Associating Interpersonal Problems and Borderline Personality Disorder Domains

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Recent studies have examined the relationship between borderline personality disorder (BPD) and interpersonal problems in a relatively broad sense. Findings from these studies have been inconclusive, confirming that BPD is heterogeneous empirically, such that there is no particular interpersonal problem associated with the disorder. This study aims to determine if breaking up BPD into its main symptom domains (affective instability, identity problems, negative relationships, and self-harm) will reveal specific interpersonal problems yet to be found when BPD is considered a unitary construct. Data from the Personality Assessment Inventory – Borderline Features Scale (PAI-BOR) and the Circumplex Scales of Interpersonal Problems (CSIP) given at a baseline were subjected to the Structural Summary Method (SSM) in order to analyze the relationships each domain had with interpersonal problems on a circumplex. Findings showed that not only was BPD as a unitary construct interpersonally diffuse, but three of the four symptom domains showed similarly diffuse results. These results are interpreted within the context of validity of the measures used, and the theoretical preposition that BPD is a core personality disorder representing a general factor of personality pathology.

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1.0 Introduction

Borderline personality disorder (BPD) is a psychiatric diagnosis associated with major long-term impairments in multiple domains, as well as high personal and social costs. According to the Diagnostic and Statistical Manual for Mental Disorders (5th ed.; *DSM–5*; American Psychiatric Association [APA], 2013), the main characteristics of individuals with a BPD diagnosis include clinically significant affective instability, identity disturbances, self-harm, and maladaptive interpersonal relationships. High levels of distress and impairment are associated with the pervasiveness of BPD, such that there are large personal and social costs for the individual. Such personal costs include self-mutilating behavior and an unstable sense of self, and social costs include unstable and intense interpersonal relationships (APA, 2013).

As described in a meta-analysis on the structural organization of BPD symptom measures, BPD can be regarded as a collection of four distinct and measurable symptom domains: a) identity problems, b) affective instability, c) self-injurious/impulsive behaviors, and d) negative relationships (Gardner & Qualter, 2009). Assessments of BPD severity, such as the Personality Assessment Inventory - Borderline Features Scale (PAI-BOR; Morey, 1991), include items corresponding to each of these symptom domains that are then combined to assess overall BPD severity. Affective instability refers to the tendency of individuals with a diagnosis of BPD to have a day-to-day life characterized by extreme and abrupt changes in emotion and, at times, intense feelings of overwhelming anger, and it is assessed in the PAI-BOR with items such as "I have little control over my anger." Identity problems are disturbances in sense of self accompanied by feelings of emptiness and low self-esteem (e.g., "I often wonder what I should do with my life"), whereas the self-harm/impulsivity domain is marked by a variety of behaviors including that of

physical harm and substance abuse (e.g., "I am a reckless person"). Finally, the negative relationships domain represents the cumulative social problems associated with BPD (e.g., "I want to let certain people know how much they have hurt me"), which is characterized by turbulent and intense social interactions (Panesar, 2015).

As one of the main BPD symptom categories, interpersonal problems more generally refer to maladaptive interactions in the context of one's social life (Girard et al., 2017). Research has analyzed associations between different aspects of interpersonal problems and BPD in both clinical and nonclinical samples. For a nonclinical sample of young adult women, a mediating association was found between BPD features and aggressive behavior, with negative interpersonal events mediating the effect (Herr et al., 2013). Specifically, negative interpersonal events (a manifestation of interpersonal problems more broadly) have associations with BPD features and related symptom constructs. Notably, Herr and colleagues (2013) found a clear proximal relationship established between BPD symptoms and negative interpersonal events; one strongly predicts the next, even in the absence of a diagnosis. Such a relationship conveys a strong association between the constructs being studied. The link between interpersonal problems and borderline features has also been supported in clinical research samples. Evidence from an outpatient sample of BPD patients showed a more general mediating factor, interpersonal problems, in the relationship between BPD features and aggressive behavior (Stepp et al., 2011). Given that the research has shown a relationship between BPD features and interpersonal problems in a variety of different sample demographics, this prompts further investigation. It must first be noted how the constructs of interpersonal problems and BPD features have been studied theoretically and empirically.

