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# Dysfunction of Empathy and Related Processes in Borderline Personality Disorder: A Systematic Review

Rui M. Salgado, MD, Raquel Pedrosa, MD, and António J. Bastos-Leite, MD, PhD, Habil

**Learning objectives:** After participating in this activity, learners should be better able to:

- Assess differences between adult patients with the diagnosis of borderline personality disorder (BPD) and healthy control subjects in terms of empathy and related processes
- Evaluate the effects of empathy or related processes as factors contributing to abnormal social functioning in BPD

**Abstract:** We reviewed 45 original research studies, published between 2000 and 2019, to assess differences between adult patients with the diagnosis of borderline personality disorder (BPD) and healthy control subjects in terms of empathy and related processes (i.e., theory of mind, mentalizing, social cognition, and emotional intelligence). Thirty-six studies reported deficits of empathy or related processes in patients with BPD. Enhanced emotional empathy in BPD was also reported in eight studies, all of which revealed that patients had increased scores of personal distress on the *Interpersonal Reactivity Index* self-report questionnaire. Six studies did not find significant differences between patients with BPD and healthy control subjects in terms of empathy or related processes. No study reported enhanced cognitive empathy, social cognition, or emotional intelligence in patients with BPD. We postulate that deficits of empathy or related processes contribute to preempting the formation of stable interpersonal relationships, whereas enhanced emotional empathy might lead to personal (and interpersonal) distress, further contributing to abnormal social functioning in BPD.

**Keywords:** borderline personality disorder, emotional intelligence, empathy, mentalization, mentalizing, neuroimaging, social cognition, theory of mind

## INTRODUCTION

Borderline personality disorder (BPD) is characterized by a pervasive pattern of instability in interpersonal relationships, self-image, affects, and behavior, as well as by marked impulsivity.<sup>1</sup>

From the University of Porto, Faculty of Medicine; Department of Psychiatry, Hospital de São João (Dr. Pedrosa) (both Portugal).

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**Correspondence:** António José de Bastos Leite, University of Porto, Faculty of Medicine, Department of Medical Imaging, Alameda do Professor Hernâni Monteiro, 4200-319 Porto, Portugal. Email: abastosleite@med.up.pt

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BPD is a chronic and debilitating mental disorder, whose estimated median prevalence is 1.6%.<sup>1</sup> It is associated with frequent episodes of self-injury and with high mortality, and has the highest degree of suicidality among personality disorders.<sup>1-3</sup>

As postulated by Gunderson,<sup>4</sup> affective instability, impulsivity, and disturbed relationships represent the three core symptom dimensions of BPD. Crucially, disturbed relationships have been proposed as the best discriminator for the diagnosis of BPD and are increasingly recognized as being essential to understand the impairment and distress associated with the disorder.<sup>4</sup>

## Empathy and Related Concepts

*Empathy* is commonly used as a lay term indicating the ability to understand “others”—the capacity to “put yourself in someone else’s shoes.” However, from the psychological, developmental, and cognitive neuroscience points of view, the concept of empathy is complex<sup>5,6</sup> and embodies different dimensions. The most well-known dimensions of empathy are the following: cognitive and emotional. In addition, motor empathy has been proposed as a distinct dimension representing the imitation of motor responses (e.g., facial expressions, vocalizations, postures, and movements) of “others.”<sup>5</sup> This dimension has been incorporated in models underlying empathy across a wide range of animal species.<sup>7,8</sup>

*Emotion recognition* refers to the identification of emotions from expressions (e.g., facial). The identification of

emotions subsequently enables one to infer emotional states. Human faces are a rich source of information regarding subjective emotional states and social communication.<sup>9</sup> This information is a prerequisite for (emotional) empathy.

*Emotional empathy* is conceptualized as the ability to respond to emotional states of “others”<sup>10</sup> in a sympathetic manner (i.e., by experiencing them vicariously). Such a state-matching reaction has been related to the *mirror neuron system*.<sup>11,12</sup> This system corresponds to a set of specialized neurons, primarily located in the premotor cortex, that are believed to be engaged in “mirroring” the behavior and actions of others.<sup>12</sup> The hypothesis that emotional empathy could be related to this system is supported by functional neuroimaging data showing decreased activation at the right pars opercularis of the inferior frontal gyrus—a part of the mirror neuron system—in children with reduced empathy (e.g., as in autism spectrum disorder), during both imitation and observation of facial emotional expressions.<sup>13</sup>

It is increasingly recognized that emotional and cognitive empathy are interconnected.<sup>8</sup> *Cognitive empathy* is the ability to take the perspective of “others” without necessarily being sympathetic or experiencing it vicariously.<sup>5</sup> According to Blair,<sup>5</sup> cognitive empathy is, in effect, the *theory of mind* (ToM).

ToM refers to the ability of attributing significance to mental states (e.g., beliefs, desires, feelings, intentions, needs, thoughts, and reasons) of “self and others” in order to understand, explain, and predict behaviors.<sup>14,15</sup> The concept of *affective ToM* has also been proposed to capture the importance of emotion (and emotion recognition) in attributing significance to mental states. Therefore, emotion recognition can help to differentiate affective ToM from the purely cognitive characteristics of ToM.<sup>16,17</sup>

Another concept closely related to ToM is *mentalization* (i.e., mentalizing). Mentalizing corresponds to the ability to understand and interpret the mental states of “oneself and others.”<sup>18,19</sup> Although the term *mentalizing* does not refer to quite the same phenomenon as ToM<sup>20</sup>—mentalizing mostly refers to an affective and self-oriented dimension, whereas ToM mostly implies cognitive understanding and attribution of significance to mental states of “others”—the terms are often used interchangeably.<sup>21</sup>

*Social cognition* mostly includes information processing about “others, the self, and the norms of the social world.”<sup>22</sup> It is also a broad concept encompassing processes such as emotion recognition, empathy, ToM, and mentalizing, and contributes to the ability of an individual to understand and effectively respond to the perspectives of “others,” enabling humans to establish and maintain interpersonal relationships.<sup>23</sup>

Finally, *emotional intelligence* includes perceiving, assimilating, understanding, and managing emotions.<sup>24,25</sup>

In summary, empathy, ToM, mentalizing, social cognition,<sup>26</sup> and emotional intelligence are closely related concepts. Although they are all different from one another, and authors have conflicting and often confusing views about them, it is widely believed that impairment of the underlying mental processes occurs in several psychiatric disorders.

## Dysfunction of Empathy and Related Processes in Borderline Personality Disorder

Dysfunction of empathy and related processes in patients with BPD has been widely suggested. Fonagy<sup>27</sup> first described the inability of perceiving mental states in BPD as a probable defense mechanism to early trauma, physical abuse (e.g., sexual), and dysfunctional family relationships. Using a questionnaire aimed at assessing adult representation of attachment by means of memories from their childhood—the Adult Attachment Interview developed by Carol George, Nancy Kaplan, and Mary Main in the mid-1980s—Fonagy and colleagues<sup>28</sup> confirmed the existence of deficits in the awareness of mental states contributing to the pattern of interpersonal dysfunction in BPD. Likewise, deficits related to inaccurate attribution and representation of behaviors are believed to be characteristic of patients with BPD.<sup>29</sup> Furthermore, mentalization-based therapy was found to be effective in patients with BPD.<sup>30</sup>

Nevertheless, the results are inconsistent regarding the role of empathy and related processes as a source of disturbed interpersonal relationships in BPD. A key example here is the *empathic paradox* that occurs in patients with BPD. The empathic paradox, or *borderline empathy paradox*, is characterized by enhanced empathy, in spite of impaired interpersonal functioning.<sup>26,31,32</sup> In other words, it corresponds to a peculiar ability of certain patients with BPD to recognize even subtle emotional states of others, without the corresponding ability to facilitate interpersonal relationships.

The purpose of this review is to assess differences in empathy and related processes (i.e., ToM, mentalizing, social cognition, and emotional intelligence) between patients with BPD and healthy subjects.

