Negative mood and obsessive-compulsive related clinical constructs: an examination of underlying factors

This is the Accepted Version of the final output.

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Title: Negative Mood and Obsessive-Compulsive Related Clinical Constructs: an Examination of Underlying Factors

Running title: The relationship between clinical constructs

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Number of words: 5192.

Number of figures: 0.

Number of tables: 2.

29 ***Abstract***

30 Emerging evidence suggests that many of the clinical constructs used to help understand and
31 explain obsessive-compulsive (OC) symptoms, and negative mood, may be causally interrelated.
32 One approach to understanding this interrelatedness is a motivational systems approach. This
33 approach suggests that rather than considering clinical constructs and negative affect as separable
34 entities, they are all features of an integrated threat management system, and as such are highly
35 coordinated and interdependent. The aim of the present study was to examine if clinical
36 constructs related to OC symptoms and negative mood are best treated as separable or,
37 alternatively, if these clinical constructs and negative mood are best seen as indicators of an
38 underlying superordinate variable, as would be predicted by a motivational systems approach. A
39 sample of 370 student participants completed measures of mood and the clinical constructs of
40 inflated responsibility, intolerance of uncertainty (IU), not just right experiences (NJREs) and
41 checking stop rules. An exploratory factor analysis suggested two plausible factor structures, one
42 where all construct items and negative mood items loaded onto one underlying superordinate
43 variable, and a second structure comprising of 5 factors, where each item loaded onto a factor
44 representative of what the item was originally intended to measure. A confirmatory factor
45 analysis showed that the five factor model was preferential to the one factor model, suggesting
46 the four constructs and negative mood are best conceptualised as separate variables. Given the
47 predictions of a motivational systems approach were not supported in the current study, other
48 possible explanations for the causal interrelatedness between clinical constructs and negative
49 mood are discussed.

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51 *Key words:* Obsessive-Compulsive Disorder; Inflated Responsibility; Intolerance of Uncertainty;
52 Not Just Right Experiences; Checking Stop Rules; Negative Mood.

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65 ### *1: Introduction*

66   A number of clinical constructs have been identified and causally linked to obsessive-
67 compulsive (OC) symptoms (Davey, 2003). These constructs aim to capture the beliefs, attitudes
68 and thought patterns associated with OC symptoms, and examples of such constructs include
69 intolerance of uncertainty (IU; Beech & Liddell, 1974) and inflated responsibility (Salkovskis,
70 1985). In addition to the aforementioned clinical constructs, negative mood has also been
71 casually linked to OC symptoms. For example, Salkovskis and Freeston (2001) proposed that
72 negative mood may increase the occurrence of intrusive thoughts, increase the accessibility of
73 negative assumptions, increase the likelihood of inadequate appraisals and decrease the efficacy
74 of dismissal, suppression, and other neutralising strategies. Whilst on occasion two or more of
75 these clinical constructs maybe connected together in a causal model (see e.g., Lind & Boschen
76 2009) more often these constructs are treated as separable and as having separable causal effects
77 on OC symptoms. The aim of the present study is to examine if clinical constructs related to OC
78 symptoms and negative mood are best treated as separable or, alternatively, if these clinical
79 constructs and negative mood are best seen as indicators of an underlying superordinate variable
80 or variables.

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82   Consistent with the idea that constructs are separable, constructs are usually measured
83 using separate inventories or sub-scales (see e.g., Obsessive Compulsive Cognitions Working
84 Group [OCCWG], 1997) and constructs have been manipulated independently of one another to
85 examine their effect on OC symptoms (e.g., Ladouceur et al. 1995). Most theories are silent on
86 any potential relationship between constructs or explicitly state they believe constructs to be
87 separable (e.g. Summerfeldt 2004, 2007) and, when constructs are examined together within a
88 single study, they are usually placed head to head against one another to see which construct
89 "best" predicts OC symptoms (e.g., Steketee et al., 1998) - an approach which emphasizes the
90 supposed separable nature of the constructs and the differences, as opposed to the similarities,
91 between them. This approach is often taken in studies even when the relevant constructs have
92 been shown to be at least moderately correlated with one another within the same study (e.g.,
93 Steketee et al., 1998).

