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Analysis of Emotional Dysregulation with Obsessive-Compulsive Disorder Using Ecological Momentary Assessment

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**Analysis of Emotional Dysregulation with Obsessive-Compulsive Disorder
Using Ecological Momentary Assessment**

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ANALYSIS OF EMOTIONAL DYSREGULATION WITH OBSESSIVE COMPULSIVE DISORDER USING ECOLOGICAL MOMENTARY ASSESSEMENT

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Abstract

Emotional dysregulation is a central mechanism implicated in the development and maintenance of Obsessive-Compulsive Disorder (OCD). While prior research has largely relied on retrospective, trait-level measures, Bischof et. al (2024) addressed this gap by employing Ecological Momentary Assessment (EMA) to capture real time affective states and emotion regulation (ER) behavior over a six- day period in $n= 72$ participants with OCD and $n= 54$ psychologically healthy individuals (HC). The present study replicates the core findings of Bischof et. al. using the same open-source dataset, applying multilevel logistic and Gaussian location-scale regression models to reproduce group-level differences in negative affect, avoidance-orient regulation, perceived ER effectiveness, and emotional acceptance. Replication results confirmed that individuals with OCD demonstrated significantly lower baseline emotional acceptance and a reduced sensitivity in that acceptance as momentary negative affect increased, relative to HC. Additionally, healthy controls showed a steeper decline in emotional acceptance only at higher intensities of negative affect, while OCD participants showed persistently lower acceptance across the affect spectrum. These findings support the robustness of Bischof et. al.'s original conclusions and strengthen confidence in the EMA methodology as a valid approach for examining moment-to-moment Er dynamics in clinical populations. Limitations related to unavailable comorbidity and medication data within the open source dataset are discussed, along with implications for future transdiagnostic ER research. Although negative affect has been extensively studied in Obsessive-Compulsive Disorder (OCD), comparatively little attention has been given to positive affect and adaptive emotion regulation (ER) as complementary dimensions of emotional functioning. The current extension builds upon the dataset and

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methodology of Bischof et al. (2024) to examine variables not addressed in the original publication, focusing on positive affect, adaptive ER strategy use, and OCD symptom severity as interacting components of emotional regulation landscape in OCD. Using the same ecological momentary assessment (EMA) dataset, four analyses were conducted. First, momentary positive affect significantly predicted the likelihood of engaging in emotion regulation, with higher positive affect associated with reduced regulation attempts across both OC and health control (HC) groups. Second, greater use of adaptive (engagement-oriented) ER strategies was significantly associated with higher perceived regulation effectiveness across groups. Third, individuals with OCD reported consistently lower perceived effectiveness of regulation even at comparable levels of maladaptive strategy use relative to HC. Fourth, as OCD symptom severity increased, maladaptive strategy use rose significantly while adaptive strategy use remained stable, suggesting that symptom escalation is accompanied by a growing reliance on avoidance-based coping rather than a reduction in engagement-oriented strategies. Together, these findings extend the original study's emphasis on negative affect and ER deficits by revealing that positive affect shapes regulatory motivation, and that worsening OCD severity is specifically linked to increasing maladaptive-not decreasing adaptive-regulation. Implications for holistic, ER-focused treatment approaches in OCD are discussed.

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Introduction

Obsessive-compulsive disorder is characterized as a condition in which an individual experiences drives to fulfill particular actions, thoughts, or ritualistic behaviors to relieve themselves of a strong sense of dread. That relief, however, does not last long enough for the individual to feel satiated from carrying out just one compulsive behavior. Those with OCD become repeatedly reliant upon their designated actions to feel at peace on a regular basis of their lives. For this reason, it becomes quite debilitating as the OCD symptoms strengthen. While anxiety is a major factor driving the compulsions, emotion can provide insight into the psychological mechanisms of OCD. To further examine this point, we applied Bichof et al. to understand the processes behind which emotion impacts an individual with OCD. In addition, the publication used a unique study called 'Ecological Momentary Assessment' (EMA) which helped collect data on the patients with OCD and a healthy controls' (HC) regular approach to emotional experience and regulation.

The EMA required participants to have a device which they could reliably connect to the assessment with for a six day period within which they received six assessments to complete. This video-recording assessment recorded information of their emotional state, approach towards regulating it if any, whether that regulation was effective or not, and any OCD symptoms they incurred. Overall, this study would give insight into how individuals with OCD compared to healthy controls without OCD or any other psychological condition when it came to emotional regulation. The data from this assessment would be analyzed through R to organize outcomes that most effectively answer the central research question which include two major hypotheses.

