HHS Public Access
Author manuscript
Clin Psychol Sci. Author manuscript; available in PMC 2022 September 27.

Negative affectivity and disinhibition as moderators of an interpersonal pathway to suicidal behavior in borderline personality disorder

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Abstract

This longitudinal study examined whether personality traits moderate the link between interpersonal dysfunction and suicidal behavior in a high-risk sample of 458 individuals diagnosed with borderline personality disorder (BPD). Participants were assessed annually for up to 30 years (mean number of follow-ups = 7.82). Using multilevel structural equation modeling, we examined i) longitudinal, within-person relationships among interpersonal dysfunction, suicidal ideation, and suicide attempts; and ii) moderation of these relationships by negative affectivity and disinhibition. Negative affectivity predicted a stronger within-person coupling between interpersonal dysfunction and suicidal ideation. Disinhibition predicted a stronger coupling between ideation and suicide attempts. Assessing negative affectivity and disinhibition in a treatment setting may guide clinician vigilance toward those at highest risk for interpersonally triggered suicidal behaviors.

Keywords

Clinicians treating patients with borderline personality disorder (BPD) are often faced with the difficult challenge of identifying when, and for whom, suicide risk is greatest. Interpersonal stressors elicit intense emotional reactions in those with BPD and are thought to precipitate self-injurious and suicidal behavior (Victor et al., 2019). Yet, we know very little about the personality dimensions that gate the associations between interpersonal problems and suicidal behavior. Here, we aim to address the questions of when and for

whom suicide risk is greatest by examining the relatively stable personality dimensions that moderate the links between interpersonal adversity and suicide attempts in BPD. To answer this question, we examined incident suicidal behavior in a high-risk sample of individuals diagnosed with BPD who have been assessed annually for up to 30 years (mean number of follow-ups = 7.82).

Interpersonal Dysfunction, Ideation, and Attempts Inform *When* Intervention is Required

Modern theories of suicide, including Joiner's Interpersonal Theory and Klonsky's Three-Step Theory, highlight relational factors, including connectedness, belonging, and perceived burdensomeness as important catalysts of suicidal ideation (Klonsky et al., 2018; Van Orden et al., 2010). Likewise, *interpersonal hypersensitivity,* characterized by a heightened vulnerability to rejection or separation from others, may facilitate self-harm and suicidal behavior within BPD specifically (Gunderson & Lyons-Ruth, 2008). Empirically, negative interpersonal events prospectively predict suicide attempts among those with BPD and interpersonal maladjustment distinguishes attempters from non-attempters (Brodsky et al., 2006; Soloff & Fabio, 2008). In a community sample in which over a quarter of participants met criteria for BPD, interpersonal rejection and criticism were prospectively associated with urges to engage in self-harm and suicidal behavior (Victor et al., 2019).

Taken together, both theory and empirical evidence indicate that recurrent interpersonal difficulties contribute to the chronic suicidal ideation that often characterizes BPD (Paris, 2002). Chronic suicidal ideation is not uncommon in psychopathology (Klonsky et al., 2016; Oquendo et al., 2020), though it is particularly common and persistent in BPD (Jopling et al., 2018; Kivelä et al., 2019; Mehlum et al., 1994; Paris, 2002). Suicidal ideation, whether chronic or transient, marks the periods during which one is at risk for suicidal behavior (Nock et al., 2008). Thus, one pathway to suicide attempts in BPD may involve recurrent interpersonal dysfunction facilitating suicidal ideation, which in turn enhances the likelihood of a future attempt.

Testing an Interpersonal Pathway to Suicide Attempts

Ideally, a rigorous test of an interpersonal pathway to suicide attempts would entail prospective, longitudinal data in which interpersonal dysfunction, ideation, and attempts are all queried repeatedly over time. But what timescale should be used to interrogate the relations between the three constructs? Rapidly unfolding dynamics between interpersonal dysfunction and suicidal ideation can be examined in diary studies that assess both constructs multiple times a day or week. Importantly, however, these studies generally rely on surrogate outcomes such as ideation or urges as opposed to attempts, because attempts do not occur frequently enough over short timescales to allow for analysis. Longer timescales provide greater power to predict suicide attempts and are of particular interest in BPD due to the chronic nature of both interpersonal dysfunction and suicidality. For instance, one clinical intuition is that decompensating relative to one's typical level of interpersonal dysfunction and/or ideation may be especially important for predicting risk for suicide attempts. Such decompensations represent how marked shifts in psychosocial functioning

impact suicidality, in contrast to more acute symptom exacerbations that quickly return to one's "baseline" following an isolated stressor.

Multiple time spans may be useful in resolving different aspects of the suicidal process in BPD. Daily diary studies are well-suited for studying how acute symptom exacerbations influence suicidality on a moment-to-moment basis, while studies with longer assessment intervals may be better suited to examine the predictive utility of fluctuations in chronic risk factors. Adopting this latter perspective, the present study draws on data from a longitudinal sample of individuals diagnosed with BPD selectively enriched to oversample suicide risk. We tested whether intraindividual variation in suicidal ideation mediates the link between interpersonal dysfunction and suicide attempts.

Trait Moderators in an Interpersonal Pathway: Identifying *Who* is Most at Risk

Not all people who experience interpersonal difficulties contemplate suicide, and not all those who contemplate it will make an attempt (May & Klonsky, 2016). Individual differences in personality may explain *who* is most at risk in each stage of the suicidal process. Negative affectivity and disinhibition are two personality dimensions relevant to suicidal thoughts and behaviors in BPD. Negative affectivity (sometimes referred to as negative emotionality, or neuroticism) reflects a tendency to experience frequent and intense negative emotions, including sadness, irritability, anxiety, and fear. In contrast, disinhibition reflects individual differences in tendencies to plan ahead, think before acting, and persevere toward a goal in spite of distracting impulses. Here, it is conceptualized as the low, maladaptive pole of the personality trait conscientiousness (consistent with its conceptualization within the *Alternative Model of Personality Disorders in DSM-5;* Suzuki, Samuel, Pahlen, & Krueger, 2015) and as related to, but distinct from the more heterogeneous umbrella term of impulsivity (DeYoung & Rueter, 2016; Strickland & Johnson, 2020).

