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Mindfulness predicts insight in obsessive-compulsive disorder over and above OC symptoms: An experience-sampling study

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ABSTRACT

Insight in obsessive-compulsive disorder (OCD) is assumed to fluctuate over time. However, temporal variations of insight and its correlates in OCD have never been empirically studied. We used ecological momentary assessment (EMA) to analyze the temporal variation of insight into the unreasonableness of the threat-related core belief (1), into the senselessness of compulsions to prevent this belief from occurring (2), and into the belief, itself, as being due to OCD (3). Furthermore, we analyzed whether worry, self-punishment and mindfulness are associated with these aspects of insight. A total of 50 OCD patients underwent EMA 10 times a day over 6 consecutive days. Data were analyzed using multilevel modelling. Results revealed that multiple time-points within individuals accounted for up to 51.4% of insight variance, indicating a substantial fluctuation of insight over time. Root mean square successive difference (rMSSD) scores indicated significantly higher fluctuation patterns in the doubt/checking dimension as compared to taboo thoughts throughout all aspects of insight. As hypothesized, self-punishment and mindfulness significantly predicted insight into the unreasonableness of the threat-related belief and the senselessness of compulsions to prevent this belief from occurring. Mindfulness demonstrated the greatest predictive value and remained significant after controlling for OC symptoms. Contrary to expectation, worry, as it was measured in our study, was not associated with insight. Besides providing evidence for insight fluctuation, our results indicate that mindfulness-based strategies might be beneficial for increasing insight in OCD.

1. Introduction

Obsessive-compulsive disorder (OCD) is defined by the presence of repetitive and intrusive thoughts, images, or impulses, and/or overt repetitive behaviors or mental acts that are performed in order to reduce distress or prevent perceived harm (American Psychiatric Association, 2013). Traditionally, the diagnostic criteria for OCD required insight into the unreasonable and excessive nature of obsessions and compulsions (Tolin, Abramowitz, Kozak, & Foa, 2001). Although OCD with poor or absent insight had been described much earlier (e.g. Insel & Akiskal, 1986; Robinson, Winnik, & Weiss, 1976; Solyom, DiNicola, Phil, Sookman, & Luchins, 1985), the DSM-IV field trial (Foa et al., 1995) empirically confirmed that OCD is characterized by a range of insight. Specifically, 4% of the sample reported themselves as being "completely certain", and 26% reported themselves as being"mostly certain" that feared consequences would occur if they did not perform their compulsions. Subsequent studies have corroborated these findings (Catapano et al., 2010; Eisen et al., 2001; Matsunaga et al., 2002; Ravi Kishore, Samar, Janardhan Reddy, Chandrasekhar, & Thennarasu, 2004; Shavitt et al., 2014; Turksoy, Tukel, Ozdemir, & Karali, 2002). Therefore, in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatric Association, 2013), the "poor insight" specifier was expanded to include three insight-options; namely, good or fair insight, poor insight, and absent insight/delusional OCD beliefs. Thus, even a complete lack of insight into OCD beliefs is no longer classified as a delusional disorder.

Despite this progress, the multidimensional nature of insight (Markova, Jaafari, & Berrios, 2009), coupled with various terminological inconsistencies in the literature (Brakoulias & Starcevic, 2011), make it difficult to give a precise definition of insight in OCD. According to the DSM, insight in OCD presumably refers to the (in)accuracy of the beliefs that underlie the obsessions (e.g., the belief that

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touching a stain of dried blood will lead to HIV) or the rationality of compulsions (e.g., the necessity to wash hands 20 times to avoid being infected by a deadly disease) (Leckman et al., 2010). However, insight can also refer to the ability to attribute the belief, itself, to OCD (Brakoulias & Starcevic, 2011). Besides its multidimensional nature, insight is also presumed to vary across different obsessions as well as over time (Abramowitz & Jacoby, 2015). Based on clinical observations, Kozak and Foa (1994) suggest that insight in OCD is situation-bound. When confronted with the feared situation, the individual may demonstrate poorer insight than when not exposed to the feared stimulus. O'Dwyer and Marks (2000) summarize it succinctly: "Patients may logically repudiate their belief while in the safety of the therapist's office, but when in a "dangerous" situation may be 100% convinced of the fact" (p. 282). Thus, insight is presumably associated with anxiety level (Steketee & Shapiro, 1995) and should therefore be conceptualized as a mental state (Markova et al., 2009). In accordance with this idea, Shimshoni, Reuven, Dar, and Hermesh (2011) question a stable trait-like insight concept, recommending repeated assessments of insight. Surprisingly, the clinically observed temporal variations of insight have never been empirically studied in OCD. Furthermore, despite a large body of research into the clinical correlates of poor insight (e.g., Bellino, Patria, Ziero, & Bogetto, 2005; de Berardis et al., 2005; Catapano et al., 2010; Cherian et al., 2012; Jacob, Larson, & Storch, 2014; Jakubovski et al., 2011; Shavitt et al., 2014), no studies investigating the temporal correlates of insight currently exist. This is, however, of particular clinical relevance, since poor insight has been found to be associated with attenuated treatment outcome in several studies (e.g., Foa, 1979; Foa, Abramowitz, Franklin, & Kozak, 1999; Solyom et al., 1985; Tolin, Maltby, Diefenbach, Hannan, & Worhunsky, 2004). This finding might be due to either a decreased willingness or an inability to engage in exposure or to modify threat-related beliefs (Tolin et al., 2001). Shedding light on processes related to insight in OCD might help to develop effective psychotherapeutic strategies for its improvement. This, in turn, might increase patients' commitment to refrain from dysfunctional neutralization strategies, and consequently, improve therapy outcome. For this purpose, this study sought to explore, for the first time, which cognitive processes are associated with level of insight in everyday life of individuals with OCD.

