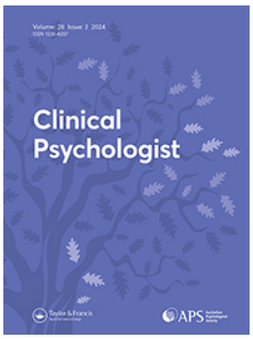

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Adult attachment and OCD symptoms: the mediating role of intolerance of uncertainty and beliefs about losing control

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ABSTRACT

Objectives: Attachment orientation has been argued to play a role in the development and maintenance of obsessive-compulsive disorder (OCD) symptoms, but this relationship has yet to be fully understood. Attachment orientation may also contribute to appraisals of uncertainty such as threatening and negative beliefs about the consequences of loss of control, constructs which may also be associated with OCD. The present study aimed to investigate whether intolerance of uncertainty (IU) and negative beliefs about losing control (BALC) mediate the relationship between attachment and OCD symptoms.

Method: Two hundred and five participants were recruited from the general community to undertake a cross-sectional online survey which included the Experiences in Close Relationships Scale-Revised, the Intolerance of Uncertainty Scale – 12 item, the Beliefs About Losing Control Inventory, and the Obsessive-Compulsive Inventory-Revised.

Results: Attachment anxiety, attachment avoidance, IU, and BALC were positively correlated with OCD symptoms. Both attachment dimensions were associated with IU and BALC. IU and BALC were found to be serial multiple mediators in the relationship between both attachment dimensions and OCD symptoms, though only the relationship between attachment anxiety and OCD remained significant when controlling for the corresponding attachment dimension.

Conclusion: The results suggest that IU and BALC may play a key role in the relationship between attachment and OCD symptoms.

KEY POINTS

What is already known about this topic:

(1) Attachment anxiety and attachment avoidance have been demonstrated to be associated with symptoms of obsessive-compulsive disorder (OCD).
(2) Both attachment dimensions have been demonstrated to be associated with intolerance of uncertainty (IU) and may be hypothesised to lead to negative beliefs about the consequences of loss of control.
(3) No research has investigated the potential mediating role of IU and beliefs about losing control on the relationship between attachment and OCD symptoms.

What this topic adds:

(1) Attachment anxiety and avoidance were found to be associated with beliefs about losing control and IU, and all variables were associated with OCD symptoms.
(2) IU and beliefs about losing control were found to be serial-multiple mediators in the relationship between attachment dimensions and OCD symptoms.
(3) Attachment orientation, IU and beliefs about losing control may all be important variables to understand as potential contributors to the experience of OCD symptoms.

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Attachment; anxiety; intolerance of uncertainty; beliefs; control; OCD

Introduction

Obsessive-compulsive disorder (OCD) is a debilitating mental health problem which is associated with considerable impairments to psychosocial functioning, reduced quality of life, and increased use of health services (Eisen et al., 2006; Grabe et al., 2000). Within the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association [APA], 2013), OCD is defined as being characterised by the experience of recurrent unwanted, intrusive thoughts, impulses, or images that elicit distress (obsessions) and the performance of repetitive, purposeful behaviours or rituals carried out with the aim to avoid or reduce obsessional distress (compulsions). Research has identified that OCD is heterogeneous and encompasses several subtypes of obsessive and compulsive issues, common presentations can

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include the following symptom dimensions; contamination/cleaning, obsessions/checking, and symmetry/ordering (Mataix-Cols et al., 2005). Despite a variety of theories describing the development and maintenance of OCD, it has been argued that the current understanding of the phenotypic heterogeneity associated with OCD is a challenge that is yet to be overcome (Olatunji et al., 2019). It has, therefore, been suggested that further research is needed to understand what factors contribute to the experience of OCD symptoms (e.g., Abramowitz et al., 2014; Morein-Zamir et al., 2020; van Leeuwen et al., 2020).

Cognitive-behavioural conceptualisations of OCD suggest that OCD is characterised by the misinterpretation of intrusive thoughts as threatening and highly important (Salkovskis, 1985), and the presence of a variety of dysfunctional beliefs and cognitive biases, which may include an inflated sense of responsibility, overestimation of threat, heightened desire for control, and intolerance of uncertainty (Abramowitz et al., 2014; Obsessive Compulsive Cognitions Working Group, 1997; Salkovskis, 1985). Cognitive-behavioural theory suggests that such beliefs, particularly concerning the meaning and perceived controllability of intrusive thoughts and biases, serve to maintain and exacerbate the occurrence of intrusive thoughts and drive the use of strategies to suppress or neutralise such thoughts and prevent feared outcomes from occurring which, in turn, serve to perpetuate OCD symptomology (Ivarsson et al., 2016; Salkovskis & Millar, 2016). The specific beliefs and factors which contribute to individuals holding such beliefs have yet to be fully understood.

A variety of research, literature and assessment instruments are consistent with a conceptualisation of OCD symptoms as dimensional, rather than categorical, i.e., OCD symptoms vary in frequency and severity across the population rather than being strictly present or not present dependent on whether or not individuals' difficulties meet DSM-5 diagnostic criteria for OCD (e.g., Angelakis et al., 2017; Aydin et al., 2014; Foa et al., 2002). Despite observed differences in the frequency and intensity of OCD symptoms in clinical and non-clinical populations, the content and phenomenology of symptoms have been observed to be similar across clinical and non-clinical samples (Abramowitz et al., 2014; Overduin & Furnham, 2012). Abramowitz et al. (2014) further concluded that the aetiological factors, development, and maintenance factors of OCD in clinical populations are highly generalisable and relevant to non-clinical presentations of OCD symptoms (Abramowitz et al., 2014). Consequently, it may be beneficial to investigate OCD symptoms in non-clinical populations to gain an understanding of factors, which contribute to the experience of OCD symptoms (Simonds & Elliott, 2001).

