or acts.

Strengths of this study include its clinically assessed, clinically referred early adolescent sample, with prominently elevated suicide risk and strong compliance with an EMA protocol. This is the second study to our knowledge related to dissociation using EMA methodology (Greene, 2018), and the first demonstration that adolescents can report on daily dissociation experiences in real-world settings. We took care to tease apart the suicide risk-dissociation relationship from several possible confounds, affective and clinical, while also articulating the confounding role of adolescent gender, and we replicated our findings with an alternative, 4-day suicide risk indicator. We have also identified needs for further replication and improvement, especially through intensive EMA designs of longer duration and temporal density. With this study as a first step, we encourage others to incorporate dissociation

items into EMA studies of suicidal and at-risk youth and to consider the potential importance of dissociation in adolescents' daily lives as a marker of elevated suicide risk.

CRediT authorship contribution statement

Vera Vine: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Visualization. **Sarah E. Victor:** Conceptualization, Methodology, Writing - original draft, Writing - review & editing. **Harmony Mohr:** Conceptualization, Writing - review & editing. **Amy L. Byrd:** Conceptualization, Writing - review & editing. **Stephanie D. Stepp:** Supervision, Project administration, Funding acquisition, Writing - review & editing.

Declaration of Competing Interest

The authors have no conflicts of interest to declare.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.112870.

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