Negative affectivity and disinhibition may gate (moderate) different stages of the suicidal process in BPD and provide information about who is at the greatest risk. Negative affectivity may be especially important to the link between interpersonal stress and suicidal ideation. For example, individuals with BPD tend to experience heightened negative affect following interpersonal conflict or rejection, and this effect predicts suicidal urges (Hepp et al., 2018; Victor et al., 2019). Negative affectivity is also positively associated with experiencing negative emotions in response to stressors, particularly those of an interpersonal nature (Denissen & Penke, 2008). Others have noted that negative affectivity is associated with greater suicidal ideation but not suicide attempts, suggesting a specific role in the early stage of the suicidal process (Rappaport et al., 2017). Thus, we hypothesized that individuals with BPD who are higher on negative affectivity would be more likely to respond to interpersonal difficulties with suicidal ideation.

Disinhibition, on the other hand, may be more important for the link between suicidal ideation and action. The Integrated Motivational-Volitional (IMV) model of suicide, for example, considers impulsivity (which is broader than disinhibition, but closely related)

a key volitional moderator in predicting who is likely to move from ideation to attempt (O'Connor & Kirtley, 2018). Empirically, impulsivity predicts suicidal *behavior* in a variety of psychiatric conditions, including BPD (Wedig et al., 2013), and appears to distinguish ideators from attempters in several studies (Dhingra, Boduszek, & O'Connor, 2015; Nock et al., 2018; though not all, e.g., Dombrovski, Hallquist, Brown, Wilson, & Szanto, 2019). Negative emotional states also exacerbate suicide attempters' tendency to make impulsive choices, suggesting that the link between disinhibition and suicide attempts may be strengthened during periods of intense ideation (Millner et al., 2018). To our knowledge however, no previous studies have investigated whether disinhibition moderates within-person associations between suicidal ideations and behaviors.

Overall, there is suggestive evidence that negative affectivity and disinhibition moderate different components of an interpersonal pathway to suicide attempts (such an effect would be referred to as *moderated mediation*), though this moderation has yet to be tested longitudinally. To characterize this pathway, we first examined whether within-person variability in suicidal ideation accounted for the association between interpersonal dysfunction in a given year and the likelihood of one attempting suicide (i.e., an indirect effect of within-person interpersonal dysfunction on the likelihood of an attempt via within-person ideation). A subsequent model tested whether baseline negative affectivity and disinhibition moderated the prospective, within-person associations between interpersonal dysfunction and suicidal ideation, and between suicidal ideation and suicide attempt, respectively. We hypothesized that negative affectivity would be associated with stronger within-person coupling of interpersonal dysfunction and ideation, whereas disinhibition would be associated with the link between ideation and attempting suicide.

Methods

Participants

Participants were 458 adults enrolled in an ongoing, longitudinal study of suicidal behavior in BPD. Participants were recruited from inpatient, outpatient, and community referral sources (for demographic and clinical characteristics, see Table 1). Enrollment into the study was based on the presence of a probable or definite diagnosis for BPD on the International Personality Disorders Examination (Loranger et al., 1987) and a definite diagnosis for BPD on the Diagnostic Interview for Borderline Patients (or the revised version, DIB-R, which was used for all participants after 2001) (Zanarini et al., 1989). Questions surrounding differential diagnoses were resolved via clinical consensus discussions using all available data. The sample was heterogeneous with respect to comorbidities (see Table S1). Participants were excluded for the following conditions: any past or current diagnosis of schizophrenia, delusional disorder, schizoaffective disorder, bipolar disorder, or depression with psychosis; any evidence of a central nervous system pathology or organic brain disorder; physical disorders with known psychiatric consequences; borderline or impaired intellectual functioning. All participants provided written informed consent to participate in the study.

Measures

A detailed history of prospectively observed suicide attempts was recorded at every visit using the Suicide History and Lethality Rating Scale, a clinician-administered semi-structured interview (Oquendo et al., 2003) based on Beck's Lethality Scale (Beck et al., 1975). Attempts were defined as "self-injurious acts committed by an individual with either an explicit or implicit intent to die" (intent can be inferred from lethality or statements made by the individual; Oquendo et al., p. 105). Clinicians gathered information about the date, lethality, method, circumstances, and consequences of each attempt since either birth (for the baseline visit) or the last study visit (for all follow-ups), moving in chronological order. Lethality codes are provided for common attempt methods and range from 0 (no medical consequences) to 8 (death). Visits were conducted every 6 months with one additional visit occurring 3 months post-baseline. Medical records were used to corroborate suicide attempts when possible. Only prospective attempts were included in the analysis. Suicide attempts were placed onto an annual time grid for analyses by first computing the length of time between each individual's baseline assessment date and the dates of prospective suicide attempts. Attempts were binned into yearly assessment waves by rounding the time between baseline and the date of attempt to the closest year. Participants who reported one or more attempt within each yearly interval were given a 1 on our dependent variable, whereas those with no attempts during the interval scored a 0 (e.g., if a participant reported an attempt at 11.6 years post-baseline, they would receive a score of 1 on the dependent variable at Year 12; see Table S9 and Figure S1). Thus, attempt status was treated as a categorical variable in all analyses.

