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The social domains organization of mentalizing processes in adolescents: a contribution to the conceptualization of personality function and dysfunction in young people

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Background: We propose and evaluate a contribution to the conceptualization and assessment of personality functioning based on social domains and mentalizing hypotheses. Social domains are distinct social contexts, such as with acquaintances and friends, with differentiated expectations regarding participants' behaviours and social attributions. The capacity to organize social participation according to these expectations requires the ability, we suggest, to modulate mentalizing processes domain by domain. Drawing on evidence that social domain organization is impaired in borderline personality disorder (BPD) and that hypermentalizing, a heightened interpretation of others' motives, thoughts or emotions, is elevated in adolescent BPD, we hypothesized that hypermentalizing levels in adolescents will vary by social domain and that elevated BPD features will be associated with impairment of this domain organization of hypermentalizing. **Methods:** Measures including the borderline personality features scale for children (BPFSC) and the movie for the assessment of social cognition (MASC) were administered to 171 adolescents aged 12–17 recruited from public schools and community organizations in a large metropolitan area in southwestern United States. Mean hypermentalizing scores were computed for adolescent interpretations of sequences in the MASC focusing on the social domains of acquaintance, friends and romantic interactions. **Results:** There was a progressive increase in hypermentalizing scores across the acquaintance, friends and romantic interactions (repeated measures ANOVA, $p < .001$, all pairwise comparisons, $p \leq .02$), which was markedly reduced in the presence of elevated BPD features (interaction term, $p = .007$). **Conclusions:** Hypermentalizing is organized according to social domain and this organization is impaired in the presence of elevated BPD features. The findings are consistent with the proposal that personality functioning entails a social domains organization of hypermentalizing, which is impaired in personality dysfunction. Identifying mentalizing processes domain by domain has the potential to create a personalized focus for the treatment of adolescents with personality difficulties.
Keywords: Personality functioning; adolescence; social domains; mentalizing processes; borderline personality features.

Background

Personality, personality functioning and personality disorder

A firm understanding of what we mean by personality functioning would provide an invaluable starting point for examining impairing variations as candidates for personality dysfunction (Sharp, 2022; Sharp & Wall, 2021). Establishing this approach in adolescence will be particularly relevant because of the importance of differentiating normal and problematic functioning at a time of challenge and change (Hartley et al., 2022; Tyrer, 2022). In this paper we bring together a developmental hypothesis for personality functioning, the social domains hypothesis and current findings on social dysfunction and mentalization processes in borderline personality disorder (BPD; Sharp & Hernandez, 2021), to generate hypotheses for normal and variant patterns of personality functioning. To emphasize the dimensional nature of this hypothesis, we test these hypotheses in a community-based sample of adolescents in the USA.

Mentalizing, hypermentalizing and social relationships

The concept of mentalization, 'the capacity to reflect on one's own thoughts and feelings and those of others attributing mental states to others' (Bateman & Fonagy, 2016), has philosophical, psychological and psychoanalytic origins (Bolton & Hill, 2004; Frith & Frith, 2006). The core idea is that interpreting others' behaviours in terms of their intentions, beliefs, desires and emotions, is more accurate and quicker than processing the details of those behaviours (Dennett, 1987). Deficits in mentalizing have been shown in autism, schizophrenia, conduct disorder, bipolar disorder, anxiety disorder, depression and BPD (Bateman & Fonagy, 2019; Frith &

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Frith, 2006; McLaren, Hopwood, Gallagher, & Sharp, 2022; Sharp & Hernandez, 2021) The nature of the deficits in BPD is still uncertain, with evidence both for reduced, and for elevated, mentalizing (Bateman & Fonagy, 2016; Preissler, Dziobek, Ritter, Heekeren, & Roepke, 2010; Sharp et al., 2011; Somma et al., 2019).

Differences probably arise from conceptual and methodological issues. Potentially, mentalizing can vary across several parameters, including the number of mentalizing hypotheses an individual generates, the extent to which an individual is able to revise mentalization in the light of experience, the accuracy of mentalizing interpretations, and the trade-off between duration of mentalizing and the initiation of action. The content of mentalizing can also vary considerably for example focusing on others' mental states, their emotions, their desires or their motives, and the meaning of specific behaviours such as gestures, utterances or vocal tone. Methodologically a key issue concerns the ecological validity of measures. Many which have been employed in studies of mentalizing, such as Reading the Mind in the Eyes, use procedures, which are remote from the complexity of social interactions (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). By contrast, measures such as the movie for the assessment of social cognition (MASC) present participants with more realistic and more complex scenarios (Dziobek et al., 2006).

