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Intolerance of uncertainty, not just right experiences, and compulsive checking: Test of a moderated mediation model on a non-clinical sample

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Abstract

Objective: Intolerance of uncertainty (IU) and not just right experiences (NJREs) have been claimed putative vulnerability factors for obsessive–compulsive disorder (OCD). The aim of the present study was to test whether IU could represent a trans-diagnostic construct accountable for OC checking behaviors and whether NJREs could embody an OCD-specific criterion through which IU operates.

Method: One hundred and eighty-eight Italian community individuals completed self-report measures of IU, NJREs, OC symptoms, worry, anxiety, and depression. Mediation and moderated mediation models were tested using a bootstrapping approach, wherein IU was included as the independent variable as well as the moderator; checking behaviors were entered as the dependent variable; and NJRE severity was included as a mediator.

Results: The main findings highlighted that NJREs were a mediator of the relationship between IU and checking behaviors; nonetheless, in connection with medium levels of IU, NJREs no longer mediated the path. Furthermore, IU did not emerge to moderate the mediation.

Conclusion: Despite their preliminary nature, the present results might be a hint for future research, as theoretical integration may represent a way to go for better understanding OCD etiology and phenomenology.

1. Introduction

According to the main cognitive models of emotional disorders, intolerance of uncertainty (IU) consists of the tendency to fear novel, unpredictable, and uncertain future events and of the belief that feeling uncertain is unacceptable and threatening [1–4]. IU has been claimed a potentially important trans-diagnostic factor spanning anxiety, obsessive–compulsive (OC), and depressive disorders, and a broad literature on its relationship with these disorders has been published in the last decades [4–9].

Recognition of the role played by IU in affecting OCD phenomenology is traceable to the clinical descriptions by Rachman and Hodgson [10]: "When affected people discuss their personal problems, they may appear to be rigid and inflexible, unresponsive to rational debate, and excessively eager to remove uncertainty [...] a number of investigations of obsessionals' decisions, concepts, and personal constructs are consistent with the view that some people with obsessions cannot tolerate uncertainty or ambiguity" (p. 56). In particular, the authors pinpointed that the repetitiveness and the rigidity characterizing most compulsive rituals, especially the checking ones, might be attributed to the need to achieve complete certainty about the prevention of feared outcomes. As the perfect removal of potential, anticipated bad events is, by definition, impossible, OCD individuals would feel forced to repeat their rituals in order to feel as certain as possible about effective threat prevention [10]; in other words, compulsive behaviors serve to reduce the distress associated with the fear of uncertain events, thus promoting the performance of behaviors aimed at gaining certainty [11].

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Subsequent literature provided support for the inclusion of IU among six dysfunctional beliefs (i.e., perfectionism, overestimation of threat, intolerance of uncertainty, inflated responsibility, over-importance of thoughts, and excessive concern about the importance of controlling one's thoughts) contributing to the development and maintenance of OCD identified by the Obsessive Compulsive Cognition Working Group (OCCWG) [12–15], and the existence of a relationship between IU and compulsions, beyond other OC-related cognitive domains, has been demonstrated [7,16,17]. For example, IU has been demonstrated to fully mediate the relationship between inflated responsibility and checking behaviors [16], as well as the relationship between perfectionism and OC symptoms [17], thus indicating that the association between responsibility and perfectionism on the one hand and OC symptoms on the other is fully explained by IU.