## METHODS

### Literature Search and Selection Criteria

The PubMed database was searched for articles that were published in English and used the term *borderline personality disorder* and any of the following: *empathy*, *theory of mind*, *mentalizing*, *mentalising*, *mentalization*, *mentalisation*, *social cognition*, or *emotional intelligence*. In order to include further peer-reviewed articles of interest in the field of psychology, an additional search—using the same terms—was performed on the PsycINFO database. The closing date for the searches was 31 December 2019.

All publications were scrutinized to confirm whether they were substantively related to the purpose of the current review. We selected original research articles involving adult patients with the main diagnosis of BPD using criteria from the third revised,<sup>33</sup> fourth revised,<sup>34</sup> and fifth<sup>1</sup> editions of the *Diagnostic and Statistical Manual of Mental Disorders*. We also used criteria from the tenth revised edition of the *International Classification of Diseases*<sup>35</sup> for the “emotionally unstable personality disorder, borderline type.” Mandatory inclusion criteria were the use of measures of empathy or related processes and also the existence of a group of healthy control subjects in the studies. Given that patterns of abnormal brain functioning may underlie empathic

dysfunction in patients with BPD, studies using functional neuroimaging in this setting were also included.

Review articles (e.g., including those providing meta-analytic results), commentaries, and editorials that exclusively addressed the theoretical background of BPD were not included. Nevertheless, publications addressing empathy and related concepts in BPD were surveyed for bibliographic references indicating original research articles of interest not found in the PubMed and PsycINFO searches.

Results of studies based on emotion-recognition tasks without an explicit mention of empathy or related processes were excluded, as were studies on borderline personality symptoms, traits/features, or attachment style, and studies specifically including adolescents in their samples. Furthermore, studies about biological mediators, type and effects of therapies (e.g., mentalization-based therapy), and pharmacological modulation in BPD were excluded.

Supplemental Figure 1 presents a flow diagram showing how the included studies were selected (available at <http://links.lww.com/HRP/A125>).

### Measures of Empathy and Related Processes

A major challenge in assessing empathy and related processes is the availability of tests developed that take into account real-life conditions.<sup>36</sup> Moreover, applied tests are expected to be reliable enough to “represent” mental processes underlying the theoretical concepts discussed above. We report results of studies using well-known, published, or “ecologically valid” tests for assessing empathy or related processes in BPD. Specifically, the ecological validity of a test refers to how well it mirrors real-life conditions and, therefore, how clinically useful the test might be.

Tests used in more than one of the included studies for this review are described below under separate subsections, in chronological order of the earliest publication. In a subsequent subsection, the test used to assess emotional intelligence is also described. Tests less often used (i.e., only used in a single included study) are described under a common subsection entitled “Other Measures.”

**INTERPERSONAL REACTIVITY INDEX** The *Interpersonal Reactivity Index* (IRI)<sup>10</sup> is a self-report questionnaire aimed at evaluating empathy in a two-dimensional way (i.e., cognitive and emotional). The IRI consists of four 7-item subscales: two cognitive subscales (perspective taking [PT] and fantasy [FS]) and two emotional subscales (empathic concern [EC] and personal distress [PD]). The score of each subscale corresponds to the results of a 5-point Likert scale (possible range of scores per item: 0–4 or 1–5).

**HAPPÉ’S ADVANCED TOM TEST** There are two different implementations of *Happé’s advanced ToM test*, also known as the “strange stories” task,<sup>37–39</sup> to assess ToM capacities in patients with BPD.

Arntz and colleagues<sup>40</sup> used the most complete implementation of this test. Their version consists of a mental and a physical subtest, each comprising eight stories on small illustrations. The mental subtest presents two stories involving double bluffs, mistakes, persuasion, and white lies (i.e.,

harmless or trivial lies, to avoid hurting the feelings of others). This subtest evaluates ToM by requiring inferences concerning the thoughts, feelings, and intentions of the characters. The physical subtest includes stories requiring the inference of physical causation, irrespective of the characters’ mental states. Incorrect answers are scored 0; implicit or partly correct answers are scored 1; and explicit, complete answers are scored 2. The maximum possible score is 16 per subtest. An average score for each subtest can also be calculated.<sup>40</sup>

Yeh and colleagues<sup>41</sup> used a simpler and less well-characterized implementation of this test. This implementation includes only five stories, and the maximum possible score is 10.

**FAUX PAS DETECTION TEST** The *Faux Pas* task<sup>42,43</sup> is believed to assess both cognitive and affective ToM capacities. Questions are made about a set of written stories, for the detection of a faux pas, which literally means a “misstep” and is actually defined by Baron-Cohen and colleagues<sup>43(p 408)</sup> as a sort of communication “without considering if it is something that the listener might not want to hear or know, and which typically has negative consequences that the speaker never intended.” It involves the inference of mental states and emotions of the characters in the stories. The various implementations of this test differ mainly in the number and type of questions used, and subsequently regarding the possible range of scores. Usually, this test comprises a set of 20 stories, but one implementation uses only 10.<sup>41</sup>

**READING THE MIND IN THE EYES TEST** The *Reading the Mind in the Eyes Test* (RMET), revised version,<sup>44</sup> assesses ToM capacities. This test relies on the observation of 36 black-and-white photographs of the eye region of different human faces. Participants are asked to choose, from four available mental-state descriptors (e.g., annoyance, amusement, bewilderment, reflectiveness), the descriptor that best matches the mental state of the person whose eyes are represented in each photograph, without any specific time constraint. If necessary, a glossary containing the meaning of the mental-state descriptors can be presented during assessment. The total score is the number of correctly identified mental-state attributions (possible range of scores: 0–36). To ascertain mental-state decoding on the basis of emotional valence, Harkness and colleagues<sup>45</sup> and Scott and colleagues<sup>46</sup> differentiated the stimuli into positive, neutral, and negative, each ranked by the observer on a 7-point Likert scale. To evaluate the confidence rating of responses on the RMET, Schilling and colleagues<sup>47</sup> asked subjects to rate how confident they were about their responses.

Additional implementations of the RMET have been proposed. Preißler and colleagues<sup>36</sup> used a total number of 40 photographs instead of 36. Frick and colleagues<sup>48</sup> presented the possible choices of mental state attributions after each photograph’s display, as well as time limits for such display and the mental-state decoding. The latter implementation is especially well suited for functional magnetic resonance imaging (fMRI) studies.

**EMPATHY QUOTIENT** The *Empathy Quotient* (EQ)<sup>49,50</sup> is a self-report questionnaire comprising 60 items, 40 of which aimed

to assess empathy using a 4-point Likert scale: definitely agree, slightly agree, slightly disagree, and definitely disagree. A non-empathetic response is rated 0, and an empathetic response is rated 1 or 2, depending on the strength of the response (resulting in total scores from 0 to 80).

**MOVIE FOR THE ASSESSMENT OF SOCIAL COGNITION** The *Movie for the Assessment of Social Cognition* (MASC)<sup>51</sup> questionnaire relies on a nearly 15-minute video showing interactions between four characters gathering for a dinner party. Dominant topics of the interactions between characters involve dating and friendship issues. The video is paused during its presentation so that questions about the characters' feelings, thoughts, and intentions (i.e., requiring social cognition) can be answered by selecting the most accurate response among the four available options. The three types of error (for each question) are considered to correspond to overmentalizing, reduced ToM, and no ToM. Reduced or no ToM corresponds to undermentalizing errors. The MASC has 15 items "challenging the interpretation of emotions," 14 items "challenging the interpretation of intentions," 4 items to "measure thoughts," and 4 control questions. Correct responses are scored 1, and incorrect responses are scored 0. An overall score, as well as different subscale scores, can be calculated. Andreou and colleagues<sup>52</sup> evaluated the confidence rating of responses on the MASC.

**MULTIFACETED EMPATHY TEST** The *Multifaceted Empathy Test* (MET)<sup>53</sup> is a computer-assisted method comprising 23 pairs of picture stimuli showing people in emotionally charged conditions. It allows assessment of both cognitive and emotional empathy. Cognitive empathy is assessed by inferring the mental states of individuals displayed in photographs (one correct attribution out of four possible mental-state descriptors). Emotional empathy is evaluated by rating the emotional reactions of subjects in response to the pictures; a 9-point Likert empathic-concern subscale is used.