A growing body of research suggests that attachment orientation, and particularly the dimension of attachment anxiety, may play an important role in the aetiology and maintenance of OCD symptoms and the beliefs which contribute to such symptomology (van Leeuwen et al., 2020; Yarbro et al., 2013). Attachment theory (e.g., Bowlby, 1982) purports that humans have an innate drive to form and maintain interpersonal relationships with others. Such relationships provide key emotional resources where individuals can seek support and regulate their emotions in times of need and distress (Gardner et al., 2020; Mikulincer & Shaver, 2020). Individual attachment style encompasses emotions, behaviours, and relational expectations that result from the internalisation of an individual's historical relational experiences (Fraley & Shaver, 2000). Attachment orientation, as a result of such experiences, encompasses beliefs about one's own worthiness of securing interpersonal support, one's expectation of others to be available and reliably provide support in times of need, and individuals' beliefs regarding their capacity to manage distress (Mikulincer & Shaver, 2019). Interactions with attachment figures that are unavailable, unreliable, and unsupportive contribute to the development of negative representations of the self and others, which means an individual may resort to alternative maladaptive strategies to regulate their emotion and/or elicit support (Gardner et al., 2020; Mikulincer et al., 2014).

Individual differences in attachment system functioning are argued to be organised along two orthogonal dimensions, that is, attachment anxiety and attachment avoidance (Mikulincer & Shaver, 2019). Individuals who have high levels of attachment anxiety demonstrate a negative representation of the self in relation to their capacity to independently manage their distress (Fraley & Shaver, 2000), and worry that others will not be available in times of need (Mikulincer et al., 2014). Consequently, they may be more likely to adopt hyperactivation strategies to elicit attention and care from others to cope with, and minimise, emotional threat (Mikulincer & Shaver, 2020). Such hyperactivating strategies may include the exaggeration of the threat-appraisal process, i.e., greater pessimistic beliefs about one's ability to manage distress, the attribution of threat-related events to personal inadequacy, and heightening threatening aspects of benign events (Mikulincer & Shaver, 2019). Attachment difficulties, therefore, give rise to hypervigilance regarding threat, which further leads to distorted cognitive representations regarding how one views the world, i.e., the world is threatening but potentially controllable (Mikulincer & Shaver, 2019). Thus, attachment anxiety is

considered to be a vulnerability factor for a variety of anxiety symptomology characterised by the over-estimation and misinterpretation of threat and exaggerated responsibility. The premise that attachment anxiety leads individuals to experience over-estimation of responsibility and exaggerated threat appraisals, in conjunction with developing a variety of negative self-representations, suggests that attachment anxiety may predispose individuals to beliefs, which give rise to OCD symptoms (Doron et al., 2008, 2009, 2012).

In contrast, attachment avoidance has been conceptualised as reflecting the extent to which individuals do not trust others' willingness to provide help and support and that others are not dependable (Mikulincer et al., 2003). Consequently, heightened attachment avoidance predisposes individuals to believe that efforts to elicit support are futile or may lead to negative outcomes (Mikulincer et al., 2003). Attachment avoidance is consequently associated with the use of deactivating strategies to avoid perceived dependence on others, where individuals may be more likely to employ avoidance, disengage from interpersonal relationships, or employ suppression-related strategies (Mikulincer & Shaver, 2019; Mikulincer et al., 2003). van Leeuwen et al. (2020) summarised the theoretical links between attachment avoidance and OCD symptoms, highlighting that attachment avoidance is associated with setting high, unrealistic personal standards and may impact on OCD symptoms by contributing to an individual placing a high degree of importance on thoughts and the need to control such thoughts.

A recent meta-analytic review (van Leeuwen et al., 2020) demonstrated that across 16 studies, attachment anxiety was significantly associated with OCD symptoms, demonstrating a medium-to-large effect. Additionally, attachment avoidance was associated with OCD symptoms, displaying a medium effect. Notably, this review found no significant difference in the strength of the association between attachment insecurity (i.e., anxiety and avoidance) and OCD symptoms when comparing clinical and general population studies (van Leeuwen et al., 2020). The relevance of attachment to the experience of OCD symptoms is further highlighted by recent findings by Tibi et al. (2019) which reported that a fearful attachment style (indicating elevated attachment anxiety and attachment avoidance) predicted increased likelihood of dropout before completion of exposure and response prevention treatment for OCD. Furthermore, the findings of this study indicated that individuals categorized as having a fearful attachment style displayed attenuated OCD symptom improvement over the course of treatment when compared to individuals with a non-fearful attachment style. However, the nature of the relationship between attachment insecurity and OCD symptoms has yet to be fully understood, and it may be proposed that the influence of attachment on other pertinent beliefs and biases may mediate the relationship between attachment and OCD symptoms. Whilst both attachment dimensions may be associated with OCD symptoms, it is notable that a variety of studies suggest that attachment anxiety may play a more important role in the perception of threat and the experience of anxiety symptoms (e.g., Campbell et al., 2005; Wright et al., 2017).

Intolerance of uncertainty (IU) is conceptualised as a cognitive bias that affects how one perceives, interprets, and responds to uncertainties, reflecting beliefs about one's ability to cope with uncertainty, the consequences of being uncertain, and the necessity of certainty (Gentes & Ruscio, 2011). Attachment anxiety and avoidance have been demonstrated to be associated with IU within cross-sectional research studies (Clark et al., 2020; Wright et al., 2017). More pertinently, longitudinal research suggests that childhood attachment insecurity predicts IU in adulthood (Zdebik et al., 2018) and, therefore, it has been argued that attachment orientation and attachment anxiety may play a causal role in influencing the individual level of IU.

Attachment anxiety has been proposed to lead to appraisals of ambiguity and uncertainty (inherent within interpersonal relationships and interpretation of others' behaviours and intentions) as threatening, promoting doubt associated with one's capacity to cope with emotional distress associated with such threats (e.g., Wright et al., 2017). Such appraisals, in turn, may promote recurrent and persistent negative thoughts and concerns about future outcomes (e.g., Mikulincer et al., 2003). Consequently, the theoretical impact of attachment anxiety on individual response towards, and anticipation of, threat, as well as the aforementioned empirical findings supporting the association between attachment and IU, has been argued to support the premise that heightened attachment anxiety predisposes individuals to heightened IU (Clark et al., 2020; Zdebik et al., 2018).