As previously mentioned, IU has been reported to play a crucial role especially in checking and repeating rituals, where doubt and indecisiveness are usually experienced as adverse conditions [11,16,18–21]. Patients with OC checking symptoms have been observed to find uncertainty more distressing than both patients with OC non-checking symptoms and healthy controls [11] and to need higher levels of certainty than healthy controls [22]. Furthermore, Fourtounas and Thomas [18] recently investigated the possibility of a differential involvement of the two IU components (i.e., prospective and inhibitory) in checking behaviors. Prospective IU has been proposed as a future-oriented component, referring to an active engagement in seeking information aimed at reducing uncertainty and action planning, whereas inhibitory IU has been defined as a sense of being stuck and unable to respond when facing uncertainty (i.e., uncertainty paralysis) [5,23]. In light of this, they conceptualized prospective IU as an approach behavior and inhibitory IU as an avoidance one; consequently, they expected to observe a stronger association between prospective IU – rather than inhibitory IU – and checking behaviors. In contrast to their hypothesis, they found that the two IU components were similarly associated with checking [18]. Such a result is, nevertheless, reasonable in consideration of recent evidence supporting the unidimensionality of IU: Hale et al. [24] further tested the factor structure of the Intolerance of Uncertainty Scale-12 (IUS-12) [23] and found that a bifactor model fitted the data better than both a unidimensional model and a correlated two-factor one (the two-factor model identified by Carleton et al. [23]). Their finding highlights that a strong general factor underlies all the IUS-12 items, and in their opinion this "bolsters support for IU's standing as a trans-diagnostic maintaining factor, given that unidimensional constructs are more likely than multidimensional constructs to exhibit invariance in form and function across individuals with different types of psychopathology" (Hale et al., p. 206) [24].

Besides understanding why individuals with OCD feel forced to perform compulsions, research has also focused on investigating the criteria endorsed to decide that a ritual can be stopped or, on the contrary, should be carried on (i.e., *stopping criteria*) [25]. Among these stopping criteria, particular attention has been devoted to not just right experiences (NJREs) [26], a construct that has been proposed as a candidate endophenotype for OCD [27,28]. Patients with OCD frequently report "an inner drive that is connected with a wish to have things perfect, absolutely certain, or completely under control" (Rasmussen & Eisen, p. 756) [29]; as a consequence, they persistently enact compulsions until the distress deriving from these sensations decreases or fades away. NJREs refer to such uncomfortable sensations of things being "not just right"; usually individuals experiencing them report feeling driven to perform an action in order to reduce the discomfort associated with these feelings and to achieve the sensation of things being "just right" [26]. Therefore, extant literature evidence conceptualizes NJREs as both motivators underlying repetitive behaviors [30–32] and subjective criteria endorsed to establish that a desired state (e.g., certainty) has been achieved [25].

Cross-sectional associations between NJREs and OCD or OC symptoms have been identified as strong in both non-clinical and clinical populations [33–36], and in a one-year longitudinal study on undergraduates, NJREs emerged as predictive of OC symptom variation, even when looming style was accounted for [37]. In addition, Coles et al. [38] assessed patients' reports of several variables that may have played a role in the evolution from the presence of obsessions and compulsions to full-blown OCD, and they observed that increases in the strength of NJREs were viewed as contributing to the onset of OCD. Importantly, a few experimental studies have also further demonstrated that NJREs elicited in the laboratory predicted OC symptoms [39,40], and the possible role of NJREs in the slowness characterizing OCD performance has been proposed in a study using a go/no-go task [34]. Lastly, NJREs appear to be fairly specific to OCD: In several studies NJREs emerged as significantly more strongly correlated with OC symptoms than with other domains of psychopathology (e.g., social anxiety, worry, depression) [25,35,36,41,42]. Recently, Sica, Bottesi, Pieraccioli, Sighinolfi, and Ghisi [43] observed that patients with OCD reported higher levels of NJRE severity than patients with gambling or eating disorders; moreover, despite that patients suffering from OCD and individuals with hair-pulling disorder did not differ in NJRE levels, the latter did not show higher scores of NJRE severity than patients with gambling or eating disorders. Taken as a whole, such evidence suggests that the achievement of these sensations might be considered an underlying vulnerability factor that may cut across overt symptoms in OCD, across its non-clinical and clinical expressions, and perhaps across its boundaries with other disorders [44]. Nonetheless, despite evidence supporting the relevance of NJREs in relation to OCD, certainly not all patients with OCD experience difficulties with NRJEs. For example, for some individuals harm avoidance and not NJREs represents the main drive to perform compulsions [31]; furthermore, a number of stopping criteria different form NJREs could be endorsed by individuals with OCD when they have to decide that they can interrupt their rituals [25].