Dziobek and colleagues<sup>54</sup> proposed an adaptation of the MET for fMRI, using a series of 80 less ambiguous pictures and a two-option answer for both the cognitive- and emotional-empathy subscales. Ritter and colleagues<sup>55</sup> evaluated emotional empathy not only using the empathic-concern subscale but also scoring emotional contagion (i.e., mirroring emotions) with a 0–9 point visual analogue scale. Finally, Wingenfeld and colleagues<sup>56,57</sup> proposed a modified version of the MET using 30 picture stimuli.

**REFLECTIVE FUNCTIONING QUESTIONNAIRE** The *Reflective Functioning Questionnaire* (RFQ)<sup>58</sup> is a mentalizing self-report measure with responses to specific items scored on a 6- to 7-point Likert scale, rescored from 0–2 or 0–3 both for a subscale of certainty (RFQ\_C) and a subscale of uncertainty (RFQ\_U) about mental states of self and others. The RFQ provides measures of empathy, mindfulness, and perspective taking, both associated with self- and clinician-reported measures of borderline personality features.<sup>58</sup>

**MAYER-SALOVEY-CARUSO EMOTIONAL INTELLIGENCE TEST** The *Mayer-Salovey-Caruso Emotional Intelligence Test* (MSCEIT)<sup>25</sup> is a performance-based measure to assess the following four branches (skills) of emotional intelligence: perceiving emotions, assimilating or using emotions to facilitate thought, understanding emotions, and regulating or managing emotions. Each of the four skills is measured with two tasks. Different scoring methods are implemented for each task.<sup>25</sup>

**OTHER MEASURES** The *Picture Sequencing Task* consists of 11 stories, each in the form of a four-card picture set,<sup>59</sup> and an additional story designed to detect a false belief.<sup>60</sup> A short version of this test or the *False-Belief Picture Sequencing Task* uses 10 stories in patients with BPD, 4 of which assess simple cognitive understanding of false beliefs (involving cognitive ToM).<sup>61</sup>

The *Mental State Attribution Tasks* (MSAT)<sup>62</sup> assess ToM capacities. The MSAT total (MSAT-T) score corresponds to the sum of the MSAT event sequencing (MSAT-S) plus the MSAT questionnaire (MSAT-Q) subscores. The MSAT-S comprises six cartoon picture stories, each represented by four cards, indicating three specific types of social interaction: a cooperation between two subjects, one subject tricking another, and two subjects cooperating to deceive a third one. It tests the ability of the participants to order cards in a logical sequence of events, and the corresponding subscore is based upon a rating method proposed by Langdon and colleagues.<sup>59</sup> The maximum possible subscore for the MSAT-S is 36. The MSAT-Q comprises 23 questions to test the ability of participants to recognize the characters' mental states (e.g., cooperation, deception, and beliefs). Each correct answer on the MSAT-Q corresponds to a subscore of 1. Therefore, the possible range of scores for the MSAT-T is 0–59. According to Ghiassi and colleagues,<sup>63</sup> the MSAT-Q subscore is considered to be "the most interesting component" of the MSAT to assess ToM capacities in patients with BPD.

The *Theory of Mind Assessment Scale*<sup>64,65</sup> consists of a semistructured interview assessing cognitive and affective ToM capacities. Its current implementation uses 37 open-ended questions divided into four scales by means of which participants are prompted to express understanding of their mental states and those of others.

The *Joke-Appreciation*<sup>66</sup> and *Nonverbal ToM*<sup>41</sup> tasks correspond to novel measures of ToM capacities partly based on Happé's advanced ToM test. Both address implicit or nonverbal ToM and were included as valid measures for this review. Likewise, the *Questionnaire of Cognitive and Affective Empathy*<sup>67</sup> is a relatively novel instrument for assessing empathy partly based on the Interpersonal Reactivity Index and Empathy Quotient self-report questionnaires.

Self-report mentalizing abilities can be assessed using the *Mentalization Questionnaire* (MZQ)<sup>68</sup> or the *Mentalization Scale* (MentS).<sup>69</sup> Although none of these measures is clearly related to other well-known tests, their reliability was reported to be satisfactory.<sup>68,69</sup>

| <b>Table 1</b>  |  |   |
|---|--|---|
| <b>Samples and Main Findings of Studies Using the Interpersonal Reactivity Index as a Measure of Empathy in BPD</b>   |  |   |
| Guttman & Laporte (2000) <sup>72</sup>  | 27 women with BPD<br>28 women with anorexia nervosa<br>27 healthy control women                              | PT =; FS =; EC ↑**; PD ↑**                              |
| Harari et al. (2010) <sup>17</sup>  | 20 patients with BPD (18 women)<br>22 healthy control subjects (19 women)                                    | PT + FS ↓*; EC + PD =                                   |
| Dziobek et al. (2011) <sup>54</sup>   | 21 women with BPD<br>21 healthy control women  | PT =; FS =; EC =; PD ↑**                                |
| Ritter et al. (2011) <sup>55</sup>  | 27 patients with BPD (25 women)<br>47 patients with NPD (24 women)<br>53 healthy control subjects (29 women) | PT ↓*; EC ↓*  |
| New et al. (2012) <sup>76</sup>   | 79 patients with BPD (53 women)<br>76 healthy control subjects (48 women)                                    | PT ↓*; FS =; EC =; PD ↑***                              |
| Matzke et al. (2014) <sup>79</sup>  | 28 women with BPD<br>28 healthy control women  | PT =; FS =; EC =; PD ↑***                               |
| Petersen et al. (2016) <sup>61</sup>  | 19 patients with BPD (18 women)<br>20 healthy control subjects (19 women)                                    | PT ↓**; FS =; EC =; PD ↑*                               |
| Flasbeck et al. (2017) <sup>83</sup>  | 46 women with BPD<br>47 healthy control women  | PT ↓***; FS =; EC =; PD ↑***                            |
| Flasbeck et al. (2017) <sup>84</sup>  | 50 women with BPD<br>48 healthy control women  | PT ↓***; FS =; EC =; PD ↑***                            |
| Homan et al. (2017) <sup>85</sup>   | 17 patients with BPD (10 women)<br>18 healthy control subjects (11 women)                                    | PT ↓*; FS =; EC ↓*; PD =                                |
| Martin et al. (2017) <sup>86</sup>  | 22 women with BPD<br>23 healthy control women  | PT + FS ↓**; EC + PD ↑***; PT ↓***; FS =; EC =; PD ↑*** |
| BPD, borderline personality disorder; EC, empathic concern; FS, fantasy; NPD, narcissistic personality disorder; PD, personal distress; PT, perspective taking; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects; ↑, increased relative to healthy control subjects. *p < .05; **p < .01; ***p < .001 |  |   |

Finally, Niedtfeld<sup>70</sup> used an approach to assess emotional empathy in BPD based on the relative contribution of facial expressions, prosody, and speech content. This approach was previously used in healthy subjects and in patients with psychiatric conditions other than BPD.<sup>71</sup>

### Analysis

All studies were analyzed as to whether they reported decreased, similar, or increased levels of empathy or related processes in patients with BPD relative to healthy control subjects, according to the statistical thresholds used in the corresponding publications (Tables 1–10).

### RESULTS

Forty-five studies, published between 2000 and 2019, were included in this review.<sup>17,36,40,41,47,48,52,54–57,61,63,69,70,72–101</sup> Thirteen (28.9%) of the 45 studies comprised samples of patients with psychiatric conditions other than BPD,<sup>40,41,52,55,72,74,77,81,82,87,91,97,100</sup> including other personality disorders, major depressive disorder (MDD), attention-deficit/hyperactivity disorder (ADHD), schizophrenia, substance abuse disorder, and anorexia nervosa

(Tables 1–4 and 6–10). All but two studies<sup>47,82</sup> reported sex distributions for patients with the diagnosis of BPD. The female-to-male ratio of patients included in studies reporting sex distribution was 8:1.