94

95   However, emerging research suggests that constructs may interact to increase OC
96 symptoms and that constructs themselves may be causally interrelated. For example, using a
97 mediation model, Lind and Boschen (2009) found that the relationship between inflated
98 responsibility and checking was fully mediated by IU. In a series of three experiments that
99 explored the causal relationships between inflated responsibility, IU and negative mood, Britton
100 and Davey (2014) found that all three constructs were causally interrelated. Similarly, Dash and
101 Davey (2012) found that manipulating negative mood casually affected the deployment of as-
102 many-as-can (AMAC) stop rules, whilst Britton (2011) found that manipulating inflated
103 responsibility increases the intensity of "not just right experiences" (NJRE).

104

105   Britton and Davey (2014) interpreted their results within a motivational systems
106   approach. In this approach emotions such as anxiety are seen as features of a 'precautionary
107   system' that simultaneously alerts the individual to challenges and threats to goals, and
108   coordinates cognitive and behavioural reactions in order that the individual can respond more
109   effectively to these challenges and threats. Individual threat management systems such as this
110   will be characterised by a functional coherence in which perceptual, affective, cognitive and
111   behavioral processes work together to reduce the fitness costs of potential threats (e.g., Frijda
112   1986; Keltner et al., 2006). As perceptual, affective, cognitive and behavioral elements are all
113   part of an integrated evolved functional system, we would expect these elements to be highly
114   coordinated and interdependent, with the affective experience being an emerging property of the
115   activation of the various functional elements in the system (Neuberg et al., 2011; Kendrick &
116   Shiota, 2008). Britton and Davey (2014) argued that if disorders such as OC disorder (OCD) are
117   fundamentally derived from anxiety as an adaptive emotion then one implication of the
118   motivational systems view is that emotional, cognitive and behavioral elements characteristic of
119   anxiety should be coordinated and interdependent within the threat management system relevant
120   to anxiety, and the integrated nature of the relationships between negative mood and constructs
121   such as inflated responsibility and IU are supportive of such a view. Rather than one set of
122   factors (e.g., constructs) being causes of a different set of factors (e.g., affect), they are all
123   integrated components of an anxiety precautionary system that promotes a 'cascade' of relevant
124   perceptions, cognitions, behaviors and affective experience conducive to solving the adaptive
125   problem (Kenrick et al., 2010).

126

127   The primary purpose of this paper is to further examine the underlying relationship
128   between 4 constructs related to OC disorder and negative mood. Specifically, the primary aim of
129   the current study was to examine if these clinical constructs and negative mood are separable or
130   if they are indicators of a single superordinate variable, as would be suggested by a motivational
131   system approach, or, alternatively, if they are indicative of a different number of underlying
132   variables. Due to the large number of clinical constructs linked to OCD within the literature, the
133   authors' chose to include only those constructs which have been shown to be casually related to
134   each other and/or with negative mood within the literature.

135

136   In addition to negative mood, the clinical constructs IU and inflated responsibility were
137   measured in the current study as evidence suggests they have bidirectional relationships with
138   both negative mood and with each other (Britton & Davey, 2014). *IU* is defined as a
139   "dispositional characteristic that arises from a set of negative beliefs about uncertainty and its
140   connotations and consequences" (Birrell et al., 2011, p.1200) and is underpinned by appraisals
141   such as 'uncertainty is dangerous', 'uncertainty is intolerable' and 'I can't deal with uncertainty'
142   (Koerner & Dugas, 2006). *Inflated responsibility* is defined as the belief that one has the power
143   to bring about or prevent subjectively crucial negative outcomes (Salkovskis, 1985; Rachman,
144   1998).

