Empathy, compassion, and theory of mind in obsessive-compulsive disorder

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Objectives. Individuals with obsessive-compulsive disorder (OCD) often suffer from impairments in social functioning. This study investigates differences in empathy, compassion, and Theory of Mind (ToM) in individuals with OCD as a possible cause for social functioning deficits.

Design. Sixty-four individuals diagnosed with OCD and 62 healthy individuals completed a naturalistic behavioural task (EmpaToM) and a self-report measure (Interpersonal Reactivity Index, IRI).

Methods. Three preregistered repeated measures analyses of variance (ANOVAs).

Results. People with OCD exhibited higher empathy levels − namely increased sharing of others' suffering − in the EmpaToM task and reported more distress (IRI) compared with healthy individuals. Furthermore, no differences in compassion (EmpaToM) between both groups emerged, although people with OCD reported more concern for others (IRI) compared with healthy individuals. Concerning the ToM, no group differences were detected, neither in the behavioural task, nor self-report.

Conclusion. By investigating OCD with diverse scientific practices we shed light on the higher levels of empathy exhibited by individuals with OCD, which are relevant for clinical practice and our understanding of OCD symptomatology.

Practitioner Points

- People with obsessive-compulsive disorder show higher levels of empathy, that is the increased sharing of others' suffering, compared with healthy individuals in both a traditional self-report and a naturalistic task.

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- Regarding compassion, that is caring for others, their self-reported compassion was higher in people with OCD.
- In Theory of Mind, that is cognitively understanding the situation of another person, no differences have been found neither at self-report nor in a naturalistic task compared with healthy individuals.
- Independent of traditional interventions, it could prove useful to improve emotion regulation skills so people with OCD learn to cope with empathic distress. Furthermore, it might strengthen the treatment gains and lower dropout rates if the social mind and consequently social relationships become a topic in the treatment and prevention of OCD.

Individuals afflicted with mental disorders often suffer from problems in their interpersonal relationships (e.g., De Silva, McKenzie, Harpham, & Huttly, 2005; Eklund & Hansson, 2007). Obsessive-compulsive disorder (OCD) is characterized by *obsessions* (recurrent and unwanted thoughts or impulses) that evoke affective distress, and/or *compulsions* (repetitive rituals performed to reduce this distress). Recurrent topics are for example obsessions regarding contamination that are followed by the compulsion to inappropriately wash oneself or obsessions regarding responsibility for catastrophes followed by compulsive checking (Abramowitz, 2006). OCD often affects social relationships negatively (Adam, Meinlschmidt, Gloster, & Lieb, 2012; Lochner et al., 2003; Ruscio, Stein, Chiu, & Kessler, 2010). Individuals with OCD show severe impairments in psychosocial functioning, as symptoms interfere with socializing, close relationships, and ability to study or work (Lochner et al., 2003; Mavrogiorgou, Akyol, Siebers, Kienast, & Juckel, 2015). This is for example reflected in more impairment in their family lives compared to people with other disorders like social anxiety or panic disorder, and higher rates of divorce and separation than people without OCD (Lochner et al., 2003). Frequently, people with OCD involve others in their symptoms, persuading them to co-adapt compulsive rituals and avoidance behaviour (Abramowitz et al., 2013). Relatives and friends might comply out of rapport for the sufferer, although this involvement strains the quality of life for both involved (Stengler-Wenzke, Kroll, Matschinger, & Angermeyer, 2006a, 2006b), as well as their relationship satisfaction (Boeding et al., 2013) and family life (Cicek, Cicek, Kayhan, Uguz, & Kaya, 2013; Lochner et al., 2003; Wu et al.,l., 2016). The inconvenience that some people with OCD impose upon their family and friends seemingly stands in contrast to the high concern and responsibility for the well-being of others (Abramowitz, 2006), which are recurring topics of obsessive thoughts in OCD.

This seeming contradiction might be explained by differences in social understanding, which is fundamental for successful social interactions with others (Kanske, Böckler, Trautwein, & Singer, 2015). On a behavioural and neural basis, one can differentiate between three main facets of the social mind (Kanske, 2018) as follows: (a) *empathy* (i.e., affective empathy or experience sharing), feeling what other people feel (De Vignemont & Singer, 2006); (b) *compassion* (i.e., empathic care), a warm sense of care and the wish for the well-being of others, often linked to prosocial behaviour (Singer & Klimecki, 2014); and (c) *Theory of Mind* (ToM) (i.e., mentalizing, cognitive perspective-taking, fantasy, or cognitive empathy), reasoning about the beliefs, thoughts or emotions of others, that is understanding what other people feel (Decety and Jackson, 2004; Frith & Frith, 2006).