Negative affectivity and disinhibition were assessed at baseline via self-report and interview measures. Negative affectivity was assessed using a composite of three subscales from the Harm Avoidance scale of the Temperament and Character Inventory (TCI; Subscales: anticipatory worry, fear of uncertainty, fatigability; Cloninger, 1994), a composite of three subscales from the Symptom Checklist 90-R (depression, anxiety, somatic complaints; Derogatis, 1977), the total score from the Beck Depression Inventory (Beck et al., 1961), and the total score from the Hamilton Depression Rating Scale (17-item version; Hamilton, 1960). Disinhibition was assessed via two subscales from the Barratt Impulsivity Scale (motor, nonplanning; Barratt, 1965), a composite of two subscales from the novelty-seeking scale of the TCI (impulsiveness, extravagance), and the persistence scale of the TCI. Items pertaining to suicide were excluded in the scoring of all measures, including the BDI, Hamilton, and SCL-90.

Scales assessing each personality construct were initially selected by examining patterns of baseline intercorrelations among all available clinical and personality measures, including self-reports and interviews. Scores from the same subscales of the same measure were collapsed into a composite; relevant scales from each measure were determined by examining the pattern of correlations between each subscale and other scales hypothesized to assess the same construct (e.g., TCI Impulsiveness and Extravagance, part of the Novelty-Seeking subscale, showed stronger coherence with the two Barratt Impulsivity scales than other TCI Novelty-Seeking subscales did, suggesting that they could be collapsed into a useful indicator of Disinhibition). The time horizon for the scales varied, with some

measures inquiring about average affect and behavior, and others asking about more finite time periods (e.g., the Beck, Hamilton, and SCL have time horizons involving the last 1–2 weeks). Empirically, measures of transient affective symptoms and personality traits show remarkably similar, and high, stability over time, suggesting the distinction between state and trait measures may be minimal (Struijs et al., 2020). Nonetheless, every construct had at least one indicator that assessed average affect and behavior (e.g., the TCI and Barratt Impulsivity Scale both inquire about behavior on average), which helped to ensure that common variance captured by each latent dimension was trait-like in nature.

Interpersonal dysfunction was assessed at yearly follow-ups using the overall score from the Social Adjustment Scale: Self-Report (SAS-SR) form (Weissman & Bothwell, 1976), which assesses interpersonal functioning across work, leisure, and family domains during the past two weeks. Items included in the overall SAS-SR score predominantly assess relational dynamics with peers, colleagues, and family members, though some items reflect more general functioning or engagement within social settings (for a list of items, see Table S12). Suicidal ideation was similarly assessed at annual follow-ups using the Beck Scale for Suicidal Ideation (Beck et al., 1979), which assesses the intensity of one's ideation, plans, and preparations for suicide during the last two weeks (for a list of items, see Table S13).

In the event of missing items on any measure, scales were prorated based on their total number of items, provided that at least 50% of all items on the scale were completed. The only exception to this was for the SAS-SR, which does not have a fixed number of items (e.g., not all participants are able to answer items pertaining to relationships with a partner, or children). For the SAS-SR, we reviewed all items on the measure, identified those items that all or nearly all participants would be able to answer (n_{items} = 23), and used half of that number (11.5) to determine the minimum number of items necessary to warrant prorating rather than exclusion.

Statistical Approach

Confirmatory factor analysis (CFA) was used to determine whether scales selected from the measures listed above were strong indicators of latent negative affectivity and disinhibition at baseline. Model fit for the CFA was determined using established guidelines for the comparative fit index (CFI; .95 or above), the root mean square error of approximation (RMSEA; .06 or below), and the standardized root mean square residual (SRMR; .08 or below) (Hu & Bentler, 1999).

Hypotheses were tested using multilevel structural equation models (MSEM), which examined multiple predictors and outcomes simultaneously (Sadikaj et al., 2019). Latent decomposition was used to partition total variance in outcomes and predictors into within- and between-person components (Lüdtke et al., 2008). Between-person components represented an individual's average level of interpersonal dysfunction or suicidal ideation (i.e., random intercepts), or their average propensity to attempt suicide, whereas within-person components reflected the degree to which individuals deviated from their average levels at any given follow-up.

Personality dimensions are between-person variables that reflect relatively stable interindividual differences. In models examining the role of negative affectivity and disinhibition as moderators, we included random slopes for the effect of interpersonal dysfunction on ideation, and ideation on attempt, thereby allowing for between-person variability in the components of the interpersonal pathway (Preacher et al., 2016). Cross-level interactions were added to the model to test whether within-person coupling of each link in the pathway depended on traits (i.e., moderated mediation). More specifically, between-person variability in negative affectivity and disinhibition predicted the strength of 1) the within-person coupling of interpersonal dysfunction and ideation, and 2) the within-person coupling of suicidal ideation and attempts.

All models were estimated using Bayesian estimation with non-informative priors in Mplus version 8.4 (Muthén & Muthén, 2019). Bayesian estimation uses all available data, and provides similar results to full information maximum likelihood in accounting for missing data (see Table S2 for rates of missing data on all variables) (Asparouhov & Muthén, 2010). We report unstandardized and standardized regression coefficients, 95% credible intervals, and Bayesian p-values. Bayesian p-values are based on the probability of direction test, a hypothesis test that is closely aligned to frequentist null hypothesis significance testing (Makowski et al., 2019). Notably however, Bayesian posterior probabilities quantify the extent to which the data support a given hypothesis, providing stronger inference than frequentist approaches that quantify the probability of observing the data under the null hypothesis. In all models, time (coded as annual follow-up) was entered as a within-person covariate to account for temporally driven dependencies (e.g., time-related score changes, gradual regression to the mean from baseline) (Sadikaj et al., 2019). Age, sex, years of education, and race (non-white or white) were entered as between-person covariates. The global fit of our initial model examining an interpersonal pathway to suicide attempts was determined based on the posterior predictive p-value (PPP). Fit indices in multilevel SEM are not estimable once random slopes are incorporated (i.e., in our moderation tests). Indirect effects were defined as the product of the component paths of interest and were evaluated across varying levels of the moderators.