Many of the conceptual issues outlined in the previous paragraph have not so far received much attention. Two are of particular importance to the findings presented here. First, the scope of mentalizing can vary substantially. For example, in mentalizing about the reason another person, who knows very well when my birthday is, fails to get me a card, I may interpret it in terms of a simple lapse in memory, or competing demands on their time, or I may be concerned that they are unwell or highly stressed, or upset because I see it as a sign of lack of care, or even as a deliberate and provocative act. Mentalizing over a broad front in this way, and also beyond the behavioural evidence, may be exactly the kind of imaginative sensitivity that can lead to an understanding of thoughts and feelings that a person themselves is struggling to understand. Equally the more possibilities that are considered, the greater the scope for going beyond the evidence, and hence of being less accurate – especially in the context of emotionally charged attachment relationships. However, the mistake proneness of mentalizing over a broader front may be mitigated where a person is able to test out alternative interpretations with the other person, provided they are then able to flexibly revise or relinquish some of them. Thus, whether or not comprehensive mentalizing, which goes beyond the evidence and perhaps mistake-proned, is adaptive, may depend on the kind of relationship of the mentalizer with the other. Such 'hypermentalizing' may be readily accommodated, and indeed important, in intimate romantic relationships, but problematic in interactions with work colleagues. Second, many of the features of mentalizing that we might regard as advantageous, such as consideration of several possibilities, and openness to revision, are likely to slow the progression to action, and so be socially inefficient (Bolton & Hill, 2004). Equally, they may be cognitively and emotionally overwhelming, so failing to guide appropriate action, and resulting in impulsive, emotion-led, maladaptive actions.

Hypermentalizing and borderline personality disorder

Much of the more recent evidence, at least in adolescents, has indicated that BPD is associated with hypermentalizing (Miano, Dziobek, & Roepke, 2017; Sharp et al., 2011, 2013; Sharp & Vanwoerden, 2015; Somma et al., 2019). Many studies reporting this finding have used the MASC, which presents subjects with complex emotion laden social scenarios in a video sequence in which four young adults, two male, two female meet for dinner. The video is paused 45 times to present subjects with four alternative interpretations of what the participants have said to each other, including a hypermentalizing option. This is described in more detail later in the paper.

Sharp and colleagues have proposed that a mutual interaction between hypermentalizing and emotion dysregulation contribute to the emotional and interpersonal instability seen in BPD (Sharp, 2014; Sharp & Vanwoerden, 2015). In this model, when an individual with BPD is presented with an emotionally intense interpersonal event, a lack of balanced mentalizing leads to emotional arousal, which, in turn, increases errors in interpretation (e.g. rejection), culminating in hypermentalizing, which further dysregulate emotions. Thus, hypermentalizing is seen as the result of a failure to integrate the cognitive and emotional components inherent in most social situations as well as a failure to integrate mentalizing the other in relation to self. In many cases, hypermentalizing involves the attribution what is one's own mind to the mind of the other – thinking that others hold the same thoughts and feelings we do.

In the light of the points we considered earlier, there may be an additional perspective on hypermentalizing. Complex, elaborated, mistake-prone mentalizing may be adaptive in relationships where four conditions apply. First the participants relate over a wide range of concerns and emotions, so that their behaviours may also reflect this breadth. Under these conditions more comprehensive mentalizing may be required. Second the relationship provides opportunities for joint scrutiny of interpretations and for their modification through discussion and

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mutual understanding. Third, participants in the relationship are able to support each other at time of distress or anger arising from the interplay between hypermentalizing and emotion dysregulation. Fourth the relationship can accommodate periods of reflection and reconsideration without the need to progress rapidly to action. This view would challenge current views on hypermentalizing as maladaptive under all circumstances and extend the concept to include circumstances in which case more mentalizing effort may be exerted.