IU has been proposed to be a core cognitive vulnerability for OCD (Faleer et al., 2017; Gentes & Ruscio, 2011; Tolin et al., 2003). A variety of research has indicated that IU is related to multiple OCD symptom domains (e.g., Sarawgi et al., 2013). A desire for certainty and predictability (reflecting heightened IU) has been suggested to result in increased use of strategies, such as compulsive checking behaviours, as individuals attempt to re-establish certainty and reduce distress caused by perceived threat and danger (Fourtounas & Thomas, 2016; Tolin et al., 2003). Furthermore, experimental research suggests that higher levels of IU may contribute to increasing worries concerning intrusive and ego-dystonic thoughts (Faleer et al., 2017). Therefore, there is

reason to hypothesise that, given attachment anxiety's proposed influence on IU, individual level of attachment anxiety may influence level of IU which, in turn, influences the experience of OCD symptoms. This hypothetical causal chain may suggest that IU plays a mediating role in the relationship between attachment orientation and OCD symptoms. To our knowledge, this relationship has yet to be investigated.

Maladaptive beliefs and cognitive biases are thought to be responsible for the misinterpretation of normal intrusive thoughts as threatening (Gagné & Radomsky, 2017; Moulding & Kyros, 2007). Cognitive theories and previous empirical investigations concerning the development and maintenance of OCD have highlighted the importance of beliefs about control of thoughts, specifically, that control is important, achievable, and desirable, and some individuals with OCD fear eventual loss of control over thoughts and other aspects of functioning (Gagné & Radomsky, 2017; Purdon & Clark, 2002; Radomsky & Gagné, 2020; Tolin et al., 2003). Concerns regarding subjective feelings of control and concerns about loss of control, particularly regarding intrusive thoughts, have been argued to be a vulnerability factor for OCD (Moulding & Kyrios, 2007; Moulding et al., 2008). Moulding and Kyrios (2007) demonstrated that desire for control (i.e., the need or motivation to exert control over situations and outcomes) and sense of control (i.e., perceived level of control over situations and outcomes) were related to OCD-related beliefs and symptoms. Gagné and Radomsky (2017) proposed that a crucial cognitive factor in the relationship between control and OCD symptoms is beliefs about losing control. Gangé and Radomsky demonstrated the importance of such beliefs in an experimental study which found that participants primed with high negative beliefs about losing control engaged in checking behaviours significantly more than participants provided with low negative beliefs about losing control. Gagné and Radomsky (2020) developed the Beliefs About Losing Control Inventory (BALCI) to measure negative beliefs regarding the consequences of losing control and demonstrated strong associations between BALCI scores and OCD symptoms. Within the present study, the term "beliefs about losing control" (BALC) will be used to refer to negative beliefs regarding the impact and consequences of losing control of thoughts, behaviour, emotions, body and/or bodily functions, consistent with the definition offered by Gangé and Radomsky. A growing body of research, led by the work of Radomsky and colleagues, illustrates the potential importance of BALC in relation to OCD symptoms and has led to the proposal that BALC "may well play a causal role in the expression of at least some symptoms of OCD" (Radomsky, 2020, p. 3). As noted above, heightened attachment anxiety as well as IU have separately been suggested to predispose individuals to believe that loss of control will have negative consequences, specifically due to the notion that each gives rise to negative models of personal capacity to manage distress and uncertainty (e.g., Clark et al., 2020; Zdebik et al., 2018). Consequently, it may be hypothesised that attachment anxiety and IU may influence the degree to which one believes that loss of control will result in aversive outcomes (i.e., will be associated with the individual level of BALC). However, no research, to date, has investigated attachment and IU in relation to BALC.

The present study

To date, the relationship between attachment, IU and BALC has received no empirical investigation. Based on the hypothesised relationships described above, it would be reasonable to hypothesise that IU and BALC would be serial mediators in the relationship between attachment anxiety and OCD symptoms. The rationale for this hypothesis is as follows: consistent relational experiences characterised by unavailability and rejection towards securing interpersonal support lead to the development of negative self and world representations in the form of heightened attachment anxiety (i.e., over-exaggeration of threat and over-inflated sense of helplessness; Mikulincer & Shaver, 2019). The level of attachment anxiety, thereby, predisposes individuals to perceive uncertainty as threatening and dangerous, leading to difficulties with tolerating uncertainty (Wright et al., 2017). The negative beliefs and expectations associated with attachment anxiety and IU may predispose individuals to hold beliefs concerning negative consequences resulting from loss of cognitive, emotional and/or physical control (i.e., BALC), which, in turn, renders them vulnerable to experiencing OCD symptoms.

The present study sought to evaluate a serial mediation model consisting of the previously stated proposed relationships, in which IU and BALC are hypothesised to act as serial mediators in the relationship between attachment anxiety and OCD symptoms. Consistent with previous research (e.g., Clark et al., 2020; van Leeuwen et al., 2020), it was predicted that attachment avoidance would display similar, though attenuated, associations with each of the study variables as compared to attachment anxiety. Based on previous research which has suggested that the relationship between attachment avoidance and IU and attachment avoidance anxiety-related difficulties may be a function of shared variance with the dimension of attachment anxiety (e.g., Read et al., 2018; Wright et al., 2017), it was also predicted that, when controlling for

level of attachment anxiety, attachment avoidance would not display a significant relationship with OCD symptoms, and the relationship between attachment avoidance and OCD symptoms would not be significantly mediated by IU and BALC. The present study aimed to evaluate these relationships in a community sample. The following hypotheses were specified:

(1) Attachment anxiety would be positively associated with IU and display a significantly stronger association with IU than attachment avoidance.
(2) Attachment anxiety would be positively associated with BALC and display a significantly stronger association with BALC than attachment avoidance.
(3) Attachment anxiety would be positively associated with OCD symptoms and display a significantly stronger association with OCD than attachment avoidance.
(4) IU and control beliefs would be serial multiple mediators in the relationship between attachment anxiety and OCD symptoms.

Materials and methods

Participants

Participants were recruited through opportunity sampling (via online advertisement) within the United Kingdom to complete a battery of questionnaires within an online survey hosted on the Qualtrics research platform (Qualtrics, Provo, UT). To participate, participants were required to be fluent in written English and over the age of 18 years. No further exclusion criteria were specified. Three hundred and four participants began the study and 205 filled out the survey to completion.