### Interpersonal Reactivity Index

Eleven (24.4%) of the 45 studies included in this review used the IRI as a measure of empathy (Table 1).<sup>17,54,55,61,72,76,79,83–86</sup>

**INTERPERSONAL REACTIVITY INDEX COGNITIVE SUBSCALES** Seven studies using the perspective-taking subscale of the IRI found a significant reduction of the corresponding scores in patients with BPD relative to healthy control subjects.<sup>55,61,76,83–86</sup> Three studies did not find significant differences of PT scores between groups.<sup>54,72,79</sup>

No study found a significant difference of fantasy scores between patients with BPD and healthy control subjects.<sup>54,61,72,76,79,83–86</sup>

Harari and colleagues<sup>17</sup> and Martin and colleagues<sup>86</sup> calculated the sum of scores from both cognitive subscales of the IRI (i.e., the PT + FS score). Both studies revealed an overall deficit of cognitive empathy in patients with BPD.<sup>17,86</sup>

**Table 2****Samples and Main Findings of Studies Using Happé's Advanced ToM Test as a Measure of ToM Capacities in BPD**

|                                   |  |       |
|-----------------------------------|--|-------|
| Arntz et al. (2009) <sup>40</sup> | 16 women with BPD<br>16 women with Cluster C personality disorders<br>28 healthy control women               | ToM = |
| Yeh et al. (2017) <sup>41</sup>   | 40 patients with BPD (37 women)<br>34 patients with MDD (32 women)<br>36 healthy control subjects (33 women) | ToM = |

BPD, borderline personality disorder; MDD, major depressive disorder; ToM, theory of mind; =, no significant difference relative to healthy control subjects.

**INTERPERSONAL REACTIVITY INDEX EMOTIONAL SUBSCALES** Eight studies using the personal-distress subscale of the IRI found enhanced distress in patients with BPD.<sup>54,61,72,76,79,83,84,86</sup> One study did not find a significant difference of PD scores between patients and controls.<sup>85</sup>

Two studies reported impaired,<sup>55,85</sup> and one study reported enhanced, empathic concern in patients with BPD,<sup>72</sup> but the vast majority of studies did not find significant differences of EC scores between patients and controls.<sup>54,61,76,79,83,84,86</sup>

In parallel with their calculations regarding the cognitive subscales, Harari and colleagues<sup>17</sup> and Martin and colleagues<sup>86</sup> also calculated the sum of scores from both emotional subscales of the IRI (i.e., the EC + PD score). Martin and colleagues<sup>86</sup> reported enhanced emotional empathy in patients, whereas Harari and colleagues<sup>17</sup> did not.

**Happé's Advanced ToM Test**

Two (4.4%) of the 45 studies included in this review used Happé's advanced ToM test (Table 2).<sup>40,41</sup> None of them found a significant difference between patients with BPD

and healthy control subjects in terms of ToM capacities as assessed by this test.<sup>40,41</sup>

**Faux Pas Detection Test**

Six (13.3%) of the 45 studies included in this review used the Faux Pas detection test as a measure of ToM capacities (Table 3).<sup>17,41,61,78,88,94</sup> Five of these studies found significant deficits of ToM in patients with BPD.<sup>17,61,78,88,94</sup> One study did not find a significant difference between patients and controls in recognizing faux pas.<sup>41</sup>

Two of these six studies independently analyzed the cognitive and affective domains of ToM.<sup>17,78</sup> Both studies found deficits of cognitive ToM in patients with BPD. Baez and colleagues<sup>78</sup> also found deficits of affective ToM in patients, whereas Harari and colleagues<sup>17</sup> did not.

**Reading the Mind in the Eyes Test**

Thirteen (28.9%) of the 45 studies included in this review used the RMET to assess ToM capacities (Table 4).<sup>36,47,48,61,73,78,80,88,89,91,98,99,101</sup>

**Table 3****Samples and Main Findings of Studies Using the Faux Pas Detection Test as a Measure of ToM Capacities in BPD**

|  |  |   |
|--|--|---|
| Harari et al. (2010) <sup>17</sup>     | 20 patients with BPD (18 women)<br>22 healthy control subjects (19 women)                                    | ToM ↓***<br>Cognitive ToM ↓*<br>Affective ToM = |
| Baez et al. (2014) <sup>78</sup>       | 15 patients with BPD (12 women)<br>15 healthy control subjects (13 women)                                    | Cognitive ToM ↓*<br>Affective ToM ↓*            |
| Petersen et al. (2016) <sup>61</sup>   | 19 patients with BPD (18 women)<br>20 healthy control subjects (19 women)                                    | ToM ↓***  |
| Yeh et al. (2017) <sup>41</sup>        | 40 patients with BPD (37 women)<br>34 patients with MDD (32 women)<br>36 healthy control subjects (33 women) | ToM =   |
| Zabihzadeh et al. (2017) <sup>88</sup> | 44 patients with BPD (21 women)<br>25 healthy control subjects (12 women)                                    | ToM ↓**   |
| Pluta et al. (2018) <sup>94</sup>      | 30 women with BPD<br>38 healthy control women  | ToM ↓**   |

BPD, borderline personality disorder; MDD, major depressive disorder; ToM, Theory of Mind; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects.

\*p < .05; \*\*p < .01; \*\*\*p < .001

| <b>Table 4</b>   |  |  |
|--|--|--|
| <b>Samples and Main Findings of Studies Using the Reading the Mind in the Eye Test as a Measure of ToM Capacities in BPD</b> |  |  |
| Fertuck et al. (2009) <sup>73</sup>  | 30 patients with BPD (26 women)<br>25 healthy control subjects (15 women)                                    | RMET total ↑***<br>Positive valence ↑*<br>Neutral valence ↑***<br>Negative valence =                                     |
| Preißler et al. (2010) <sup>36</sup>   | 64 women with BPD<br>38 healthy control women  | RMET total =   |
| Frick et al. (2012) <sup>48</sup>  | 21 women with BPD<br>20 healthy control women  | RMET total ↑**<br>Positive valence ↑*<br>Neutral valence =<br>Negative valence ↑**                                       |
| Schilling et al. (2012) <sup>47</sup>  | 31 patients with BPD<br>27 healthy control subjects  | RMET total =<br>Positive valence =<br>Neutral valence =<br>Negative valence =<br>High confidence rating**                |
| Baez et al. (2014) <sup>78</sup>   | 15 patients with BPD (12 women)<br>15 healthy control subjects (13 women)                                    | RMET total =   |
| Unoka et al. (2015) <sup>80</sup>  | 78 patients with BPD (74 women)<br>76 healthy control subjects (69 women)                                    | RMET total ↓*<br>Positive valence ↓**<br>Neutral valence ↓**<br>Negative valence =                                       |
| Petersen et al. (2016) <sup>61</sup>   | 19 patients with BPD (18 women)<br>20 healthy control subjects (19 women)                                    | RMET total =<br>Positive valence ↓**<br>Neutral valence =<br>Negative valence =  |
| Zabihzadeh et al. (2017) <sup>88</sup>   | 44 patients with BPD (21 women)<br>25 healthy control subjects (12 women)                                    | RMET total ↑**<br>Positive valence ↓ <sup>a,**</sup> or ↑ <sup>b,**</sup><br>Neutral valence ↓**<br>Negative valence ↑** |
| Anupama et al. (2018) <sup>89</sup>  | 20 patients with BPD (17 women)<br>20 healthy control subjects (17 women)                                    | RMET total ↓**<br>Positive valence ↓*<br>Neutral valence ↓***<br>Negative valence =                                      |
| Berenson et al. (2018) <sup>91</sup>   | 64 patients with BPD (51 women)<br>49 patients with APD (26 women)<br>60 healthy control subjects (43 women) | RMET total =<br>Positive valence =<br>Neutral valence =<br>Negative valence =  |
| Duque-Alarcón et al. (2019) <sup>99</sup>  | 18 women with BPD<br>15 healthy control women  | RMET total =   |
| Van Heel et al. (2019) <sup>98</sup>   | 79 patients with BPD (58 women)<br>79 healthy control subjects (58 women)                                    | RMET total ↓*<br>Positive valence ↓*<br>Neutral valence =<br>Negative valence =  |
| Zegarra-Valdivia & Chino Vilca (2019) <sup>101</sup>   | 20 women with BPD<br>20 healthy control women  | RMET total ↓**   |

APD, avoidant personality disorder; BPD, borderline personality disorder; Negative valence, RMET negative emotional valence; Neutral valence, RMET neutral emotional valence; Positive valence, RMET positive emotional valence; RMET, Reading the Mind in the Eyes Test; ToM, theory of mind; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects; ↑, increased relative to healthy control subjects.