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The first hypothesis inquires upon individuals with OCD reporting more negative emotional affect than positive and their regulation method would involve avoiding the emotional state at hand. Additionally, the hypothesis states that the regulation method would be ineffective and if they chose to not regulate, it would not be due to acceptance of the emotion but rather having doubts about its purpose. This first hypothesis observes outcomes between both groups, OCD and control to produce an evaluation. The second hypothesis examines the relationship between negative affect and applying more avoidance oriented strategies to the emotion with low resulting effectivity. The OCD group is expected to have this particular outcome more than the control.

To ensure robustness of the results and approach to the hypotheses, we conducted a replication and extension study. In the replication, we applied the exact R code provided by Bichof et al. to ensure their data has been demonstrated reasonably throughout the paper with accuracy and relevance to the research question. This meant editing sections of code to represent the table of variables and statistical tests that measure the reliability of the study methodology. Overall, our outcomes demonstrate a relationship between individuals with OCD and negative affect while the healthy control group provides insight into expectations for approaching negative affect. The characteristics observed serve to enhance an understanding of emotional regulation for those with OCD and how data can be incorporated reliably into an analysis. For the extension we lightly involved a secondary paper, Dzinalija et al., which carries insight on a topic that complements Bichof et al. We also used new code to breakdown additional variables that were not originally attended to in the published Bichof et al. piece. While the replication touches on negative affect, the extension aims to understand positive affect along with regulation

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by reinforcement of particular conditions. The OCD group was extensively explored through symptom severity as well in relation with regulations methods. Since OCD is often perceived with increased insight towards negative affect, exploring positive affect offers an additional understanding of emotional regulation as a whole and not only negative affect selectively. The data was extracted only from Bichof et al to further expand on their study methods and collected data as well. The extension provides the chance to utilize the multimodal notion of data analysis performed by the research team and build into a more nuanced research topic for OCD.

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Replication

Methods

Participants

Individuals were recruited through public display of the EMA study in which a paid opportunity incentivized participation. Participants either self identified as healthy or having OCD. To establish objective grouping of applicants, the study further examined them through major diagnostic methods. Primary diagnosis was administered based on the DSM-5 guidelines for OCD. Additionally, those with comorbidities aside from major depressive disorder were excluded from participating in the OCD group or at all. To qualify under a healthy control, applicants could not have a history of substance abuse and must have been psychologically healthy in the past five years. Following participant screening, 72 individuals were selected for the healthy control group and 54 remained in the OCD group.

Materials/Assessment

The present replication re-analyzed the ecological momentary assessment (EMA) dataset provided by Bischof et al. This examination addressed whether the reported relationships between obsessive–compulsive symptom severity, negative affect, and emotion regulation (ER) outcomes could be reproduced using different statistical approaches. While the original study primarily used generalized additive mixed models (GAMMs) to analyze moment-to-moment changes within individuals, the replication conducted complementary analyses in RStudio using two-group analyses of variance (ANOVA) and a linear regression model. These methods were selected to reproduce the key group differences and continuous relationships reported in the

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original study while providing a clearer comparison of average effects across diagnostic groups.

This analytic strategy aligns with the replication goal of testing whether the main findings remain consistent when examined using different, but theoretically comparable, statistical methods.

The analyses focused on several core variables central to the original two hypotheses. These included mean negative affect, adaptive emotion regulation use (ER_adaptive), perceived emotion regulation effectiveness, and standardized OCD symptom severity (OC_mean).

Diagnostic group membership (OCD vs. HC) served as the primary between-subjects predictor in ANOVA models examining differences in average levels of these variables. In addition, continuous predictors (particularly OCD and HC emotional acceptance) were analyzed using linear regression models to evaluate their relationships with negative affect.