When assessing interpersonal characteristics, the interpersonal circumplex (IPC) is widely implemented as a well-validated model for "interpersonal traits, problems, sensitivities, values,

messages, strengths, and behaviors" (Girard et al., 2017). It organizes interpersonal functioning mathematically into a circular array with the vertical axis of agency (dominant/submissive) and the horizontal axis of communion (warm/cold) (Wiggins, 1991). This circumplex is organized in such a way where related concepts (e.g., domineering and vindictive) are separated by a smaller angle than unrelated concepts (e.g., domineering and cold) and opposing concepts (e.g., domineering and nonassertive) (see Figure 1A). The IPC's content is operationalized using a set of scales that cover the full range of interpersonal functioning content domains. Typically, eight scales are used: domineering, intrusive, self-sacrificing, exploitable, non-assertive, socially inhibited, cold, and vindictive. The magnitude of the correlation between different scales of the circumplex is equivalent to the cosine of the angle between them (Gurtman, 1992). Also, because of the IPC's well-established structure, it can be used to determine the interpersonal nature of other constructs. Specifically, to the extent an external construct is prototypically interpersonal, it should follow a specific pattern of associations with IPC inventory scales; namely, a cosine curve. When evaluating a construct using the circumplex's established structure, the expected cosine curve can be decomposed into three basic parameters: amplitude, displacement, and elevation. Elevation is the average correlation value on the IPC across all octant scales, displacement is where the construct's association peaks and therefore the location of its interpersonal content, and amplitude is the degree to which a construct is interpersonally differentiated or correlates with specific content of the circumplex more strongly relative to other content (Gurtman, 1992) (see Figure 1B). Distance from the origin of the IPC (i.e., greater extremity, regardless of direction) has been associated with clinical symptomatology in personality disorders (Wilson et al., 2017).

The Inventory of Interpersonal Problems—Circumplex Scales (IIP-C; Horowitz, Alden, Wiggins, & Pincus, 2000), has been used extensively to evaluate the association between BPD and

interpersonal problems. A meta-analysis of different personality disorders (PDs) and their trends on the IIPC-C demonstrated two findings: BPD's interpersonal problem profiles tends to peak around the vindictive style of interpersonal problems, and BPD showed a more modest level of differentiation in interpersonal styles relative to most other PDs that were studied (Wilson et al., 2017). When looking at the results of the Wilson and colleagues (2017) meta-analysis, it appears that – relative to other PDs – BPD shows weaker specific associations with warmth and dominance, even though the peak problem is vindictive (i.e., low warmth and high dominance). In other words, BPD has a less differentiated profile, even though it has strong relationships with general or all interpersonal problems. Thus, BPD is less strongly associated with the traditional correlation pattern that should result from theoretical mapping the construct onto the IPC, and therefore is not prototypically interpersonal. This suggests heterogeneity in the construct definition of BPD may be the possible cause for decreased differentiation relative to other PDs.

In addition to BPD, as a unitary construct, not fitting the theoretical mapping within its results of IIPC-C and PD meta-analysis, high levels of variation have been shown within interpersonal problems both cross-sectionally and longitudinally. In a study of individuals with significant borderline pathology, Wright et al. (2013b) discovered six distinct interpersonal problems utilizing the IIPC: vindictive, intrusive, avoidant, nonassertive, moderate exploitable, and severe exploitable. The wide array of distinct and variable classes of interpersonal problems further supports the contention that BPD should possibly not be considered a unitary construct. Another study investigated the change in interpersonal style for individuals with various levels of BPD severity over the course of a year using a combination of intermittent self-assessment and clinical interview (Wright et al., 2013a). A wide variety of interpersonal problems are likely associated with BPD, and when following individuals longitudinally, this manifests as shifts in the

type of problem. Variation in interpersonal styles across time within individuals was found, showing that BPD taken as a singular and static construct might be too broad when used in the context of interpersonal problems. Taken together, the prior research relating BPD to the IPC suggests that there is a high degree of variability in the pattern of observed associations.

These recent studies have focused on the associations between BPD symptom severity as a unitary construct in relation to interpersonal problems. However, given that BPD is a diagnosis with multiple domains of impairments (i.e., affect, suicide/self-harm, impulsivity, and interpersonal), it may be that the focus on BPD as a single unitary construct is missing important distinctions in these domains when associating the diagnosis with IPC scales. Thus, a more thorough way of studying the relationship between BPD and interpersonal problems would be to focus on the domains encapsulated by BPD and their relationship with the IPC. In addition, it is plausible that the reason behind BPD not traditionally fitting the ideal IPC curve is due to innate heterogeneity within the disorder – a problem that differential analysis of its components has the potential to solve. Accordingly, the current study aims to analyze the relations between the four established domains of BPD symptoms and a contemporary measure of interpersonal problems, the Circumplex Scales of Interpersonal Problems (CISP; Boudreaux et al., 2018; see Figure 1). Given the construct comparison between BPD and the IPC, the current study hypothesizes that the domains subsumed within BPD will exhibit more differentiated, but also distinct, sinusoidal patterns with the octants of the IPC relative to when it is studied as a unitary construct.

From a search of relevant literature on interpersonal problems and borderline personality domains, we formed hypotheses for the interpersonal problems associated with the PAI-BOR subscales of identity problems, affective instability, self-harm/impulsivity, and negative relationships (see Table 1 for a further summary of our hypotheses). We hypothesized that identity

problems will localize in the submissive-cold quadrant, affective instability in the submissive-warm quadrant, and self-harm/impulsivity in the submissive half. Based on the broad interpersonal nature of the negative relationships domain negative relationships will not have a differentiated pattern (see Table 1). Based on previous research, we also hypothesize finding no differentiated interpersonal signature for total BPD severity. The results will serve to provide a more complete quantifiable relationship between the variables of study and show the complex nature of interpersonal relationships within personality pathology.