In addition to overt and mental rituals and avoidance behavior, past research has also addressed the role of thought control strategies in maintaining OCD (e.g., Abramowitz, Whiteside, Kalsy, & Tolin, 2003; Amir, Cashman, & Foa, 1997; Fergus & Wu, 2010; Moore & Abramowitz, 2007; Purdon, Rowa, & Antony, 2007). Thought control strategies describe various 'techniques' people use to control their unwanted thoughts, some of which are more functional than others. In an effort to explore which strategies individuals use to control unwanted thoughts and to measure individual differences in the use of these strategies, Wells and Davies (1994) developed the Thought Control Questionnaire (TCQ). The original item pool was derived from results of semi-structured interviews conducted in a sample of 10 healthy individuals and 10 patients with different anxiety disorders. Consecutive cluster analyses based on results of student samples revealed 5 factors, corresponding to different strategies: Distraction (e.g., I keep myself busy), social control (e.g., I talk to a friend about the thought), and reappraisal (e.g., I challenge the thought's validity), which are considered to be adaptive; and worry (e.g., I think about past worries instead) and punishment (e.g., I shout at myself for having the thought), which have been found to be especially maladaptive and are additionally related to higher scores on measures of trait anxiety (Wells & Davies, 1994). Compared to anxious and non-anxious controls, OCD patients employ dysfunctional thought control strategies more often, exhibiting an increased use of worry and self-punishment and a decreased use of distraction (Abramowitz et al., 2003). Abramowitz et al. (2003) suggest that the use of these maladaptive thought control strategies is crucial to the maintenance of OCD. This assumption is supported by the finding that worry increases intrusions (Wells & Papageorgiou, 1995) and interacts with obsessive beliefs to predict the frequency of unwanted thoughts in healthy individuals (Fergus & Wu, 2010). Abramowitz et al. (2003) posit that worry and self-punishment both preserve levels of anxiety and threat associated with intrusions. Thus, worry and self-punishment may, by maintaining a heightened sense of threat, also be related to lower insight into the unreasonableness of obsessions and the senselessness of compulsions.

Contrary to the presumably negative effects of worry and self-punishment, mindfulness is assumed to be especially helpful for OCD patients (Didonna, 2009; Fairfax, 2008; Hertenstein et al., 2012; Key, Rowa, Bieling, McCabe, & Pawluk, 2017; Külz et al., 2013, 2014; Lu et al., 2018). Kabat-Zinn (1994) defines mindfulness as intentionally attending to the present moment experience in a non-judgmental and accepting way. Some studies hint at the efficacy of mindfulness training in reducing OC symptoms (e.g., Hanstede, Gidron, & Nyklicek, 2008; Hertenstein et al., 2012; Key et al., 2017; Külz et al., 2013; however, see Strauss et al. (2018), for contrary results), and in a more recent study, the capacity to allow thoughts and feelings to come and go was found to predict symptom reduction after CBT (Hawley et al., 2017). Looking beyond symptom reduction, laboratory studies have found that mindfulness strategies reduce distress associated with intrusive thoughts (Marcks & Woods, 2005; Najmi, Riemann, & Wegner, 2009), increase willingness to experience intrusive thoughts (Marcks & Woods, 2007), and reduce post-exposure anxiety and the urge to neutralize (Wahl, Huelle, Zurowski, & Kordon, 2013). With a mindful attitude, thoughts and feelings are perceived as temporary mental states rather than as accurate reflections of reality. This change in relation to experience has been termed decentering or cognitive defusion (Fresco, Segal, Buis, & Kennedy, 2007; Hayes, Strosahl, & Wilson, 1999). It has been suggested that obsessive thoughts lose their threatening character and may stop causing distress when OCD patients regard them as transient mental events. Furthermore, Didonna (2009) assumes that the sense of non-attachment which results from decentering increases tolerance towards unpleasant inner states and thereby may also improve insight in OCD patients.

To the best of our knowledge, no study has yet examined temporal fluctuations of insight and their association with antecedent worry and self-punishment, as compared to mindfulness in OCD, and consequently, adequate assessment tools are lacking. The Brown Assessment of Beliefs Scale (Eisen et al., 1998) – the gold standard of insight assessment – assesses global insight level regarding the past week, and thus is not appropriate for assessing temporal variations of insight in daily life. Ecological Momentary Assessment Method (EMA, Stone & Shiffman, 1994), also known as Experience-Sampling Method (ESM, Csikszentmihalyi & Larson, 1987), is defined by the repeated collection of real-time data on participants' momentary experiences in their natural environments (Stone, Shiffman, Atienza, & Nebeling, 2007). The repeated and dense sampling of momentary states provides a high temporal resolution, allowing the analysis of dynamic processes and their temporal correlates. Additionally, unlike retrospective techniques of data collection, EMA is less prone to memory distortions like recall biases and guarantees the realization of ecological validity (Shiffman, Stone, & Hufford, 2008). EMA is an important research tool which has already been successfully used in a variety of clinical studies (Trull & Ebner-Priemer, 2009). Thus, EMA might prove promising for the repeated measurement of insight.

The present study had two aims. Firstly, we sought to empirically confirm clinical observations of temporal variation of insight in OCD in order to improve insight conceptualization. In this context, our aim was also to quantify the intensity of insight fluctuation by taking the temporal order of scores into account. On this basis, we conducted an exploratory analysis of differences in the intensity of insight fluctuation between OC symptom dimensions. The scientific exploration of the dynamic patterns of insight in OCD is a completely novel line of research, which is, however, of crucial importance since insight has always challenged the nosologic boundaries between OCD and psychosis.

Secondly, this study was designed to investigate whether worry and self-punishment on the one hand, or a mindfulness-based strategy on the other hand, predict the consecutive degree of insight. We hypothesized that antecedent worry and self-punishment would predict lower levels of insight, whereas a mindfulness-based strategy was expected to have the reverse effect. Furthermore, we sought to analyze if worry, self-punishment and mindfulness remain significant predictors of insight with a time-lag of one assessment point (i.e., when predicting insight measured at time point t by these strategies assessed at time point t-1). A time-lag of one assessment point was chosen following the design of a study by Hartley, Haddock, Vasconcelos e Sa, and Emsley (2014) to explore the temporal stability of the associations we sought to investigate.

2. Method

2.1. Participants

Participants were recruited through the OCD and anxiety ward of the Department of Psychiatry and Psychotherapy (University Medical Center Freiburg, Germany), through registered psychotherapists in private practice, and through the website of the German Society for Obsessive Compulsive Disorder (DGZ). The study was approved by the Ethics Committee of the University Medical Center Freiburg (Germany) and registered in the German Clinical Trials Register (DRKS00009734). Participants were required to fulfill criteria for a primary diagnosis of OCD and to suffer from clinically relevant OC symptoms (i.e., a global score > 12[1] or a score of ≥ 8 in either obsession or compulsion subscale according to Y-BOCS, see below).

Exclusion criteria were a history of psychosis, a current manic or a severe depressive episode, generalized anxiety disorder, current substance dependence, borderline personality disorder, acute suicidal tendencies according to the Suicidal Behaviors Questionnaire-Revised (SBQ-R), a severe neurological disorder (e.g. epilepsy, stroke) and insufficient comprehension or production of the German language as estimated by a vocabulary test (WST, Schmidt & Metzler, 1992). Furthermore, participants were excluded when no specific belief about the consequences of not performing compulsions (other than experiencing unpleasant feelings) could be identified. Participants undergoing inpatient therapy were also excluded from participation, because we wanted to assess insight in participants' natural environments.