The analytic framework parallels the conceptual distinction between fixed and random effects used in the original GAMM analyses. In the original models, the diagnostic group, day, age, and sex were treated as fixed effects, while individual differences across participants were captured through random intercepts and slopes to account for repeated measurements. Although the present replication primarily used ANOVA and regression rather than full multilevel GAMMs, these models were designed to approximate comparable fixed-effect comparisons, such as group differences, as well as key predictive relationships, such as the association between OCD severity and affect. As a result, the replication focuses on reproducing the mean-level and association-level effects that form the central theoretical claims of the original study. No new participants were recruited for the replication. Instead, analyses were conducted using the original study's EMA dataset, which included individuals diagnosed with OCD and a healthy

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control comparison group. In the original study, participants completed repeated real-time assessments multiple times per day over a six-day period. These assessments measured momentary affect, emotion regulation strategy use, perceived regulation effectiveness, and the presence of OCD symptoms. Diagnostic group classification was determined using standardized clinical assessment procedures described in the original article, including structured diagnostic interviews and validated symptom measures. These procedures established the OCD and HC groups used in both the original analyses and the present replication.

Analysis

The original study by Bischof et al. (2024) investigated whether individuals with OCD and healthy controls (HC) differ in emotional regulation patterns and if momentary negative affect differentially predicts emotional regulation strategies across groups. Using an ecological momentary assessment (EMA) design over a six-day period, the primary hypothesis from the original study proposed that the relationship between momentary negative affect and emotional acceptance would be moderated by group, displaying that healthy controls show a stronger negative association compared to individuals with OCD. To assess the robustness of the original study, we conducted a mixed-effects regression analysis to predict emotional acceptance from person-mean-centered momentary negative affect, group (OCD vs. healthy controls), and their interactions, with random intercepts for the participants. Our results replicated the original study's findings with consistency. Our results show the significance of momentary negative affect on emotional acceptance ($b = -3.881$, $z = -7.640$, $p < .001$), suggesting that high levels of negative affect are associated with a lower probability for acceptance of one's emotions.

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Additionally, a high significance of group type ($b = -2.314$, $z = -4.576$, $p < .001$) suggests that individuals with OCD show lower baseline levels for emotional acceptance compared to healthy controls. Most significantly, results from the interaction between momentary negative affect and group ($b = 2.423$, $z = 4.466$, $p < .001$) indicate that the relationship between negative affect and emotional acceptance differed by group. In Figure 1(a), we witness the two groups diverge not simply in quantity, but in how and when acceptance breaks down: healthy controls maintained relatively high levels of emotional acceptance across mild-to-moderate levels of negative affect, with a sharp decline occurring shortly after negative affect reached higher intensities. This suggests that the controls possess a greater affective threshold and can tolerate moderate levels of negative affect without meaningful loss of emotional acceptance, though only under conditions of strong negative affect does that acceptance collapse rapidly.

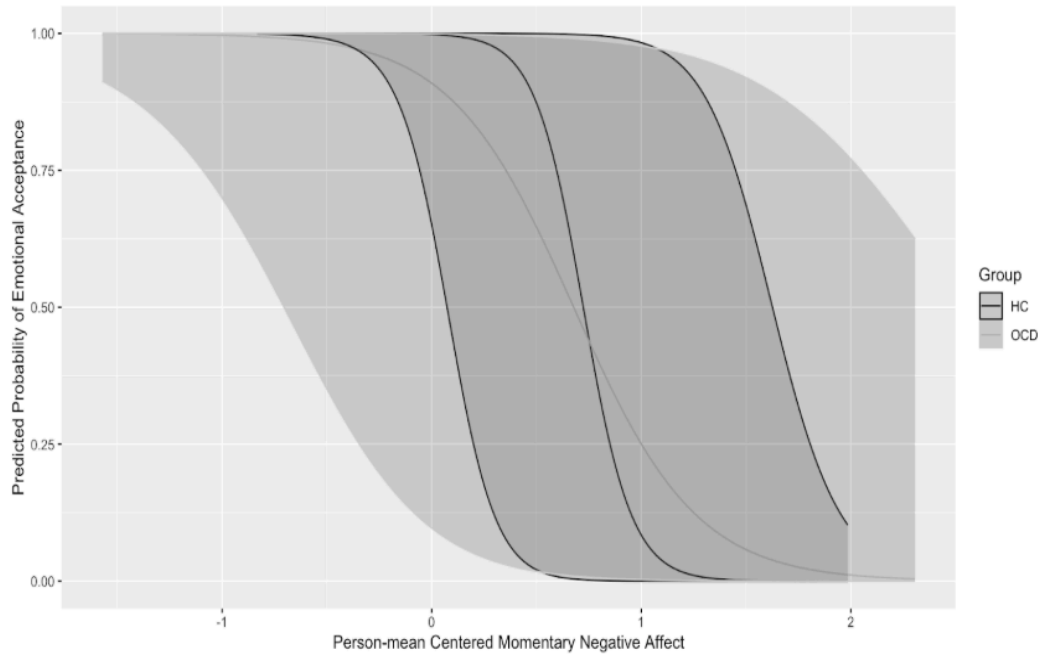
Notably, the two groups converge toward a near-zero probability of emotional acceptance at the higher end of the negative affect scale. This convergence highlights that the key distinction between the groups is not simply their response to extreme negative affect, but rather their response to moderate affective fluctuations.