Results

Descriptive statistics for all study variables are presented in Table S2. Between-person and within-person correlations are presented in Table S3. Participants were observed for a median of 5.08 years (see Table S10 for retention rates across all study waves), reporting 328 prospective attempts. On average, participants reported .09 attempts per wave (SD = .42) (see Table S9 and Figures S1–S2 for more detail).

Confirmatory Factor Analysis of Negative Affectivity and Disinhibition

Figure 1 presents the standardized factor loadings for the two-factor CFA of negative affectivity and disinhibition at baseline. The model exhibited adequate fit to the data, χ^2 (19) = 54.70, p < .001, CFI = .94, RMSEA = .07, SRMR = .06. Factor loadings were moderate to strong and significant (range of standardized loadings, negative affectivity: .55 - .85; disinhibition: −.52 - .82; all p-values < .001). Disinhibition and negative affectivity

were modestly correlated ($r = .35$, $p < .001$). To better characterize each factor, we extracted factor scores using the regression method and examined correlations between the factors and the individual items that made up each observed indicator (see Table S11). Disinhibition was best characterized by items capturing a lack of planning, forethought, and/or persistence, consistent with our conceptualization of it as the low pole of conscientiousness (similar in content to the shared variance between the lack of premeditation and lack of perseverance scales of the UPPS; Whiteside & Lynam, 2001). In contrast, items most strongly correlated with the negative affect factor dealt primarily with low mood, anxiety, and/or depressive cognitions (e.g., feeling hopeless/worthless).

Validation of an Interpersonal Pathway

We first examined a model in which suicidal ideation accounts for the association between interpersonal dysfunction and suicide attempts at both the within-person and between-person levels (see Table S4 and Figure 2). Between-person effects reflect the effect of *individual differences* in each predictor on each outcome; within-person effects reflect the effect of *year-to-year fluctuations* (relative to an individual's mean) in each predictor on each outcome (e.g., the extent to which a larger-than-normal increase in interpersonal dysfunction affects suicidal ideation in a given year). The model provided a good fit to the data (*PPP* = .13). Between- and within-person effects are described separately below. Notably, there was no change in results when age, sex, race, and education were excluded from the model (see Table S6). Likewise, there was no qualitative change in results when we entered interpersonal dysfunction and suicidal ideation from the previous year, as opposed to the current year, into the model (see Table S8), indicating all within-person effects held even when we lagged the predictors to ensure they were assessed prior to any reported attempts.

Between-Person Effects—Average interpersonal dysfunction was positively associated with average suicidal ideation ($\beta = .43$, $p < .001$). Average ideation was also positively associated with the general propensity to attempt suicide ($\beta = .67$, $p < .001$). Average ideation fully accounted for the association between interpersonal dysfunction and suicide attempt propensity ($B = .31$, $p < .001$).

Within-Person Effects—Year-to-year fluctuations in interpersonal dysfunction were positively associated with year-to-year fluctuations in suicidal ideation ($\beta = .33$, $p < .001$) and with the likelihood of a prospective suicide attempt in the same year ($\beta = .17$, $p = .002$). Yearly fluctuations in suicidal ideation were also positively associated with the likelihood of attempting suicide in the same year ($\beta = .11$, $p = .01$). Within-person variability in ideation partially accounted for the association between yearly fluctuations in interpersonal dysfunction and the likelihood of attempting suicide ($B = .06$, $p = .01$).

Traits Moderate Within-Person Links in an Interpersonal Pathway to Suicide Attempts

To test whether personality moderates an interpersonal pathway to suicide attempts, we specified a random slopes model in which negative affectivity and disinhibition predicted, in any given year: 1) the relationship between interpersonal dysfunction and suicidal ideation, and 2) the relationship between suicidal ideation and a suicide attempt (for full results, see

Table S5 and Figure 3A). All results held when excluding age, sex, education, and race from the model (see Table S7).

Negative affectivity positively predicted a stronger relationship between interpersonal dysfunction and ideation in a given year ($\beta = .35$, $p = .004$, $R^2 = .10$), indicating that high trait negative affectivity is associated with a stronger coupling of yearly fluctuations in interpersonal dysfunction and suicidal ideation. Within-person interpersonal dysfunction was positively associated ($p < .05$) with ideation among individuals who scored above the 10th percentile on negative affectivity in the sample ($z > -1.28$; Figure 3B; Johnson & Neyman, 1936). There was no effect of disinhibition on the within-person association between interpersonal dysfunction and suicidal ideation ($\beta = -.15$, $p = .17$).

Disinhibition also positively predicted the association between ideation in a given year and a corresponding suicide attempt ($\beta = .40$, $p = .02$, $R^2 = .16$). Probing this cross-level interaction revealed that above average within-person ideation was more likely to convert into an attempt only among individuals who were above the 63rd percentile of disinhibition in the sample ($z > .34$; Figure 3C). Thus, year-to-year fluctuations in ideation were positively associated with attempting suicide at high, but not low or average, levels of disinhibition. There was no effect of negative affectivity on the within-person association between ideation and attempting suicide ($\beta = -.06$, $p = .73$).

Finally, there was a significant indirect effect, such that the relationship between higher-than-normal interpersonal dysfunction and attempting suicide in a given year was accounted for by elevations in suicidal ideation (relative to one's personal baseline). Moreover, this effect was dependent on one's personality traits at baseline. Specifically, the relationship between within-person interpersonal dysfunction and suicidal ideation was significant at all levels of negative affectivity, though it became stronger in magnitude as negative affectivity increased. However, the relationship between ideation and attempting suicide was only significant at high levels of disinhibition (Table S5 and Figure S3).