2.2. Instruments

The Mini International Neuropsychiatric Interview (M.I.N.I.) (Sheehan et al., 1998), was used to determine the presence of mental disorders. The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS, Goodman et al., 1989; Hand & Büttner-Westphal, 1991) is a semi-structured interview which was applied to assess symptom dimensions as well as severity of obsessions and compulsions. In order to assess threat-related beliefs underlying OC symptoms and the global level of insight, the Brown Assessment of Beliefs Scale (BABS, Buhlmann, 2014; Eisen et al., 1998) was conducted. The BABS is a clinician administered, semi-structured interview with specific probes and anchors designed to assess six aspects of insight connected with beliefs during the past week: 1) conviction, 2) perception of others' views of beliefs, 3) explanation of differing views, 4) fixity of ideas, 5) attempts to disprove ideas, 6) ability to assign a psychiatric or psychological cause for the belief (referred to as "insight"). The presence of ideas of reference (item 7) is not included in the total score. The BABS total score ranges from 0 to 24 with higher scores indicating poorer insight. For every participant, the predominant threat-related belief was chosen and categorized according to the 5-factor structure found by Pinto et al. (2008), which comprises symmetry/ordering, doubt/checking, hoarding, contamination/cleaning and taboo thoughts. Since hoarding disorder is classified as a distinct entity in DSM-5, the category hoarding was negligible for our study. The Beck Depression Inventory-II (Beck, Steer, & Brown, 1996; Hautzinger, Keller, & Kühner, 2006) was applied to assess the severity of depressive symptoms. ESM-items are described below.

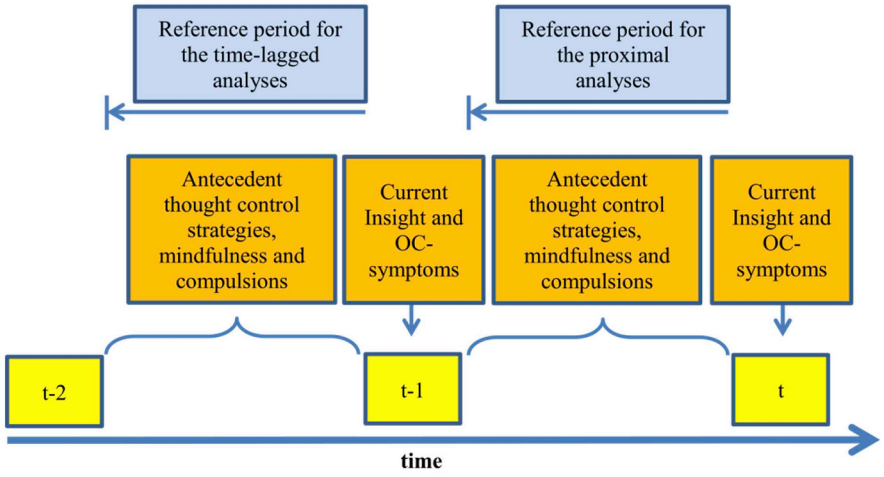
2.3. ESM hardware, software and sampling scheme

Participants were provided with smartphones (Huawei Ascend Y300) equipped with the web-based experience sampling software movisensXS (movisens GmbH, Karlsruhe, Germany). In order to address the research question, the EMA protocol was designed following recommendations by Shiffman (2007). As insight is understood as a phenomenon that can be measured continuously but is expected to vary in intensity, we employed a time-based sampling-scheme with 10 assessment points a day on 6 consecutive days. To avoid biases, and to assure a representative sample of participants' experiences, a (quasi-) random-interval assessment following a stratified sampling schedule was chosen. Therefore, the day (from 8 a.m. to 11 p.m.) was divided into 10 blocks and one assessment was randomly scheduled in each of these 90-min blocks, with at least 30 min between each prompt. Signals were presented for 10 s at the beginning of every minute for a total duration of 15 min. Participants could start to fill out the form only within this time frame. They could start the assessment right away, postpone the assessment for five or 10 min or dismiss it by pressing a button on the screen. These functions were included to help participants to be adherent to the protocol and thus increase compliance rates (Hufford, 2007). Participants received an expense allowance of 50€ for compliance rates of at least 80%. A combination of momentary assessment at each time point and a coverage strategy in which participants were asked to recall their experiences since the last assessment was used (see Fig. 1). At each data point (t), we assessed the severity of current OC symptoms (immediately before the signal), current level of insight and antecedent use of thought control strategies, mindfulness and compulsive behavior in dealing with obsessive thoughts referring to the time frame since the last assessment (t-1). In the latter case, participants were also given the possibility to select the response option 'I have not experienced intrusive thoughts since the last beep'.

2.4. EMA items and item development

EMA items are shown in Table 1. Items assessing insight were developed in a multistep procedure. After preliminary item formulation based on review of the literature, three aspects were chosen: 1) conviction that feared belief is or will come true, 2) conviction that engaging in compulsions is reasonable to prevent feared consequences from occurring, and 3) conviction that feared belief is due to OCD. In order to determine suitability of the items, ten OCD experts with long-standing scientific and/or clinical background ($M = 16.5$ years, $SD = 9.46$) rated these items for plausibility on a 5-point-Likert scale ranging from 1 (item is unsuitable to assess insight) to 5 (item is suitable to assess insight). Furthermore, an overall evaluation of the three items' ability to capture insight in its multidimensional nature was rated on a 4-point scale ranging from 1 (totally disagree) to 4 (totally agree). Results revealed satisfactory plausibility of the items and a good overall evaluation with mean ratings of $M = 4.70$ ($SD = 0.68$) for the first and the third aspect, $M = 4.30$ ($SD = 1.37$) for the second aspect and $M = 3.40$ ($SD = 0.70$) for overall suitability to assess insight. In a

[1] We defined a lower Y-BOCS cut-off score than is typically used (i.e., a total score of 14 or 16 points) since we sought to test our hypotheses based on a representative sample of individuals with OCD. Hence, we decided to include participants with the full range of symptom severity - from mild to severe - using a commonly applied criterion for symptom remission as the cut-off at the lower end of the scale. A Y-BOCS cut-off score of ≤ 12 was identified as the optimal score to predict symptom remission (Lewin et al., 2011) and wellness (Farris, MeLean, Van Meter, Simpson & Foa, 2013) and was, for example, used in a study by Simpson, Huppert, Petkova, Foa, and Liebowitz (2006).