<sup>a</sup> In patients with BPD and comorbid major depressive disorder.  
<sup>b</sup> In patients with BPD without comorbid major depressive disorder.  
\*p < .05; \*\*p < .01; \*\*\*p < .001

| <b>Table 5</b>  |   |         |
|---|---|---------|
| <b>Samples and Main Findings of Studies Using the Empathy Quotient as a Measure of Empathy in BPD</b>                                   |   |         |
| Matzke et al. (2014) <sup>79</sup>  | 28 women with BPD<br>28 healthy control women                             | EQ ↓*   |
| Lind et al. (2019) <sup>96</sup>  | 30 patients with BPD (28 women)<br>30 healthy control subjects (28 women) | EQ ↓*** |
| BPD, borderline personality disorder; EQ, Empathy Quotient; ↓, decreased relative to healthy control subjects.<br>*p < .05; ***p < .001 |   |         |

Four studies reported lower,<sup>80,89,98,101</sup> and three studies reported higher,<sup>48,73,88</sup> RMET total scores in patients with BPD relative to healthy control subjects, but six studies did not find a significant difference between patients and controls in the RMET total score.<sup>36,47,61,78,91,99</sup> Schilling and colleagues<sup>47</sup> reported a pattern of high confidence ratings for correct and incorrect answers in patients.

Nine studies assessed emotional valences on the RMET.<sup>47,48,61,73,80,88,89,91,98</sup> Table 4 presents detailed information regarding the diversity of results from these studies.

### Empathy Quotient

Two (4.4%) of the 45 studies included in this review used the EQ as a measure of empathy (Table 5).<sup>79,96</sup> Both studies found reduced EQ scores in patients with BPD relative to healthy control subjects.<sup>79,96</sup>

### Movie for the Assessment of Social Cognition

Seven (15.6%) of the 45 studies included in this review used the MASC as a measure of ToM or mentalizing and social cognition (Table 6).<sup>36,52,55,56,81,97,99</sup>

| <b>Table 6</b>  |  |  |
|---|--|--|
| <b>Samples and Main Findings of Studies Using the Movie for the Assessment of Social Cognition as a Measure of ToM Capacities in BPD</b>  |  |  |
| Preißler et al. (2010) <sup>36</sup>  | 64 women with BPD<br>38 healthy control women  | MASC total ↓**<br>Challenging emotions ↓*<br>Challenging intentions ↓**<br>Measure thoughts ↓* |
| Ritter et al. (2011) <sup>55</sup>  | 27 patients with BPD (25 women)<br>47 patients with NPD (24 women)<br>53 healthy control subjects (29 women)                         | MASC total ↓*<br>Challenging emotions =<br>Challenging intentions ↓*<br>Measure thoughts =     |
| Wingenfeld et al. (2014) <sup>56</sup>  | 38 women with BPD<br>35 healthy control women  | Challenging emotions =<br>Challenging intentions =<br>Measure thoughts =                       |
| Andreou et al. (2015) <sup>52</sup>   | 44 patients with BPD (38 women)<br>36 patients with schizophrenia (16 women)<br>38 healthy control subjects (22 women)               | Overmentalizing errors ↑*<br>Undermentalizing errors =<br>Overconfidence in errors***          |
| Vaskinn et al. (2015) <sup>81</sup>   | 25 women with BPD<br>25 women with schizophrenia<br>25 healthy control women   | MASC total =<br>Overmentalizing errors ↑*<br>Undermentalizing errors =                         |
| Duque-Alarcón et al. (2019) <sup>99</sup>   | 18 women with BPD<br>15 healthy control women  | MASC total =<br>Overmentalizing errors =<br>Undermentalizing errors =                          |
| Normann-Eide et al. (2019) <sup>97</sup>  | 53 patients with BPD (48 women)<br>34 patients with other personality disorders (21 women)<br>71 healthy control subjects (29 women) | MASC total =<br>Overmentalizing errors ↑**<br>Undermentalizing errors =                        |
| BPD, borderline personality disorder; Challenging emotions, MASC “challenging the interpretation of emotions” subscale; Challenging intentions, MASC “challenging the interpretation of intentions” subscale; MASC, Movie for the Assessment of Social Cognition; Measure thoughts, MASC “measure thoughts” subscale; NPD, narcissistic personality disorder; ToM, theory of mind; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects; ↑, increased relative to healthy control subjects.<br>*p < .05; **p < .01; ***p < .001 |  |  |



| <b>Table 7</b>   |  |  |
|--|--|--|
| <b>Samples and Main Findings of Studies Using the Multifaceted Empathy Test as a Measure of Empathy in BPD</b> |  |  |
| Dziobek et al. (2011) <sup>54</sup>  | 21 women with BPD<br>21 healthy control women  | MET cognitive ↓*<br>MET emotional ↓*                     |
| Ritter et al. (2011) <sup>55</sup>   | 27 patients with BPD (25 women)<br>47 patients with NPD (24 women)<br>53 healthy control subjects (29 women) | MET cognitive =<br>MET emotional ↓***                    |
| Wingenfeld et al. (2014) <sup>56</sup>   | 38 women with BPD<br>35 healthy control women  | MET cognitive =<br>MET emotional =                       |
| Wingenfeld et al. (2018) <sup>57</sup>   | 47 women with BPD<br>47 healthy control women  | MET cognitive =<br>MET emotional ↓ <sup>a, **</sup> or = |

BPD, borderline personality disorder; MET, Multifaceted Empathy Test; MET cognitive, MET cognitive subscale; MET emotional, MET emotional subscale; NPD, narcissistic personality disorder; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects.  
<sup>a</sup>Under a stress condition.  
 \*p < .05; \*\*p < .01; \*\*\*p < .001

Two studies found reduced MASC scores in patients with BPD relative to healthy control subjects.<sup>36,55</sup> In particular, they found an average reduction of 4.6 points in the MASC total score, as well as an average reduction of 1.7 points in the score specifically measuring items “challenging the interpretation of intentions” in patients with BPD.<sup>36,55</sup> With respect to items “challenging the interpretations of emotions” and regarding the capacity to “measure thoughts,” Preißler and colleagues<sup>36</sup> found lower scores in patients with BPD relative to controls, whereas Ritter and colleagues<sup>55</sup> did not find a significant difference between groups.

Although four studies did not find significant differences of MASC scores between patients with BPD and healthy control subjects,<sup>56,81,97,99</sup> three studies revealed an increase of overmentalizing errors in patients.<sup>52,81,97</sup> In addition, one study revealed “overconfidence in errors” as the major abnormality in BPD.<sup>52</sup>

**Multifaceted Empathy Test**

Four (8.9%) of the 45 studies included in this review used the MET as a measure of empathy (Table 7).<sup>54-57</sup>

On the MET cognitive subscale, Dziobek and colleagues<sup>54</sup> found deficits of cognitive empathy in women with BPD, but no other study found a significant difference between patients with BPD and healthy control subjects on this subscale.<sup>55-57</sup>

On the MET emotional subscale, two studies found deficits of emotional empathy in patients with BPD.<sup>54,55</sup> Specifically, these studies found an average reduction of 0.9 points in the “emphatic concern” subscale score of patients with BPD relative to healthy control subjects.<sup>54,55</sup> One of these studies also found impaired “emotional contagion” in patients.<sup>55</sup>

Two studies by Wingenfeld and colleagues<sup>56,57</sup> did not find significant differences of emotional empathy between women with BPD under usual conditions and healthy control women, but one of these studies reported deficits of emotional empathy in women with BPD under stress.<sup>57</sup>

**Reflective Functioning Questionnaire**

Three (6.7%) of the 45 studies included in this review used the RFQ as a measure of mentalizing (Table 8).<sup>87,90,93</sup>