The social domains hypothesis

According to the Social Domains hypothesis, effective adult functioning requires a capacity to interpret others' behaviours, and to respond, in accordance with widely accepted distinctions between different classes of interaction (Hill, Pilkonis, & Bear, 2010). For example, within the work setting, most adults maintain the focus of their interactions on work tasks, and they mentalize within constraints, which support efficient completion of those tasks. In romantic relationships, by contrast, in addition to task foci, such as the day to day household management and financial planning, there are many other areas of mutual concern, including sex, intimacy, fidelity, comfort, shared interests, wider relationships with families, and for many, parenting. We have proposed that friendships and wider (nonspecific) social interactions with unfamiliar adults are also similarly demarcated. Domains, therefore, provide a guide to the scope of mentalizing required for functioning in different kinds of social interaction. This will provide a means for generating rapid accurate social action in interactions with a wide range of people, provided participants share the same framework, and there are mechanisms for detecting that they do not. We provided initial evidence that such a mechanism exists (Bland, Zahn, Elliott, Taylor, & Hill, 2021). We presented adults with stimuli, which varied by focus and domain to test the prediction that individuals will be alerted to domain incongruence by stimuli with a personal focus (such as the other person complains because you forgot their birthday) presented in the work domain, but not in the romantic domain. We found that such domain incongruent stimuli were associated with frontoinsular activation, which also predicted shorter reaction times to identifying incongruence, consistent with the idea that this mechanism supports rapid social action.

Thus, based on the social domains hypothesis, we predict that romantic relationships require more comprehensive and detailed mentalizing, than other social domains. We also propose that if these are also more mistake prone, the level of detailed discussion of thoughts and feelings within romantic relationships compared to other domains, will allow for review and revision of mentalized interpretations, hence resulting in an adaptive form of hypermentalizing. Similarly, based on the attachment functions of romantic relationships (Hazan & Shaver, 1987; Hill et al., 2011), we expect that they are well suited to providing understanding and comfort in the face of emotional dysregulation associated with high levels of mentalizing, both accurate and inaccurate. Finally, romantic relationships provide the setting where understanding and misunderstanding can be talked over without detrimental effects of delay in social action.

We have reported romantic-friendship contrasts consistent with the idea that hypermentalizing will be better accommodated in romantic relationships than in friendships. When adults were asked, using a brief questionnaire how likely they were to 'show distress and look for comfort from' and 'to show anger and get into an argument with' mean scores on both items were significantly higher for romantic partners than for friends (Hill, Jones, Williams, & Morriss, 2018). The implication is that intense emotions are expected and regulated more in romantic relationships than in friendships. We conducted a functional imaging study to examine differences in emotion regulation resources between romantic and friendship relationships (Morriss, Bell, Johnstone, Van Reekum, & Hill, 2019). Participants completed functional magnetic imaging sessions in which they underwent a scan in the presence of a romantic partner or friend, whilst completing a threat of shock task. In the presence of a romantic partner, contrasted with the friend condition, amygdala activation to threat reduced over time. Furthermore, in the presence of a romantic partner versus friend we observed greater subgenual anterior cingulate cortex and ventromedial prefrontal cortex activation to threat, consistent with activation of emotion regulatory mechanisms associated with affiliative processes specifically in the presence of a romantic partner.

Social domain disorganization in borderline personality disorder

Adult psychiatric patients with BPD have higher levels of social domain disorganization than patients with avoidant PD, and with no PD (Hill et al., 2008; Morse et al., 2009). Domain organization and disorganization are assessed using the Revised Adult Personality Functioning Assessment (RAPFA), which evaluates functioning in the social domains of work, romantic relationships, friendships, nonspecific social interactions (strangers and acquaintances) and negotiations. Domain organization refers to the accurate identification by the individual of the demands of the domain and the expectations that each participant in the domain can have of one another, the appropriate level of emotional expression and its intentionality for the domain, and the extent of intimacy and emotional resources to be

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found in the domain. Domain disorganization is identified where processes that are appropriate in one domain appear in another, or where the balance of intensity or intimacy across the domains is skewed. This we propose will be associated with an impaired organization of domains-based hypermentalizing precisely because it is through adaptive mentalizing that domain organization characteristic of healthy personality functioning is achieved (McAdams, 2015; Sharp & Wall, 2021).