145

146   Two further constructs were also measured in the current study as evidence suggests that
147   they are causally facilitated by negative mood, IU or inflated responsibility (Dash & Davey,
148   2012; Britton, 2011) and therefore these constructs may potentially be coordinated and
149   interdependent within any relevant threat management system. *NJREs* can be defined as, "the
150   subjective sense that something isn't just as it should be", an unsettled feeling due to something
151   in the individual or in the world around them not being right (Coles et al., 2003). The final
152   construct focused on in this paper is *"as many as can" (AMAC) goal-directed stop rules* for
153   checking. Stop rules can be best explained by linking them to task motivation. Broadly, two
154   specific types of task motivation have been proposed, performance focused motivation and task
155   focused motivation (Vaughn et al., 2006). A performance motivated individual who engages in a
156   task will be focused on meeting a certain standard or criteria whilst engaged in that task. The
157   person motivated in this way is likely to continue with the task until they have met their given
158   standard or criteria for that task (e.g. Hirt et al., 1996). In contrast, a task motivated individual
159   who engages in a task will do so without concern about evaluation or without any particular
160   performance standards for the task. A person using AMAC stop rules whilst engaged in a task
161   (such as checking or worrying) is analogous to someone using performance focused motivation,
162   the individual's AMAC stop rule for that task will encourage them to continue with the task until
163   they are sure they have met whatever their specific criteria or standard was for that task.

164

165   It is of note that all four constructs measured in the current study have been shown to
166   have a causal effect on OC symptoms (Ladouceur et al., 1995; Toffolo et al., 2013; Coles et al.,
167   2005; MacDonald & Davey, 2005) and each have also been linked to anxiety related symptoms
168   (Startup & Davey, 2003; Ladouceur et al., 2000; Coles et al., 2003) making an exploration of the
169   relatedness of these constructs also of relevance to anxiety disorders. In summary, the primary
170   aim of the current study is to explore the underlying relationships between negative mood and 4
171   OC symptom related constructs which recent evidence suggest are causally interrelated. A threat
172   management system approach would suggest that each construct and negative mood would be
173   best depicted as an indicator of a single superordinate variable whilst, if constructs and negative
174   mood are separable, we would predict that a 5 factor model would be the best depiction of these
175   relationships, with each of the 4 constructs and negative mood, respectively, represented by a
176   single factor. Plausible arguments could be made for other factor solutions. For example,
177   Summerfeldt's (2004, 2007) model of OCD proposes two core, continuous, orthogonal
178   dimensions to explain the motivational processes important to the development and maintenance
179   of OCD: harm avoidance (as characterised by inflated responsibility) and incompleteness (as
180   characterised by NJRE). This model would suggest that NJRE and inflated responsibility should
181   be represented by two separate factors. However, it would be difficult to predict based on this
182   model if negative mood, for example, should load onto either of these two factors or a separate
183   factor.

184

185   In order to explore the factor structure underlying the four constructs and negative mood
186   an exploratory factor analysis was first carried out in order to ascertain possible factor structures
187   underlying the relationships between the 4 measured constructs and negative mood. Any
188   emerging plausible models based on the findings of this exploratory factor analysis were then
189   directly compared with one another using confirmatory factor analysis.

190

2: Method

2.1: Participants

A questionnaire booklet was completed by a student sample of 370 participants (male: 74; female: 296). Ages ranged from 17 to 74 years ($M = 27.38$, $SD = 11.96$). 48.3% of the sample in the current study consisted of psychology undergraduates at the University of Sussex who received partial fulfilment of a course requirement by taking part in the study. The reminder of the sample represent other students, university staff and university visitors who volunteered to fill in the questionnaire after being initially approached by the researcher. This latter groups of participants received the gratitude of the researcher for participation but were not financially rewarded.

201

2.2: Procedure

Participants were provided with questionnaire-batteries, with every second questionnaire package reverse ordered. Participants were asked to supply some very basic demographic information and to provide informed consent before completing the questionnaire.

206

This study was carried out in accordance with the recommendations of British Psychological Society with written informed consent from all subjects. All subjects gave written informed consent in accordance with the Declaration of Helsinki. The protocol was approved by the ethics committee at the University of Sussex.