1.1. The current study

In consideration of the above-reported literature findings, we believe that IU can be reasonably conceptualized as a trans-diagnostic construct accountable for the preservative behaviors characterizing OCD, whereas NJREs could embody an OCD-specific criterion to decide that an action can be interrupted (as a perception of certainty about its outcomes has been achieved). In other words, IU might operate in OCD through NJREs, leading to OC phenomenology. Notably, to our knowledge no study directly explored the relationship between IU and NJREs, nor the relationship between IU, NJREs and OC phenomenology altogether.

In the present study we aimed to explore such a hypothesis in an Italian non-clinical sample. The dimensionality of both IU and NJREs, as well as evidence supporting the utility of employing analogue samples when aiming to gain a clearer understanding of OC mechanisms and symptoms [45], drove our decision to preliminarily test our model on a non-clinical sample. Furthermore, in light of the preliminary nature of the current study, we decided to focus our attention primarily on the OC checking dimension for two main reasons: evidence supporting its peculiar association with IU [11,16,19,20]; evidence supporting the relationship between checking behaviors and poor motor inhibition abilities [46], which might explain perseveration and, therefore, difficulties with the endorsement of stopping criteria [34]. Therefore, according to our objective, our main hypothesis was that NJREs would emerge as a mediator of the relationship between IU and checking behaviors. Furthermore, we were interested in testing whether IU would moderate such a mediation (i.e., the higher IU, the greater the mediational role played by NJREs): Indeed, IU has been considered a cognitive vulnerability factor involved in the development and maintenance of OCD [12–15], and changes in IU are correlated with treatment outcome (i.e. symptoms reduction) in psychological interventions for OCD [47–49]. Therefore, assuming that IU moderates the mediation is reasonable but, in absence of specific literature on the interplay between IU, NJREs and checking behaviors, we sought to explore this issue without advancing specific hypotheses.

2. Material and methods

2.1. Participants and procedure

One hundred and eighty-eight (115 females and 73 males) Italian community individuals entered the study. The mean age of the sample was 41.08 years (SD = 14.27; range = 20–74), and the mean years of education was 15.00 (SD = 3.51; range = 7–30). Marital status was 48.4% married or cohabitating, 43.6% single, 6.9% separated or divorced, and 1.1% widowed. The employment profile of the sample was 53.7% full-time employed, 14.4% student, 10.6% part-time employed, 5.3% retired, 4.8% full-time homemaker, 4.3% unemployed, and 6.9% other.

Participants were individuals who resided in several different midsized communities in northern and central Italy and who had responded to advertisements requesting potential volunteers for psychological studies. They were all informed of the study's aims and gave their written, informed consent before entering the study; no incentives were offered for participation. Participants filled in a sociodemographic schedule and then a battery of self-report questionnaires, and the sequence of measures was rotated to control for order effects. The research was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Psychological Sciences, University of Padova.

2.2. Measures

The following questionnaires were administered. Notably, a subsample (N = 62) completed the Beck Anxiety Inventory (BAI) [50] and the Beck Depression Inventory–Second Edition (BDI-II) [51], evaluating anxiety and depression symptoms, respectively, whereas another subsample (N = 125) completed the Depression Anxiety Stress Scale-21 (DASS-21) [52], instead of the BAI and the BDI-II, assessing general distress [53]. This was due to the fact that the two subsamples were recruited at slightly different times and no validated Italian versions of the DASS-21 were available at the time of data collection of the first subsample.

The Intolerance of Uncertainty Scale-12 (IUS-12) [23,54] is a 12-item self-report measure evaluating the tendency to find uncertainty upsetting and distressing on a 5-point Likert scale. The IUS-12 has proved excellent internal consistency and convergent and discriminant validity [23,55,56]. Preliminary validation of the Italian version of the IUS-12 on a sample of university students showed that it possessed good internal consistency, construct and discriminant validities, and gender invariance [54]. Internal consistency for the total score, in the current sample, was excellent (α = .90).