Interestingly, these three constructs have different underlying neural processes that work independently of each other (Kanske, Böckler et al., 2016a). Differential patterns of the social mind are shown in aggressive offenders, psychopathy, autism, schizophrenia, depression, or patients with brain lesions (for an overview, see Farrow & Woodruff, 2007). For example, people with higher trait aggression show impaired empathy but intact ToM (Winter, Spengler, Bermpohl, Singer, & Kanske, 2017) , whereas O'Connor

et al. (2002) describe depression as a 'disorder of concern for others' and suggest that empathy and depression are intertwined. Failures in efforts to help others increase the severity of depression, which leads to a vicious cycle. O'Connor and colleagues (2002) theorize that the interconnection is built by an exaggerated moral system and interpersonal guilt. The moral system, guilt, and concern for others are also common topics of intrusive thoughts in OCD (Jansen, Overgaauw, & De Bruijn, 2020). This suggests that empathy could also be overly active in OCD, not only because comorbid depression is common in people with OCD (Masellis, Rector, & Richter, 2003), which might affect social functioning, but it might be a social mind pattern that both disorders have in common. Since intrusive thoughts are highly stressful and stress leads to an impairment in ToM performance (Smeets, Dziobek, & Wolf, 2009), one could hypothesize both lower ToM performance and higher empathy in OCD, particularly because there are some overlapping brain regions that are considered to be involved in social understanding abilities and the neurobiology of OCD (Sayın, Oral, Utku, Baysak, & Candansayar, 2010). However, social cognition in OCD has been largely overlooked; only few studies have studied ToM, empathy, or compassion in OCD and existing literature shows mixed findings (Jansen et al., 2020):

(a) Some studies indicate higher levels of empathy for people with OCD (e.g., Fontenelle et al., 2009), while other results show lower self-reported affective empathy (Pino et al., 2016). However, few studies have been conducted on empathy in OCD (Jansen et al., 2020). (b) For compassion, self-report results suggest no difference between the healthy comparison group and individuals with OCD (Kang, Namkoong, Yoo, Jhung, & Kim, 2012). (c) Regarding ToM, some studies report lower ToM performance in OCD (Grisham, Henry, Williams, & Bailey, 2010; Kang et al., 2012), whereas others report either mixed results (Liu et al., 2017; Pino et al., 2016; Sayın et al., 2010) or no differences (Buhlmann, Wacker, & Dziobek, 2015; Mavrogiorgou et al., 2016). One possible reason for the mixed results is that most of these studies used self-report measures (e.g., Interpersonal Reactivity Index, IRI; Davis, 1983) or very basic behavioural tasks (e.g., Eyes Task, Hinting Task, Yoni task). Accordingly, this emphasizes the need of studying social cognition with more naturalistic stimuli to shed light on the specifics of social understanding in OCD.

The current study

We therefore want to gain a more detailed insight into the three different components of empathy (a) , compassion (b), and ToM (c) and analyse which of these social mind components are specifically linked to OCD. To address this question, the present study uses a naturalistic behavioural task and a self-report measure after provoking OC symptoms in participants with OCD, as difficulties in social interactions may not be present all the time but rather linked in a state-like fashion to OC symptoms. Healthy individuals were asked to undertake a worry provocation task to ensure comparability in arousal between the two groups.

(a) In line with O'Connor's , Berry, Weiss, and Gilbert (2002) theory for depression and Jansen et al.'s review (2020) suggesting heightened empathy levels in OCD, as well as the notion that morality and interpersonal guilt are common topics of intrusive thoughts in OCD, we hypothesize that empathy will be overly active in OCD. We therefore expect higher empathy scores in the EmpaToM for people with OCD and more self-reported personal distress (IRI) than the healthy comparison group.

(b) Given that people with OCD might involve close others in compulsive behaviour (Abramowitz et al., 2013) – thus prioritizing the reduction of personal stress over the time and effort that other people invest in them – we hypothesize that people with OCD show lower compassion levels than healthy individuals in the EmpaToM task and the self-report measurement (IRI, empathic concern scale).

(c) Concerning the ToM performance, we expect a difference between the two groups, given that previous studies have shown that stress leads to an impairment in ToM performance (Smeets et al., 2009) and lower ToM performance in people with OCD (Grisham et al., 2010; Kang et al., 2012). Mixed results in other studies (Liu et al., 2017; Pino et al., 2016; Sayın et al., 2010) might be explained by not being tested in a complex or naturalistic way. Therefore, we expect that people with OCD have lower ToM performance than healthy individuals in the EmpaToM task and self-report (IRI, perspective-taking and fantasy scales).

This study investigates the social mind pattern of OCD to advance our understanding of this burdensome disorder, which heavily affects the interpersonal relationships by those afflicted with OCD. By combining the self-report with a naturalistic behavioural task, this study may provide important insights into the underlying mechanisms of disturbed social behaviour in OCD.