Note: t = assessment at time point t; t-1 = assessment at time point t-1 etc.

Fig. 1. Schematic overview of EMA assessment points and reference periods for the proximal and time-lagged analyses (adapted from Hartley et al., 2014)
Note: t = assessment at time point t; t-1 = assessment at time point t-1 etc.

Table 1
EMA items and corresponding scales.

Item	Aspect	Scale	Range
"Right before the signal, I was having obsessions" "Right before the signal, I was engaging in compulsions"	OC symptoms	5-point Likert scale	"Not at all" –"Extremely"
How convinced are you at this very moment that your feared belief is or will come true? How convinced are you at this very moment that engaging in compulsions is reasonable to prevent your feared belief from occurring? How convinced are you at this very moment that your feared belief is due to OCD?	Insight	Visual analogue scale	0–100%
"Since the last signal, when I experienced an obsessive or intrusive thought …"			
"… I thought more about other problems I have"	Worry	5-point Likert scale	"Not at all" –"Extremely"[a]
"… I did something that I enjoy or I occupied myself with work"	Distraction		
"… I got angry at myself for having the thought"	Self-punishment		
"… I tried to reinterpret the thought"	Reappraisal		
"… I talked to another person about the thought"	Social control		
"… I just noticed the thought and let it go"	Mindfulness		
"… I engaged in overt or mental compulsions"	Compulsions		

Note.
[a] For each strategy, participants could alternatively choose the response option 'I have not experienced intrusive thoughts since the last beep'.

third step, four OCD patients who were not included in the study were asked to rate items for comprehensibility on a 5-point Likert scale ranging from 1 (not at all comprehensible) to 5 (very comprehensible). Ratings were satisfactory, with average ratings of $M = 5$ ($SD = 0$) for the first two aspects of insight and $M = 4.75$ ($SD = 0.5$) for the third aspect of insight. Items to assess thought control strategies were adapted from the Thought Control Questionnaire (Fehm & Hoyer, 2004; Wells & Davies, 1994) with one item for each of the five thought control strategies. The strategies distraction, reappraisal and social control were not further investigated in this study. The item to capture mindfulness was adapted from the scale "nonreacting to inner experiences" from the Five Facet Mindfulness Questionnaire (FFMQ, Baer et al., 2008).

2.5. Procedure

After undergoing a screening assessment per telephone, participants fulfilling inclusion criteria attended the pre-EMA assessment. After obtaining written informed consent, socio-demographic information was collected using a brief interview. Mental disorders, suicidal tendency, symptom dimensions and severity of OCD, as well as feared beliefs and level of insight were assessed in clinical interviews (M.I.N.I., Y-BOCS and BABS) by two trained psychologists with clinical experience. Following this, participants were introduced to the EMA assessment and practiced recording data. The predominant threat-related belief was selected based on participants' statements in the BABS interview and participants were asked to refer insight ratings exclusively to that belief. Regarding thought control strategies, participants were instructed to rate the extent to which they have used a certain strategy since the last assessment for each of the presented strategies separately (i.e., they were allowed to select more than one strategy). The interviewers also explained the difference between obsessions and compulsions. Participants were then informed about the sampling-scheme and were instructed to follow their usual habits (including waking and sleeping times). During the EMA-phase, there was no personal contact with participants except in case of technical problems. After the 6 assessment days, participants were asked to return the smartphones and to fill out the BDI-II.

2.6. Statistical analyses

Due to the hierarchical structure of EMA-data in which repeated reports in daily life (level 1) are nested within individuals (level 2), and owing to certain characteristics of real-time data (uneven spacing of

Table 2
Demographic and clinical characteristics of the sample (N = 50).

Demographic and clinical characteristics	
Mean age in years (*SD*)	35.96 (12.44)
Ethnicity	
Caucasian (%)	50 (100)
Gender f/m (%)	24 (48.0)/26 (52.0)
Mean length of education in years (*SD*)	14.20 (3.16)
Current psychotherapeutic treatment (%)	35 (70.0)
Mean duration in months (*SD*)	21.66 (20.72)
CBT (%)	29 (82.86)
Psychodynamic (%)	3 (8.57)
Other (%)	3 (8.57)
Psychopharmacologic medication (%)	34 (68.0)
Mean duration of illness since diagnosed with OCD in years (*SD*)	10.59 (9.04)
Y-BOCS total score (*SD*)	21.51 (5.63)
Y-BOCS obsessions (*SD*)	10.59 (3.23)
Y-BOCS compulsions (*SD*)	10.92 (3.04)
BDI-II (*SD*)	18.64 (13.22)
BABS total score (*SD*)	4.04 (4.0)
BABS insight classification (%)	
Excellent insight	28 (56)
Good insight	11 (22)
Fair insight	9 (18)
Poor Insight	2 (4)
Lack of insight/delusionality	0 (0)
Symptom dimensions (%)	
Symmetry/Ordering	0 (0)
Taboo thoughts	12 (24)
Doubt/Checking	16 (32)
Contamination/Cleaning	16 (32)
Other (getting insane, somatic, making mistake)	6 (12)

Note: f = female; m = male; BABS = Brown Assessment of Beliefs Scale; BDI-II = Beck Depression Inventory-II; Y-BOCS = Yale-Brown Obsessive Compulsive Scale.

assessments, missing data, serial autocorrelations), multilevel modelling was used to analyze data (Schwartz & Stone, 2007). We used R (R Core Team, 2018) and the packages lme4 (Bates, Maechler, Bolker, & Walker, 2015), lmerTest (Kuznetsova, Brockhoff, & Christensen, 2017) and stargazer (Hlavac, 2018) for multilevel regression analyses, the provision of p-values, and for the formatting of regression tables. In a first step, we fitted intercept-only models for each of the three aspects of insight as dependent variable. Since intercept-only models do not contain any explanatory variables, variance within level 2 units can be separated from variance between level 2 units. Based on this decomposition of variance, we calculated intraclass correlations (ICC) to analyze which proportion of insight total variance is due to repeated reports within individuals (level 1). Additionally, for further quantifying temporal variability, we calculated mean square successive difference (MSSD) scores. The MSSD was originally proposed by von Neumann, Kent, Bellinson, and Hart (1941) and accounts for both variability and temporal dependency (Ebner-Priemer, Eid, Kleindienst, Stabenow, & Trull, 2009; Jahng, Wood, & Trull, 2008). The MSSD is calculated by the average of the squared difference between successive observations for every participant. Hence the score is influenced by all changes between observations; nevertheless, it is more sensitive to high frequency fluctuations. For interpretational purposes, we report the square root of the MSSD (rMSSD), so that, as in the original scale, values range between 0 and 100.