The majority of the final sample (80.6%) identified as female ($n = 166$) and 17.5% identified as male ($n = 36$). Two participants identified as transgender (1%), one as non-binary (0.5%), and one participant (0.5%) preferred not to report their gender. Participants reported ages ranging from 18 to 72 years ($M = 31.60$, $SD = 68.90$) while two participants declined to report their specific age. The *Obsessive-Compulsive Inventory-Revised* (OCI-R; Foa et al., 2002), described below, was utilised to assess participants' experience of OCD symptoms. Abramovitch et al. (2020) proposed that a score of 0–15 on the full OCI-R indicates "mild" OCD symptoms, a score of 16–27 reflects "moderate" symptoms and 28–72 reflects "severe" symptoms. Participants reported a wide range of scores (0-to-72), with 51% of the sample ($n = 105$) scoring 16 or above (indicating at least moderate OCD symptoms) and 24% of the sample ($n = 50$) recording a score of 28 or above, indicating severe OCD symptoms. Wootton et al. (2015) suggested that when evaluating OCI-R scores pertaining only to OCD symptoms (omitting questions relating to hoarding symptoms), a score of 12 provides an optimal cut-off score for screening individuals who experience clinical levels of OCD symptoms. Fifty-six percent ($n = 115$) of the sample scored 12 or above on this OCI-OCD subscale in the present study. In addition to this, it is notable that OCI-R total mean score ($M = 19.22$, $SD = 13.83$) and OCI-OCD subscale mean ($M = 15.88$, $SD = 12.08$) both exceeded the aforementioned cut-offs. These scores may, therefore, be interpreted as indicating that individuals in the present sample experienced a range of severity of OCD symptoms, including a significant proportion of the sample whose severity of symptoms was equivalent to those experienced by individuals within clinical samples.

Materials

The Experiences in Close Relationships Scale-Revised (ECR-R; Fraley et al., 2000) was used to measure attachment anxiety and attachment avoidance. The ECR-R is a 36-item measure that requires respondents to indicate their agreement regarding whether each statement represents their general experience and attitudes within intimate relationships. A total of 18 items correspond to each attachment dimension and an average score is calculated for each dimension, with higher scores representing greater levels of attachment anxiety and attachment avoidance, respectively. The ECR-R has demonstrated good test-retest reliability and good convergent and discriminant validity (Sibley et al., 2005). In the current study, internal reliability was excellent for the dimensions of attachment anxiety ($\alpha = .94$) and attachment avoidance ($\alpha = .94$).

*The Intolerance of Uncertainty Scale – 12-item (*IUS-12; Carleton et al., 2007) was used to measure participants' levels of IU. The IUS-12 asks participants to respond to 12 items on a five-point Likert scale ranging from 1 (*Not at all characteristic of me*) to 5 (*Entirely characteristic of me*), to indicate their level of agreement with each statement regarding responses to uncertainty. A total score, ranging from 12 to 60, is calculated to indicate the individual level of IU. The scale has been shown to have excellent reliability and excellent internal consistency (Hale et al., 2016), which was also reflected in the present study ($\alpha = .93$).

Beliefs About Losing Control Inventory (BALCI; Gagné & Radomsky, 2020) was used to assess participants' beliefs about losing control. The BALCI is a 21-item measure that requires respondents to indicate on a five-point Likert scale, ranging from 0 (*Not at all*) to 4 (*Very much*), the degree to which they agree with statements describing concerns regarding losing control. A total

score is calculated and can range from 0 to 84, with higher scores indicating greater negative BALC. The inventory has demonstrated adequate test-retest reliability and excellent internal consistency (Gagné & Radomsky, 2020). In the present study, the BALCI demonstrated excellent reliability (α = .96).

The Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002) was utilised to measure OCD symptoms. The OCI-R is an 18-item measure that requires respondents to indicate how much common OCD and hoarding symptoms have caused distress or bothered them during the past month on a five-point Likert scale ranging from 0 (*Not at all*) to 4 (*Extremely*). A total score is calculated and can range from 0 to 72, with higher scores indicating greater symptom severity, whilst individual subscales measuring specific OCD symptoms (washing, obsessing, ordering, checking, neutralising), and a hoarding symptom subscale can be calculated. A number of researchers (Wootton et al., 2015) have reported the utility of separating the OCI-R into two scales, one based on the three items measuring hoarding symptoms (OCI-HD) and the other based on the 15 items outlining OCD items excluding hoarding (OCI-OCD). In the present study, the OCI-R total score will be employed for the primary analysis, following the precedent of similar research (e.g., Seah et al., 2018). However, associations between the study variables and each of the aforementioned subscales of the OCI-R will also be reported. Previous research has reported that the OCI-R total score demonstrates high levels of internal consistency and adequate test-retest reliability (Abramovitch et al., 2020; Hajcak et al., 2004). In the current study, the OCI-R total score demonstrated excellent reliability (α = .91) as did the OCI-OCD scale (α = .91), whilst the OCI-HD scale demonstrated acceptable reliability (α = .73).

Procedure

The present study was approved by the Faculty of Medical Sciences Research Ethics Committee at Newcastle University (Ref: 2210/2020). Participants were recruited by the distribution of study participation invitations via social media (i.e., Facebook, Reddit and Instagram). The study participation invitation, shared via social networks and public forums on social media, included a link that potential participants were required to click on to be taken to the online survey hosted by Qualtrics. After following this link, participants were presented with the study information sheet. In order to ensure informed consent and transparency regarding the nature, focus and content of the study, the social media invitation and study information sheet explicitly noted that the study would investigate the experience of anxiety and OCD symptoms and that the survey would involve participants responding to questions regarding their experience of OCD symptoms. As the study sought to recruit individuals with a range of experiences, in relation to severity of OCD symptoms, including individuals who experienced low levels of OCD symptoms, both the study invitation and the participant information sheet advised potential participants that "you do not need to experience difficulties with symptoms of OCD or have a diagnosis of OCD in order to participate in this study". After reading the information sheet, participants who chose to proceed with the study were asked to provide online informed consent and then complete the demographic questions and the aforementioned measures.