211

2.3: Measures

IU was measured using the Intolerance of Uncertainty Scale (IUS, Freeston et al., 1994), which was designed to measure an individual's IU, particularly the ideas that uncertainty is unacceptable, reflects badly on a person, leads to frustration and stress, and leads to the inability to take action. The IUS has demonstrated excellent internal consistency ($\alpha = .94$), good test–retest reliability (r = .78) and convergent and divergent validity (Buhr & Dugas, 2002). The IUS had excellent internal consistency in the current study ($\alpha = .95$).

219

NJREs were measured using the The Not Just Right Experiences-Questionnaire Revised (NJRE-QR, Coles et al., 2003) which is composed of 19 items. The first ten items measure how often NJRE occur. The next two items (items 11 and 12) ask respondents to indicate which NJRE occurred most recently and when it last occurred (past few hours to past month). The last 7 items in the questionnaire measure the intensity of NJRE. The NJRE-QR produces two total scores, NJRE occurrence (composite score of NJRE-QR items 1-10) and NJRE intensity (composite score of NJRE-QR items 13-19). Coles et al., (2003) found good internal consistency

227 (α =.79) for the 10 NJRE occurrence items, and all 19 items showed good convergent and
228 discriminant validity, evident in stronger correlations with OCD symptoms than with depressive
229 symptoms, trait anxiety, social anxiety or worry. In the current sample the NJRE occurrence sub-
230 scale showed acceptable internal consistency (α = .74) whilst the NJRE intensity scale showed
231 excellent internal consistency (α = .94).

232

233   Negative mood was measured using the Positive and Negative Affect Schedule (PANAS,
234 Watson et al., 1988) which consists of two 10-item mood scales. The first is a measure of
235 positive affect and lists 10 "positive" emotions and the second is a measure of negative affect
236 and lists 10 "negative" emotions. Watson et al., (1988) report that both scales have good internal
237 consistency (reliability of the positive affect scale ranged from α = .86 to α =.90, the negative
238 affect scale from α = .84 to α = .87). The construct validity of the scale has been supported (see
239 Crawford & Henry, 2004). In the current sample both the positive affect scale (α = .87) and the
240 negative affect scale (α = .88) showed good internal consistency.

241

242   Inflated responsibility was measured using the Responsibility Attitude Scale (RAS;
243 Salkovskis et al., 2000), a 26-item questionnaire that measures general beliefs related to inflated
244 responsibility. The internal consistency of the scale is excellent and test–retest reliability is also
245 excellent (r = .94, Salkovskis et al., 2000). Several studies attest to the measures convergent
246 validity (Salkovskis et al., 2000; Yorulmaz et al., 2002). The RAS had excellent internal
247 consistency in the current study (α = .92).

248

249   AMAC checking stop rules were measured using the Checking Stop Rule Questionnaire
250 (CSRQ, Britton 2011), a 20-item questionnaire where 10 items -measure endorsement of AMAC
251 stop rules and where 10 -measure endorsement of "feel like continuing" (FLC) stop rules. Britton
252 (2011) reported that two factors underlie the CSRQ, the first measuring AMAC stop rules and
253 the second FLC stop rules and that both of these factors are reliable (reliability for AMAC
254 subscale was α = .91, reliability for the FLC subscale was α = .88). The same study found that
255 the CSRQ's two subscales correlate in expected directions with other relevant constructs
256 providing evidence of the CSRQ's validity (Britton, 2011). In the present study the AMAC
257 subscale had excellent internal consistency (α = .91) whilst the FLC subscale had very good
258 internal consistency (α = .89).

259

260 *3: Results*
261 **3.1: Missing data**

262   There was very little missing data in the sample; overall 99.12% of the total number of
263 questions were answered across the sample. Therefore, any missing data was imputed by adding
264 the mean of the relevant question.