For further analyses, cases were excluded in which participants chose the option for not having had obsessions or intrusions since the last assessment. In a second step, to analyze if antecedent worry, self-punishment and mindfulness are associated with current insight (i.e. significantly predict insight and explain a substantial proportion of level 1 variance), linear mixed effects regression analyses were performed, one for each aspect of insight as dependent variable. We entered worry, self-punishment and mindfulness as fixed effects (without an interaction term). Furthermore, we added random intercepts for participants and by-participant random slopes for the effect of the three independent variables on insight. In a third step, aimed at exploring if worry, self-punishment and mindfulness are associated with insight over and above OC symptoms, we also included current OC symptoms and antecedent compulsions into our models, with fixed effects for all independent variables as well as random intercepts for participants and by-participant random slopes for the effect of the independent variables on insight. Following recommendations by Winter (2013), we performed visual inspection of residual plots in order to rule out obvious deviations from homoscedasticity or normality. We performed likelihood-ratio tests for each full model against a model without the effect in question. For the time-lagged analyses, the same models were fitted including the independent variables at t-1. Our sample size was chosen based on calculations by Maas and Hox (2005), who simulated design characteristics of different sample sizes to construct the 95% confidence interval. Maas and Hox (2005) reported an operating alpha level of 7.3% for 50 elements on level 2 (in our case, the participants). Although this is slightly higher than the commonly applied alpha level of 5%, we decided to accept a slightly increased risk of type 1 error.

3. Results

3.1. Demographic and clinical characteristics

Sixty-seven individuals were screened for eligibility. A total of 50 participants were enrolled in the study, while 17 were excluded from participation for not meeting inclusion criteria. One participant withdrew from participation shortly after starting the EMA-assessment period. The remaining 49 participants completed the study. On average, participants completed 78.78% (*SD* = 17.97) of the 60 assessments. Two participants did not fulfill the classical criterion of at least one third of the assessment points (Palmier-Claus et al., 2011) and were therefore excluded from further analyses. Data of one participant was excluded due to obvious problems encountered in connecting insight ratings to the identified belief. The remaining 46 participants had an average response rate of 81.52% (*SD* = 12.68). Demographic and clinical characteristics of the total sample are shown in Table 2. T-tests revealed that, in terms of mean duration of illness, BDI-II, Y-BOCS or BABS total, the participants who were included in the analyses did not differ from those who were excluded (all *ps* ≥ .13).

3.2. Insight

Concerning the EMA-measured insight levels, participants had an average level of conviction of *M* = 29.79 (*SD* = 22.74) that their threat-related belief is or will come true, with the majority of participants (76.1%) exhibiting a mean score of < 50. Although average conviction scores were highest for beliefs related to doubt of harm/checking, followed by the symptom dimensions contamination/cleaning and taboo thoughts, no statistically significant difference was found between symptom dimensions (see Table 3). Average degree of conviction that engaging in compulsions is reasonable to prevent feared consequences from occurring was *M* = 30.37 (*SD* = 22.93). Here, 76.1% of participants had a mean score of < 50. Again, average conviction scores were highest for beliefs related to harm/checking, followed by contamination/cleaning and taboo thoughts. However, average conviction scores did not differ significantly between symptom dimensions. The average degree of conviction that feared belief is due to OCD was *M* = 71.52 (*SD* = 23.47). For this aspect of insight, 84.78% had a mean score of > 50, with average conviction scores being highest for beliefs related to taboo thoughts, followed by contamination/cleaning and harm/checking. The one-way ANOVA became significant $F(2,38) = 3.549$, $p = .039$. The Tukey HSD test revealed a significant difference between the mean scores of the symptom dimensions taboo thoughts and doubt/checking.

Table 3
Average insight scores and root mean square successive difference (rMSSD) scores for symptom dimensions according to Pinto et al. (2008).

Symptom dimensions				
Insight	Taboo thoughts (N = 12)	Contamination/Cleaning (N = 16)	Doubt/Checking (N = 16)	ANOVA
Conviction that feared belief is or will come true				
Mean (SD)	21.48 (21.55)	29.28 (23.18)	38.32 (22.22)	$F(2,38) = 1.828$, $p = .175$
rMSSD (SD)	14.33 (9.59)	22.05 (10.29)	31.26 (13.08)	$F(2,38) = 7.365$, $p = .002$**
Conviction that engaging in compulsions is reasonable				
Mean (SD)	20.03 (19.60)	33.20 (23.22)	38.63 (23.37)	$F(2,38) = 2.249$, $p = .119$
rMSSD (SD)	16.53 (8.51)	27.74 (10.77)	32.50 (14.62)	$F(2,38) = 5.892$, $p = .006$**
Conviction that feared belief is due to OCD				
Mean (SD)	85.87 (12.10)	65.62 (23.46)	64.93 (25.53)	$F(2,38) = 3.549$, $p = .039$*
rMSSD (SD)	11.39 (5.91)	31.21 (19.04)	33.37 (22.58)	$F(2,38) = 5.370$, $p = .009$**

Note: *$p < .05$; **$p < .01$; ***$p < .001$; rMSSD = *root mean square successive difference.*

3.3. Variability of insight over time

Intraclass correlations showed that a considerable proportion of total variance could be attributed to within-person variance for all three aspects of insight measured during EMA. For insight concerning the conviction that the threat-related belief is or will come true, level 1 (multiple time-points within persons) explained 44.28% of the variance. For insight concerning the conviction that engaging in compulsions is reasonable to prevent feared consequences from occurring, level 1 explained 47.42% of total variance, and for insight concerning conviction that threat-related belief is due to OCD, 51.40% could be attributed to level 1. Average rMSSD scores for each aspect of insight and each symptom dimension are shown in Table 3. For all facets of insight, temporal variability was highest for beliefs related to doubt of harm/checking, followed by contamination/cleaning and taboo thoughts. The one way ANOVAs became significant for all of the three aspects of insight. The Tukey HSD tests revealed significant differences between the mean scores of the symptom dimensions doubt/checking and taboo thoughts (all ps $< .05$). Furthermore, for insight concerning conviction that threat-related belief is due to OCD, a significant difference was also found between the symptom dimensions taboo thoughts and contamination/cleaning (p = .02).