Data analysis

Hypotheses 1-to-3 were evaluated using Pearson bivariate correlations to test the significance of associations between the variables of interest, and a Fisher's *r*-to-*z* transformation calculation was used to test whether the difference in each of the correlation coefficients relating to attachment anxiety and attachment avoidance was significantly different, following the method described by Lee et al. (2013) for testing the difference between two dependent correlations with one variable in common. The hypothesised serial mediation effect of IU and BALC on the relationship between attachment anxiety and OCD symptoms (Hypothesis 4) was assessed using model 6 of Hayes' PROCESS macro, and employing 5,000 bootstrap samples (Hayes, 2018).

Whilst Hypothesis 4 only pertained to attachment anxiety, as the first study to investigate the relationship between attachment, IU, BALC and OCD symptoms, it was judged that, due to the significant associations between attachment avoidance and OCD symptoms reported by previous research (e.g., van Leeuwen et al., 2020), a further serial mediation analysis should be performed to assess whether the relationship between attachment avoidance and OCD symptoms was mediated by IU and BALC.

Numerous researchers have emphasised the importance of statistically controlling for the correlation between attachment anxiety and avoidance when evaluating attachment using self-report questionnaire (e.g., Leenders et al., 2019). Therefore, consistent with previously published studies, which have investigated mediation models including attachment dimensions as independent variables (e.g., Murray et al., 2021; Read et al., 2018; Wright et al., 2017, two iterations of each

mediation model were assessed. The primary analysis included each attachment dimension as an IV in a separate serial mediation model. The second iteration of the analysis examined effects which may be due to any shared variance with the alternate attachment dimension, through inclusion of the alternate dimension as a covariate.

The responses of seven participants included some missing values (< 5%) and these missing values were imputed through Expectation Maximisation (e.g., Dong & Peng, 2013) using SPSS Version 26. Three univariate outliers were identified in the total OCI-R scores and were then checked for accuracy. These outliers were determined to reflect scores in the clinical range of OCD symptoms and were not improbable. Other authors employing the OCI-R in a community sample, such as Calamari et al. (2014), found relatively few univariate outliers and argued for their retention upon evaluating the influence on statistical test results. Following this contention, mediation analyses were conducted both with and without the outliers included (Calamari et al., 2014). The inclusion of the outliers was determined not to influence the significance or interpretation of results relative to the removal of the outliers. Consequently, outliers were retained in the final analysis.

Results

Means and intercorrelations between the studied variables can be seen in Table 1. Associations between the study variables and each of the OCI-R subscales can be seen in Table 2. Consistent with Hypothesis 1, attachment anxiety was found to be significantly associated with IU ($r = 0.52$, $p < .001$), and attachment avoidance was also associated with IU, $r = 0.21$, $p = .003$. The correlation between attachment anxiety and IU was significantly stronger than the association between attachment avoidance and IU, $z = 4.58$, $p < .001$. Hypothesis 1 was, therefore, supported. Attachment anxiety ($r = 0.53$, $p < .001$) and attachment avoidance ($r = 0.35$, $p < .001$) were both found to be significantly associated with BALC. The association between attachment anxiety and BALC was significantly stronger than the association between attachment avoidance and BALC, $z = 2.72$, $p = .003$. Hypothesis 2 was, therefore, supported. Attachment anxiety ($r = 0.45$, $p < .001$) and attachment avoidance ($r = 0.21$, $p = .002$) were also both found to be significantly associated with OCD symptoms. The association between attachment anxiety and OCD symptoms was significantly stronger than the association between attachment avoidance and OCD symptoms, $z = 3.39$, $p < .001$. Thus, Hypothesis 3 was supported.

Hypothesis 4 evaluated whether IU and BALC, in serial, mediated the relationship between attachment anxiety and OCD symptoms. The serial mediation model was significant, with a significant total model effect observed ($b = 5.08$, 95% CI [3.70, 6.46], $\beta = .45$, $p < .001$). Unstandardised coefficients and significance of individual pathways can be seen in Figure 1. When accounting for the indirect effects, the direct effect of attachment anxiety on OCD symptoms was not significant ($b = .80$, 95% CI [−.55, 2.14], $\beta = .07$, $p = .246$), only accounting for a small proportion ($\beta = .07$) of the total standardised effect ($\beta = .45$). The indirect effect from

Table 1. Intercorrelations, means and standard deviations ($N = 205$).

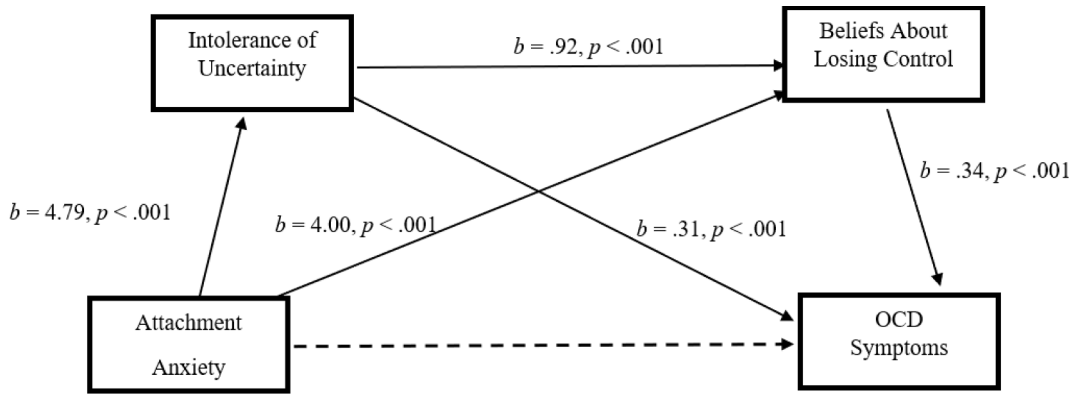
	1.	2.	3.	4.	5.
1. Attachment Anxiety		.39***	.52***	.53***	.45***
2. Attachment Avoidance			.21***	.35*	.21***
3. IU				.66***	.60***
4. BALC					.68***
5. OCD Symptoms					
M	3.67	2.92	34.00	28.86	19.22
SD	1.23	1.10	11.26	19.56	13.83

*$p < .05$.
**$p < .01$.
***$p < .001$.