The Not Just Right Experiences–Questionnaire Revised (NJRE-QR) [35,41] is a self-report measure composed of 19 items. The first 10 items present sample NJREs, and respondents have to indicate whether they have experienced these within the past month. In the following two items respondents identify the most recent NJRE and when it last occurred. For the last seven items, respondents are required to rate frequency, intensity, immediate distress, delayed distress, rumination, urge to respond, and sense of responsibility associated with the most recent NJRE. The sum of the ratings for these seven items comprises the NJRE-QR Severity Scale. The questionnaire has shown good internal consistency and 30-day test–retest reliability, as well as good convergent and divergent validity [41]. The Italian version of the NJRE-QR has demonstrated unidimensionality and good psychometric properties [35]. In the present sample the internal consistency value for the NJRE-QR Severity Scale was excellent (α = .93).

The Obsessive Compulsive Inventory–Revised (OCI-R) [57,58] is an 18-item self-report questionnaire assessing the distress caused by several OC symptoms in the past month

on a 5-point Likert scale. It is made up of six subscales: Washing, Checking, Ordering, Obsessing, Mental neutralizing, and Hoarding. Internal consistency values of both the original and the Italian version have been good [57,58]. Given the purpose of the present study, only the OCI-R Checking Subscale was retained in the analyses. The Cronbach's alpha value for the OCI-R Checking Subscale observed in the current sample was adequate (α = .70).

The Penn State Worry Questionnaire (PSWQ) [59,60] is a 16-item questionnaire evaluating the tendency to worry excessively and uncontrollably on a 5-point Likert scale. Internal consistency and test–retest reliability of the PSWQ proved good in both non-clinical and clinical samples [59]; also, convergent and divergent validity were good [61]. The Italian version of the questionnaire has demonstrated good psychometric properties as well [60]. In the current sample Cronbach's alpha was adequate (α = .76).

The Depression Anxiety Stress Scale-21 (DASS-21) [52,53] is a 21-item measure assessing depression (lack of incentive, low self-esteem, and dysphoria), anxiety (somatic and subjective symptoms of anxiety as well as acute responses of fear), and stress (irritability, impatience, tension, and persistent arousal) over the previous week on a 4-point Likert scale. Good psychometric properties have been reported [52]. Findings on the Italian version suggested that use of the total score, measuring a general distress factor, might be more appropriate than calculating the three subscale scores separately [53]. The total score of the Italian version showed excellent internal consistency values. The Cronbach alpha values for the DASS-21 Total score in the current sample (N = 125) was good (α = .88).

The Beck Anxiety Inventory (BAI) [50,62] is a 21-item self-report questionnaire measuring the severity of anxiety over the previous week on a 4-point Likert scale. The BAI is characterized by excellent internal consistency and good one-week test–retest reliability [50]. The Italian version of the BAI demonstrated good internal consistency and 30-day test–retest reliability [62]; internal consistency was good in the study sample (α = .81; N = 62).

The Beck Depression Inventory-II (BDI-II) [51,63] is a 21-item self-report questionnaire assessing the severity of affective, cognitive, motivational, vegetative, and psychomotor components of depression on a 4-point scale. The BDI-II showed high internal consistency and good one-week test–retest reliability among college students [51]. The Italian version evidenced excellent psychometric properties as well [63], and the Cronbach alpha value observed in the present sample (N = 62) was α = .74.

2.3. Statistical analyses

Before performing analyses, missing data (<1%) found in questionnaires were substituted with the participant's mean score on the respective measure. After that, all measures were tested for univariate and multivariate normality, and the distributions of all continuous data were examined. Distributions on measures were judged normal according to figures of skew and kurtosis. Overall, scores were normally distributed, with all items indicating acceptable levels of skewness and kurtosis (≤|1|). The OCI-R Checking and the PSWQ showed significant skewness and were thus changed to a normal distribution, applying a log10 transformation. Internal consistency of all measures was evaluated by calculating Cronbach's alpha (α) coefficients.