Hypothesis testing using the movie for the assessment of social cognition

In this study, and based on considerations reviewed earlier, we test the hypothesis, first, that within a nonclinical sample of adolescents, levels of hypermentalizing will be higher in relation to romantic interactions than to friendship interactions and in (nonspecific) interactions between strangers or acquaintances. We do this using the MASC, which has been used extensively in the study of mentalizing. Although it has not been designed to specifically examine the social domains organization of hypermentalization, it has a number of features, which make it suitable for a first test of the hypothesis. In the MASC, participants view a video recording of four young adults, two males two females, getting together for dinner in one of their homes (Dziobek et al., 2006). They are asked to make inferences about video characters' mental states. Three kinds of interaction are portrayed, between same-sex friends, between male–female strangers/acquaintances, and between the same protagonists but with increasing reference to dating possibilities between the males and females as the video progresses. The relationships between the characters were chosen to, 'vary the amount of intimacy their interactions are based on, and thus represent different social reference systems on which mental state inferences have to be made' (Dziobek et al., 2006, p. 626). The MASC is, therefore, designed to assess a general mentalizing capacity across social domains. However, the difference in social reference systems, which are portrayed provides an opportunity to examine hypermentalizing domain by domain. The nonspecific (stranger/acquaintances) interactions, and friendship interactions, in the MASC provide portrayals of social domains as envisaged in the hypothesis and as defined in the RAPFA. The MASC does not portray established romantic relationships; however, the male–female interactions shown as the dinner party progresses clearly make reference to the romantic processes and may be expected to activate social cognitions appropriate to romantic interactions.

The second hypothesis is that BPD features will be associated with a domains-based pattern of hypermentalizing, predicted by domain disorganization. That is, the difference between hypermentalizing with reference to romantic interactions, friendships and nonspecific interactions will be reduced in the presence of BPD features. In view of the association between BPD and depression we assessed depressive symptoms with the aim of controlling for them in analyses of the role of BPD features.

Methods

Participants

The community sample was recruited from public schools in a large metropolitan area in the southwestern United States (Sharp, Steinberg, Temple, & Newlin, 2014). Informed consent and assent were provided by legal guardians and adolescents, respectively. The study was approved by the Committee for the Protection of Human Subjects of the University of Houston. Inclusion criteria for study participation consisted of: (a) being 12–17 years of age, (b) sufficient fluency in English to complete all research, and (c) no mental disability as determined by educational records. The sample comprised 171 adolescents (121 girls, 50 boys), mean age = 15.42, *SD* = 1.253. The ethnic representation was Black = 31, Asian = 52, White = 15, Hispanic = 70. Ethnicity data were missing on three participants, and age on one, so for models including BPD features, *N* = 167. Data on adolescent depressive symptoms were missing on a further 10 participants, so for analyses controlling for depression, *N* = 157.

Measures

Mentalizing. Hypermentalizing was assessed using the MASC (Dziobek et al., 2006). Participants are asked to watch a 15-min film about four characters getting together for a dinner party. During administration of the task, the film is stopped 45 times during the plot and 45 questions referring to the characters' mental states (feelings, thoughts and intentions) are asked (e.g. What is Betty feeling?, What is Cliff thinking?), thus generating 45 responses for each participant. Participants are provided with four response options: (a) a hypermentalizing response, (b) an undermentalizing response, (c) a nonmentalizing response, and (d) an accurate mentalizing response. A summary score for each of the subscales, is derived from a count of the number of times the relevant response option has been endorsed. For example, if a hypermentalizing response was endorsed for 11 of the 45 sequences, this would generate a score of 11 for hypermentalizing. The MASC is a reliable instrument that has yielded replicated findings on hypermentalizing and BPD and has proven sensitive in detecting subtle mindreading difficulties in adults of normal IQ (Dziobek et al., 2006; Sharp et al., 2013; Wacker, Bölte, & Dziobek, 2017).

We identified that in the early sequences of the MASC, the two females (F1, F2) are portrayed as friends and so are the two males (M1, M2), and the four male–female pairings (F1 with M1, M2; F2 with M1, M2) are portrayed either as acquaintances (not well known to each other) or strangers (meeting for the first time). We examined how consistently these were identified by independent raters close in age to participants in this study, by showing three MASC sequences for each of the six participant pairs (i.e. F1 with F2, M1, M2; F2 with M1, M2; M1 with M2) to two classes of Masters students. Using Mentimeter with their ratings hidden so they could not see what others had rated, they were asked to indicate for each portrayed pair whether they represented a stranger/acquaintance (nonspecific), friendship or romantic relationship. A total of 34 students provided ratings. The rating of the male–female pairs as nonspecific (acquaintance/stranger) was endorsed by 92%, and of the friends' concordance was 100%. As the MASC

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does not portray identifiable romantic relationships, we did not conduct a similar exercise for the later interactions which we identified as having a romantic dynamic.