Perroud and colleagues<sup>87</sup> found higher RFQ\_U and lower RFQ\_C scores in patients with BPD relative to healthy

| <b>Table 8</b>  |  |  |
|---|--|--|
| <b>Samples and Main Findings of Studies Using the Reflective Functioning Questionnaire as a Measure of Mentalizing in BPD</b> |  |  |
| Perroud et al. (2017) <sup>87</sup>   | 108 patients with BPD (101 women)<br>101 patients with ADHD (41 women)<br>236 healthy control subjects (154 women) | RFQ_U ↑***<br>RFQ_C ↓***                   |
| Badoud et al. (2018) <sup>90</sup>  | 55 women with BPD<br>105 healthy control women   | RFQ_C – RFQ_U ↓***                         |
| Morandotti et al. (2018) <sup>93</sup>  | 59 patients with BPD (42 women)<br>154 healthy control subjects (89 women)   | RFQ_U ROC curve (AUC): 78%<br>cutoff = 4.5 |

ADHD, attention-deficit/hyperactivity disorder; AUC, area under the curve; BPD, borderline personality disorder; RFQ, Reflective Functioning Questionnaire; RFQ\_C, RFQ certainty subscale; RFQ\_U, RFQ uncertainty subscale; ROC, receiver operating characteristic; ↓, decreased relative to healthy control subjects, ↑, increased relative to healthy control subjects;  
 \*\*\*p < .001

**Table 9****Samples and Main Findings of Studies Using the Mayer-Salovey-Caruso Emotional Intelligence Test in BPD**

|   |   |   |
|---|---|---|
| Hertel et al. (2009) <sup>74</sup>  | 19 women with BPD<br>35 patients with substance abuse disorder (9 women)<br>31 patients with MDD (21 women)<br>94 healthy control subjects (63 women) | MSCEIT total ↓**<br>Perceiving emotions =<br>Assimilating emotions =<br>Understanding emotions ↓***<br>Managing emotions ↓* |
| Beblo et al. (2010) <sup>75</sup>   | 19 patients with BPD (16 women)<br>20 healthy control subjects (17 women)   | MSCEIT total =<br>Perceiving emotions =<br>Assimilating emotions =<br>Understanding emotions =<br>Managing emotions =       |
| Peter et al. (2013) <sup>77</sup>   | 61 patients with BPD (57 women)<br>69 patients with other personality disorders (44 women)<br>248 healthy control subjects (150 women)                | MSCEIT total =<br>Perceiving emotions =<br>Assimilating emotions =<br>Understanding emotions ↓*<br>Managing emotions =      |
| Hurtado et al. (2016) <sup>82</sup>   | 15 patients with BPD<br>19 patients with schizophrenia<br>18 healthy control subjects   | MSCEIT total ↓**<br>Perceiving emotions ↓*<br>Assimilating emotions =<br>Understanding emotions ↓*<br>Managing emotions =   |
| Peter et al. (2018) <sup>100</sup>  | 85 patients with BPD (69 women)<br>39 patients with Cluster C personality disorders (23 women)<br>69 healthy controls (44 women)                      | MSCEIT total ↓*<br>Perceiving emotions =<br>Assimilating emotions =<br>Understanding emotions ↓*<br>Managing emotions =     |
| Lind et al. (2019) <sup>96</sup>  | 30 patients with BPD (28 women)<br>30 healthy control subjects (28 women)   | MSCEIT total =  |
| Assimilating emotions, MSCEIT “assimilating emotions” subtest; BPD, borderline personality disorder; Managing emotions, MSCEIT “managing emotions” subtest; MDD, major depressive disorder; MSCEIT, Mayer-Salovey-Caruso Emotional Intelligence Test; Perceiving emotions, MSCEIT “perceiving emotions” subtest; Understanding emotions, MSCEIT “understanding emotions” subtest; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects.<br>*p < .05; **p < .01; ***p < .001 |   |   |

control subjects. Likewise, Badoud and colleagues<sup>90</sup> calculated the RFQ total score by subtracting the RFQ\_C score from the RFQ\_U score. The result was a negative value for the subtraction (−4.4) in patients with BPD, and a positive value (+7.5) in healthy controls.<sup>90</sup>

The main purpose of a study by Morandotti and colleagues<sup>93</sup> was to differentiate patients with BPD from healthy subjects by using receiver operating characteristic curves. Their study found that the RFQ\_U score was particularly useful for such a differentiation and also for predicting BPD severity.<sup>93</sup>

#### Mayer-Salovey-Caruso Emotional Intelligence Test

Six (13.3%) of the 45 studies included in this review used the MSCEIT as a measure of emotional intelligence (Table 9).<sup>74,75,77,82,96,100</sup> Four of these studies found deficits of emotional intelligence in patients with BPD.<sup>74,77,82,100</sup> Two studies did not find significant differences of emotional intelligence between patients and controls.<sup>75,96</sup>

#### Other Measures

Table 10 summarizes results of the eight studies (17.8%) using other measures of empathy and related processes.

The Questionnaire of Cognitive and Affective Empathy revealed decreased cognitive empathy, but similar levels of emotional empathy, in patients with BPD relative to healthy control subjects.<sup>92</sup> Curiously, in women with BPD, Niedtfield<sup>70</sup> found enhanced emotional contagion secondary to nonverbally expressed emotions (i.e., ones just conveyed by emotionally charged facial expressions and prosody, but not by speech content) and lack of emotional empathy when both speech content and nonverbally expressed emotions were presented.<sup>70</sup>

The Joke-Appreciation and the Nonverbal ToM tasks revealed deficits of ToM in patients with BPD.<sup>41,61</sup> Colle and colleagues<sup>95</sup> also reported ToM deficits using the Theory of Mind Assessment Scale and found them to be more pronounced when mindreading tasks of patients required them to undertake an “allocentric” perspective—that is, the perspective of another individual. Likewise, the Mentalization Questionnaire and the Mentalization Scale revealed deficits of mentalizing abilities in BPD.<sup>69,89</sup>

The False-Belief Picture Sequencing Task and the Mental State Attribution Tasks did not reveal significant differences between patients with BPD and healthy control subjects in

| <b>Table 10</b>   |  |  |   |
|---|--|--|---|
| <b>Samples and Main Findings of Studies Using Other Measures of Empathy and Related Processes in BPD</b>  |  |  |   |
| Ghiassi et al. (2010) <sup>63</sup>   | 50 patients with BPD (46 women)<br>20 healthy control subjects (13 women)                                    | Mental State Attribution Tasks (measure of ToM)                                  | MSAT-S =<br>MSAT-Q =<br>MSAT-T =                |
| Petersen et al. (2016) <sup>61</sup>  | 19 patients with BPD (18 women)<br>20 healthy control subjects (19 women)                                    | False-Belief Picture Sequencing Task<br>Joke-Appreciation task (measures of ToM) | Cognitive ToM =<br>ToM ↓**                      |
| Niedtfeld (2017) <sup>70</sup>  | 34 women with BPD<br>32 healthy control women  | Facial expressions, prosody, and speech content (measure of emotional empathy)   | Emotional contagion ↑*<br>Emotional empathy ↓** |
| Yeh et al. (2017) <sup>41</sup>   | 40 patients with BPD (37 women)<br>34 patients with MDD (32 women)<br>36 healthy control subjects (33 women) | Nonverbal ToM tasks (measure of ToM)   | ToM ↓***  |
| Anupama et al. (2018) <sup>89</sup>   | 20 patients with BPD (17 women)<br>20 healthy control subjects (17 women)                                    | Mentalization Questionnaire (measure of mentalizing)                             | MZQ ↓***  |
| Dimitrijević et al. (2018) <sup>69</sup>  | 62 patients with BPD (42 women)<br>62 healthy control subjects (42 women)                                    | Mentalization Scale (measure of mentalizing)                                     | MentS ↓*  |
| Colle et al. (2019) <sup>95</sup>   | 20 patients with BPD (14 women)<br>20 healthy control subjects (14 women)                                    | Theory of Mind Assessment Scale (measure of ToM)                                 | ToM ↓**   |
| Grzegorzewski et al. (2019) <sup>92</sup>   | 30 women with BPD<br>38 healthy control women  | Questionnaire of Cognitive and Affective Empathy (measure of empathy)            | QCAE cognitive ↓**<br>QCAE emotional =          |
| <p>BPD, borderline personality disorder; MDD, major depressive disorder; MentS, Mentalization Scale; MSAT, Mental State Attribution Tasks; MSAT-S, MSAT event-sequencing subscore; MSAT-Q, MSAT questionnaire subscore; MSAT-T, MSAT total score; MZQ, Mentalization Questionnaire; QCAE, Questionnaire of Cognitive and Affective Empathy; ToM, Theory of Mind; ↓, decreased relative to healthy control subjects; =, no significant difference relative to healthy control subjects ↑, increased relative to healthy control subjects;</p> <p>*p &lt; .05; **p &lt; .01; ***p &lt; .001</p> |  |  |   |

terms of ToM.<sup>61,63</sup> Ghiassi and colleagues<sup>63</sup> reported, however, that parental care during childhood influenced ToM capacities of patients with BPD as assessed by the MSAT; maternal rejection and punishment, taken together, were found to be a significant predictor of poor mentalizing in BPD.<sup>63</sup>