2.0 Methods

2.1 Participants

Participants were 342 Pittsburgh community members recruited via flyers around the community and online media advertising. Full-time undergraduate students were excluded from the study to achieve a more representative sample of the residential community. The age requirement for recruitment was between 18- and 40-years old (M = 28, SD = 5). Participants were 52% female, 85% White, and 79% heterosexual. Participants were required to own a functioning smartphone that was able to run iOS or Android OS. See Tables 2 and 3 for a demographic description of the sample.

The data processed in this study was initially collected for a study of narcissistic personality disorder (NPD). The NEO Personality Inventory – Revised (NEO-PI-R; Costa, 1992) was utilized to prescreen participants for a 2-1-1 ratio of low, moderate, and high levels of trait modesty within the sample. Data analyzed in the current study was collected at participants' baseline assessment, which consisted of an online self-report questionnaire battery prior to a ten-day ecological momentary assessment (EMA) data collection.

2.2 Measures

Borderline personality disorder features. BPD features were measured using the Personality Assessment Inventory - Borderline Features Scale (PAI-BOR; Morey, 1991). This

measure was administered at the initial onboarding appointment as a baseline self-assessment. The PAI-BOR categorizes aspects of BPD into four main dimensions, each with a set of corresponding multiple-choice questions. The dimensions are Negative Relationships, Identity Problems, Affective Instability, and Self-Harm. Each of these domains has six associated questions that assess the construct for a total of 24. For each question, the participant may select an option on a four-point scale (0 = *Not True at All; False* to 3 = *Very True*), with some being reverse-scored. Negative Relationships measures general interpersonal turbulence (e.g., "I want to let certain people know how much they have hurt me"), Identity Problems measures disturbances in one's sense of self (e.g., "I often wonder what I should do with my life"), Affective Instability measures extreme/abrupt changes in emotion (e.g., "I have little control over my anger"), and Self-Harm measures generalized danger to oneself (e.g., "I am a reckless person").

Interpersonal problems. Interpersonal problems were measured using the 32-item version of the Circumplex Scales of Interpersonal Problems (CSIP; Boudreaux, et al., 2018). As with the PAI-BOR, the CSIP was also administered as a self-assessment at baseline. The CSIP measures interpersonal problems using eight scales designed to capture the full range of the IPC (see Figure 1A). The CSIP can be used to locate an individual's degree of interpersonal problems within the established axes of the IPC (Boudreaux et al., 2018). Each of the eight resulting constructs has four corresponding statements where the participant will rate to what degree they believe this is a problem for themselves (0 = *Not a Problem* to 3 = *Serious Problem*). Domineering and Nonassertive are on the vertical axis with example items being "Bossing around people too much" and "Difficulty taking the lead" respectively. Distant/Cold and Self-Sacrificing are on the horizontal axis with example items being "Difficulty showing love and affection towards others" and "Putting people's needs before my own too much" respectively. Self-Centered and Exploitable

are on the first diagonal axis with example items being "Disliking most people" and "Acting overly submissive with others" respectively. Finally, Socially Inhibited and Intrusive are on the second diagonal axis with example items being "Avoiding people or social situations" and "Talking too much" respectively. Table 2 provides descriptive statistics for each domain of both measures for the population.

3.0 Results

All analyses were coded and run through R. We used the Structural Summary Method (SSM; Gurtman, 1992; Kotov et al., 2017) using the *circumplex* package (Girard et al., 2017) to study the relationship between BPD and interpersonal problems. This method uses a Fourier transform on association patterns in the data to extrapolate the parameters of a sinusoidal curve. From there, this observed pattern is compared to a perfect curve with the same parameters to find the level of prototypicality (Gurtman, 1992). Specifically, the whole PAI-BOR scale as well as each of the four symptom domains of the PAI-BOR were correlated with the eight interpersonal problem scales on the CSIP. The resulting patterns of associations were subjected to SSM to calculate the elevation, amplitude, displacement, and level of prototypicality (R^2). We hypothesized that each individual PAI-BOR BPD sub-domain would show a prototypical and differentiated sinusoidal pattern characteristic of IPC scales. However, we predicted that the overall PAI-BOR scale will not exhibit this prototypical pattern. See Table 4 for the SSM parameter results. In addition to the above set of analyses, descriptive statistics are also reported in Tables 2 and 3.