Material and methods

Procedure

Assessment/study design

All variables were assessed within the framework of a larger treatment study (Clinical Trial Registration ID: NCT01483339; the EmpaToM was approved by the Ethical Committee at the Medical Faculty of Leipzig University as an additional assessment variable, Exner et al., in prep.). This is a preregistered study, whereby the preregistration can be accessed at osf.io/z9r3x/. Participants were recruited via newspaper, flyers, and web announcements. In response to the announcements, voluntary participants made a brief phone call and an appointment was set. People were invited to attend an assessment interview at the University of Leipzig or Philipps University of Marburg Outpatient Clinic. Healthy individuals received 10 Euros per hour as monetary compensation. Informed consent for the study was obtained from all participants. Trained diagnosticians checked the inclusion and exclusion criteria, and clinical measures of both groups were assessed (see measures).

Preceding the assessment of social mind variables all participants had to complete an anxiety activation task (for a detailed description of the tasks, see anxiety activation): given that our main question was how OCD symptoms affect the social mind we wanted to activate those symptoms prior to measurement. Participants with OCD had to undertake the Behavioral Avoidance Test (BAT; see measures), which activates anxiety. Correspondingly, healthy individuals had to undertake a worry induction to activate anxious feelings. To check whether the worry induction worked, the healthy comparison group had to fill in the German version of the Positive and Negative Affect Schedule (PANAS, see measures) before and after the anxiety task. Successful worry induction would be indicated by a change in mood.

Subsequently, outcome measures were assessed: all participants completed the EmpaToM (see measures) and a second behavioural measurement (Mindwandering Task, e.g., Kanske, Schulze, et al., 2016; Kanske, Sharifi, Smallwood, Dziobek, & Singer, 2017) –

which will not be analysed in this study – in randomized order. Finally, they filled in several self-report measures, including the German version of the IRI (see measures).

Participants

Sixty-four treatment-seeking individuals diagnosed with OCD (N = 26 male; 38 female; mean age = 34.2 years, SD = 9.85, range = 19 to 58) and 62 matched healthy individuals (N = 23 male; 38 female; one gave no information; mean age = 35.8 years, SD = 10.2, range = 21 to 63) were included in the study. Inclusion requirements for both people with OCD and the comparison group were being aged between 18 and 65, as well as being able to speak German. Additionally, all patients with a primary diagnosis of OCD (see assessment) confirmed by the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) score (see measures) with a cut-off score of 13 and above were offered to be part of a treatment study for OCD. Exclusion criteria were a current or past diagnosis of substance dependence, psychosis, a neurological condition, and intellectual disability. If participants with OCD took medication, they had to be on a stable medication regime for at least four weeks. Healthy individuals were only included if they had no mental disorder (see measures).

Measures

Clinical measures

First, participants with OCD were rated with the Structured Clinical Interview for DSM-IV (SCID), and healthy individuals with the SCID screening. The SCID is a structured diagnostic instrument for assessing DSM-IV disorders: it assesses mood disorders, psychotic disorders, substance use disorders, anxiety disorders, obsessive-compulsive and related disorders, eating disorders, somatic symptom disorders, sleep disorders, externalizing disorders (i.e., adult attention deficit hyperactivity disorder), and trauma- and stressor-related disorders. Subsequently, the Symptom Checklist 90 Revised (German version; Franke, 2002) – which assesses nine dimensions of psychopathology – was filled in by participants.

As inclusion criteria, people with OCD had to score at least 13 in the Y-BOCS (Goodman et al., 1989). The Y-BOCS is a clinician-rated assessment of OCD symptoms and severity (German version; Hand & Büttner-Westphal, 1991). In this study, the Cronbach's α for the Y-BOCS was .745.

The Beck Depression Inventory-II (BDI, German version; Hautzinger, Bailer, Worrall, & Keller, 1994) represents a standard self-report measurement of depressed mood. In this study, the Cronbach's α for the BDI was .933.

We considered symptom severity (Y-BOCS) and depression (BDI) as covariates in the EmpaToM task.

Anxiety activation tasks

To ensure that we measured the link between OCD symptoms and the social mind, we activated symptoms in participants with OCD. For symptom provocation, the BAT (Steketee, Chambless, Tran, Worden, & Gillis, 1996) has proven to be effective as tasks used for the BAT are difficult or impossible for OCD patients to undertake without significant anxiety or rituals (Grabill et al., 2008; Woods, Chambless, & Steketee, 2002).

The BAT has become a standard measure of avoidance behaviour in anxiety, and it is often used to evaluate treatment outcome in OCD (Arnaudova, Kindt, Fanselow, & Beckers, 2017), as it has been proven to demonstrate good convergent and divergent validity, as well as treatment sensitivity (Steketee et al. 1996; Najmi, Tobin, & Amir, 2012). In this study, the BAT was administered for three specific compulsive behaviours identified as being personally relevant for every participant. For example, if the general problem was 'washing', an associated BAT was conducted for specific tasks like touching specific objects and restraining from washing for a certain amount of time, with increasing difficulty (five steps). Performance is rated in terms of the degree of avoidance or ritualizing, as 0 (no avoidance/rituals), 1 (partial avoidance/rituals), or 2 (unable to do task). The instructions were as follows: 'What I'm going to ask you to do now is a test of your ability to approach a feared situation for as long as you comfortably can. It is not a test of courage. You are free to refuse to engage in the task, so you can end the task at any point. If you do wish to stop the task, please let me know.' (p.230, Najmi et al., 2012). Furthermore, participants reported their anxiety on a scale from 0 to 100 for each step.