265

266 **3.2: Preliminary analysis**
267   A preliminary analysis was conducted to examine the Pearson's correlation between the
268 total scores (or relevant sub-scale scores) on the questionnaire measures of the four constructs
269 and negative mood. IU, inflated responsibility, negative mood, AMAC stop rule use and NJRE
270 occurrence and intensity were all significantly correlated, with correlations ranging from medium
271 to large in terms of size (correlations ranging from .36 to .69, see table 1). From this preliminary
272 analysis it is realistic to assume that IU, inflated responsibility, negative mood, AMAC stop rule
273 use, NJRE occurrence and NJRE intensity all overlap and possibly reflect some underlying
274 superordinate variable.

275

276 **Table 1:** Pearson correlation coefficients between the total scores on the 4 clinical constructs and
277   negative mood.

	IU	Inflated Responsibility	Negative mood	NJRE Occurrence	NJRE Intensity	AMAC
IU	†	.59*	.56*	.48*	.44*	.48*
Inflated Responsibility		†	.42*	.36*	.36*	.48*
Negative mood			†	.37*	.37*	.40*
NJRE Occurrence				†	.69*	.43*
NJRE Intensity					†	.44*
AMAC						†

278   *$p < .001$, Two-tailed significance reported.

279

280 **3.3: Analytic strategy and treatment of categorical data**
281   In order to explore to explore if the constructs and negative mood are separable or if they
282 are best seen as indicators of one (or more) superordinate variables, a two-stage approach was
283 taken. Firstly, an exploratory factor analysis was conducted to provide an indication of how
284 many factors may underlie the data set. Secondly, plausible factor structures (as suggest by the
285 exploratory factor analysis) were compared directly using confirmatory factor analysis.

286

287   Items entered into a factor analysis should generally be continuous as opposed to
288 categorical (Kline, 2005). Within the current study, 10 items were measured on scales with less
289 than 5 levels. These 10 items are the first ten items of the NJRE-QR. Each of these items ask the
290 participant to state if they have experienced a specific NJRE within the past month (e.g. I have
291 had the sensation after getting dressed that parts of my clothes tags, collars, pant legs, etc, didn't
292 feel just right) and participants are simply asked to offer a yes or no response. Kline (2005)
293 suggests one way to overcome the problem of categorical items in factor analysis is to parcel
294 items together, that is to create one or more total scores (linear composites) across a set of two or
295 more items. These parcels can then be treated as continuous indicators. It was decided to
296 therefore make two composite variables (both of which would have a range of possible scores
297 from 0 to 5). The response to NJRE items 1, 2, 3, 4, and 5 were combined to make a composite

8

298 score, NJRE occurrence 1. In support of the combination of all of these items into one score, all
299 of the individual items were significantly positively correlated with each other (all correlations
300 significant at $p <.001$). The responses to NJRE items 6, 7, 8, 9, and 10 were combined to make a
301 second composite score, NJRE occurrence 2. In support of the combination of all of these items
302 into one score, all of the individual items were significantly positively correlated with each other
303 (all correlations significant at $p <.01$). With these 10 variables transformed into two composite
304 scores, all variables in the data set were now measured on a scale with at least 5 levels.

305

306 ### 3.4: Exploratory factor analysis
307 An exploratory factor analysis was performed on the four constructs and negative mood
308 to explore the factor structure underlying these variables. All of the 26 items measuring inflated
309 responsibility (the RAS), the 27 items measuring IU (the IUS), the 10 items measuring AMAC
310 stop rule use (from the CSRQ) and the 10 items measuring negative mood (from the PANAS)
311 were examined in the analysis. In addition, the two composite NJRE occurrence variables
312 described in the previous section and the items in the NJRE-QR measured on separate 7-point
313 Likert scales (items 13-19) were also examined in the analysis (giving a total of 82 items).

314

315 Communalities ranged from .50 to .84. Fifteen components had eigenvalues over 1:
316 23.29, 5.02, 4.59, 3.37, 3.15, 1.97, 1.70, 1.54, 1.36, 1.25, 1.20, 1.13, 1.12, 1.07, 1.01. The scree
317 plot was used to determine the optimum number of factors (as recommended by e.g., Catell,
318 1966; Field, 2009). The scree plot strongly indicated a one or five factor solution over alternative
319 factor solutions (e.g., a two factor solution or three factor solution) and so these two possible
320 factor structures were further explored.