We first conducted SSM analyses on the full PAI-BOR scale. The resulting elevation from the SSM analysis was 0.42 for the full PAI-BOR measure without differentiation into the domain groups. This, again, is defined as the mean correlation value across all interpersonal problems octants. Values above 0.15 are considered substantial, and thus the global PAI-BOR scale has significant generalized interpersonal problems. The amplitude was 0.06, and values above 0.15 have also been suggested as a cutoff for meaningful magnitude for this parameter. Given the amplitude for the total scores was markedly below the recommended .15 cutoff, this is consistent

with the notion that total BPD is not associated with any specific interpersonal problem. The circumplex location where the data is concentrated (angular displacement) for the total was 220° with a resampling-based 95% confidence interval (CI) that ranged from 148° to 275°. The point estimate for the SSM peak is generally located in the submissive/cold quadrant, though with a 95% CI range that spanned a full third of the circumplex (127°), which is consistent with the hypothesis that the full PAI-BOR would not map onto any particular interpersonal problem very strongly. The data overall was modestly prototypical with an R^2 value of 0.72. The cutoff values for prototypicality are >0.8 for a significant fit, 0.7-0.8 for modest fit, and <0.7 for unacceptable fit (Gurtman, 1992).

Turning next to the subscales, the elevation for the Affective Instability domain was 0.34, showing significant generalized interpersonal problems for those high in affective instability. The amplitude value was 0.08, also subthreshold and is therefore showing only a modest degree of interpersonal problem differentiation. For angular displacement, affective instability appeared at 167° with a 95% CI that ranged from 116° to 222°, spanning nearly a third of the circumplex (106°). Inconsistent with the localization hypothesis, it was found that the cold and self-centered octants are where affective instability mapped most closely to. The overall fit for the data was significant with the R^2 value of 0.81.

The elevation for the Identity Problems domain was 0.41, showing the highest level of mean interpersonal problems. The amplitude value was also greatest for identity problems, with a value approximately at the threshold reported at 0.14. Identity problems were generally located at 248° with a 95% CI that ranged from 226° to 272°, meaning the data was centered most closely around the point estimate for angular displacement (only 46° span). Results shown here map this domain to the socially inhibited/submissive octants with the highest degree of precision among

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all of the domains studied ($R^2 = 0.94$). Also, the results were consistent with the original hypothesis.

The elevation reported for the Negative Relationships domain was 0.35, again showing significant interpersonal problems for participants high in negative relationships. Amplitude was reported to be 0.05, which is the lowest value across all five analyses done, exhibiting the least differentiation of any of the BPD domains. Supporting this, the angular displacement was 240° with a 95% CI that ranged from 150° to 332°. This domain's point estimate for the SSM peak is generally located in the submissive/cold quadrant, but the 95% CI was the largest at 182°. This spans half of the circumplex, supporting the hypothesis of a lack of localization. The R^2 value was below the threshold for a modest fit at 0.62.

The elevation reported for the Self-Harm domain was 0.23, suggesting that of the PAI-BOR domains, self-harm was the least related to generalized interpersonal problems. Amplitude was modest for this domain as well, with a value of 0.07, so this domain was not particularly correlated with its point estimate for the SSM peak. That area had an angular displacement value of 76° with a 95% that ranged from 8° to 134°, spanning 126° of the circumplex. Thus, the results were inconsistent with the hypothesis, as domineering/intrusive was the octant where the point estimate from the SSM analysis peaked, and was rather diffuse, as over a third of the circumplex was contained in its 95% CI. The data was modestly prototypical ($R^2 = 0.73$).

4.0 Discussion

This study's general research question was to see if the heterogeneity of the BPD construct was the reason behind the construct not having a particular maladaptive interpersonal style. We believed that by differentiating BPD into the four symptom domains used in the PAI-BOR (affective instability, identity problems, negative relationships, and self-harm), that there could be different interpersonal problems associated with each, thus supporting the theory that heterogeneity of BPD symptoms explains why BPD is not consistently associated with a specific style of interpersonal problems. Towards this aim, we implemented the SSM on a community sample to determine if the four BPD symptom domains were associated with localized interpersonal problems. Results showed both consistent and inconsistent evidence for the different hypotheses presented.

For total BPD severity (as assessed through total PAI-BOR score), it was hypothesized that there would be no or only modest correlation with any particular interpersonal style due to the high degree of BPD symptom heterogeneity identified in previous literature (Wright et al., 2013a; Wright et al., 2013b; Wilson et al., 2017). This hypothesis was supported by our results that BPD severity was associated with elevated interpersonal problems, but not localization to any specific type of interpersonal problem. These results suggest that BPD is primarily associated with elevated general interpersonal distress, rather than specific interpersonal problems. One potential reason for this lack of association with a specific interpersonal problem may be that individuals endorse different levels of constituent BPD symptoms, making BPD presentation too heterogenous to isolate specific interpersonal problems. The diffuse results with the PAI-BOR total score in this study therefore support further investigation into the effects of the BPD domains to see any

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significant differences in interpersonal mapping patterns. Another reason could be that BPD represents a general factor of personality pathology, associated more with elevated impairment and distress across personal and interpersonal domains of functioning rather than a specific interpersonal signature (Sharp et al., 2015). Notably, Sharp and colleagues (2015) determined that BPD does not have any unique factor for personality pathology generally, and this supports the lack of a well-differentiated interpersonal style for the total. By examining the relationship between BPD symptom domains and interpersonal problems, we can begin to understand potential reasons for the general relationship between BPD severity and interpersonal problems.