To activate worry in healthy individuals and thus to make the two groups comparable, worry induction instructions were adapted from Vasey and Borkovec's (1992) Catastrophizing Interview Technique. The worry instructions asked participants to worry about a topic that they were currently concerned about and which remained unsolved. Instead of being interviewed, participants had 10 minutes to write down everything they were worrying about. Participants were informed that they could keep the paper or throw it away and were left alone in the room for the writing time. To control for effectiveness of the manipulation, the German adaptation of the PANAS (Krohne at al., 1996) – a self-report questionnaire to measure positive and negative affect – was applied before and after the worry induction. In this study, the Cronbach's α for the PANAS was .801 for the negative affect scale and .850 for the positive affect scale before and .880 for the negative affect scale and .846 for the positive affect scale after the anxiety task.

EmpaToM task

The EmpaToM task (Kanske et al., 2015) was employed to assess empathy, compassion, and ToM. Social affect is assessed in reaction to socio-affective videos, while the cognitive understanding of others is assessed as ToM reasoning. In the EmpaToM, naturalistic video stimuli depicting autobiographical narratives are presented. These 48 short video sequences – which are approximately 15 seconds each – differ in emotional valence (negative vs. neutral). After each video, participants perform two ratings: first, regarding the valence of their current emotional state (negative to positive, with strong negative emotion after a negative video indicating empathic affect sharing; *empathy measure*); and second, about the level of compassion that they felt for the person in the video ('none' to 'very much'; *compassion measure*). Participants moved a sliding rating scale without numbers, although for analysis responses in the ratings were coded from 0 (negative affect/no compassion) to 7 (positive affect/very much compassion). Subsequently, participants were asked to answer a multiple-choice question (maximum 14 seconds) with either ToM inference (e.g., false beliefs, irony, metaphors) or factual reasoning about the content of the video (*ToM measure*). ToM performance encompasses the participants' response accuracy and reaction time. Finally, participants were asked to rate how confident they felt about choosing the correct response. Put simply, this paradigm follows a 2 × 2 factorial design with videos depicting stories with a) negative vs. neutral emotional valence and b) ToM vs. no ToM demands in the stories. The

EmpaToM is a validated task by Kanske et al. (2015, Experiments 1a/b). More concretely: empathy and compassion ratings in the EmpaToM were validated with valence ($r = .37$, $p < 05$) and compassion ratings ($r = .59$, $p < .01$) in the Socio-affective video task (Klimecki et al., 2013). ToM performance was validated with the Imposing Memory Task (point biserial correlation $r = .28$, $p < .05$). Furthermore, fMRI analyses revealed clearly separable neural networks for empathy, compassion and ToM. The task was validated by a further study by Tholen et al. (2020) finding similar activation patterns across subject- and item-analyses.

Interpersonal reactivity index (IRI)

The Saarbrücker Persönlichkeitsfragebogen (Paulus, 2009) – the German Version of the IRI (Davis, 1983) – was applied to evaluate empathy. The questionnaire contains four sub-scales: perspective-taking, fantasy, empathic concern, and personal distress. Each sub-scale comprises four items. Perspective-taking measures the ability to see something from the psychological perspective of another person (self-reported ToM). The fantasy scale captures the tendency to put oneself in the emotional world of characters in novels or movies. The empathic concern scale is used to measure other-oriented feelings such as compassion or concern for persons in distress (self-reported compassion). The personal distress scale measures empathic self-focused feelings such as empathic discomfort (self-reported empathy). In this study, the Cronbach's α for the German version of the IRI was .840.

Statistical analyses

We used parametric tests for statistical analysis. Affect and compassion ratings as well as performance in ToM (see Kanske et al., 2015) were analysed as preregistered, with three separate repeated measures analyses of variance (ANOVAs). A 2×2 factorial design was applied with the within-subject factors *emotionality of video* (negative vs. neutral videos) and a between-subject factor *group* (OCD vs. comparison group) to analyse empathy and compassion ratings.

Second, ToM performance was analysed with a 2×2 factorial design with the within-subject factor *ToM* (ToM vs. factual reasoning) and the between-subject factor *group* (OCD vs. comparison group).

Finally, the Saarbrücker Persönlichkeitsfragebogen (German version of the IRI) was analysed using the sub-scales of perspective-taking, personal distress, fantasy, and empathic concern comparing participants with OCD and healthy participants. Significance was set at $p < .05$.