3.4. Prediction of insight

3.4.1. Degree of conviction that feared belief is or will come true

Results of the proximal and time-lagged analyses are shown in Table 4. In the first model (1), self-punishment and mindfulness became significant (*ps* $< .001$). As expected, the coefficient of self-punishment was positive, whereas the coefficient for mindfulness was negative. The more pronounced was the mindfulness (self-punishment) in the time frame since the last assessment, the lower (higher) the conviction that feared belief is or will come true. Contrary to our hypotheses, worry did not exert a significant influence on insight. All three independent variables together explained 17.51% of level 1 variance (time-level). The coefficient of mindfulness became smaller after additionally including current OC symptoms and antecedent compulsions, but still remained significant ($p = .002$). Indeed, this model fitted the data better. Coefficients for current OC symptoms and antecedent compulsions were positive, indicating a negative association with insight. In other words, the more pronounced were the current symptoms and compulsions in the time frame since the last assessment, the higher the conviction that feared belief is or will come true. Here, the second model fitted the data better. In the first model of the time-lagged-analysis, coefficients for self-punishment and mindfulness (measured at t-1) were smaller but still remained significant ($p = .014$ and $p = .008$, respectively). However, after rerunning the model with current OC symptoms and antecedent compulsions, the coefficients of these variables failed to reach a conventional significance level ($p < .05$).

Table 4
Regression coefficients and standard errors for the regression analyses to predict insight concerning the degree of conviction that feared belief is or will come true.

	Conviction that feared belief is or will come true			
	Proximal analyses		Time-lagged analyses	
	(1)	(2)	(3)	(4)
Worry	0.02 (0.70)	0.74 (0.50)	0.32 (0.48)	0.22 (0.35)
Self-punishment	2.30*** (0.70)	0.51 (0.53)	1.02* (0.41)	−0.06 (0.36)
Mindfulness	−3.76*** (0.85)	−1.84** (0.60)	−1.33** (0.51)	−0.48 (0.37)
Current obsessions		6.35*** (1.10)		8.73*** (1.30)
Current compulsions		2.50** (0.91)		4.05** (1.27)
Compulsions		1.58** (0.52)		0.32 (0.32)
Constant	34.47*** (4.25)	20.66*** (3.53)	30.47*** (3.36)	17.49*** (3.15)
Observations	1.74	1.75	1.81	1.81
Log Likelihood	−7543.05	−7255.05	−8084.69	−7541.56
Akaike Inf. Crit.	15114.10	14562.10	16197.38	15135.13
Bayesian Inf. Crit.	15190.64	14704.23	16274.39	15278.16

Note: *$p < .05$; **$p < .01$; ***$p < .001$.
Due to the inverse operationalization of insight (the lower the score, the higher insight and vice versa), negative signs of coefficients indicate a positive predictive value of the corresponding variable on insight, whereas positive signs of coefficients indicate a negative predictive value.

3.4.2. Conviction that engaging in compulsion is reasonable to prevent feared consequences from occurring

Results of the proximal and time-lagged analyses are shown in Table 5. Again, in the first model of the proximal analyses, only coefficients for self-punishment and mindfulness became significant (*ps* $<$ .001). Due to reverse scaling of insight, signs of coefficients are in accordance with hypotheses, showing a negative association between self-punishment and insight and a positive link between mindfulness and insight. However, worry did not exert a significant influence on insight. All three variables together explain 13.18% of level 1 variance. Again, when additionally including current OC symptoms and antecedent compulsions into the regression analysis, only the coefficient for mindfulness remained significant ($p = .016$). Again, this model fitted the data better. Due to reverse scaling of this aspect of insight, positive

Table 5
Regression coefficients and standard errors for the regression analyses to predict insight concerning the degree of conviction that engaging in compulsions is reasonable to prevent feared belief from occurring.

	Conviction that engaging in compulsions is reasonable to prevent feared belief from occurring			
	Proximal		Time-lagged	
	(1)	(2)	(3)	(4)
Worry	−0.22	0.18	0.42	0.09
	(0.64)	(0.52)	(0.51)	(0.40)
Self-punishment	3.46***	0.89	0.81	−0.25
	(0.68)	(0.53)	(0.44)	(0.41)
Mindfulness	−3.52***	−1.66*	−1.23*	−0.31
	(0.84)	(0.67)	(0.54)	(0.42)
Current obsessions		4.193***		6.10***
		(1.00)		(1.09)
Current compulsions		4.39***		6.63***
		(1.22)		(1.50)
Compulsions		1.92**		0.47
		(0.61)		(0.37)
Constant	34.19***	21.71***	30.89***	19.14***
	(4.34)	(3.61)	(3.36)	(3.54)
Observations	1.75	1.75	1.81	1.81
Log Likelihood	−7717.16	−7443.14	−8210.25	−7775.38
Akaike Inf. Crit.	15462.32	14938.28	16448.50	15602.76
Bayesian Inf. Crit.	15538.86	15080.42	16525.52	15745.78

Note: *$p < .05$; **$p < .01$; ***$p < .001$.
Due to the inverse operationalization of insight (the lower the score, the higher insight and vice versa), negative signs of coefficients indicate a positive predictive value of the corresponding variable on insight, whereas positive signs of coefficients indicate a negative predictive value.

coefficients of OC symptoms indicate a negative association with insight (i.e., the more pronounced OC symptoms, the lower insight concerning the unreasonableness to engage in compulsions). In the first model of the time-lagged analyses, the regression coefficient for mindfulness (measured at t-1) was smaller but remained significant ($p = .023$), whereas self-punishment no longer exerted a significant influence on insight. However, after rerunning the model with current OC symptoms and antecedent compulsions (measured at t-1), the regression coefficient of mindfulness no longer became significant.

3.4.3. Conviction that feared belief is due to OCD

Results of the regression analyses of the third aspect of insight are shown in Table 6. Contrary to results of the first two facets of insight, this aspect of insight could neither be predicted by antecedent worry or self-punishment, nor by mindfulness (see model 1). In the second model, only antecedent compulsions predicted insight ($p = .048$) (model 2). The negative sign of the coefficient implies a negative association between compulsions and insight (the more a participant had engaged in compulsions in the time frame since the last signal, the less convinced he was that his belief is due to OCD). Results of the lime-lagged analyses show a similar pattern. None of the three variables became significant in the first analysis (model 3). In the second model of the time-lagged analysis (model 4), current obsessions and antecedent compulsions (measured at t-1) became significant ($ps < 0.05$). Signs of coefficients show a positive association between symptoms and conviction that feared belief is due to OCD.