Assuming that BPD heterogeneity is responsible for the diffuse interpersonal signature associated with BPD symptoms in our sample, we additionally hypothesized that differentiating and running SSM analyses on each of the sub-domains of the PAI-BOR separately would reveal a set of more well-defined, but heterogeneous and possibly contrasting, relationships between BPD and interpersonal problems. We anticipated that specific interpersonal problems in BPD may result from the interpersonal manifestation of specific symptoms, with each domain of BPD symptoms potentially differentially localizing on the interpersonal circumplex. We hypothesized localized interpersonal problems associated with BPD symptom domains of affective instability, identity problems, and self-harm/impulsivity, though a diffuse and elevated association between interpersonal problems and negative relationships, similar to the relationship between interpersonal problems and BPD total severity.

Initially, we believed affective instability would be well-differentiated in a submissive octant, but in contrast to my hypotheses, is domain exhibited a profile that lacked a well-differentiated and specific interpersonal theme. Although the interpersonal problems profile for affective instability was prototypical, its amplitude was generally modest, suggesting it was not

well-differentiated, and, by extension, it had wide confidence intervals around its central theme. Previous research suggested high levels of affective instability are correlated with submissive and quarrelsome interpersonal behaviors (Russel et al., 2007), but in the current study the peak of the affective instability profile was found in the self-centered octant, which although interpersonally cold is also dominant. Looking back at the specific items within the self-assessments, possible reasoning as to what is behind this association can be extrapolated. Of the six PAI-BOR items that assessed affective instability, three of them asked about anger specifically, and one asked about general intense emotion. It can be postulated that if a participant were to score high on PAI-BOR item 18: "I've had times when I was so mad I couldn't do enough to express all of my anger," then they will also likely score high on domineering related questions in the CSIP more than submissive questions. Though due to the high diffusivity of this domain, elevation should be the parameter of interpretive focus. A strong average association was observed with generalized interpersonal distress (i.e., elevation). Thus, affective instability appeared to be strongly linked with general interpersonal distress and only a modest suggestion that it was associated with more self-centered problems, though we believe this should be interpreted with caution due to how undifferentiated the profile is.

Identity problems, uniquely, had high significance in the results for each of the parameters given from the SSM analysis. Like the other domains, the overall level of interpersonal problems was high, but identity problems was particularly well-differentiated with narrow confidence intervals around its centered point. The profile peaked in the socially inhibited octant, in which the data showed high significance when this was mapped, consistent with the established hypothesis. In comparison with the other domains, the identity problems domain has the smallest angular displacement range, and is therefore most interpersonally consistent.

In interpreting why the identity problems domain is strongly well-differentiated on the socially inhibited octant, the PAI-BOR identity problems items and CSIP social inhibition items should be compared. These items, though on different self-assessments, are all dealing with interpersonal forms of identity that are characteristic of social inhibition. For example, two of the six items assessing identity problems in the PAI-BOR are: "I worry a lot about other people leaving me" and "I can't handle separation from those close to me very well", and these items are similar in content to the social inhibition items in the CSIP, such as "Feeling like an outsider in social situations" and "Acting shy around others". Given the PAI-BOR is directly using specific interpersonal content in the items assessing identity, greater levels of interpersonal specificity will be the result. Difficulty with self-other distinction, where an individual can distinguish the thoughts, emotions and behaviors of themselves with others, is often found in individuals with heightened levels of BPD symptomatology (De Muelemeester et al., 2021). Self-other distinction has been shown to be a possible mechanism for identity diffusion, and therefore dysfunction, in individuals with BPD, contributing to impairment in self and interpersonal functioning (Kernberg, 2006). This is important for the results of our study, as it supports the connection of socially inhibited interpersonal behavior and identity problems (as defined in the PAI-BOR).

To look at identity problems more generally, a future study should use a scale that covers identity more broadly. Previous research found evidence, in a professional sample of clinicians, that identity disturbance is multifaceted, with four distinct divisions: role absorption, painful incoherence, inconsistency, and lack of commitment (Wilkinson-Ryan & Weston, 2000). Wilkinson-Ryan and Weston also found that painful incoherence, defined as a subjective sense of lack of coherence, was characteristic of BPD, and this concept is largely missed in the PAI-BOR identity problems items. Using their measure, the Identity Disturbance Questionnaire, could

provide a more complete assessment of identity problems. In addition, another study ran analyses on the construct validity of the Self-Concept and Identity Measure (SCIM), and also found that differentiation in identity problems: disturbed identity, consolidated identity, and lack of identity (Kaufman et al., 2015). Utilizing multiple measures of high construct validity, like the Identity Disturbance Questionnaire and the SCIM, could reveal underlying complexities for the interpersonal nature of identity problems.