321

322 Firstly, a factor analysis was run extracting one factor. This solution explained 23.29% of
323 the variance. The internal consistency for this scale was excellent ($\alpha = .96$). Examination of the
324 factor loadings showed that while most of the items had moderate loadings (.40 or above, Field,
325 2009) on the one emergent factor, 9 items did not. Of the items which did not load moderately
326 onto the emergent factor, 7 were from the RAS, one from the CSRQ and one from the PANAS.

327

328 Secondly, a factor analysis was run extracting five factors with varimax rotation (a
329 varimax rotation was used to aid with interpretation of the emergent factors, however, it is of
330 note that an oblique rotation was also run which produced a nearly identical factor solution to the
331 varimax rotation. The results of the oblique rotation are therefore not reported). After rotation the
332 five emergent factors had eigenvalues of: 12.28, 8.55, 6.65, 6.23 and 5.61. This solution
333 explained 47.94% of the variance. Looking at the rotated component matrix the resulting scale
334 produced 5 reliable subscales each separately measuring each of the original 5 constructs; IU,
335 inflated responsibility, negative mood, NJRE, AMAC stop rules (see table 2 for internal
336 consistency, means and standard deviations on the five scales and correlations between factors).
337 Of note is the fact that *all* of the items thought to measure a particular construct loaded most
338 strongly onto the factor thought to represent that construct.

339

340   **Table 2.** Descriptive statistics for the 5 constructs and correlations between factors (n = 370).

	Internal Consistency	Mean (SD)	2	3	4	5
1. AMAC	α = .91	2.46 (.90)	.48*	.48*	.44*	.40*
2. Inflated responsibility	α = .92	3.60 (.91)		.60*	.37*	.41*
3. IU	α = .95	1.98 (.71)			.47*	.55*
4. NJRE	α = .91	4.72 (3.64)				.39*
5. Negative Mood	α = .89	2.59 (.81)				

341   Note: * $p <.001$. Two-tailed significance reported.

342

343   ### 3.5: Confirmatory factor analysis

344   A confirmatory factor analysis was performed to directly compare the five factor model
345   and the one factor model.

346

347   The one factor model was specified so that all items loaded directly onto one factor. In
348   the five factor model items were specified to load onto only one of five factors according to the
349   pattern indicated by the five factor solution (i.e. all IU items loading only onto factor 1, or the IU
350   factor, all RAS items loading only onto factor 2, or the inflated responsibility factor, all negative
351   mood PANAS items load only onto factor 3, or the negative mood factor, all NJRE-QR factors
352   loading only onto factor 4, or the NJRE factor, all AMAC CSRQ items loading only onto factor
353   5, or the AMAC factor). In the model all five factors were specified to correlate with one another
354   (as is suggested in table 2).

355

356   This analysis showed the five factor model is a significantly better fit than the one factor
357   model, $\Delta\chi^2 (10) = 4840, p <. 001$.The five factor solution is therefore preferred over the one
358   factor solution.

359

360   It should be noted that neither the one factor nor the five factor model were an especially
361   good fit to the data using many conventional fit indices, although observation of these indices
362   support the findings of the chi-square test, suggesting that the five factor model is a better fit to
363   the data than the one factor model. The reason for such poor fit, in relation to both models, is

364   because a large number of significant pathways were not specified in the models as doing so
365   would have compromised the point of the analysis: to test the relative fit of a one factor vs five
366   factor model. A list of the significant pathways not added to the models by type are: correlations
367   between error terms, correlations between items, correlations between error terms and items (five
368   factor model only), correlations between error terms and latent variables (five factor model only)
369   and correlations between items and latent variables (five factor model only). Values for selected
370   fit indices for the one factor model are: CFI = .51, RMR = .22, RMSEA = .08 with 90%
371   confidence interval .08-.09. Values for selected fit indices for the five factor model are: CFI =
372   .79, RMR = .12, RMSEA = .06 with 90% confidence interval .05-.06.