Table 2. Correlations between study variables and OCI-R subscales ($N = 205$).

	OCIR-OCD	OCIR-Hoarding	OCIR-Washing	OCIR-Obsessing	OCIR-Ordering	OCIR-Checking
Attachment Anxiety	.43***	.40***	.30***	.44***	.32***	.27***
Attachment Avoidance	.20**	.26***	.03	.27***	.20**	.09
IU	.60***	.45***	.41***	.53***	.46***	.45***
BALC	.66***	.50***	.43***	.74***	.47***	.42***

OCIR-OCD = OCI-R total minus items measuring hoarding symptoms.
*$p < .05$.
**$p < .01$.
***$p < .001$.



Total effect: $b = 5.08$, 95% CI [3.70, 6.46], $\beta = .45$, $p < .001$

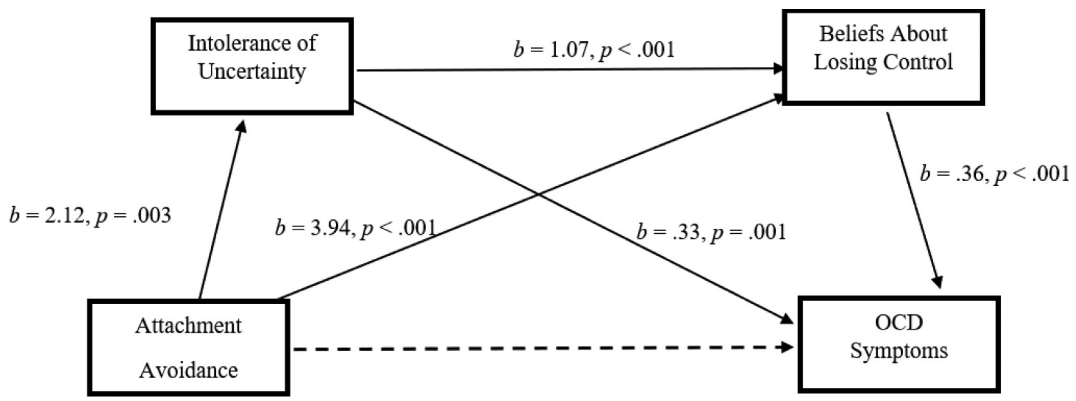
Direct effect: $b = .80$, 95% CI [-.55, 2.14], $\beta = .07$, $p = .246$

Total indirect effect: $b = 4.29$, 95% CI [3.11, 5.58], $\beta = .38$

Figure 1. Mediation model assessed using Hayes' PROCESS model six (2018) evaluating IU and BALC as mediators of the relationship between attachment anxiety and OCD symptoms ($N = 205$). Significant pathways are indicated using solid arrowed lines. Non-significant pathways are indicated by dashed arrowed lines. b = unstandardised regression coefficient, β = completely standardised regression coefficient of the indirect effect, CI = bias-corrected and bootstrapped confidence intervals based on 5,000 samples.

attachment anxiety to OCD symptoms via IU was significant ($b = 1.47$, 95% CI [.68, 2.40], $\beta = .13$), as was the indirect effect via BALC ($b = 1.34$, 95% CI [.65, 2.16], $\beta = .12$). Furthermore, the indirect serial mediation effect from attachment anxiety to OCD symptoms via IU and BALC was significant ($b = 1.47$, 95% CI [.87, 2.20], $\beta = .13$), with the total standardised indirect effect ($\beta = .38$) accounting for the majority of the total model effect ($\beta = .45$). Hypothesis 4 was, therefore, supported.

As noted above, in addition to testing the hypothesised model, we assessed whether IU and BALC, in



Total effect: $b = 2.69$, 95% CI [.98, 4.39], $\beta = .21$, $p = .002$

Direct effect: $b = -.23$, 95% CI [-1.56, 1.09], $\beta = -.02$, $p = .728$

Total indirect effect: $b = 2.92$, 95% CI [1.70, 4.08], $\beta = .23$

Figure 2. Mediation model assessed using Hayes' PROCESS model six (2018) evaluating IU and BALC as mediators of the relationship between attachment avoidance and OCD symptoms ($N = 205$). Significant pathways are indicated using solid arrowed lines. Non-significant pathways are indicated by dashed arrowed lines. b = unstandardised regression coefficient, β = completely standardised regression coefficient of the indirect effect, CI = bias-corrected and bootstrapped confidence intervals based on 5,000 samples.

serial, mediated the relationship between attachment avoidance and OCD symptoms. This serial mediation model was also significant, with a significant total model effect observed ($b = 2.69$, 95% CI [.98, 4.39], $\beta = .21$, $p = .002$). Unstandardised coefficients and significance of individual pathways can be seen in Figure 2. The total direct effect of attachment avoidance on OCD symptoms was not significant ($b = -.23$, 95% CI [−1.568, 1.09], $\beta = -.02$, $p = .728$). The direct effect only accounted for a small proportion ($\beta = -.02$) of the total standardised effect ($\beta = .21$). The total indirect effect was significant ($b = 2.92$, 95% CI [1.70, 4.08], $\beta = .23$). The indirect effect from attachment avoidance to OCD symptoms via IU was significant ($b = .71$, 95% CI [.19, 1.38], $\beta = .06$), as was the indirect effect via BALC ($b = 1.40$, 95% CI [.66, 2.24], $\beta = .11$). Furthermore, the indirect serial mediation effect from attachment anxiety to OCD symptoms via IU and BALC was significant ($b = .81$, 95% CI [.24, 1.42], $\beta = .06$) with the total standardised indirect effect ($\beta = .23$) accounting for the vast majority of the total model effect ($\beta = .21$; we note that the total standardised model effect is smaller than the total standardised indirect effect due to the negative beta value of the standardised direct effect).