Table 6
Regression coefficients and standard errors of the independent variables at t (t-1, respectively) to predict insight concerning the degree of conviction that feared belief is due to OCD.

	Conviction that feared belief is due to OCD			
	Proximal		Time-lagged	
	(1)	(2)	(3)	(4)
Worry	−0.230	−0.357	0.080	−0.081
	(0.522)	(0.472)	(0.555)	(0.473)
Self-punishment	0.921	1.131	0.244	−0.418
	(0.984)	(0.914)	(0.482)	(0.486)
Mindfulness	0.982	0.775	−0.317	−0.355
	(0.716)	(0.727)	(0.587)	(0.499)
Current obsessions		0.092		3.045*
		(0.932)		(1.463)
Current compulsions		0.311		1.486
		(0.977)		(1.552)
Compulsions		−1.204*		0.857*
		(0.589)		(0.437)
Constantrowhead	73.917***	75.450***	71.955***	67.288***
	(3.835)	(4.165)	(3.460)	(5.565)
Observations	1.701	1.701	1.761	1.761
Log Likelihood	−7345.236	−7295.205	−8106.996	−7828.169
Akaike Inf. Crit.	14718.470	14642.410	16241.990	15708.340
Bayesian Inf. Crit.	14794.620	14783.820	16318.620	15850.650

Note: *$p < .05$; **$p < .01$; ***$p < .001$.
Due to the operationalization of insight (the lower the score, the lower insight and vice versa), negative signs of coefficients indicate a negative predictive value of the corresponding variable on insight, whereas positive signs of coefficients indicate a positive predictive value.

4. Discussion

This is the first study to trace insight as a multidimensional concept in its temporal variations during everyday life, and additionally, through use of EMA, to analyze the impact of worry, self-punishment and mindfulness on insight in OCD patients. Results confirmed the assumption that insight fluctuates considerably over time. As already pointed out by several authors (Abramowitz & Jacoby, 2015; Kozak & Foa, 1994; Markova et al., 2009; O'Dwyer & Marks, 2000; Shimshoni et al., 2011), these findings suggest that insight in OCD is a phenomenon which is highly situation-bound and influenced by its temporal context. Hence, as it has already been suggested by Markova et al. (2009), we recommend to conceptualize insight in OCD as a mental state. Insight variability as measured with the rMSSD revealed a statistically significant difference between OC symptom dimensions for all three aspects of insight, whereby variability was significantly higher in beliefs related to doubt (of accidently harming another person)/checking as compared to beliefs related to taboo thoughts. This finding is novel and highlights the heterogeneous nature of OCD.

As hypothesized, self-punishment predicted lower insight into the unreasonableness of the underlying belief and the senselessness of engaging in compulsions, whereas mindfulness predicted higher levels of these two aspects. However, after including current OC symptoms and antecedent compulsions into the multilevel regression analyses, only mindfulness remained a significant predictor of insight into the absurdity of the content of obsessions and the senselessness of engaging in compulsions. Current OC symptoms and antecedent compulsions were the strongest predictors in our models, explaining between 38.1% and 41.4% of within-person variance. Taking this into account, it is remarkable that mindfulness still exerts an effect on insight over and

above OC symptoms. This finding adds support to the idea pointed out by several authors (e.g., Didonna, 2009; Fairfax, 2008; Key et al., 2017; Külz et al., 2014) that mindfulness may help patients to regard their intrusive thoughts as transient mental events, thereby distancing them from the content of these thoughts. Our results also extend findings from laboratory studies in which mindfulness- and acceptance-based strategies have proven beneficial in reducing distress associated with intrusive thoughts (Marcks & Woods, 2005; Najmi et al., 2009), in increasing the willingness to experience intrusive thoughts (Marcks & Woods, 2007), as well as in reducing post-exposure anxiety and urge to neutralize (Wahl et al., 2013). Our results also confirm a link between self-punishment and insight. Self-punishment can be regarded as the very opposite of mindfulness, since it implies clinging to a thought in a judgmental way instead of just "letting it go". Seen from this perspective, it is plausible that our results showed a negative link between self-punishment and insight.

Contrary to our hypotheses, worry, as it was assessed in our study, did not seem to impact on insight measured in daily life at all. This is surprising since worry is associated with a range of negative consequences such as an increased attention to and detection of threat (Beck & Clark, 1997), difficulties in attentional disengagement from threat (Verkuil, Brosschot, Putman, & Thayer, 2009), as well as enhanced threat expectancies and an increase in perceived uncontrollability in response to an anxiety trigger (Stapinski, Abbott, & Rapee, 2010). One explanation could be that worry, as it was assessed in our study, might not have fulfilled the characteristic qualities described by Borkovec, Robinson, Pruzinsky, and DePree (1983), who define it as a negatively affect-laden and relatively uncontrollable attempt to engage in mental problem-solving. An assessment based on a single item can hardly cover all aspects contained in this concept. Furthermore, the TCQ worry scale, from which our worry item was adapted, has not proven valid for assessing pathological worry in a study by Fehm and Hoyer (2004). In this study, no statistically significant correlation was found between the TCQ worry subscale and the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) in a sample of healthy individuals, and only a small correlation ($r = 0.28$) was found between these scales in a clinical sample of patients with different anxiety disorders and OCD (Fehm & Hoyer, 2004). Since the PSWQ is considered the gold standard for assessing pathological worry (Stöber, 2000), the TCQ worry subscale apparently does not measure the same construct. Due to correlations between the TCQ worry scale and other features of psychopathology, such as anxiety and depression, Fehm and Hoyer (2004) concluded that this scale "may reflect a broad dysfunctional way of dealing with unwanted thoughts rather than specific behavioral or cognitive reactions"(p.115). Hence, it is likely that our operationalization of worry might have failed to measure pathological worry. Consequently, it would be premature to rule out a potential link between worry as a dysfunctional strategy to deal with intrusive thoughts and insight in OCD.

Interestingly, the first two aspects of insight were consistently associated with current and antecedent compulsions, in that compulsions predicted poorer insight. This is in line with classical models of OCD (Rachman, 1997; Rachman & Silva, 1978; Salkovskis, 1999) which posit that compulsions indirectly preserve the misinterpretations of obsessions and their anticipated consequences due to feedback processes. Current obsessions were the strongest predictor for poor insight concerning reasonableness of the threat-related belief and of engaging in compulsions. This is also in line with concepts about the maintenance of OCD which assume that a perceived failure to gain control over obsessive thoughts triggers a secondary appraisal process in which the fact of not being able to get rid of the thought is interpreted as highly significant and threatening (Clark, 2004). Therefore, it is not surprising that the occurrence of obsessions is associated with lower insight (i.e., I can't gain control over the idea that I might hurt my child. This means that I am a weak person who may lose control over the aggressive impulses one day).