Power analysis

The relationship between (self-) compassion and general psychopathology has been estimated to be $r = -.54$ (MacBeth & Gumley, 2012). Effect sizes for group comparison with the EmpaToM vary between $\eta^2 = .12$ (main effect empathy between aggressive and control group), $\eta^2 = .55$ (main effect ToM between age groups, Reiter, Kanske, Eppinger, & Li, 2017), and $\eta^2 = .71$ (main effect valence of the video empathy; Winter et al., 2017).

The planned sample size was 45 participants with OCD and 45 healthy participants, when we assume a medium effect of $\eta^2 = .30$, power for 90 participants' calculated with G*Power 3.1.9.2 (a priori power analysis, ANOVA: repeated measures, between factor;

number of groups: 2; number of measurements: 2; α = .05) amounts to about 90%. The actual sample size was 127, so the power was above 90%.

Results

Preliminary analysis

The 64 individuals diagnosed with OCD had a mean Y-BOCS score of 24.08 (SD = 5.12) and a mean BDI score of 20.97 (SD = 10.64), the healthy control group a mean BDI score of 4.17 (SD = 5.29) and OCD as well as any other psychological disorder was ruled out by a trained diagnostician. No significant difference in age ($t(124)$ = 0.90, p = .367), gender (t(124) = 0.57, p = .569), or years of education ($t(124)$ = 0.83, p = .409) was detected between OCD participants and healthy participants. Therefore, the two groups were regarded as comparable.

During the BAT, individuals with OCD reported a mean anxiety score of 34.21 (SD = 24.33, N = 64) for the first step, a mean anxiety score of 56.54 (SD = 21.41, N = 52) for the third step and a mean anxiety score of 85.21 (SD = 21.52, N = 39) for the fifth step. For the last step, 25 participants refused to do the task, which is an indicator of high anxiety. The anxiety activation task for healthy participants was proven to be effective, as we found a significant increase of negative affect between before (Mean = 12.28; SD = 2.846) and after (Mean = 19.26; SD = 7.265) the task, t(38) = -6.67, $p < 0.001$, 95% CI [-9.09, $-4.86.31$], d = -1.068, and a significant decrease of positive affect between before (Mean = 31.46; SD = 6.440) and after (Mean = 28.13; SD = 7.281) the task, $t(38)$ = 3.22, p = .003, 95% CI [1.24, 5.43], d = 0.516. This shows that the worry activation task was effective in inducing a more negative emotional state. Due to 23 missing values of the PANAS before and 21 after worry induction, we had lower power for this comparison, although the effect was still significant, which speaks for the comparability of the two tasks.

Results EmpaToM

Empathy ratings

Regarding the main effect of *valence*, all participants showed more negative affect ratings for emotionally negative compared with neutral videos ($F(1,124)$ = 444.66, $p < .001$, η^2 = .550). We found a significant main effect of *group* ($F(1,124)$ = 14.4, $p < .001$, η^2 = .031), with people with OCD feeling significantly more negative affect after watching the videos compared with healthy participants (Figure 1). This increased sharing of negative affect indicates higher levels of empathy in participants with OCD than in healthy individuals (Table 1).