As we expected, the domain of negative relationships has the least distinct and differentiated results relative to other domains for each parameter extracted using the SSM analysis: lowest elevation, lowest amplitude, widest 95% CI range, and lowest prototypicality. This implies that negative relationships is the most diffuse domain, similar to the undifferentiated total, with no specific interpersonal problem of any significance. We hypothesized that, because previous research showed associations between negative relationships and interpersonal problems as a whole construct, there would be no signature interpersonal problem for this domain (Ryan & Shean, 2007; Haggerty et al., 2009). Results supported this hypothesis, as negative relationships had the largest range of interpersonal styles, with the profile's peak confidence interval encompassing half of the overall circumplex. Given this domain had the lowest level of prototypicality, elevation should be the primary parameter of focus. Elevation was significant suggesting high levels of negative relationships within BPD is related to heightened but nonspecific interpersonal pathology. Marked elevation coupled with high levels of diffusivity in this domain, as well as every other domain analyzed, with the exception of identity problems, could suggest BPD as a central disorder of interpersonal problems with no particular signature.

Finally, self-harm has a wide span of interpersonal styles, but most of its range on the circumplex was mapped outside of what was initially hypothesized. Extensive research on the

relationship between self-harm and interpersonal problems isn't very conclusive, but it is believed to be correlated with general submissiveness (Wright et al., 2013a). Results showed a not well differentiated localization in the intrusive/dominant quadrants suggesting either self-harm in BPD has an alternative mechanism, or the PAI-BOR might be measuring a different construct, impulsivity, more so than physical self-destructive behavior. If the self-harm items are more accurately measuring impulsivity, specific items in the PAI-BOR should be further examined. For example, two of the items assessing self-harm in the PAI-BOR are: "I sometimes do things so impulsively that I get into trouble," and "I'm too impulsive for my own good" mention impulsivity directly. In fact, five out of six items stated to measure self-harm in the PAI-BOR seem to be assessing emotional and behavioral components of impulsivity. So, is impulsivity a markedly intrusive construct? Previous clinical studies have found that when individuals with BPD have an increased level of mood lability (which is characteristic of the disorder), this leads to self-destructive, impulsive and intrusive behaviors (Levy et al., 2010). This supports having the majority of the interpersonal content spanning around impulsivity rather than submissiveness. Though, the high degree of differentiation within the circumplex could be due to the other PAI-BOR items assessing more traditional aspects of self-harm, thus widening the amount of interpersonal content covered on the circumplex from this domain.

There were some limitations to generalizing the results of this study to other samples. The sample used was not clinical, and thus all of the data gathered on BPD characteristics were from individuals without a reported diagnosis. Generalizing the results of this study into the clinical sphere would need additional research on a clinical sample for completeness. Also, the data was taken at one point in time (the baseline of a previous EMA study), so the results could be affected by momentary affect, and no temporal claim can be made on the relationships established. As

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discussed earlier, longitudinal data on BPD and interpersonal problems has shown that interpersonal styles shift over time, which adds a layer of heterogeneity that this study would be unable to conclude (Wright et al., 2013a). Future studies could remedy this limitation by implementing an EMA structure in order to make temporal claims. Through daily, momentary, self-assessments, each of the BPD domains in the present study, when looking at symptom expression/severity, had temporal variation (especially affective instability) found using an EMA structure (Santangelo, 2014). Participant data was gained fully from self-assessments, as there was no third-party informant piece in the procedure, so reliability issues could be at risk. These third-party informants should be close friends and family who could give perspective on the behaviors of the participants. When looking at the comparison between self-report and a third-party informant report for BPD features, low levels of agreement were found between the groups (Balsis et al., 2018). This result is important for the results of this study, as it implicates that a purely self-report structure could be missing key behaviors in the participants. Future research should integrate informants into the data for greater reliability and outcome predictability.

This study initially hypothesized that BPD taken as a singular construct is too heterogeneous for it to have any characteristic interpersonal pathology. In running the analyses, not only was total BPD severity interpersonally diffuse, but three of the four symptom domains were similarly not well-differentiated. So, breaking up BPD into its symptom domains did not reveal symptom-specific interpersonal problems (except identity problems). There could be a few reasons underlying these results. Possibly, the cross-sectional structure missed that BPD domains studied longitudinally have characteristic interpersonal problems associated with them. Though, like in the cross-sectional case, previous research has shown heterogeneity for BPD unitarily, using a longitudinal structure (Wright et al., 2013a). Another, less researched, possibility could be that

BPD is the core personality disorder, such that it is the central disorder for personality pathology. A previous study looked at the relation BPD has with a general personality factor, 'g,' that represents the common variance in expression of PDs (Sharp et al., 2015). They found that all criterion for BPD diagnosis were a part of the g-factor, and there was no unique, well-differentiated factor for BPD (unlike the other PDs). Heightened elevation of general interpersonal problems found in this study supports that BPD could be a central PD, which would underlie the lack of any interpersonal style. Delving deeper into the structure of BPD, as a core disorder, could reveal the root of its heterogeneity, both within its clinical symptom presentation and its interpersonal nature.