Discussion

Most previous studies of suicidal behavior in BPD have examined long-term risk factors, typically in cross-sectional retrospective data. In contrast, the present study ascertained suicide attempts prospectively (328 total attempts were observed in the follow-up period) to examine how traits moderate distinct components of the suicidal process in BPD. We found strong evidence supporting an interpersonal pathway to suicide attempts: year-to-year interpersonal dysfunction was positively linked to suicide attempts, and this association was accounted for by year-to-year suicidal ideation. Traits also moderated distinct links in the pathway, with high negative affectivity moderating the link between interpersonal dysfunction and ideation, and disinhibition moderating the link between ideation and attempts. Our results are consistent the notion that the development of suicidal ideation, and the transition from ideation to attempt are mechanistically distinct components of the suicidal process (Klonsky et al., 2018). Here, we demonstrated that these components are also moderated by distinct personality dimensions. Negative affectivity may reflect a tendency to turn interpersonal stress inward, biasing an individual away from

external problem-solving and toward suicidal ideas (Dombrovski & Hallquist, 2021). High disinhibition has a similar effect on the subsequent step in the pathway, clearing the way for suicidal ideation to be enacted.

Notably, the gating influences of negative affectivity and disinhibition persisted despite entering both dimensions as simultaneous predictors of each step in the pathway. This suggests that our results are reasonably specific and not better explained by shared variance between the two dimensions. That is, negative affectivity uniquely regulates the likelihood that interpersonal dysfunction will be accompanied by an exacerbation in suicidal ideation, and disinhibition regulates the likelihood that exacerbations in suicidal ideation will be accompanied by a suicide attempt. Broadband measures of impulsivity typically fail to differentiate between ideators and attempters, but facets of impulsivity that specifically tap into low conscientiousness perform better (Klonsky & May, 2010). Our measure of disinhibition is well-situated at the low end of conscientiousness, capturing individual differences in one's ability to plan ahead, deliberate before acting, and persevere in spite of distracting impulses (DeYoung & Rueter, 2016). For those more familiar with the UPPS model of impulsivity, disinhibition in this study likely represents the shared variance between lack of perseverance and lack of premeditation, both of which have primary loadings on conscientiousness (Whiteside & Lynam, 2001). Thus, our results offer additional support for using the big five personality traits as an organizing framework by which to disentangle components of impulsivity (Strickland & Johnson, 2020), with those related to conscientiousness being most predictive of converting suicidal ideation into suicide attempts. Overall, our findings suggest that clinicians can better gauge risk for suicide attempts in BPD by understanding a patient's baseline levels of interpersonal stress and ideation, identifying marked elevations from that baseline, and contextualizing those elevations within a broader assessment of their patient's personality traits.

When interpreting these findings, one should bear in mind that our study captured a longer timescale than typical within-person studies of suicidal ideation or behavior. This enabled us to focus explicitly on prospective suicide *attempts*, as opposed to being limited to suicidal ideation or other surrogate outcomes. Our results provide evidence for a slower within-person suicidal process in BPD, with sustained departures from one's prior level of interpersonal dysfunction and ideation increasing suicide risk on a timescale of months. This is consistent with theoretical models of BPD in which interpersonal dysfunction and ideation are chronic risk factors (Kernberg, 2001). In individuals with high disinhibition, sustained clinical vigilance may be needed during these months-long periods of decompensation, during which interpersonal problems may spiral, promoting more persistent suicidal ideations. However, this is not to say that long-timescale dynamics are the only dynamics of consequence. Daily diary studies are still important for capturing rapid fluctuations in interpersonal dysfunction and ideation that occur following acute stress and precipitate impulsive suicidal urges and/or behavior. These rapid dynamics may form the foundation of the more protracted decompensations in interpersonal dysfunction and ideation that we observed here. Our results suggest there is incremental utility in studying these longer-term processes, because they predict suicide *attempts* and often unfold over long enough periods that clinicians will have time to intervene.

One unresolved empirical question is whether our findings are specific to BPD. On the one hand, our results are clearly in line with the interpersonal hypersensitivity model of the suicidal process in BPD (Gunderson et al., 2018). On the other hand, the interpersonal theory of suicide was conceived independent of any specific disorder and also links interpersonal dysfunction with suicidal ideation (Van Orden et al., 2010). BPD has substantial overlap with the general factor of psychopathology, which may suggest the role of interpersonal dysfunction in suicidal behavior is transdiagnostic in nature (Gluschkoff et al., 2020). An important next step will be to test this pathway in a large, transdiagnostic sample to determine if our findings replicate.

The strengths of our study include a large high-risk clinical sample, rich clinical and psychometric characterization, and prospective longitudinal assessments of suicidal ideation and attempts, which enabled us to observe within-person associations. Nonetheless, several limitations are worth noting. Suicide attempts were binned into the nearest yearly interval surrounding each annual assessment, meaning that while our measures represented the best possible estimate of one's interpersonal dysfunction and ideation at the time of their attempt, they were not guaranteed to precede the attempt at each wave. Binning attempts into yearly intervals reduced the time between each attempt and the point at which interpersonal dysfunction and ideation were assessed, enabling a more accurate estimation of within-person coupling. Moreover, sensitivity analyses indicated that within-person associations in the pathway held even when we lagged interpersonal dysfunction and ideation to the preceding year (ensuring that observations of interpersonal dysfunction and ideation preceded observed attempts in each wave).