Figure 1. (a) Empathy ratings of both groups (mean). Lower affect levels indicate higher empathy. (b) Compassion ratings of both groups (mean). Higher concern levels indicate higher compassion. (c) ToM accuracy of both groups (mean). Higher accuracy levels signify higher performance of giving the correct answer. Error bars indicate standard deviations.
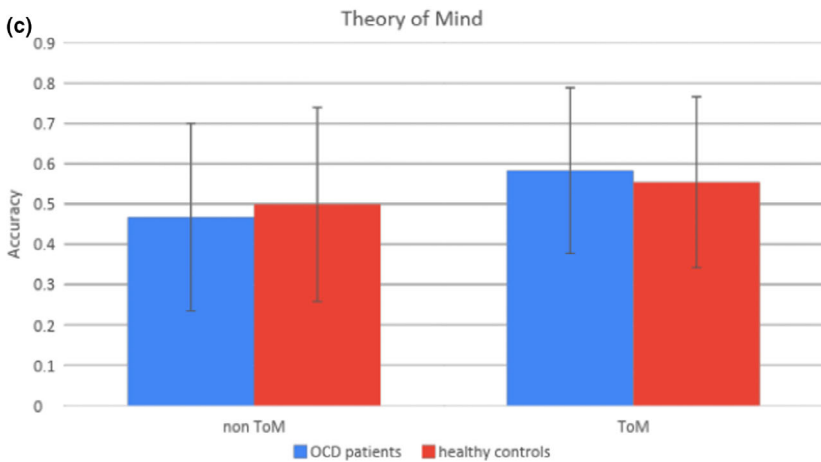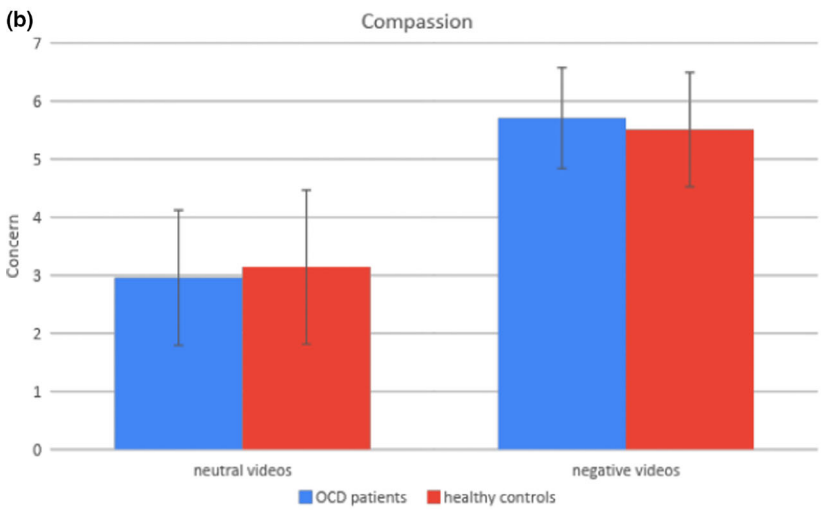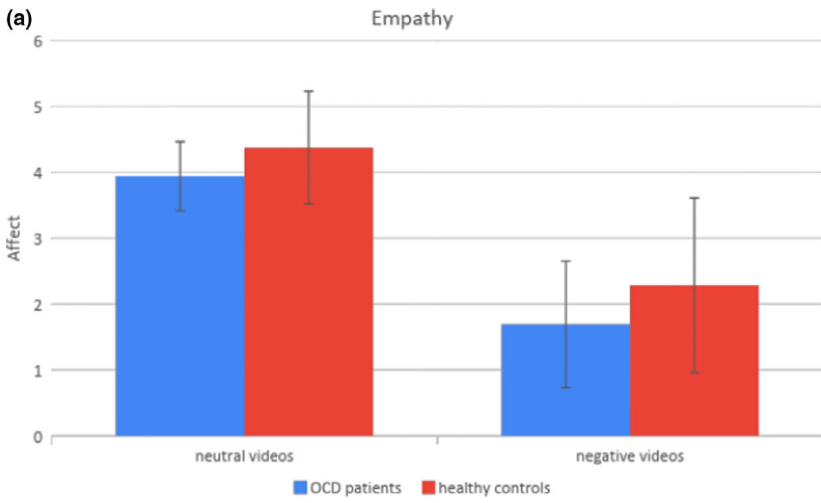
(a)

Empathy

(b)

Compassion

(c)

Theory of Mind

Table 1. Comparison between the IRI of individuals with OCD and healthy controls

IRI	Individuals with OCD (SD)	Healthy controls (SD)	Results
Perspective-taking	13.40 (±2.35)	13.16 (±2.57)	$t(122) = 0.83, p = .586$
Fantasy	13.21 (±3.07)	12.02 (±3.32)	$t(122) = 2.08, p = .040$, 95% CI [−2.33, −0.06], $d = −.373$.
Empathic concern	15.70 (±2.71)	14.44 (±2.26)	$t(122) = 2.81, p = .006$, 95% CI [−2.15, −0.37], $d = −.504$
Personal Distress	12.81 (±3.32)	9.10 (±2.55)	$t(122) = 6.97, p < .001$, 95% CI [−4.76, −2.66], $d = −1.252$

Note. SD = standard deviation.

Compassion ratings
All participants reported more *compassion* after watching emotionally negative videos compared with neutral videos ($F(1,124) = 432.47, p < .001, \eta^2 = .578$). There was no significant main effect of *group* ($F(1,124) = 0.002, p = .961, \eta^2 < .001$).

Theory of mind performance
The main effect of *ToM* vs. factual reasoning accuracy was significant ($F(1,124) = 17.15, p < .001, \eta^2 = .036$). However, there was no significant effect of group ($F(1,124) = 0.001, p = .970, \eta^2 < .001$), indicating no differences in accuracy performances between participants with OCD and healthy participants. Furthermore, neither the main effect of *reaction time* ($F(1,124) = 0.282, p = .596, \eta^2 = .000$) nor the main effect of *group* ($F(1,124) = 1.016, p = .315, \eta^2 < .001$) or the interaction between group and reaction time ($F(1,124) = 1.887, p = .172, \eta^2 = .013$) was significant.