### Summary of Results Across Studies

Thirty-six studies included in this review reported deficits of empathy (i.e., cognitive or emotional), ToM, mentalizing, social cognition, or emotional intelligence in patients with BPD.<sup>17,36,41,47,52,54,55,57,61,69,70,74,76–90,92–98,100,101</sup>

Eight studies reported enhanced emotional empathy in patients with BPD, mostly because of an increase in the PD subscale scores of the IRI.<sup>54,61,72,76,79,83,84,86</sup> Curiously, three

studies using the RMET also revealed enhanced ToM capacities in patients with BPD.<sup>48,73,88</sup>

Contradictory results between distinct tests for assessing empathy and related processes were reported in three studies.<sup>54,79,88</sup> The study by Dziobek and colleagues<sup>54</sup> showed deficits of both cognitive and emotional empathy on the MET but revealed enhanced emotional empathy on the basis of the PD subscale of the IRI. Matzke and colleagues<sup>79</sup> reported deficits of empathy on the basis of the EQ but found enhanced emotional empathy on the basis of the PD subscale of the IRI. Finally, Zabihzadeh and colleagues<sup>88</sup> found lack of ToM capacities in patients with BPD based on the Faux Pas detection test but found enhanced ToM capacities on the RMET.

Six studies showed no significant differences of empathy or related processes between patients with BPD and healthy control subjects.<sup>40,56,63,75,91,99</sup> With respect to the tests employed in these studies, Arntz and colleagues<sup>40</sup> used Happé's advanced ToM test; Beblo and colleagues,<sup>75</sup> the MSCEIT; Ghiassi and colleagues,<sup>63</sup> the MSAT; Wingenfeld and colleagues,<sup>56</sup> the MASC and the MET; Berenson and colleagues,<sup>91</sup> the RMET; and Duque-Alarcón and colleagues,<sup>99</sup> the RMET and the MASC.

### Comorbidities

Eight (17.8%) of the 45 studies included in this review analyzed the possible effect of comorbid psychiatric conditions on dysfunction of empathy and related processes in BPD.<sup>36,73,80,87,88,91,94,96</sup>

Preißler and colleagues<sup>36</sup> reported significantly lower MASC scores for items to “measure thoughts” in patients with BPD and comorbid posttraumatic stress disorder (PTSD) relative to patients without comorbid PTSD. In addition, this study found the following two significant predictors of poor social cognition: intrusive symptoms (a core feature of PTSD) and history of sexual trauma.<sup>36</sup>

Unoka and colleagues<sup>80</sup> reported higher RMET total, neutral valence, and negative valence scores in patients with BPD and major depressive episode relative to patients without this comorbidity. Zabihzadeh and colleagues<sup>88</sup> also reported higher RMET total and negative valence, but lower positive valence, scores in patients with BPD and comorbid MDD relative to patients without comorbid MDD. By using the Faux Pas detection test, this study found reduced ToM capacities in patients with BPD and comorbid MDD relative to patients without comorbid MDD.<sup>88</sup>

Finally, Perroud and colleagues<sup>87</sup> found higher RFQ\_U scores in patients with BPD and comorbid ADHD relative to patients without comorbid ADHD. No further significant contribution of comorbidities for the pattern of empathic dysfunction in BPD was reported.

### Neuroimaging

Two (4.4%) of the 45 studies included in this review assessed empathy or related processes in the setting of blood oxygenation level-dependent (BOLD) fMRI.<sup>48,54</sup>

Using an adaptation of the MET for fMRI, Dziobek and colleagues<sup>54</sup> found that patients with BPD showed less activation of the left superior temporal gyrus in a condition challenging cognitive empathy but found higher activation of the right insular cortex in a condition challenging emotional empathy.

Using the implementation of the RMET for fMRI, Frick and colleagues<sup>48</sup> found activation of multiple brain regions both in patients with BPD and healthy control subjects. The authors highlighted a pattern of enhanced activation of the right amygdala during positive emotional valence stimuli and a pattern of enhanced activation of the left amygdala during negative emotional valence stimuli in patients with BPD.

### DISCUSSION

Eighty percent of the studies included in this review reported deficits of empathy or related processes in patients with BPD.<sup>17,36,41,47,52,54,55,57,61,69,70,74,76–90,92–98,100,101</sup> Moreover, enhanced emotional empathy in BPD was reported in eight studies, all of which revealed that patients had increased scores of distress on the IRI self-report questionnaire.<sup>54,61,72,76,79,83,84,86</sup> Several studies found no significant differences between patients with BPD and healthy control subjects in terms of empathy or related processes,<sup>40,56,63,75,91,99</sup> and some even found contradictory results between distinct tests.<sup>54,79,88</sup> No study reported enhanced cognitive empathy, social cognition, or emotional intelligence in patients with BPD.

Clinical heterogeneity (i.e., differences in characteristics of patients) across samples partly explains the diversity of results reported by studies included in this review. Specifically, demographic factors (age, sex, and education), the severity of BPD symptoms, history of traumatic events, history of suicidal attempts, features leading to hospitalization, concurrent medication, and psychiatric comorbidities might have influenced the reported results. A key example here is the influence of childhood trauma and comorbid PTSD on the development of empathic dysfunction in BPD,<sup>36,102</sup> which leads to a practical inability in determining where the aberrations in empathy and related processes originated. Statistical variance due to small sample sizes might also have contributed to the diversity of results.

The measures used to assess empathy and related processes can also explain part of the results, and some tests might even be unable to detect abnormalities. An example is perhaps the RMET,<sup>44</sup> which—despite being the most frequently used test in studies included in this review<sup>36,47,48,61,73,78,80,88,89,91,98,99,101</sup>—was the test that most often did not detect differences between patients and controls,<sup>36,61,78,91,99</sup> and the only one revealing enhanced ToM capacities in patients with BPD.<sup>48,73,88</sup> Maybe the absence of stimuli resembling realistic social interactions on the RMET can explain the presumably inaccurate results.

The absence of realistic social interactions is also a common feature of performance-based tests using cartoons or illustrations to present stimuli, such as Happé's advanced ToM test, the False-Belief Picture Sequencing Task, and the MSAT. None of these tests revealed significant differences between patients with BPD and healthy subjects in terms of ToM.

In addition, results based on the IRI, EQ, RFQ, and other self-report measures should be interpreted with caution because these tests are dependent on the participants' ability to understand percepts, perspectives, and emotions—an ability potentially lacking in patients with mental disorders.

Alternatively, some of the applied measures might have disproportionately weighted different dimensions of empathy and related processes in patients with BPD. This can lead to somewhat discrepant results, such as those reported by Dziobek and colleagues,<sup>54</sup> in which a decrease of cognitive and emotional empathy was shown using the MET, whereas enhanced emotional empathy was revealed using the PD

subscale of the IRI. It is conceivable that the reason for such a discrepancy might be the absence of a specific measure of distress on the MET.