We generated domains-based scores, first by counting the number of mental state questions relating to friendship interactions. There were 10. We then took the first 10 questions in the video about male–female interactions, which occurred soon after introductions, to provide scores in relation to nonspecific social interactions, and the last 10 in the video to provide scores in relation to the romantic relationships domain. Some of the domains-based undermentalizing and nonmentalizing scores were too skewed for standard transformations, so they were summed yielding variables, which were normalized by log transformation.

Dimensional measure of BPD traits

The Borderline Personality Features Scale for Children (BPFSC; Crick, Murray-Close, & Woods, 2005) is a 24-item questionnaire measure that assesses borderline personality features in children and adolescents ages 9 and older. Responses are scored on a five-point Likert scale, ranging from 1 (not at all true) to 5 (always true) with higher total scores indicating greater levels of borderline personality features. Criterion validity has been reported (Chang, Sharp, & Ha, 2011) and in the present sample, internal consistency of this measure was good, with a Cronbach's α of .88.

Current depressive symptoms

Depressive symptoms were assessed using the Beck depression inventory (BDI), a widely used 21-item self-report measure (Beck, Steer, & Brown, 1996). BDI scores were available from 161 participants.

Data analyses

Skewed variables were log transformed for parametric analyses. Associations between total and domains-based hypermentalizing scores, BPD features, depressive symptoms and demographic variables were examined through *t*-tests, ANOVAs and correlational analyses. Repeated measures ANOVA was used to compare hypermentalizing scores across romantic, friends and nonspecific domains. In order to test for variations by BPD features, we adopted a dimensional approach consistent with much of the literature on personality disorders (Sharp & Wall, 2021) and indeed more broadly in relation to child and adolescent psychopathology (Waldman, Poore, van Hulle, Rathouz, & Lahey, 2016). The key analysis, therefore, in relation to BPD features was the test of the interaction between domains-based hypermentalizing and BPD features scores. In order to illustrate the moderator effect and to show whether there was a progressive effect across the distributions we created three groups. The highest scoring group was identified using a threshold for DSM diagnosis validated against a diagnostic interview (Chang et al., 2011) and the other two groups were generated using the median of BPFSC scores below threshold.

Results

Borderline personality disorder, depression and domains-based hypermentalizing scores were skewed and log transformation was effective in each case. There were no significant gender differences in age, BPD features, depressive symptoms or overall or domain based hypermentalizing scores (Table 1). Forty-four participants (26%) had BPFSC scores of 66 or higher, the previously validated threshold for DSM-defined BPD. The small group of Caucasian participants with BDI scores available ($N = 15$) had significant lower mean transformed depression scores than each of the other ethnic groups. The Hispanic participants had significantly higher mean BPD features scores than the White. Adolescent BPD features and depression scores were correlated, $r = .74$.

Table 2 shows the untransformed total MASC scores over 45 sequences and the scores for each of the 10 sequences representing the domains. Transformed scores were compared using repeated measures ANOVA and the F values of the models are shown in the table. As is evident in Table 2, and as shown in Figure 1 for transformed scores, there was a progressive increase in hypermentalizing scores across nonspecific interactions, friends' interactions and interactions with a romantic dynamic in the MASC. All of the pairwise comparisons of hypermentalizing were statistically significant, romantic versus friends ($p = .020$), romantic versus nonspecific ($p < .001$), friends versus nonspecific ($p = .001$). It is also evident from Table 2 that there was not a domains-based organization of correct mentalizing, but there were domains-based differences in low or nonmentalizing responses. Both pairwise comparisons with romantic sequences were highly significant ($p < .001$), but the nonspecific versus friends difference was nonsignificant versus friends difference was nonsignificant.

In repeated measures ANOVA controlling for age, gender and ethnicity these differences were modified by an interaction with total self-report BPFSC scores ($F = 7.501$, $p = .007$). As outlined earlier in order to illustrate the moderator effect, and to show whether there was a progressive effect across the distributions, we created three groups based on a validated threshold for a diagnosis of BPD and on the median score of those below the threshold. There was a statistically significant interaction in repeated measures ANOVA once again controlling for age and gender and ethnicity ($F = 3.50$, $p = .008$). Mean hypermentalizing scores by BPD group are shown in Table 3 and illustrated in Figure 2. There was a progressive effect of increasing BPD features. Those in the low BPD features group had the highest hypermentalizing counts for the late romantic sequences, but the lowest in the friends and the early nonspecific, while the high BPD group, above the diagnostic threshold, had the lowest hypermentalizing counts for romantic sequences and the highest for the friends and nonspecific sequences. The mid BPD features group showed an intermediate pattern.