Clinical variables
When adding depressive symptoms (BDI) as a covariate, the main effect of *valence* remained significant ($F(1,121) = 162.31, p < .001, \eta^2 = .308$), as well as the interaction between valence and depressive symptoms ($F(1,121) = 4.55, p = .035, \eta^2 = .009$). Furthermore, when adding depressive symptoms as a covariate the main effect of *compassion* remained significant ($F(1,121) = 152.76, p < .001, \eta^2 = .328$) and the interaction between compassion and depressive symptoms was also significant ($F(1,121) = 4.95, p = .028, \eta^2 = .011$). Moreover, the main effect of ToM performance also remained significant when adding depressive symptoms (BDI) as a covariate ($F(1,121) = 5.55, p = .020, \eta^2 = .013$), although the interaction between ToM performance and depressive symptoms ($F(1,121) = 0.28, p = .598, \eta^2 < .001$) did not.

We found a significant negative Pearson's r correlation between OCD symptoms (Y-BOCS) and empathy, $r(62) = −.28, p = .024$, 95% CI [−0.04, −0.50], for negative videos, which indicates higher empathy and symptom severity are correlated. For all other EmpaToM variables (empathy for neutral videos, compassion, ToM performance, non-ToM performance), we found no significant correlation (see Table S1).

Results IRI

Participants with OCD reported higher levels of empathic concern, $t(122) = 2.81$, $p = .006$, 95% CI $[-2.15, -0.37]$, d $= -.504$, and fantasy, $t(122) = 2.08$, $p = .040$, 95% CI $[-2.33, -0.06]$, d $= -.373$. However, no significant difference between self-reported perspective-taking was detected between people with OCD and healthy individuals ($t(122) = 0.83$, $p = .586$). However, participants with OCD reported feeling significantly higher levels of personal distress compared with healthy participants, $t(122) = 6.97$, $p <.001$, 95% CI $[-4.76, -2.66]$, d $= -1.252$.

Discussion

The present study used a naturalistic behavioural task and a self-report measure to shed light on the link between OCD and three different aspects of the social mind, specifically empathy (a), compassion (b), and ToM (c).

(a) As expected, we found higher empathy levels in the behavioural task, as well as more self-reported personal distress in people with OCD compared with healthy participants. Symptoms of people with OCD significantly correlated with empathy for negative videos. Analyses of co-variances showed that heightened levels of empathy in the OCD group were not explained by higher depression scores, as results remained significantly different after controlling for the effect of depression. Our results are in line with the overview on empathy in OCD by Jansen et al. (2020), which showed that self-reported empathy was higher in OCD. The results support the evidence one a behavioural level, suggesting that empathy seems to be overly active in OCD. Just like O'Connor et al., (2002) suggested overdrive in empathy for people with depression, this overdrive might be part of OCD symptomatology and heightened levels of empathy might be a risk factor for OCD. Hence, OC symptoms and related problems in their interpersonal relationships might not be solved by enhancing empathy for others in the clients. The overdrive in empathy reflected by the self-reported personal distress when faced with others' negative emotions suggests that deficits in emotional regulation abilities might be the underlying factor, which is supported by studies showing emotion regulation deficits in people with OCD (Chase et al., 2019; Eichholz et al., 2020). Experiencing a social form of empathy (other-focused) rather than personal distress (self-focused) in response to someone's suffering requires regulation abilities of one's own emotions (Eisenberg, 2010), as the limitation of personal distress is a premise to be able to respond to another human being in need (Decety & Jackson, 2004). It therefore might be worthwhile training functional emotion regulation strategies with patients to improve their interpersonal relationships. However, studies investigating emotion regulation in a social context are lacking (Jansen et al., 2020).

(b) In line with Kang et al. (2012), we found no differences in compassion levels in the behavioural task. By contrast, participants with OCD reported more concern for others than the healthy comparison group. This might initially seem surprising since symptom accommodation implies prioritizing the reduction of personal stress over the well-being of the person people with OCD involve, although the content of intrusive thoughts often contains 'concern about others'. For example, a person with OCD might have the urge to wash their hands excessively (ritual) to prevent a specific illness (intrusive thought), not so much because he/she is scared of having that illness but rather because he/she does not want to be responsible for infecting other people around them. In other words, in the logic of the intrusive thought symptom accommodation might imply prioritizing people

who might become infected over oneself and close others. However, despite their feelings of concern for others people with OCD might fail to compassionately support others, as avoidance and rituals inhibit the ability to help effectively (O´Connor et al., 2007), which explains why even though they report higher compassion they do not show this on a behavioural level. The dysfunctional patterns in relationships of people with OCD (Abramowitz et al., 2013; Adam et al., 2012; Lochner et al., 2003; Mavrogiorgou et al., 2015; Ruscio et al., 2010) are therefore not explained by lower levels of social understanding or compassion. On the contrary, their symptoms might be a reflection of their over-aroused empathy and their high concern and responsibility for the well-being of others. Put simply, too much empathy or concern might not only have negative consequences for oneself but may also involve social costs.