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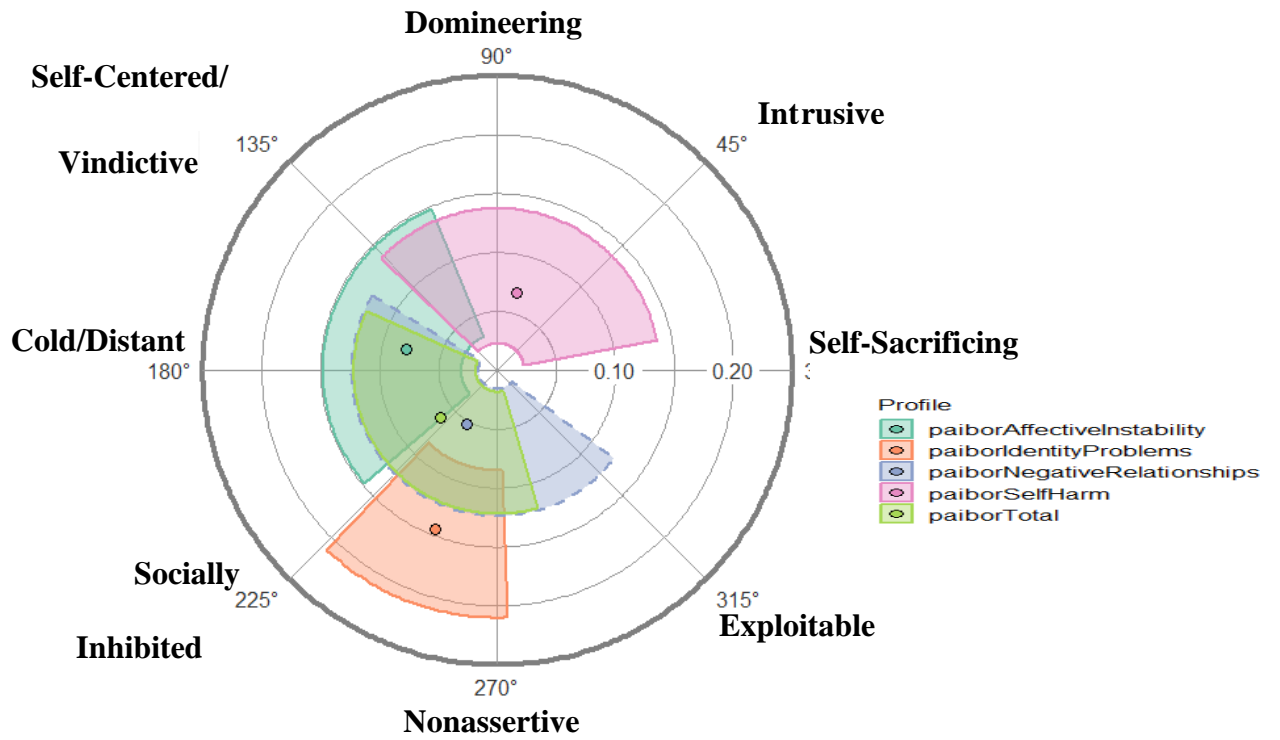
6.0 Figures and Tables

Figure 1 IIPC with Example
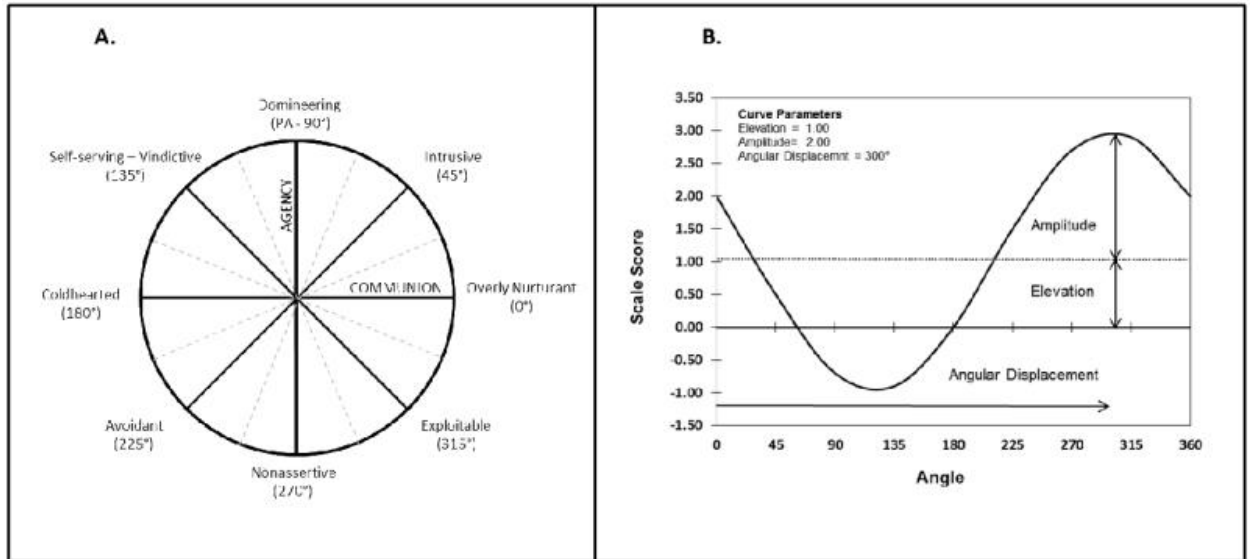
The Inventory of Interpersonal Problems Circumplex (A) and a theoretical example of a structural summary