Lack of cognitive empathy, ToM, mentalizing, social cognition, or emotional intelligence was found to be a common feature among patients with BPD. This can explain a failure in their process of repairing disrupted social cooperation, which is a finding supported by neuroimaging data in the setting of an economic exchange game with healthy partners.<sup>103</sup>

The possible concomitance of reduced emotional empathy further diminishes the ability of patients with BPD to sustain social cooperation, but a most intriguing finding is the possible occurrence of the empathic paradox, or borderline empathy paradox, in these patients.<sup>31,32</sup> This is a form of enhanced emotional empathy enabling access to the emotions of others, which are possibly misinterpreted in the setting of interpersonal relationships. Put simply, it is possible that some patients with BPD may perceive and respond to subtle emotional cues that healthy subjects might otherwise ignore for the sake of socialization. The occurrence of this borderline empathy paradox has been related to a previous history of abuse during childhood, and is consistent with results of selected studies indicating enhanced emotional empathy and ToM.<sup>48,54,61,72,73,76,79,83,84,86,88</sup> Along these lines, a proposed model explains the borderline empathy paradox resulting from a combination of increased attention to social stimuli and dysfunctional processing of social information,<sup>31</sup> but the model needs to be confirmed. In addition, it is uncertain how patients with BPD interpret basic social information, and how well they use it to support interpersonal relationships.<sup>104</sup>

We did not include results of studies based on emotion-recognition tasks. Although this exclusion may be regarded as a limitation of the current review, it was intended to avoid possible confounds. As mentioned in the introduction, we consider emotion recognition as a prerequisite for empathy, but the possible occurrence of preserved or even enhanced emotion-recognition abilities is not necessarily a synonym of preserved empathy. In other words, although empathy and related processes are dependent on emotion recognition, an individual can be able to recognize emotions without being empathetic at all. We also did not include results of studies using unpublished<sup>105,106</sup> or not generalizable assessment measures of empathy-related processes,<sup>107</sup> and we did not include results of studies using other than “traditional ToM tasks.”<sup>108</sup>

Previous reviews have focused on dysfunction of empathy and related processes in patients with BPD.<sup>26,31,102,104,109–116</sup> The major advantage of the present review relative to former ones is the inclusion of a larger number of studies assessing a wider range of psychological processes, using tools that help to explain the abnormal social functioning in patients with BPD. Furthermore, we separately reported the possible role of comorbidities and also considered findings of neuroimaging studies. Most previous reviews were either nonsystematic<sup>26,102,104,109,110,112</sup> or had a different scope in terms of the

addressed psychological processes.<sup>111,113–116</sup> In particular, a substantial number of those reviews included studies on emotion recognition,<sup>31,104,112,116</sup> and some were also devoted to psychiatric conditions other than BPD.<sup>111,114,116</sup>

The heterogeneity of samples and assessment measures, the different implementations of the latter, and the discrepancies among concepts underlying the addressed psychological processes correspond to limitations of this review, leading to a practical inability to calculate valid effect sizes or to take a meta-analytic approach. A possible strategy to deal with this particular limitation in the future could be to develop and implement research domain criteria<sup>117</sup> as well as to use accurate, more homogeneous, and valid neuropsychological tools to assess empathic dysfunction in BPD.

Accordingly, no cutoffs to establish impaired empathic capacities in patients with BPD have been previously established in the literature, apart from a value of 4.5 reported by Morandotti and colleagues<sup>93</sup> for the RFQ\_U. It is relevant to point out that cutoff values have been previously proposed for tests applied to healthy subjects or in the setting of psychiatric conditions other than BPD. For instance, a cutoff of 30 has been proposed for the EQ in a study involving patients with Asperger’s syndrome or high-functioning autism.<sup>49</sup> The current absence of cutoffs for the vast majority of tests assessing empathy or related processes represents a limitation in conveying validated information regarding salient differences between patients with BPD and healthy control subjects. Future original research studies aimed at resolving this issue are warranted.

Another limitation was the scarce number of neuroimaging studies using valid assessment measures and conditions designed to test empathy and related processes in BPD. Most probably, the results of these studies are not generalizable and did not specifically confirm the involvement of brain regions considered as part of the mirror neuron system in the process of empathic dysfunction. Curiously, one study not fulfilling inclusion criteria for this review revealed decreased activation in brain regions belonging to that system, as well as increased activation of the amygdala.<sup>118</sup>

Also of note is that published functional neuroimaging studies in BPD have been diverse in terms of their designs, paradigms, and conditions, with results that still need to be integrated into a single, coherent picture. For instance, studies not included in this review found increased activation of the following regions of the brain in BPD: frontal pole, medial prefrontal, frontal, anterior cingulate, and temporal-parietal cortices, as well as the precuneus and the superior and middle temporal gyri.<sup>85,119,120</sup> Similarly, resting-state BOLD fMRI studies mostly reported decreased functional connectivity among several brain regions in patients with BPD.<sup>121,122</sup>

Structural neuroimaging studies have also been carried out in the setting of BPD. A widespread reduction of gray matter volume was demonstrated by using segmentation-based methods—including voxel-based morphometry and algorithms combining either analyses of cortical surface and

sulci,<sup>123,124</sup> or assessments of cortical thickness and source-based morphometry.<sup>125,126</sup> Regional abnormalities (e.g., in the limbic system) were also reported.<sup>127,128</sup> One study using diffusion tensor imaging revealed reduced fractional anisotropy of the inferior longitudinal fasciculus in adolescents, but not in adult patients, with BPD.<sup>129</sup>

Novel work is needed to clarify the underlying neurobiological mechanisms of empathy and related processes in patients with BPD via neuroimaging studies mapping psychopathology in combination with reliable neuropsychological assessment measures. Furthermore, it will be relevant to explore novel strategies to study neural substrates of social interaction in BPD. A key example here is *hyperscanning*—the use of simultaneous behavioral experiments in which participants can interact with each other while fMRI data are synchronously acquired from different scanners. With hyperscanning, a given pattern of brain activity can be consistently compared with the corresponding pattern of another brain.<sup>130</sup> This sort of strategy would be especially well suited to evaluate trust and sensitivity to rejection in patients with BPD, given that lack of trust and an increased or inappropriate (i.e., maladaptive) rejection sensitivity occur in these patients, and might contribute to their pattern of abnormal social functioning.<sup>131,132</sup> Furthermore, hyperscanning could be used to test the sense of belonging, acceptance, or inclusion of patients with BPD to specific social contexts.<sup>132</sup> Another strategy that could provide similar advances is the “second-person neuroscientific approach” to study social interaction. In simple terms, *second-person neuroscience* refers to studies in which there are real-time interactions, as opposed to simply observational contexts (sometimes referred to as *third-person neuroscience*).<sup>133</sup>

Further proposed dimensions of empathy, such as the *prosocial concern*,<sup>134</sup> and novel psychophysiological assessment measures, such as *ecological momentary assessment*,<sup>135,136</sup> should also be brought to the fore to evaluate patients with BPD. Prosocial concern, as proposed by Zaki and Oshner,<sup>134</sup> refers to an additional dimension to the concept of empathy, apart from “experience sharing” (largely related to emotional empathy) and “mentalizing” (largely related to cognitive empathy and ToM). By taking prosocial concern or motivation into account, it would be possible to assess how well an individual can help another on the basis of his own resources or both of theirs. Ecological momentary assessment involves a series of repeated measures of behaviors or physiological processes from participants engaging in real-life activities.<sup>135,136</sup>

In summary, a common finding in patients with BPD is dysfunction of empathy and related processes. This seems to contribute to their symptoms because a lack of cognitive or emotional empathy, ToM, mentalizing, social cognition, or emotional intelligence serves to preempt sustained social cooperation or to prevent its repair after disruption. In addition, enhanced emotional empathy or an excessive and inappropriate awareness of patients to emotions of others may occur. The authors postulate that such an inappropriate awareness might lead to emotional instability and intense personal (and interpersonal) distress, in keeping with results of

numerous studies revealing increased scores in the personal distress subscale of the Interpersonal Reactivity Index. This conclusion further helps to explain the unstable interpersonal relationships of patients with borderline personality disorder.

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