(c) Concerning the ToM performance, we found no differences between individuals with OCD and healthy individuals neither in the behavioural task, nor at self-reported perspective-taking. These results are in line with Buhlmann et al., (2015) and Mavrogiorgou et al., (2016) but contradict previous studies (Grisham et al., 2010; Kang et al., 2012). However, it should be noted that Grisham et al. (2010) did not conduct the study with a clinical sample. Furthermore, some studies report the fantasy scale as part of the ToM network (e.g., Fontenelle et al., 2009) and in our study participants with OCD reported higher levels of fantasy.

Boeding et al. (2013) note that it can be painful to observe a loved one in distress, which holds true for both individuals with OCD and their close others. Close others might become involved in symptom accommodation to alleviate the felt distress for a short time, although accommodation is associated with poorer relationship functioning (Abramowitz et al., 2013). Higher empathy levels in OCD – as suggested by our results – might be associated with people with OCD being more likely to be distressed by their close other's frustration and dissatisfaction. It is easy to imagine how a vicious cycle might arise out of symptom accommodation: an over-arousal in empathy leads to personal distress, stress provokes heightened OCD symptoms, which promote more symptom accommodation, which cause relationship dissatisfaction in the partner. This is again detected by the overly active empathy of individuals with OCD, and again may produce more stress for them, etc. Moreover, Boeding et al., (2013) suggest that the difficulty of seeing others in pain predicts a partner's willingness to accommodate, thus implying that low empathy levels in partners might be investigated as a protective factor against the tendency to accommo-date. Future research could study both people with OCDs and their close others to shed light on these relationship dynamics. For example, it might be fruitful to analyse the interplay between both partners with new methodological approaches, such as the social relations model by Back and Kenny (2010). With this approach, one could disentangle actor, partner-and relationship effects of the social mind, such as how empathy, compassion, or Theory of Mind abilities of patients and their partners affect their emotional co-regulation (English & Eldesouky, 2020) or relationship satisfaction. Furthermore, it might be worthwhile investigating the neural correlates of social mind patterns with the EmpaToM to learn more about the specificity and origin of these patterns. Moreover, it might be fruitful to study how the behavioural and neurological patterns change with therapeutic progress.

Clinical implications

Our study sheds light on the short-term functionality of OCD symptomatology in social contexts, namely regulating the stressful emotions that arise out of high empathy levels,

and might explain why OCD is linked to interpersonal problems (Adam et al., 2012; Lochner et al., 2003; Ruscio et al., 2010). Independent of traditional interventions, it could prove useful to improve emotion regulation skills (Eichholz et al., 2020) so people with OCD learn to cope with empathic distress. Furthermore, it might strengthen the treatment gains and lower dropout rates if the social mind and consequently social relationships become a topic in the treatment and prevention of OCD (Abramowitz et al., 2013). Having emotional support and being able to maintain satisfactory relationships may help individuals with OCD to maintain the motivation to confront effective but stressful interventions, such as exposure and response prevention. Targeting the social mind patterns might hence be a promising treatment approach for people afflicted with OCD.

Limitations
Although the EmpaToM is a more naturalistic measure than most empathy measures, it is still a task in an experimental setting and thus might not fully represent behaviour in the individuals' everyday lives. Direct interactive tasks are currently being developed and might help to gain a better understanding of social deficits in OCD (Lehmann, Maliske, Böckler, & Kanske, 2019). Furthermore, it is unclear whether the anxiety activated by the tasks for the OCD and control group are comparable, as it is possible that the task for controls led to more anxiety or vice versa and this may have affected results.

Conclusion
The current study provides important and novel findings regarding possible deviations in the processing and interpretation of social and emotional information in OCD. Compared with healthy individuals, participants with OCD show an overdrive of empathy at a behavioural and self-report level. People with OCD also report higher levels of compassion but do not differ from healthy individuals in the behavioural task. However, both methods show that their ToM levels do not differ from the healthy comparison group. It speaks for the validity of our results that the same differential patterns related to OCD symptomatology on the facets of the social mind are shown in both a behavioural task and a self-report measure. It is necessary for clinical practice to address these differences and reduce the negative effects of symptoms on the relationships of those afflicted with OCD.

Acknowledgments

Author contribution

Maike Salazar Kämpf, Philipp Kanske, and Cornelia Exner developed the study as part of an RCT planned by Cornelia Exner and Julia Glombiewski, who both did the funding acquisition. Maike Salazar Kämpf, Anke Haberkamp, and Alexandra Kleiman performed the experiments. Maike Salazar Kämpf contributed to data analysis, interpretation, and visualization under the supervision of Cornelia Exner and Philipp Kanske. Maike Salazar

Kämpf drafted the preregistration and manuscript, and all other authors provided critical revisions. All authors approved the final version of the manuscript for submission.

Conflict of interest

All authors declare no conflict of interest.

Open practices

This is a preregistered study. The preregistration and supplemental materials are publicly available via the Open Science Framework and can be accessed at https://osf.io/z9r3x/.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Table S1. Pearson's r correlation matrix of the EmpaToM and YBOCS scores of individuals with OCD.