Interpersonal dysfunction was operationalized in this study using the Social Adjustment Scale (Weissman & Bothwell, 1976), which takes a broad perspective on interpersonal and social functioning across various life domains (work, school, family). In contrast, theories of BPD and suicidal behavior often suggest a role for more circumscribed interpersonal behaviors and styles (e.g., sensitivity to rejection). Our broadband approach to measuring interpersonal dysfunction precludes inferences about the role of these more specific constructs. Future studies could consider whether within-person variability in such constructs show incremental validity, above and beyond the more general effect of interpersonal dysfunction that we have demonstrated here.

Given that some of our measures employed different time horizons, one critique might be that our latent factors for negative affectivity and disinhibition are better markers of dimensions of psychopathology than stable traits. Empirically, symptoms and traits show similar stability over time (Struijs et al., 2020), and structural research consistently yields independent negative affectivity and disinhibition factors, regardless of whether trait or symptom indicators are used (Kotov et al., 2017). At least one trait-like indicator was included in each of our factors, helping to ensure that common variance was trait-like in nature. Notably, the fact that some of our indicators have a shorter time horizon than a traditional trait inventory should have made it *harder* to find evidence supporting our hypotheses. Indeed, it is remarkable that scales thought to reflect acute symptom exacerbations hold predictive utility years later, and it would seem to suggest the effects are driven by trait variance in the scales. Finally, most of our indicators of negative affectivity

measured depressive and anxious content. Future research should consider other facets of negative affectivity, including anger and irritability, to determine if they are similarly associated with a stronger coupling of interpersonal dysfunction and suicidal ideation.

Our sample was primarily comprised of White women living in the northeast United States, most of whom initially enrolled in young adulthood. The role of cultural or geographic factors not measured in our study should be interrogated more closely, as these factors can influence the types of stressors that lead to suicide attempts and the manner in which suicidal thoughts and behaviors are expressed (Chu et al., 2010). Our sample exhibited substantial heterogeneity in other sociodemographic characteristics, including marital status, race/ethnicity, education and employment history, and referral source. All results held when controlling for age, sex, education, and race, suggesting that our findings may be generalizable to a broad swath of individuals diagnosed with BPD.