Intercorrelations among all study measures were carried out by computing Pearson's r or point-biserial coefficients. To test for differences of correlations, Fisher's r *to* z transformation was utilized. Subsequently, a mediation model and a moderated mediation model were tested by means of a bootstrapping approach through the PROCESS macro for SPSS [64,65]. PROCESS, beyond testing traditional path coefficients, furnishes direct, indirect, and total effects, as well as bias-corrected and accelerated confidence intervals (CIs). Mediation exists when a 95% CI of the indirect effect estimated from the bootstrap procedure excludes zero. It has been proven [65] that bootstrapping enables more accurate and powerful analyses compared to traditional mediation approaches [66]. Moreover, PROCESS allows testing conditional indirect effects of an independent variable, that is, measuring the effect of an independent variable on the dependent one by means of mediators, depending on a moderator (i.e., moderated mediation) [64]. Therefore, the following model was tested: IU (IUS-12) was entered as the independent variable; compulsive checking (OCI-R Checking) was entered as the dependent variable; and NJRE (NJRE-QR Severity Scale) was entered as a mediator. Then, moderated mediation was tested: the same model was run including IU (IUS-12) as the independent variable as well as the moderator. Ten thousand bootstrap samples and 95% bias-corrected CIs were used to evaluate the significance of the conditional indirect effect. Lastly, if the indirect effect was significant, its effect size was measured as the percent of the effect of predictor-outcome relationship that is mediated (i.e., ratio of indirect to total effect).

All statistical analyses were performed using the software Statistical Package for the Social Sciences (SPSS) version 22.

3. Results

3.1. Descriptive statistics and correlational analyses

Table 1 displays score ranges, mean scores, and standard deviations (not transformed scores) on all the study's measures.

Scores obtained on the IUS-12 were comparable to those observed in a large sample of Italian undergraduate students [67]. As far as mean scores on the NJRE-QR Severity Scale, the OCI-R Checking, the BAI, the BDI-II, and the DASS-21, they were similar to those reported in other Italian non-clinical samples [35,53,62,63]. Mean scores obtained on the PSWQ were higher than the Italian normative one [60], but overall, the current mean z scores were z = 1.13 for males and z = .63 for females.

Table 1
Mean and standard deviations observed in the study questionnaires.

	Mean	SD	Score range
IUS-12	24.76	8.85	12–49
NJRE-QR Severity Scale	16.55	9.81	7–41
OCI-R-Checking	1.45	1.72	0–9
PSWQ	40.83	11.52	17–76
BAI	4.18	4.08	0–13
BDI-II	3.68	3.33	0–12
DASS-21	14.53	6.66	0–26

IUS-12 = Intolerance of Uncertainty Scale-12; NJRE-QR Severity Scale = Not Just Right Experiences-Questionnaire Revised Severity Scale; OCI-R-Checking = Obsessive Compulsive Inventory-Revised-Checking subscale; PSWQ = Penn State Worry Questionnaire; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory-Second Edition; DASS-21 =Depression Anxiety Stress Scale-21.

Table 2 reports correlations between all measures. Positive (medium magnitude) correlations between IUS-12, NJRE-QR Severity Scale, OCI-R Checking, and PSWQ emerged. The putative predictors (IUS-12 and NJRE-QR Severity Scale) demonstrated comparable correlations with scores on the OCI-R Checking (Fisher $z = .64$, $p = .50$). The BAI showed positive correlations only with the NJRE-QR Severity Scale, the OCI-R Checking, and the PSWQ, whereas no associations with the IUS-12 emerged; lastly, the BDI-II and the DASS-21 positively correlated (small-medium range) with all the study's measures.

Also, the relations of age and gender to all variables were assessed. Neither age nor gender (coding: 0 = male; 1 = female) was related to any of the study measures (all $ps > .05$).

3.2. Mediation and moderated mediation findings

As far as concern the direct effects (depicted in Fig. 1, reporting also the respective unstandardized regression coefficients): the IUS-12 scores positively predicted scores on the NJRE-QR Severity Scale (b = .4672; SE = .0737; 95% CIs = .3217, .6126); the NJRE-QR Severity Scale scores were predictive of OCI-R Checking scores (b = .0059, SE = .0020, 95% CIs = .0019, .0099); and, lastly, also the total direct effect of IUS-12 scores on OCI-R Checking scores was significant (b = .0096, SE = .0022, 95% CIs = .0052, .0140).