Further repeated measures ANOVAs were conducted to find out whether the BPD features effect was accounted for by the associated depressive symptoms. Sample size for this analysis was smaller ($N = 157$) because of missing BDI data and so for

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Table 1 Summary statistics of study participants

	Range	Males ($N = 48$)	Females ($N = 119$)	Value of p
Age	12–18	15.65 (1.41)	15.33 (1.18)	.13
Borderline personality disorder (BPD) Features	26–90	54.29 (13.08)	55.52 (14.89)	.62
Above BPD threshold %		11 (24%)	33 (28%)	.58
Depression	0–40	9.82 (8.76)	10.65 (7.80)	.44
Total Hypermentalizing	0–14	6.60 (2.97)	6.15 (2.80)	.35

Means were compared using independent groups t-tests.
Proportions above BPD threshold were compared using χ^2.
Only four participants (2.4%) were under 14 years old and 95% of participants were aged 14–17.

Table 2 Means and standard deviations of total and domains-based mentalizing scores

		Domains-based scores – mean (*SD*) 10 sequences				
	Total 45 sequences	Nonspecific	Friends	Romantic	F value	p Value
Hypermentalizing	6.29 (2.82)	0.99 (1.02)	1.27 (1.16)	1.76 (1.32)	20.26	<.001
Correct mentalizing	32.52 (5.87)	7.21 (1.58)	7.06 (1.94)	7.33 (1.72)	1.54	.22
Under or nonmentalizing	5.38 (3.33)	1.62 (1.23)	1.50 (1.39)	0.89 (1.61)	37.94	<.001

The table shows the untransformed total movie for the assessment of social cognition scores over 45 sequences and the scores for each of the 10 sequences representing the domains. Transformed scores were compared using repeated measures ANOVA and the F values of the models are shown in the table.

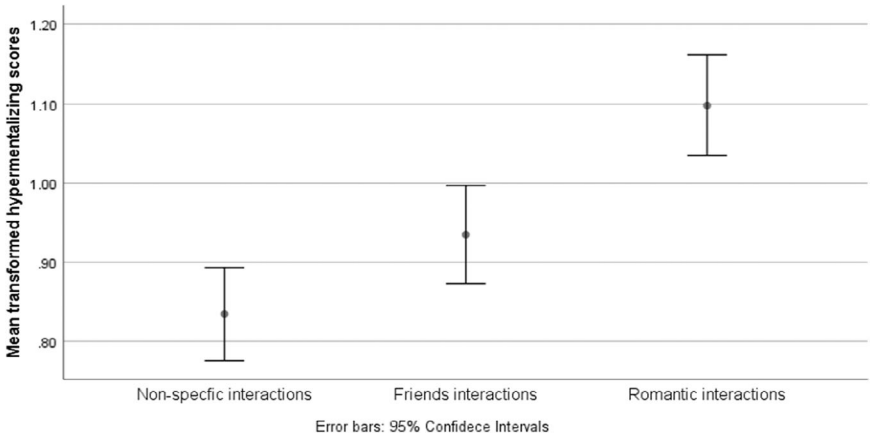

Figure 1 Mean and 95% CI transformed hypermentalizing scores in response to nonspecific, friends and romantic sequences in the movie for the assessment of social cognition

Table 3 Means and standard deviations of total and domains-based hypermentalizing scores overall and in borderline personality disorder (BPD) subgroups by low, mid and above diagnostic threshold

		Domains-based scores – mean (*SD*) 10 sequences per domain				
	Total 45 sequences	Nonspecific	Friends	Romantic	F	p
Hypermentalizing	6.29 (2.82)	0.99 (1.02)	1.27 (1.16)	1.76 (1.32)	20.26	<.001
Low BPD ($N = 60$)	6.35 (3.00)	0.85 (1.07)	1.13 (1.17)	2.21 (1.21)	27.65	<.001
Mid BPD ($N = 63$)	6.02 (2.76)	0.97 (0.97)	1.19 (1.05)	1.64 (1.54)	3.77	.026
BPD above diagnostic threshold ($N = 44$)	6.59 (2.73)	1.21 (1.02)	1.54 (1.28)	1.50 (1.05)	1.33	.270

The table shows the untransformed total movie for the assessment of social cognition scores over 45 sequences and the scores for each of the 10 sequences representing the domains. Transformed scores were compared using repeated measures ANOVA and the F values of the models are shown in the table.