In conclusion, our replication successfully reproduced Bischof et al.'s (2024) key findings—individuals with OCD show reduced emotional acceptance in response to negative affect compared to healthy controls. The patterns illustrated by Figure 1(a) show a significantly attenuated response for the OCD group, indicating a stronger correlation between affective states and acceptance responses. The consistency of fixed effects sizes, significance patterns, and

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visualization in Figure 1(a) provides strong evidence for the replicability of this effect that will be further interpreted in the discussion.

Figure 1. Probability of Emotional Acceptance and Mean Negative Affect
(a)



(b)

	Fixed_effect	Estimate	z_value	p_value	CI_95	Random_effect_SD
1	(Intercept)	4.917	11.481	<.001	4.077, 5.756	2.156
2	affect_mean_neg	-3.881	-7.640	<.001	-4.877, -2.885	
3	groupOCD	-2.314	-4.576	<.001	-3.306, -1.323	
4	affect_mean_neg:groupOCD	2.423	4.466	<.001	1.36, 3.487	

Discussion

The present replication seeks to evaluate findings from Bischof et al on emotion regulation(ER) in obsessive-compulsive disorders by using ecological momentary assessment(EMA). Our replication replicated the main Table 2's tests using the same multilevel

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modelling as the original study. Because the nature of the study dictated multiple datapoints(EMAs) within individuals over a period of weeks, all models accounted for nesting. For continuous labels, the replication used Gaussian Location-Scale models for continuous variables(negative affect, positive affect, perceived effectiveness). For binary outcomes(eg, non-regulation outcomes, 1 = acceptance and 0 = other reasons), the replication used multilevel logistic models.

Overall, the findings support the view that people with OCD experience emotional dysregulation and negative affect differently, compared to healthy controls. Replication reproduced the finding that momentary negative affect predicted lower emotional acceptance; This association differed between groups. In addition, individuals with OCD showed lower baseline emotional acceptance than healthy controls, who in turn demonstrated a steeper decline in emotional acceptance as momentary negative affect increased.

Taken together, these findings suggest individuals with OCD persistently suffer more than healthy controls in emotion acceptance during periods of emotion dysregulation. Interestingly, for healthy controls, sharper decline in emotional acceptance following increases in negative affect were seen in healthy controls than individuals with OCD. This can be interpreted as healthy controls having more varied levels of emotional acceptance. Instead, a better interpretation is that for individuals with OCD, since emotional acceptance is consistently lower, increases in negative affect produce less additional change.

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Extension

Materials & Methods

The extension analyses were conducted using the same ecological momentary assessment (EMA) dataset from Bischof et al., consisting of repeated real-time observations of emotional affect, regulation strategies, and perceived effectiveness across individuals with obsessive-compulsive disorder (OCD) and healthy controls (HC). No additional data collection or participant recruitment was performed, as the extension aimed to reanalyze existing variables within a new conceptual framework.

In contrast to the replication, which focused on negative affect and its relationship to emotion regulation, the extension examined positive affect and reinforcement-related dynamics of regulation behavior. Two primary variable relationships were analyzed. First, the association between adaptive emotion regulation (ER_adaptive) and perceived regulation effectiveness (effectivity) was evaluated across groups. Second, the relationship between momentary positive affect (affect_mean_pos) and the likelihood of engaging in emotion regulation was examined, where regulation was coded as a binary variable (0 = no regulation, 1 = regulation attempted).

Data were analyzed in R using regression-based approaches appropriate to the structure of each outcome variable. Linear models were used to assess relationships between continuous variables (e.g., ER_adaptive and effectivity), while binary outcomes (regulation vs. no regulation) were analyzed using logistic modeling frameworks. Results were visualized through scatterplots with fitted regression lines to visualize associations between variables across OCD and HC groups.