When the first serial mediation model was assessing attachment anxiety and OCD symptoms, and attachment avoidance was added as a covariate, the overall mediation was significant ($b = 4.90$, 95% CI [3.39, 6.40], $\beta = .16$, $p < .001$). The direct effect of attachment anxiety on OCD symptoms was not significant ($b = .94$, 95% CI [−.47, 2.34], $\beta = .08$, $p = .191$). The direct effect ($\beta = .08$) only accounted for a small proportion of the total standardised effect ($\beta = .44$). The indirect effect from attachment anxiety to OCD symptoms via IU was, again, significant ($b = 4.44$, 95% CI [.63, 2.41], $\beta = .13$). The indirect effect from attachment anxiety to OCD symptoms, via BALC, was significant ($b = 1.02$, 95% CI [.28, 1.87], $\beta = .09$). The indirect serial mediation effect from attachment anxiety to OCD symptoms via IU and BALC was significant ($b = 1.50$, 95% CI [.83, 2.34], $\beta = .13$). The total indirect effect was significant ($b = 3.96$, 95% CI [2.58, 5.48], $\beta = .35$). The standardised indirect effect ($\beta = .35$) accounted for the majority of the total standardised effect ($\beta = .44$). Therefore, when controlling for anxiety symptoms and attachment avoidance, the mediating pathways via IU, BALC, and IU and BALC were again significant, though with a slightly attenuated effect size.

For the second mediation model, assessing the relationship between attachment avoidance and OCD symptoms, the total mediation model effect, whilst controlling for attachment anxiety, was not significant ($b = .52$, 95% CI [−1.16, 2.22], $\beta = .04$, $p = .538$). Similarly, the direct effect of attachment avoidance on OCD symptoms was not significant ($b = -.49$, 95% CI [−1.87, .89], $\beta = -.04$, $p = .483$). The indirect effect from attachment avoidance to OCD symptoms via IU was not significant ($b = .004$, 95% CI [−.50, .49], $\beta = .00$). However, the indirect effect from attachment anxiety to OCD symptoms, via BALC, was significant ($b = 1.01$, 95% CI [.30, 1.88], $\beta = .08$). The indirect serial mediation effect from attachment avoidance to OCD symptoms via IU and BALC was not significant ($b = .004$, 95% CI [−.55, .45], $\beta = -.00$). The total indirect effect was not significant ($b = 1.02$, 95% CI [−.15, 2.19], $\beta = .08$). Therefore, when controlling for attachment anxiety, the previously significant mediation effect between attachment avoidance and OCD symptoms was not demonstrated.

Discussion

The present study aimed to evaluate the relationship between attachment anxiety, IU, BALC, and the experience of OCD symptoms. Consistent with H1, attachment anxiety was positively associated with IU and displayed a stronger association with IU than attachment avoidance. These results are consistent with previous research that demonstrated associations between attachment anxiety and IU and consistent with arguments that attachment anxiety may play the more important role in the influence of attachment on IU (Clark et al., 2020; Zdebik et al., 2018). However, of course, in the context of the present cross-sectional study, we are precluded from making causal claims.

The present study, to our knowledge, represents the first to have investigated the association between attachment dimensions and BALC, which is a measure of the strength of belief in negative outcomes occurring due to loss of cognitive, physical, and emotional control. Notably, attachment anxiety was moderately associated with BALC, and displayed a significantly stronger association than attachment avoidance, which also displayed a significant, though small, correlation. This is a notable finding as it is consistent with the contention that level of attachment anxiety, reflecting the extent to which individuals develop a negative internal working model of the self, including one's perceived capacity to manage negative cognitive and affective states (e.g., Mikulincer & Shaver, 2019), is associated with beliefs that such loss of control will result in negative outcomes.

As hypothesised, and in line with previous findings (e.g., van Leeuwen et al., 2020), attachment anxiety was significantly and moderately associated with

OCD symptoms. However, it is notable that, when evaluating the proposed serial mediation model, the direct pathway between attachment anxiety and OCD symptoms was no longer significant when accounting for the indirect effects via IU and BALC. However, the serial mediation pathway consisting of a hypothetical causal chain whereby the level of attachment anxiety was expected to promote levels of IU, which, in turn, was expected to promote greater negative BALC and, ultimately, the level of OCD symptoms, was found to be significant. The serial mediation pathway remained significant when controlling for attachment avoidance. The relationship between attachment avoidance and OCD symptoms was also found to be fully mediated by IU and BALC. It is notable, however, that the total model as well as the direct and serial mediation pathways became non-significant when controlling for attachment anxiety. It must be noted that this result does not indicate that attachment avoidance has no influence on OCD symptoms or the mediating variables. Instead, the results of the second iteration of the mediation analysis may suggest that the influence of attachment avoidance on OCD symptoms, as well as on IU and BALC, may operate through the variance it shares with attachment anxiety (i.e., variance attributable to shared features of attachment insecurity).

The findings support the contention that attachment anxiety and, potentially, attachment avoidance (or, indeed, the variance that both dimensions share) may indirectly act on OCD symptoms through the impact on IU and BALC. In addition to these novel findings, the current study extends on previous research (e.g., Clark et al., 2020) which suggested that IU may act as a mediator of the relationship between attachment anxiety and anxiety-related symptoms and is consistent with previous arguments that IU reflects a cognitive vulnerability factor which may contribute to the experience of OCD symptoms and potentially the development of OCD (Fortounas & Thomas, 2016; Tolin et al., 2003; Sarawgi et al., 2013).

The findings, in supporting the hypothesised serial mediation model, can be argued to be consistent with existing cognitive theories of OCD which propose that the misinterpretation of intrusive thoughts as threatening occurs as a consequence of dysfunctional beliefs (including those regarding the meaning and consequences of such intrusive thoughts) which, in turn, contributes to the cognitive, affective, and behavioural features of OCD symptom (e.g., Obsessive Compulsive Cognitions Working Group, 1997; Salkovskis, 1985).

The results of the present study are consistent with the proposals that IU and BALC may underlie some of the important cognitive processes central to OCD and may also be seen to be consistent with the idea that the behavioural features of OCD may reflect attempts to prevent feared outcomes as a result of loss of control and/or strategies to reduce uncertainty (Bottesi et al., 2017; Gagné & Radomsky, 2017; Ladouceur et al., 2000). In summary, the results of the present study are consistent with the proposal that the expression of OCD symptoms may be influenced by (and potentially maintained through) an individual's level of attachment anxiety, IU and BALC.