373

4: Discussion

375   The analyses reported in this paper demonstrate that inflated responsibility, IU, NJRE,
376   AMAC stop rules and negative mood are best seen as five separate variables rather than as
377   indicators of an underlying superordinate variable or variables. The exploratory factor analysis
378   suggested two plausible factor structures, one where all construct items and negative mood items
379   loaded onto one underlying superordinate variable, and a second structure comprising of 5
380   factors, where each item loaded onto a factor representative of what the item was originally
381   intended to measure (i.e. all IU items loading only onto factor 1, or the IU factor, all RAS items
382   loading only onto factor 2, or the inflated responsibility factor etc). A confirmatory factor
383   analysis showed that the five factor model was preferential to the one factor model, suggesting
384   the four constructs and negative mood are best conceptualised as separate variables.

385

386   The results of the present study are therefore not supportive of a motivational systems
387   approach in relation to explaining the relationships between constructs related to OC symptoms
388   and negative mood (Britton & Davey, 2014). Such an approach would suggest that, as the
389   constructs measured and negative mood are highly coordinated and interdependent within the
390   relevant threat management system, they should all load onto one superordinate variable
391   representative of that threat management system. Rather, the results of the present study suggest
392   the four constructs and negative mood are separable and therefore support the fact that each of
393   the clinical constructs are generally discussed, measured and manipulated separately from each
394   other within the OCD literature. The results are also supportive of those theories which suggest
395   that the constructs are separable, for example, Summerfeldt's (2004, 2007) model of OCD which
396   proposes two dimensions to explain the motivational processes important to the development and
397   maintenance of OCD: harm avoidance (as characterised by inflated responsibility) and
398   incompleteness (as characterised by NJRE). In addition, the results of the present study are
399   supportive of those theories which suggest that clinical constructs and negative mood are
400   separable, for example, Salkovskis et al's (2000) model which suggests that inflated
401   responsibility and negative mood are separate but causally interrelated variables which both
402   increase the occurrence of intrusive thoughts. Cognitive treatments for OCD and anxiety
403   disorders are often based on addressing the types of clinical constructs measured in the current
404   paper (e.g., inflated responsibility, Kohlenberg & Vandenberghe, 2007; IU, Dugas & Ladouceur,
405   2000). The results of the present study support the idea that it possible to separately address the
406   clinical constructs measured in the current study in the treatment of OCD and anxiety disorders.