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Analysis

The following results are organized around four primary figures, examining emotional regulation, positive affect, and symptom severity across OCD and healthy control (HC) groups. Figure 2(a) examines positive affect as a predictor of whether participants chose to apply emotional regulation (coded 0 = no, 1 = yes). The positive affect significantly predicted whether participants chose to regulate ($p < .001$), with the majority of participants deciding not to regulate as positive affect increased.

Figure 2. Positive Affect, Effectivity, and Maladaptive Responses

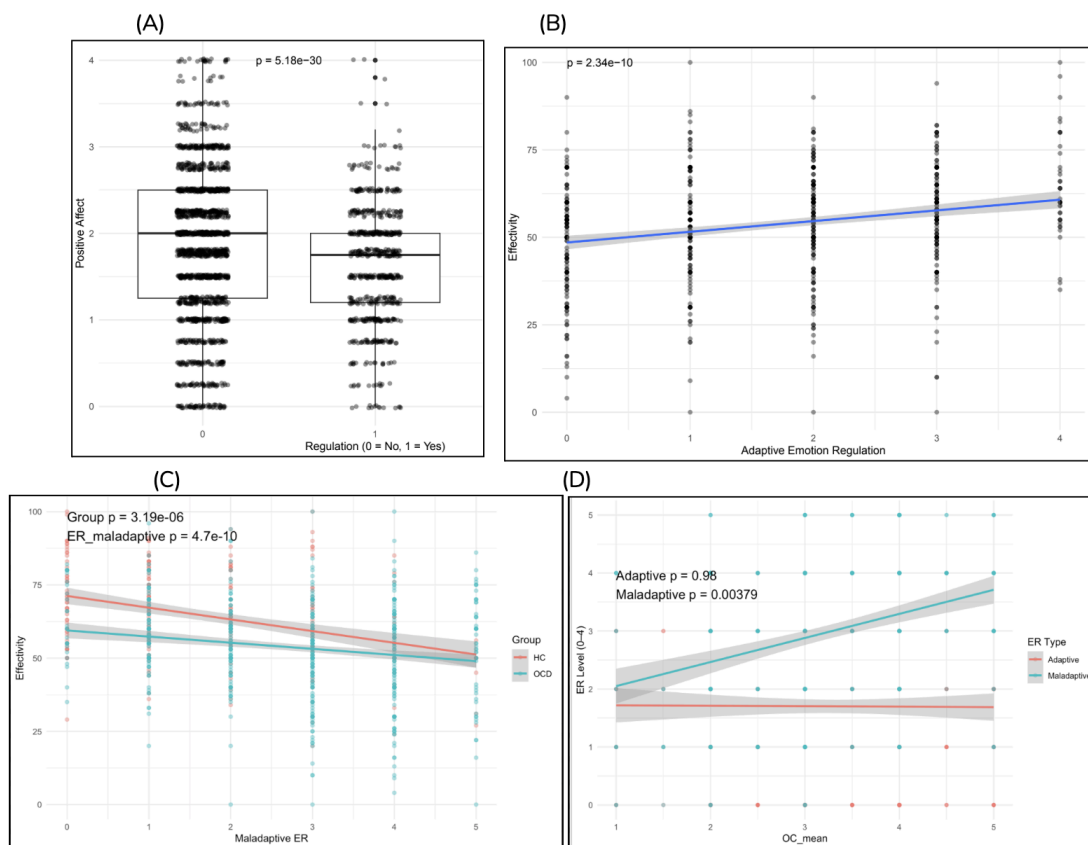


Figure 2(b) demonstrates a significant positive relationship between adaptive emotional regulation (ER_adaptive) and perceived effectiveness of regulation ($p < .001$), with a trendline

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reflecting a consistent upward slope and a denser concentration of participants at higher adaptive ER and effectivity values (intercept = 47.42, $b = 3.39$).

Figure 2(c) illustrates the significant group differences in perceived effectiveness of maladaptive regulation (ER_maladaptive) between HC and OCD participants (Group $p < .001$), displaying both trendlines declining as maladaptive ER increased. Maladaptive ER was also a significant independent predictor of effectiveness ($p < .001$). Figure 2(d) displays the use of ER_adaptive versus ER_maladaptive as a function of OCD symptom severity (OC_mean, range: 1-5). This indicates no significant change in adaptive regulation across OC_mean symptom severity ($p = .980$), while maladaptive regulation increased significantly with increased severity ($p = .004$).