Notably, Radomsky (2022) proposed that BALC may reflect a transdiagnostic factor involved in the maintenance of a variety of psychological difficulties. Given that IU and attachment insecurity have also each been argued to reflect transdiagnostic factors, which contribute to symptoms of psychopathology and anxiety in particular (e.g., Ein-Dor et al., 2016; Gentes & Ruscio, 2011), future extensions of this research could investigate the relationship between these variables and other symptoms of psychological distress and, particularly, with other forms of anxiety-related symptoms (e.g., general anxiety, social anxiety, worry, panic, and depression).

If these findings can be more broadly replicated, an important consideration for clinical research and practice will be to evaluate whether evidence-based psychological interventions such as cognitive behaviour therapy (CBT) would benefit from explicitly assessing and addressing attachment-related concerns and their links with IU and BALC when attempting to address the processes maintaining psychological disorders such as OCD.

A number of limitations need to be acknowledged when interpreting the results of the present study. The present study evaluated a non-clinical community sample and it remains to be determined whether the results would be replicated in a sample of individuals whose difficulties meet diagnostic criteria for OCD (though we do note that a large proportion of the present sample reported OCD symptomology above established clinical cut-offs and recorded OCI-R scores indicating moderate-to-severe severity of OCD symptoms). It would be helpful for future research to evaluate whether group differences exist in the nature of the relationship between the variables assessed in this study across clinical and non-clinical populations. Indeed, the present study did not assess demographic information that may be potentially pertinent. For instance, whether participants had a history of psychological difficulties and had received formal intervention for such difficulties. The online nature of the study further renders the present study's sample subject to

potential selection bias. For example, the present study's over-representation of females relative to other reported genders and the substantial level of participant dropout prior to completion are commonly reported across equivalent online studies (e.g., Read et al., 2018) but may limit the extent to which the results of the study are generalisable. Although online surveys can provide efficient participant recruitment, the overall survey included a large number of items, which may have contributed to higher rates of dropout (e.g., Hoerger, 2010). We also note that over half of the final sample of participants scored above published cut-offs on the OCI-R and this can be seen to indicate that the study recruitment materials and survey content, which explicitly addressed the focus on the experience of OCD symptoms, may have contributed to disproportionately recruiting individuals with personal experience of OCD symptoms, relative to the general population with no history of OCD symptoms. This large representation of individuals whose symptoms would be regarded as scoring within the clinical range is, of course, very valuable in ensuring that we have evaluated these relationships across a range of symptom severity but may mean that our sample can neither be argued to reflect a typical community sample nor reflect a purely clinical sample. As such, future extensions of this research may benefit from evaluating the mediation model using a smaller battery of tests, and specifically recruiting participants who experience OCD symptoms consistent with clinical levels of severity. Similarly, future research should also endeavour to recruit a sample reflecting a greater diversity of gender identities.

The present study aimed to evaluate the relationship between adult attachment, IU, BALC and OCD symptoms, utilising a measure that primarily assessed romantic relationships. It would be helpful for future research to evaluate whether the associations reported in the current study are replicated when employing non-romantic measures of attachment orientation. Whilst the study variables were measured using the leading, validated self-report measures which are commonly used to assess these variables, the results may be subject to common method variance, where the shared method of measurement can artificially inflate the size of the relationships subject to evaluation (Spector et al., 2019). This concern is common across research relying on self-report measures and highlights the importance of exploring these variables utilising non-shared methods (e.g., experimental or observational methods in combination with self-report scales) in the future research (Spector et al., 2019).

As a cross-sectional study, the directionality and inferred causality of relationships, as implied by the mediation model, cannot be demonstrated (e.g., Maxwell & Cole, 2007). Future research should therefore employ longitudinal and/or experimental designs to determine whether the relationships specified in the mediation models can be supported and also investigate alternative conceptualisations of the relationship between attachment and IU. Some proposals suggest that IU may be innate and is influenced through childhood experiences (Brosschot et al., 2016; Carleton, 2016). This could suggest that IU shapes and interacts with attachment relationships developmentally but potentially also in adulthood. Thus, it would be prudent for future studies to use a cross-lagged effects model to assess this possible bidirectional effect (see, e.g., Erhart et al., 2017). That is, future research could investigate whether IU measured at time 1 affects adult attachment measured at time 2 and whether adult attachment measured at time 1 affects IU measured at time 2. Results supporting these effects would indicate bi-directionality. Furthermore, the present study adopted a transdiagnostic perspective and did not differentiate between specific diagnostic subtypes and specific OCD symptom groups (e.g., checking, neutralising and washing). Similarly, the OCI-R total score incorporates three items which pertain to symptoms of hoarding. Whilst symptoms of hoarding (behaviours and cognitions) have been demonstrated to display similar associations with attachment dimensions to those reported for OCD (e.g., Neave et al., 2016), hoarding disorder has reflected a distinct diagnostic category from OCD since the introduction of the DSM-5 (APA, 2013) and a number of researchers have outlined the rationale for analysing OCI-R hoarding symptoms separately from those measuring OCD symptoms (e.g., Wootton et al., 2015). Of note, however, in the analysis, which is beyond the scope of this paper to report, IU and BALC were also found to mediate the relationship between attachment anxiety and OCI-Hoarding symptoms in our sample, whilst controlling for attachment avoidance. The relationship between attachment avoidance and OCI-Hoarding also became non-significant when controlling for attachment anxiety. Further investigation of these relationships with regard to specific symptom domains of OCD, as well as hoarding, may provide insight into the degree to which the relationships were associated with specific types of symptoms.

To conclude, the results of the present study add to the growing body of evidence that suggests that adult attachment orientation may play an important role in contributing to the presentation

of OCD symptoms. The findings provide further evidence that attachment anxiety is associated with the level of IU and provide the first demonstration that attachment domains are associated with BALC. Most importantly, the study provides the first evidence that indicates that IU and BALC may act as serial multiple mediators in the relationship between attachment anxiety and OCD symptoms.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The data that support the findings of this study are available from the corresponding author, GIC, upon reasonable request.

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