profile (B).

Figure 2 SSM Circumplex Output

The circumplex output of the extrapolated SSM parameters.

Table 1 Hypothesis by PAI-BOR Domain

PAI-BOR Domain	Hypothesis	Source
Identity Problems	Due to avoidant attachment levels increasing with lower mentalization, and therefore higher levels of identity problems, it is likely that this dimension will localize in the submissive-cold quadrant.	**Wilkinson-Ryan & Westen, 2000; Kaufman et al., 2015**
Affective Instability	Converging evidence has shown associations between affective instability and submissive/quarrelsome interpersonal behavior suggesting localization within the submissive cold or submissive warm domains.	**Russell et al., 2007**
Self-Harm	Though extensive evidence has not been found, some analysis has shown some localization of self-harm around the nonassertive interpersonal problem, suggesting lower half localization.	**Wright et al., 2013a**

| **Negative Relationships** | A wide variety of studies have found evidence of heightened interpersonal problems across the full circumplex. This suggests an abnormal distribution when mapped onto the circumplex with no specific localizations. | **Ryan & Shean, 2007; Haggerty et al., 2009** |

Table 2 Age and Measures Descriptives

	M	SD
Age	28	5
PAI-BOR Domain		
AI	.815	.615
IP	1.059	.672
SH	.508	.464
NR	1.002	.589
CSIP Dimension		
PA	.476	.491
BC	.445	.484

DE	.673	.668
FG	.865	.767
HI	.712	.667
JK	.776	.632
LM	1.012	.687
NO	.482	.508

Table 3 Demographic Descriptives

	n	%
Gender		
Male	162	47
Female	177	52
Non-Binary	2	<1
Prefer Not to Say	1	<1
Race		
White	293	85
Black or African American	14	4
American Indian/Alaskan Native	1	<1

Asian	26	8
Native Hawaiian/Other Pacific Islander	2	<1
Other	6	2

Sexuality		
Heterosexual	269	79
Gay	29	8
Lesbian	8	2
Bisexual	20	6
Questioning	6	2
Other	10	3

Degree		
High School	25	7
Junior College	11	3
Bachelors	175	51
Masters	97	28
Doctorate	32	9
Other	0	0
None	2	<1

Income

$0 - $15k	21	6
$15k - $30k	51	15
$30k - $45k	57	17
$45k -$60k	52	15
$60k - $75k	25	7
$75k - $90k	25	7
$90k - $110k	31	9
$110k - $130k	27	8
$130k - $150k	16	5
> $150k	37	11
Diagnosis		
Yes	262	77
No	80	23

Table 4 Parameters from SSM Analysis

Correlation-based Structural Summary Statistics with 95% CIs

Profile	Elevation	X-Value	Y-Value	Amplitude	Displacement	Fit
Affective_Instability	0.34 (0.27, 0.41)	-0.08 (-0.14, -0.02)	0.02 (-0.05, 0.08)	0.08 (0.03, 0.14)	167.4 (115.9, 221.5)	0.814
Identity_Problems	0.41 (0.36, 0.47)	-0.05 (-0.11, 0.00)	-0.13 (-0.20, -0.07)	0.14 (0.08, 0.21)	248.6 (225.8, 271.6)	0.936
Negative_Relationships	0.35 (0.29, 0.42)	-0.03 (-0.08, 0.03)	-0.05 (-0.11, 0.02)	0.05 (0.01, 0.12)	240.1 (149.7, 332.0)	0.616
Self_Harm	0.23 (0.16, 0.31)	0.02 (-0.05, 0.08)	0.07 (0.00, 0.13)	0.07 (0.02, 0.14)	75.9 (7.5, 133.7)	0.731
Total_Severity	0.42 (0.37, 0.49)	-0.05 (-0.10, 0.01)	-0.04 (-0.10, 0.02)	0.06 (0.02, 0.12)	220.0 (148.2, 275.1)	0.720