The mediation model examining the indirect effect of IUS-12 scores on OCI-R Checking scores through NJRE-QR Severity Scale scores was significant ($F_{2,185} = 22.77$, $p < .001$) and explained 19.75% of the variance in OCI-R Checking scores.

The total effect of IUS-12 scores on OCI-R Checking scores was significant (b = .0123, SE = .0021, 95% CIs = .0082, .0164). The indirect effect of IUS-12 scores on OCI-R Checking scores was significant (b = .0028, SE = .0010, 95% CIs = .0009, .0050), thus suggesting that NJRE-QR Severity Scale mediates the path. The ratio of indirect to total effect of IUS-12 on OCI-R Checking was .2234 (SE = .0930, 95% CIs = .0736, .4375) that is, the NJRE-QR Severity Scale mediated the 22.34% of the relationships between the IUS-12 and the OCI-R Checking.

The moderated mediation analysis was then performed. The IUS-12 × NJRE-QR Severity Scale interaction, i.e. the conditional indirect effect, was not significant (b = −.0001, SE = .0002, 95% CIs = −.0005, .0004): In other words, the IUS-12 did not emerge to moderate the mediation. Furthermore, a visual inspection of the bootstrapping analysis (Fig. 2) suggests that in the middle range of the IUS-12 scores (from IUS-12 = 36 on) the indirect effect of IUS-12 scores on OCI-R Checking scores is no longer significant; this finding means that from this IUS-12 score on the NJRE-QR Severity Scale does no longer mediate the path.[1]

4. Discussion

The present study aimed to preliminary test whether IU, a construct whose trans-diagnostic nature has been extensively claimed [4,6,9], would operate through NJREs, a putative vulnerability factor for OCD [42], in determining OC phenomenology. Since a peculiar link between IU and checking behaviors has been demonstrated so far in the literature [11,16,19], we specifically investigated whether the interplay between IU and NJREs could explain compulsive checking behaviors in an Italian non-clinical sample. In particular, we expected that NJREs would mediate the path from IU to compulsive checking. In the second place, we sought to exploratory assess whether IU could moderate such a mediation.

Overall, our main hypothesis was partially confirmed. Indeed, NJREs emerged as a mediator of the path from IU and checking; this finding provides support for our hypothesis of NJREs as an OC-specific mechanism through which IU functions in shaping OC phenomenology. This is in line with evidence reporting that individuals (both non-clinical and clinical) performing checking behaviors report urges to repeat certain actions until they are performed "just right"; their inability to tolerate this sense of uncertainty that may lead them to repeat the actions until a sense of certainty and rightness has been achieved [10,11,25,26]. To note, the subsequent testing of the moderated mediation model highlighted two main results. In the first place, the bootstrapping analysis revealed that, in correspondence to middle-range IU levels (from IUS-12 value =36 on), NJREs were no longer a mediator of the relationship with checking. Such a finding might suggest that, when IU increases, NJREs do not play any residual role in the path from IU to checking. Secondly, IU did not emerge to moderate the mediation; therefore, NJREs constantly mediates the path from IU to checking, but this is true only for low-middle levels of IU.

It is arguable that processes other than NJREs possibly intervene in the relationship between IU and checking. Indeed,

[1] We re-run the same models entering the PSWQ score as a covariate. The covariate was not significant and results did not change.

Table 2
Correlations (Pearson's *r*s) between the scores on all measures.