Discussion

The goal of this extension was to explore emotion regulation (ER) in OCD from a slightly different angle by focusing on positive affect, adaptive strategies, and symptom severity. While the original study mainly emphasized the role of negative affect, this extension examined whether these additional variables could provide further insight into how individuals with OCD regulate their emotions compared to healthy controls (HC).

One of the main findings was that positive affect significantly predicted whether individuals chose to engage in emotion regulation. As shown in Figure 2(a), participants were less likely to regulate their emotions when they were already experiencing higher levels of positive affect. This suggests that individuals may be less motivated to regulate when they are already feeling good, which is consistent with general theories of emotion regulation. At the

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same time, this highlights a limitation in using “whether someone regulates or not” as a measure of regulatory ability. Choosing not to regulate in a positive emotional state may be appropriate and should not necessarily be interpreted as a deficit. As a result, this variable may not fully capture meaningful differences between OCD and HC groups.

Figure 2(b) showed a clear positive relationship between the use of adaptive (engagement-oriented) strategies and perceived effectiveness. Greater use of adaptive strategies was associated with higher perceived effectiveness. This supports the idea that strategies such as reappraisal or problem-solving are generally helpful in managing emotions. This relationship appeared consistent across both groups, suggesting that adaptive strategies tend to be beneficial regardless of OCD status. However, earlier analyses indicated that individuals with OCD do not necessarily use fewer adaptive strategies, which points toward differences in how or when these strategies are used rather than simple access to them.

Figure 2(c) further demonstrated that maladaptive strategies are associated with lower perceived effectiveness for both groups. As maladaptive strategy use increased, effectiveness decreased in both OCD and HC participants. Individuals with OCD, however, consistently reported lower effectiveness overall, even at similar levels of maladaptive use. This pattern suggests a broader difficulty in achieving or perceiving successful regulation in OCD. This finding aligns with the original study, which identified lower perceived effectiveness as a key distinction between groups.

Finally, Figure 2(d) examined how emotion regulation varies with OCD symptom severity. Adaptive strategy use remained relatively stable across symptom severity levels, whereas maladaptive strategy use increased significantly as symptoms became more severe. This

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indicates that worsening OCD symptoms are associated with increased maladaptive strategy use. Essentially, individuals are adding more maladaptive strategies as symptoms intensify. This pattern aligns with the idea that OCD is associated with a growing reliance on avoidance-based or less effective coping strategies over time.

There are several limitations to consider in this extension. First, many of the variables used (such as counts of strategies or binary regulation decisions) simplify complex emotional processes and may not capture how strategies are implemented in real-life contexts. Second, perceived effectiveness is a subjective measure and may not reflect actual emotional improvement. Third, while this extension introduces new variables, it does not fully capture the moment-to-moment dynamics emphasized in the original EMA-based models. For this reason, these findings are best interpreted as complementary to, rather than a replacement for, the original analyses.

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Conclusion

As a whole, with replication and extension, the study offers a novel perspective into OCD which had not been as thoroughly investigated in previous research. The process of replicating has ensured that such a study can be carried out with reliability and validity of the results. Extension gave deeper insight into OCD through a lens of positive affect and emotional reinforcement in conjunction with OCD symptom severity.

The project concludes a successful, overarching application of the data provided as data was reproduced without inconsistencies and had meaningful interpretations. However, some data was discussed in the original study by Bishof et al. but had not been explicitly provided in the data set. This includes comorbidities which were widely incorporated as a factor towards the results but not accessible for manipulation. In addition to comorbidity, the paper mentioned additional aspects that had not been reproduced but would have provided elevated robustness to the project. Regardless of the drawbacks, such a study can be used for developing therapeutic methods that may work in practice in emotionally implicated settings. The results can also strengthen the conceptualization of what it means to have OCD and help enhance the accuracy of any medication. In sum, the paper demonstrates the key components of the study with great consistency and reproducibility while offering a unique perspective into emotional regulation in individuals with OCD.

Open Data Set

All raw data and code used for this project are provided and accessible with the following link.

<https://drive.google.com/drive/folders/1EoeH3HYX2h402tca9Z2uFgIRY7qoV8F4?usp=sharing>

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