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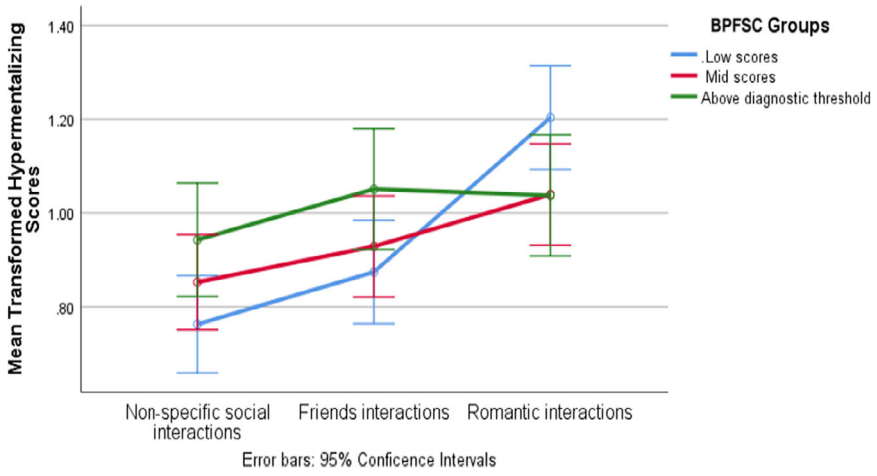

Figure 2 Mean and 95% CI transformed hypermentalizing scores in response to nonspecific, friends and romantic sequences in the movie for the assessment of social cognition, in low, mid and above DSM diagnostic threshold borderline personality disorder features groups

comparison, models omitting and then including depressive symptoms were run with this sample. Prior to the inclusion of depressive symptoms the interaction between hypermentalizing scores in each domain and BPD features was $F = 7.293$, $p = .008$, and this was somewhat reduced after inclusion of depressive symptoms to $F = 4.881$, $p = .029$. The domains-based hypermentalizing by depressive symptoms interaction was by contrast entirely nonsignificant ($p = .64$).

Discussion

The findings were consistent with our hypotheses that there is a social domains organization of hypermentalizing in adolescents and that BPD features are associated with differences in this organization. When nonclinical participants were asked to select among alternative interpretations of what participants in social interactions were thinking, feeling and meaning, their endorsement of hypermentalized items were lowest when viewing interactions between acquaintances and strangers on first meeting for dinner. They were higher when viewing interactions between friends, and yet higher when viewing flirtatious interactions later in the dinner. This demarcation was markedly diminished among adolescent with high BPD features an effect, which was seen after controlling for current depressive symptoms.

In interpreting the findings, it is important to keep in mind that the MASC was designed to assess a global mentalizing capacity across contrasting social contexts, and not to assess social contextual variations in mentalizing. In some respects, nevertheless, it is well suited to this purpose, because relationships in the nonspecific and friendship domains are portrayed, in ways which are close to their characterization in the RAPFA measure of personality functioning. Furthermore, there was very high agreement among independent raters on the identity of these domains. However, the MASC was limited in providing a test of the demarcation between these two domains and romantic interactions, because the portrayed romantic interactions are not between partners in established romantic relationships. As a consequence, it was not possible to find out whether independent raters could agree on the characterization of specific pairings as romantic, and we cannot assume that the mentalizing findings from this study will generalize to established romantic relationships. Furthermore, as the development of romantic dynamics was confounded with duration of the dinner, we cannot rule out that the differences were simply a function of how late in the dinner the portrayed sequences occurred.

Equally there are some features of the MASC, which make it well suited to the further study of hypermentalizing. First, by presenting different kinds of social scenario over a 15-min assessment it enabled us to find out whether adolescents vary their levels of hypermentalizing systematically even over short time spans. Thus, if hypermentalizing is trait-like, it also displays marked variations by context, implying that there may also be stability of situation specific profiles (Mischel, Shoda, & Mendoza-Denton, 2002). Second, by rating sequences between the same pairs, on first meeting, and also after the development of romantic dynamics, the MASC provides a control for any differences, which might arise from rating different pairs. Third, the MASC may be particularly well suited to examining mechanisms in assortative mating. Assortative mating for psychiatric disorders is well established (Plomin, Krapohl, & O'reilly, 2016), and risky partner choice is a key mechanism in continuity between adolescent and adult mental disorder (Rutter, 1992). Equally, for a vulnerable adolescent the establishment of a relationship with a supportive partner may be a key source of resilience (Hill et al., 2001; Quinton, Pickles, Maughan, & Rutter, 1993). By portraying social processes likely to be relevant to

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the establishment of romantic relationships the MASC may be particularly well suited to the study of social cognitive processes in romantic relationship establishment and hence lifespan continuities and discontinuities.