	NJRE-QR Severity Scale	OCI-R-Checking	PSWQ	BAI	BDI	DASS-21
IUS-12	.42**	.40**	.53**	.19	.33**	.19*
NJRE-QR Severity Scale		.34**	.42**	.56**	.33**	.31**
OCI-R-Checking			.32**	37**	.41**	.18*
PSWQ				.36**	.43**	.29**
BAI					.47**	-

IUS-12 = Intolerance of Uncertainty Scale-12; NJRE-QR Severity Scale = Not Just Right Experiences – Questionnaire Revised Severity Scale; OCI-R-Checking = Obsessive Compulsive Inventory – Revised – Checking subscale; PSWQ = Penn State Worry Questionnaire; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory – Second Edition; DASS-21 = Depression Anxiety Stress Scale–21.

* $p < .05$;
** $p < .001$.

research has identified a number of stopping criteria potentially employed by OC individuals in order to determine the cessation of compulsive behaviors, and several theoretical models focusing on the difficulties in interrupting compulsive behaviors (especially checking ones) have been proposed (e.g., the *feeling of knowing* [68]; the *mood-as-input hypothesis* [69,70]; *poor confidence in memory* [71–74]; *distrust in cognitive operations* [75,76]). In this regard, Wahl et al. [25] consistently provided a useful categorization of all the stopping criteria that can be used by OCD patients to stop compulsions. Suggested categories were (Appendix A, p. 160) [25]: a) external/perceptual criteria, based on tactile/visual/olfactory information or on sensi-motor information as a consequence of an action; b) internal criteria, involving feeling/mood: achievement of a general feeling of rightness/completeness, satisfaction, cleanliness, mood, or an epistemological sense of "just knowing"; c) criteria based on predetermined internal rules or memory, including having a clear picture or memory of the episode, having absolutely no doubts, time, or number of times; and d) internal criteria based on effort, which indicate that a certain amount of effort had to be put into, for example, the washing. All the above-mentioned constructs might then represent different ways through which IU drives the performance and perseveration of OC behaviors. Of course, focusing our attention exclusively on NJREs did not allow us to take into account the potential contribution played by all these further stopping criteria, and this also probably provides an explanation for the low proportion of variance explained by the mediation model (19.75%).

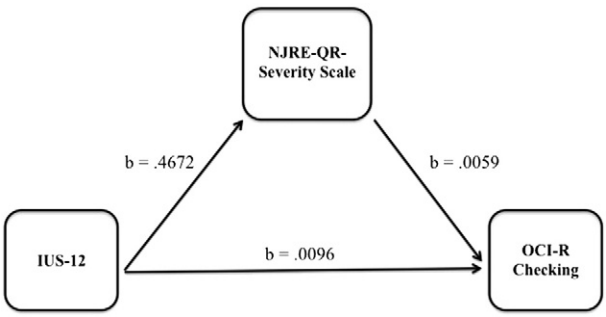

Fig. 1. Unstandardized regression coefficients of the direct effects.

The current study was characterized by some limitations that need to be pointed out. First of all, the sample size we employed was relatively small, and despite making use of bootstrap procedures, it cannot guarantee the generalization of the results that emerged to the entire Italian population. Related to this issue was the nature of the sample we employed in our research: Indeed, despite the dimensional latent structure of anxiety symptoms in the population [77,78], as well as the utility of preliminarily investigating OC mechanisms and theories in analogous samples [45], testing the same models in clinical samples may have led to different results. Another limitation was that we did not consider other OC symptoms in our analyses, though some research has proven that IU, as well as NJREs, is associated with not only checking behaviors but also with washing, ordering, and mental neutralizing features [35,79]: Indeed, despite that the role of stopping criterion played by NJREs appears to be clear in the case of checking behaviors, the triggering/motivating function of such phenomena has been documented in relation to other OC configurations (e.g., order/symmetry, washing) [26,41,80]. However, the main aim of the present study was basically "proving concept"; in light of the high heterogeneity characterizing OCD, as well as literature evidence strongly demonstrating the relationship between IU and checking, in our opinion restricting the focus on checking could have represented the more reasonable way to preliminary test such a model. Of course, future studies testing similar moderated mediation models considering OC symptoms other than checking are encouraged, also in light of recent evidence suggesting that the inability to suppress doubts and uncertainty could represent processes underling various OC configurations [46]. Similarly, further research investigating the paths from IU to OC behaviors through different stopping criteria [25] and mechanisms (previously reviewed) is recommended. Lastly, another critical issue pertains two of the self-report measures we employed. First, the OCI-R Checking scale assesses compulsive checking behaviors by means of only 3 items: This might explain why its reliability was relatively low in the present sample, and previous investigations showed that the brevity of the OCI-R scales may be of concern especially for an excessive restriction of score range