A core motivation for this study was to inform clinicians treating BPD, who are often faced with the difficult quandary of determining when and for whom to marshal resources and deploy crisis interventions to prevent a suicide attempt. Our results suggest that risk for suicidal behavior is greatest during sustained elevations of interpersonal dysfunction and suicidal ideation relative to a patient's baseline. Individuals high in negative affectivity are most likely to develop suicidal ideation in response to severe interpersonal stress, and those high in disinhibition are also more likely to subsequently attempt suicide. Undoubtedly, acute stressors are important risk factors in the suicidal process but parsing which of those stressors will or will not lead to suicidal behavior remains difficult. Our findings indicate there is also value to clinicians in adopting a longer time horizon during risk assessment, focusing not only on acute stressors, but on whether those stressors are indicative of a prolonged period of decompensation from one's baseline. Our results also add to a growing literature showing that trait vulnerabilities can be valuable predictors in determining who is most likely to convert interpersonal dysfunction into suicidal ideation and behavior (e.g., Victor et al., 2019). Careful personality measurement from the start of treatment should be part of ongoing suicide risk assessment, and could help clinicians to devise more timely, personalized interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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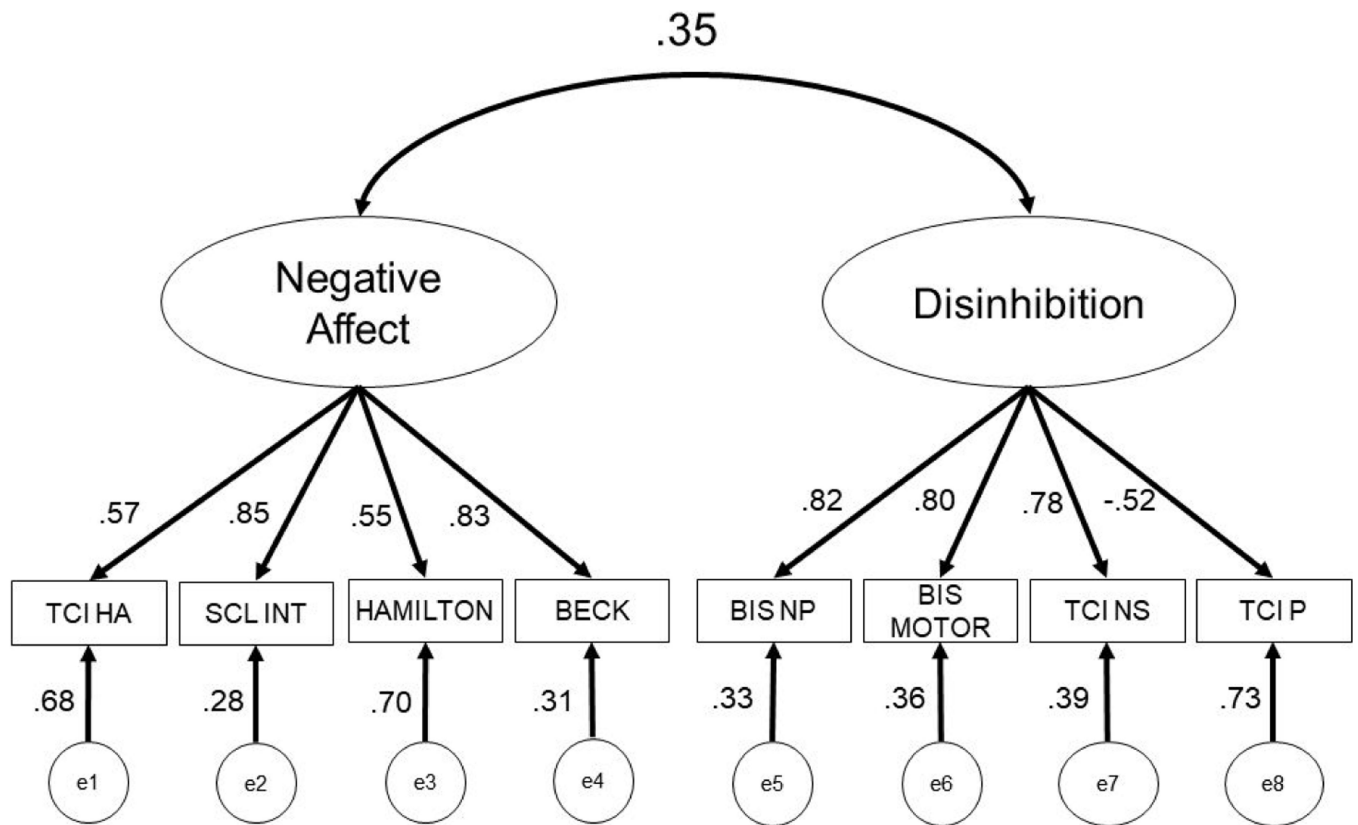
Figure 1.
Confirmatory factor analysis of baseline measures of personality. Model fit: χ^2 (19) = 54.70, $p < .001$; CFI = .94; RMSEA = .07; SRMR = .06. All paths are significant at p .001.
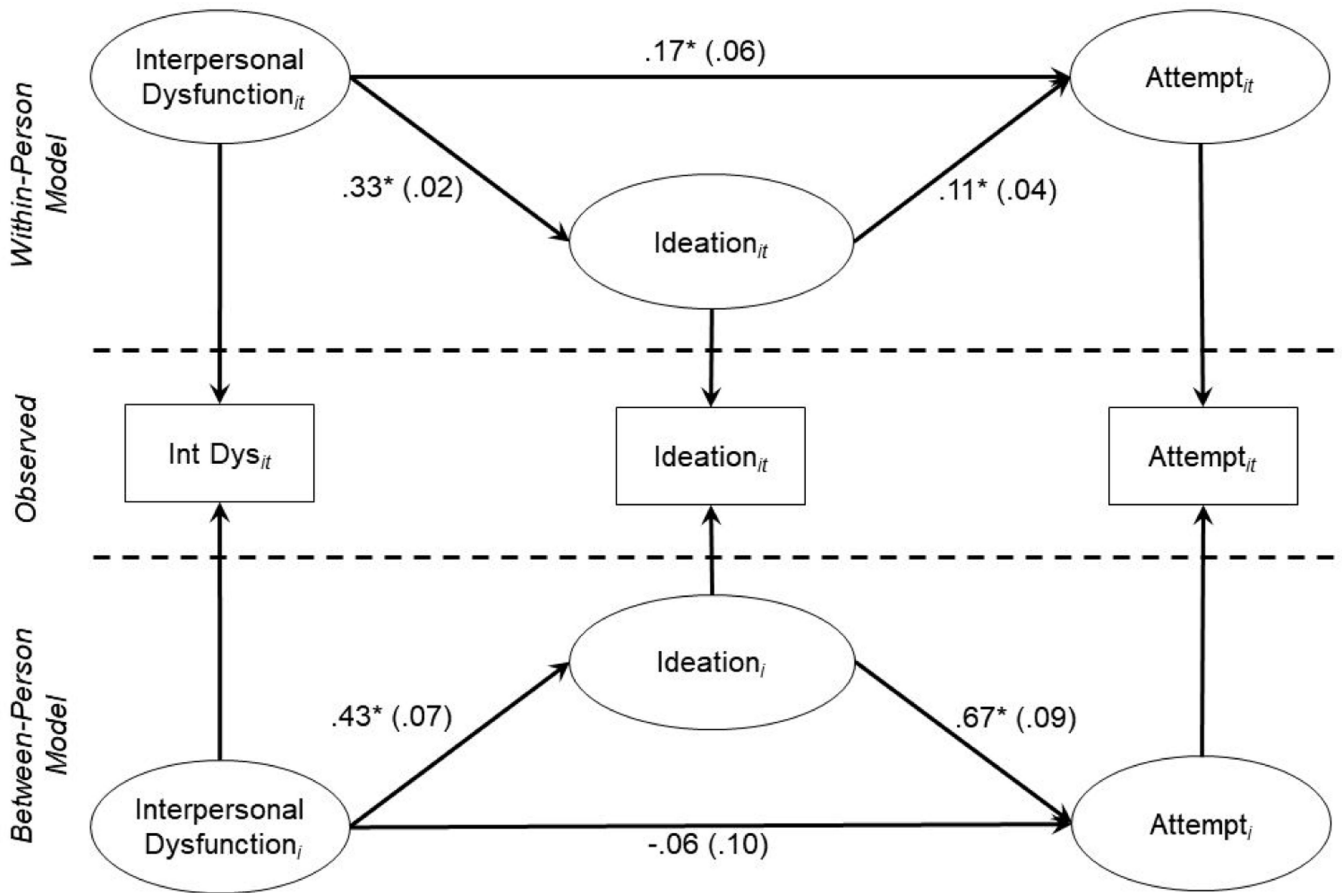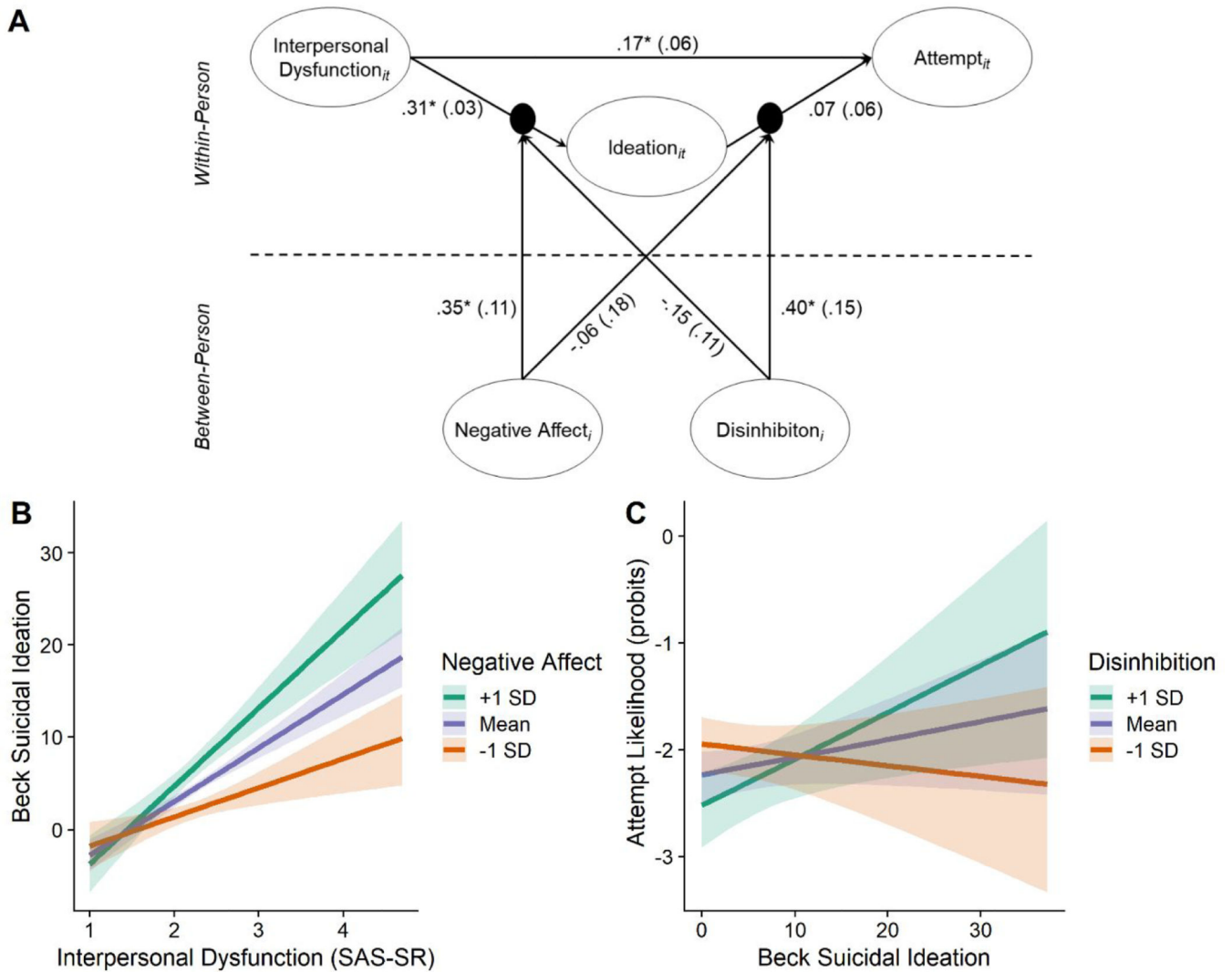
Figure 2.
Multilevel structural equation model examining within- and between-person associations between interpersonal dysfunction, suicidal ideation, and suicide attempts. Interpersonal dysfunction, ideation, and attempts are decomposed into within- and between-person components using latent decomposition. Covariates are excluded for parsimony. All coefficients are standardized except for the indirect effects. Standard deviations are in parentheses.