407

408   The finding that the constructs measured and negative mood seem to be separable rather
409   than indicators of a core underlying variable raises a question: how do we explain bidirectional
410   causal relationships between negative mood with constructs related to OC symptoms, and the
411   bidirectional relationship between constructs themselves (e.g., Britton & Davey, 2014), if they
412   are not indictors of one superordinate variable?
413
414   One possibility is that although constructs related to OC symptoms and negative mood
415   are unique and separable entities they are entities which to some extent overlap with one another,
416   as indicated by the fact that all four constructs measured in the current study and negative mood
417   appear to correlate moderately with one another. As such, the manipulation of one construct or
418   negative mood will have a causal influence on other constructs measured (or negative mood),
419   due to the overlapping relationship between the relevant constructs and negative mood.
420
421   Another possibility is that that while constructs related to OC symptoms and negative
422   mood represent unique and separable entities, they are all connected to a third variable which
423   mediates the relationship between them. One potential candidate for mediating the relationship
424   between inflated responsibility, IU and negative mood (Britton & Davey, 2014) is that all three
425   constructs affect information processing style, and in particular trigger systematic processing of
426   information. Systematic processing is a bottom-up, data-driven and comprehensively analytic
427   style in which perceivers access and scrutinize all informational input for its relevance and
428   importance to their judgement, and integrate all information in forming their judgement (Chaiken
429   et al., 1989). Negative mood has been shown experimentally to facilitate systematic processing
430   (Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001) as have a range of
431   situational and dispositional factors including responsibility, accountability, desire for control,
432   personal relevance and task importance (Chaiken et al., 1989; Maheswaran & Chaiken, 1991;
433   Lee et al., 1999; Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001;
434   Sorrentino et al., 1988) and many of these factors are likely to be enhanced by feelings of
435   inflated responsibility and IU. For example, feelings of IU have been linked to increases in desire
436   for control (Krohne, 1993) whilst increases in inflated responsibility are likely to lead to an
437   increased sense of task importance (Salkovskis, 1985). Negative mood in particular provides
438   information that characterises a situation as problematic and fosters the spontaneous adoption of
439   a systematic, detail-oriented, bottom-up processing style (Schwarz, 1990). Increasing feelings of
440   responsibility will also signal a situation as problematic and foster systematic processing
441   (Chaiken et al., 1989) – but only if the outcomes for which the individual feels responsible are
442   appraised as having potentially harmful or threatening outcomes, a characteristic typical of the
443   OC explanatory construct of inflated responsibility (Salkovskis, 1985). An increase in IU will
444   increase the desire for control (Krohne, 1993) and this in turn will also foster systematic
445   processing (Maheswaran & Chaiken, 1991). Thus, inflated responsibility, IU and negative mood
446   are all factors that potentially have an integrated relationship with a specific information
447   processing style which may explain the bidirectional causal relationships between them.
448   Activation of that common processing style through increases in inflated responsibility, IU or
449   negative mood, respectively, is likely to lead to an increase in scores on the other two constructs,
450   as all three constructs are associated with increases in systematic processing. It is also of note
451   that those individuals with OCD and OC tendencies use a more controlled information

452   processing style, even under conditions that non-OCD participants use a speed-oriented
453   information processing style (Soref et al., 2008; Kalanthroff et al., 2014).

454

455   Whilst the four constructs measured in the current study and negative mood appear to be
456   separate variables, the fact that one factor explained a good deal of shared variance between the
457   four constructs and negative mood in the exploratory factor analysis is of note. Whilst this factor
458   may have simply been artifact of shared method variance, it is possible it maybe representative
459   of a core genetic/biological deficit underlying OC symptoms (e.g., Maia et al., 2008) or anxiety
460   related problems more generally (e.g., Norrholm & Ressler, 2009).

461

462   Finally, the present study has a number of limitations. First, given a primarily student
463   sample was used in the present study, it is not clear how generalisable the conclusions of this
464   study are to a clinical population. It should be noted that taxometric studies have suggested that
465   OC related symptoms are generally best considered as dimensional rather than categorical (e.g.,
466   Haslam et al., 2005) and many cognitive models of OC symptoms follow a dimensional model
467   (e.g., Frost & Steketee, 2002) supporting the appropriateness of studying OC related phenomena
468   in student samples. However, the validity of the results presented in this paper would be
469   strengthened if they were replicated within a clinical sample. Second, the present study measured
470   only 4 constructs, and negative mood, and as such did not measure a number of other constructs
471   that have been linked to OC symptoms (e.g., thought-action fusion, Rachman, 1993). Whilst this
472   was done as we wished to include only those constructs which have been connected causally
473   through experimental manipulation, it should be noted that the inclusion of other constructs may
474   have led to a different factor structure emerging in the current study. A related limitation of the
475   present study is that OC symptoms and anxiety symptoms which have been linked to the
476   constructs measured in the current study (e.g., worry) were also not measured. Again, the
477   inclusion of OC symptoms and symptoms related to other disorders may have led to a different
478   factor structure emerging in the current study. Finally, only self-report measures were used in the
479   current study. Whilst noting the limitations associated with self-report measures, the authors'
480   would comment that the constructs measured in the current study are almost exclusively
481   measured by self-report in the wider OC literature, and so measurement of these constructs in
482   this study is consistent with other research in this field.

483

484   **Conflict of Interest Statement**

485   The authors declare that the research was conducted in the absence of any commercial or
486   financial relationships that could be construed as a potential conflict of interest.

487

488   **References**

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