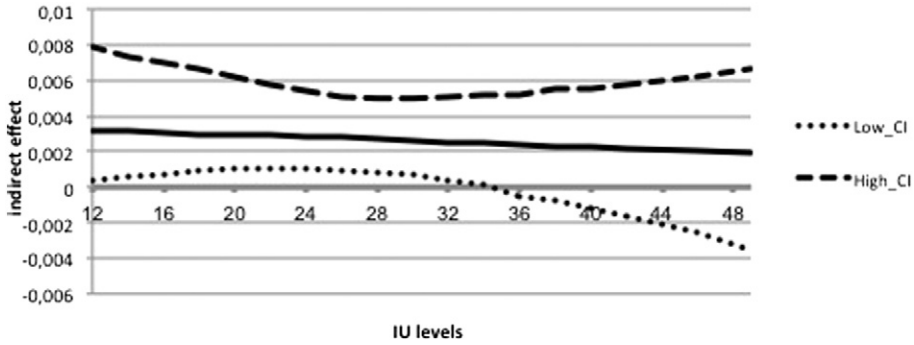

Fig. 2. Conditional indirect effect of IUS-12 scores on OCI-R-Checking scores through NJRE-QR Severity Scale scores.

[35,37]. Nonetheless, the subscales of the OCI-R have demonstrated adequate psychometric properties both in its original [57] and Italian [58] versions. In particular, the validation study of the Italian version of the OCI-R revealed that the Checking scale is characterized by adequate internal consistency (α = .76 and α = .81 in a community and in a clinical OCD sample, respectively), good one month test–retest reliability (r = .76), a moderate association with the Padua Inventory [81] Checking scale (r = .57), and weak associations with the BAI [62], the BDI-II [63], and the PSWQ [60] (rs = .31, .27, and .28, respectively). Furthermore, it is worthy to note that some previous studies [82,83] have focused on single OCI-R scales as we also did in the current study. Second, the Italian version of the IUS-12 we administered, despite having shown adequate psychometric properties in a sample of Italian undergraduates [54] as well as good internal consistency values in the present sample, has only been preliminarily validated to date; the validation of the questionnaire in community and clinical samples is in progress.

5. Conclusions

To conclude, findings from the present study acknowledge the role of both IU and NJREs in checking behaviors and in particular seem to support the idea of NJREs as a means through which IU operates in determining checking. This seems to be true only in the presence of low-medium levels of IU; as IU becomes higher, NJREs appear to no longer mediate the path. The present results do not refute the hypothesized specific relation between NJREs and OCD, nor do they contrast with the suggestion of NJREs as a putative psychological marker for OCD [28,35,43]. Rather, they have to be intended as a cue for future research, as theoretical integration may represent a convenient way to go in order to better understand OCD etiology and phenomenology. The inclusion of this growing evidence into a broader framework focused on trans-diagnostic constructs such as IU constitutes a valuable approach, as identifying the mechanisms through which specific cognitive variables lead to different kinds of phenomenology has important clinical implications. IU has been recognized as a shared vulnerability factor for emotional disorders [4,6], and studying the different mechanisms underlying different phenotypes might help to explain the high comorbidity rates between these disorders and guide the development of common treatment strategies targeting multiple psychopathologies [4]. Higher-level constructs such as IU might thus provide a way of understanding the commonalities that may exist between disorders, whereas NJREs and constructs emerging from the study of specific disorders might provide a way of understanding how processes may be specifically enacted in a way close to the expression of symptoms. Consideration of both levels provides a way of reconciling dimensional and categorical approaches to understanding psychopathology, and further conceptual development and research is needed at both levels.

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