$*p < .05$.

Figure 3.
A) Multilevel structural equation model examining the moderating influence of negative affectivity and disinhibition on within-person associations between interpersonal dysfunction, suicidal ideation, and suicide attempts. Only paths relevant to primary hypotheses are shown (see Table S5 for all path estimates). Covariates and latent decomposition of variables are excluded for parsimony. All coefficients are standardized except for the indirect effect. Standard deviations are in parentheses. B) Moderation of an interpersonal pathway to suicide attempts by personality. High negative affectivity is associated with a stronger within-person coupling between interpersonal dysfunction and suicidal ideation. C) High disinhibition is associated with a stronger within-person coupling between ideation and attempts.
*p < .05.

Table 1.

Demographic and Clinical Characteristics of the Sample

Participant Characteristic	Statistic
Mean Age (SD)	28.59 (7.53)
Age Range (at Baseline)	18 – 50
N Female (%)	352 (77%)
Race/Ethnicity – N (%)	
Asian	7 (1.53%)
Black	78 (17.03%)
Hispanic or Latinx	17 (3.71%)
Native American / Alaska Native	1 (.22%)
Pacific Islander	2 (.44%)
White	361 (78.82%)
Other - Mixed	6 (1.31%)
Marital Status	
Single	326 (71.18%)
Married	73 (15.94%)
Separated	19 (4.15%)
Divorced	39 (8.52%)
Widowed	1 (.22%)
Mean Education Years (SD)	14.13 (2.41)
N Employed (%)	227 (49.56%)
N Previous Outpatient Treatment (%)	390 (85.16%)
N Previous Inpatient Treatment (%)	287 (62.66%)
Mean Number of Years in Study	7.82 (7.48)
N Prospective Suicide Attempts	328
Median Attempts/Person	2
Attempts/Person Range	1 – 25
Mean Lethality	2.19
Median Lethality (Range)	2 (0 – 8)
Lethality Frequency [a]	
N Low Lethality (< 4)	244
N High Lethality (4)	62

Note. n = 458. The frequency of racial/ethnic identities will exceed the total sample size because some participants reported multiple racial identities. Six participants reported being of mixed race but did not specify any additional information and are therefore listed as Other – Mixed.

[a] 22 attempts were missing lethality ratings.