Although we found considerable variation over time, insight concerning the degree to which participants recognize their belief as due to OCD, was neither associated with worry, nor with mindfulness or self-punishment. Consequently, for this aspect of insight, other antecedent processes or situational correlates might be required to explain variations over time. Another explanation could be that, despite careful item development, the reverse scaling of this item might have caused confusion in participants, which, in turn, might have led to erroneous data entry of subjective experiences. This assumption is supported by astoundingly small correlation coefficients between this and the first two aspects of insight.

4.1. Strengths and limitations

This study has several strengths. First of all, we used a powerful research tool for the repeated measurement of insight in daily life. We took into account the multidimensional nature of insight and conducted expert-based plausibility ratings beforehand in order to ensure content validity. Furthermore, our sampling scheme was designed on the basis of expert recommendations (Hufford, 2007; Shiffman, 2007). The average response rates of approximately 80% are comparable to a previous EMA study in OCD patients (Gloster et al., 2008). In this study, 80.5% of responses occurred within 15 min of the first signal.

However, we also have to bear in mind some limitations of our study. Although the high external validity is clearly one of the strengths in EMA studies, the low internal validity must be considered. We could not control for confounding variables in participants' natural environments, and although our completion rates were high, we do not know if unfilled assessments occurred randomly. Particularly when confronted with their feared beliefs, participants might have postponed or dismissed assessments due to an inability to resist their compulsive urges in this moment.

Another aspect which has to be considered is reactivity to EMA self-monitoring. Although it has been shown that EMA does not result in significant reactivity in OCD (Gloster et al., 2008), it would have been useful to reassess BABS scores after the EMA data-collection phase in order to rule out reactivity. Furthermore, despite a relatively dense sampling of momentary states, we cannot infer a causal relationship between mindfulness and insight. Indeed, the link may be reverse or even bidirectional, in the sense that high insight levels facilitate a mindful way of dealing with obsessive thoughts, which, in turn, might have a positive impact on insight. Additionally, to reduce participant burden, we had to limit the number of items presented at each prompt. To this end, we assessed thought control strategies on the basis of single items. Hence, our results are not based on an exhaustive assessment of the thought control strategies we sought to investigate. Finally, we cannot infer from our results which processes mediate the association between mindfulness, self-punishment and insight. As we hypothesized in the introduction, a preserved anxiety level or sense of threat might have mediated the relationship between self-punishment and insight. By contrast, tolerance towards unpleasant inner states might have mediated the association between mindfulness and insight. However, we did not assess these constructs, and consequently, cannot draw any firm conclusions about mediating processes.

4.2. Implications for insight conceptualization, future research and clinical practice

Based on results of our study, insight in OCD should be conceptualized as a dynamic phenomenon. Thus, the DSM-5 division of insight into three categories might be too coarse to reflect the fluctuating nature of this phenomenon. Consequently, a diagnostic approach which allows for a more detailed documentation of a patients' "range of insight" (based on repeated assessments in everyday life using symptom diaries) might be more suitable. Although research on insight fluctuation is still in its infancy, the result that insight variability differs

between symptom dimensions adds to the growing understanding of OCD as a heterogeneous disorder and highlights the need to incorporate OCD symptom dimensions into clinical research. Our study was an initial step in research aimed at exploring insight variability and its temporal correlates in OCD. Future studies will need to replicate our findings based on larger sample sizes. Of note is that we only explored a subgroup of various thought control strategies. It would therefore be of significant value to explore if insight fluctuation is associated with other clinical characteristics, and if such fluctuation predicts treatment outcome over and above average insight level. With regard to implications for clinical practice, insight fluctuation might be particularly relevant for treatment planning. For example, to increase compliance and to prevent discontinuation of treatment, therapists should be aware of patients' momentary insight level when explaining the rationale for exposure and response prevention. Since our results show that insight fluctuated the most in the doubt of harm/checking dimension, particular attention must be paid in the treatment of patients with OC related beliefs related to accidently harming another person.

The observed temporal relation between mindfulness and insight is especially relevant for future research. Mindfulness comprises different dimensions (Baer et al., 2006) which have been found to be differentially associated with psychopathological processes of OCD (Emerson, Heapy, & Garcia-Soriano, 2018). Therefore, future studies should replicate our findings with a more comprehensive assessment of mindfulness in order to improve our understanding of its relation to insight in OCD.

In an effort to improve treatment outcome for patients with poor insight, future therapy studies should investigate whether mindfulness strategies may help patients to overcome the barrier to completely refrain from OC rituals. As mentioned earlier, attenuated treatment outcomes in patients with poor insight is assumed to result from a decreased willingness or ability to undergo exposure therapy (Tolin, 2001). For this patient group, an alternative approach might be, as a first step, to delay compulsive rituals. A short formal mindfulness practice such as the 3-min-breathing space might help to break the stimulus-response chains by serving as a kind of buffer between obsessions and compulsions (Külz & Rose, 2014). If such a short practice was able to help increase insight in the interim, this might, concomitantly, decrease the urge to carry out compulsive rituals and, as a consequence, help patients overcoming the barrier to engage in exposure therapy.

Last but not least, our results have implications for research on mindfulness-based interventions in OCD. Although several studies hint at the efficacy of mindfulness training for OCD (Hertenstein et al., 2012; Key et al., 2017; Külz et al., 2013), little or no evidence for the superiority of mindfulness-based interventions was found in two recent studies using control group designs (Kulz et al., 2019; Strauss et al., 2018). Hence, future studies should focus on moderators of therapy outcome so as to explore for which patient groups mindfulness training might prove beneficial and for which patient groups it might not. Given the results of the current study, and based on our theoretical considerations of the benefits of mindfulness for improving insight, we recommend including insight as one potential moderator for therapy outcome in future research on the effectiveness of mindfulness-based therapy programs for OCD.

5. Conclusions

Insight in its different facets fluctuates considerably over time in OCD and should therefore be considered to be a state-like phenomenon. Beyond this, the intensity of temporal variability differs significantly between OC symptom dimensions. This highlights the heterogeneous nature of this disorder. The temporal link between insight and mindfulness indicates the need to further explore mindfulness as one promising strategy for increasing insight in OCD. This line of research is of high clinical importance and may be especially valuable for improving treatment outcomes for patients with poor insight.

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