While our predictions were based on the hypothesis that hypermentalizing may be more or less adaptive depending on social domain, this is not the only possible interpretation of the observed linear increase by social domain in healthy adolescents. It may be that this association indicates that individuals may be more error-prone in their interpretations as the attachment demands of a task increases. Consistent with this idea, Bartels and Zeki (2004) showed in a neuroimaging study, that for conditions of both romantic and parental attachment relationships, a common set of regions associated with negative emotions, social judgment and 'mentalizing', became deactivated. They concluded that human attachment relies on mechanisms, which overcome social distance by deactivating networks used for critical social assessment and negative emotions, while it bonds individuals through the involvement of the reward circuitry. In this sense, the increasing hypermentalizing associated with increased attachment salience (nonspecific-friend-romantic partner) may simply reflect greater error proneness as general mentalizing capacity reduces. Further work is needed to clarify the meaning of our findings. Such work may also consider the impact of adverse life events on the moderating effects of social domain, especially in the context of borderline features, which are often associated with a history of adversity (Porter et al., 2020).

There may also be alternative interpretations of the patterns of hypermentalizing associated with BPD features. In particular the romantic interactions portrayed in the MASC are between males and females. As our work has shown (Reuter, Sharp, Kalpakci, Choi, & Temple, 2016) sexual orientations other than heterosexual are more common among adolescents with BPD features and so the high BPD scorers may have been less likely to have identified these interactions as romantic, hence the lower hypermentalizing scores in this group.

Irrespective of their interpretation the findings are consistent with the idea that individuals are able to modulate levels of hypermentalizing, either the amount of mentalizing or its error proneness, by social domain. We suggest that acquiring the capacity to moderate levels of hypermentalizing in this way is a key task for personality development. Further, our findings suggest that this capacity may be compromised in adolescents with elevated BPD features raising the possibility that they may deploy, or be prone to the risks associated with, hypermentalizing in relationships where it is less appropriate and may create vulnerability. For example if hypermentalizing is used in a context where opportunities for reviewing an incorrect interpretations of another's behaviour are limited, those misinterpretations may lead to conflict, or relationship breakdown, hence contributing to the relationship instability seen in BPD. More broadly, it seems likely that modulating mentalizing depending on context is a capability, which is compromised in BPD (Miano et al., 2017).

The study of social domains organization of hypermentalizing also offers possibilities for the investigation of developmental pathways to adolescent BPD. Associations between exposure to severe adverse experiences and adolescent BPD are well established (Sharp et al., 2020), but significantly limited by continuing uncertainty regarding the BPD phenotype (Gunderson, 2010). It is possible (even likely) that the broad phenotype is heterogeneous (Morse et al., 2009; Wright et al., 2016) and underpinned by several endophenotypes. Equally the endophenotype may extend across current diagnostic boundaries. Indeed, a recent meta-analyses suggested hypermentalizing to be a cross-diagnostic correlate of all major psychopathologies (McLaren et al., 2022). Generalized hyptermentalizing and impaired domains organization of hypermentalizing may both offer ways forward in the study of heterogeneity in BPD. Similarly, they may enhance the study of genetic influences for BPD (Bornovalova et al., 2013) and add specificity to the study of additive or interactive genetic and environmental effects (Fatimah et al., 2020). Furthermore, impairment of the social domains organization of hypermentalizing may contribute to transactional and interactional processes, such as effects of BPD features on parents and selection of risky peer groups in adolescent BPD (Kaufman, Victor, Hipwell, & Stepp, 2020; Runions, Wong, Pace, & Salmin, 2021).

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Key points

- Many types of psychopathology in adolescence, including Borderline Personality Disorder (BPD) are associated with mentalizing difficulties.
- According to the social domains hypothesis acquiring the ability for organized participation in different social domains is an important developmental achievement, crucial for healthy personality functioning.
- Borderline personality dysfunction is associated with 'domain disorganization'.
- We show for the first time an organization of hypermentalizing in adolescents, and impairment of this organization associated with BPD features, as predicted by the social domains hypothesis.
- Identifying mentalizing processes domain by domain has the potential to create focus for formulation and treatment plans for adolescents with personality difficulties.

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