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**Separation-distress as an affective mechanism of OCD**

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DOCTOR OF PHILOSOPHY

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ABSTRACT

Michelle Jackson

"Separation-distress as an affective mechanism of OCD"

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In this thesis, a series of four studies were carried out to address the question of whether separation-distress (the associated feeling state of the basic emotion substrate PANIC; Panksepp, 1998) is a significant constituent of Obsessive-Compulsive Disorder (OCD). The aim was to characterize more accurately the affective nature of the disorder. Separation-distress and separation trauma were examined in samples of people with high scores on measures of obsessionality and low mood, and in patients with clinical OCD and depression; as well as in control groups. The Meta-Cognitions Questionnaire (Cartwright-Hatton & Wells, 1997) Padua Inventory (Sanavio, 1988), Major Depression Inventory (Olsen, Jensen, Noerholm, Martiny, & Bech, 2003) and Positive and Negative Affect Scales (Watson, Clark, & Tellegen, 1988) were used to position participants from low- to high-scoring on spectrums of obsessionality and low mood (Studies I and II) and of OCD and depression (Studies III and IV). Participants were then evaluated on measures of separation-distress, using the Separation Anxiety Symptom Inventory (Silove *et al*., 1993), the Structured Clinical Interview for Separation Anxiety Symptoms (Cyranowski *et al*., 2002), the Adult Separation Anxiety Checklist (Manicavasagar, Silove, Wagner, & Drobny, 2003) and the Affective Neuroscience Personality Scales (Davis, Panksepp, & Normansell, 2003). Descriptive and inferential statistics, including correlational analysis, independent and dependent *t* tests and mediation, confirmed that separation-distress is significantly and consistently higher in those who score higher on obsessionality and low mood, as well as in patients with OCD and depression. Heightened separation-distress is therefore strongly implicated in both OCD and depression. It was also found to be a critical variable in the well-recognized comorbidity of the two disorders. Chi-square contingency analysis was performed on the categorical data collected for early separation trauma experiences. The results showed that the development of OCD and/or depression in adulthood is highly contingent on the experience of separation trauma during critical early life periods. The main hypothesis, that separation-distress is a central affective mechanism of OCD, was confirmed.

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DETAILED SUMMARY

In this thesis, a series of four studies were carried out to address the question of whether separation-distress (the associated feeling state of the basic emotion substrate PANIC; Panksepp, 1998) constitutes a central affective mechanism of Obsessive-Compulsive Disorder (OCD). The studies were designed to investigate the role of separation-distress as well as early separation trauma in samples of people with high scores on measures of obsessionality and low mood, as well as those with clinical diagnoses of OCD and depression. Participants who obtained low scores on obsessionality and low mood were used as controls for the non-clinical samples. A well-matched group of people without mood or anxiety disorder diagnoses functioned as a control for the clinical sample. The potential influence of separation trauma in early childhood on obsessionality, low mood, OCD and depression in adulthood was also investigated.

Study I

Aim: The first study tested the hypothesis that there will be a higher incidence of separation-distress and conflict-monitoring in a group of high obsessionality participants, in comparison to those who score low on measures of obsessionality. Method: A large non-clinical college sample (N = 1119) was recruited in order to create a spectrum of low to high obsessionality scores. Participants were administered the Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997) and the Padua Inventory (PI; Sanavio, 1988) via an online system. Scores on the MCQ and PI were averaged for each participant, placing them on a continuum from lowest to highest obsessional scores. High obsessionality (N = 21) and low obsessionality (N = 20) groups were then drawn from the sample, and these participants were further tested. They were given the Affective Neuroscience Personality Scales (ANPS; Davis, Panksepp, & Normansell, 2003) and a pencil-and-paper administered Stroop test, in which they were asked to estimate the accuracy of their own performance (creating a "meta-cognitive" measure of their error-monitoring performance). Results: Based on correlational and independent *t* test analysis, separation-distress was significantly higher in the high obsessionality group. Conflict-monitoring was not. Conclusion: The study provided reason to investigate separation-distress further as an emotion of primary importance in obsessionality.

Study II

Aim: This study aimed to reaffirm the finding that separation-distress is significantly higher in participants who score high on obsessionality, as well as on measures of low mood. An extremely high and unaccounted for comorbidity between OCD and depression provided reason to hypothesize that obsessionality and low mood may exhibit similar co-occurrence. Method: A second, large non-clinical college sample was recruited (N = 1077), also via a web-based questionnaire system designed specifically for the purposes of the study. In addition to the MCQ and PI, these participants also completed two measures to assess depression – the Major Depression Inventory (MDI; WHO, 1993; Olsen, Jensen, Noerholm, Martiny, & Bech, 2003) and the Positive and Negative Affect Scales (PANAS; Watson, Clark, & Tellegen, 1988). Scores on these measures were used to characterise the incidence and descriptive

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characteristics of obsessionality and low mood in this population. Results: Obsessionality and low mood showed significant co-occurrence in this sample; although specific factors for the two variables showed non-specific pattern of distribution. Conclusion: There is evidence to support the overall comorbidity of obsessionality and low moon in a non-clinical sample, although the various factors constituting these variables are not related in any significantly predictable or discernable way.

Study III

Aim: Apart from the intention of establishing the reliability of separation-distress as an affective mechanism of obsessionality (as seen in Study I), as well as investigating the implication of separation-distress in low mood, an additional variable introduced into Study III was early incidence of separation trauma (i.e. being physically separated from one's primary caregiver at critical age periods and for specified amounts of time). It is important to consider that separation trauma may play a different role in high obsessionality and low mood, compared with the effects of separation-distress (i.e. the affective tendency to experience heightened levels of separation-distress, paired with the increased tendency for high neural activation levels of the PANIC basic emotion subsystem; as opposed to the well documented traumatic effects of physical separation during infancy and early years). Method: A subset of the participants in Study II (N = 49) completed four separation-distress scales – the Separation Anxiety Symptom Inventory (SASI; Silove *et al*., 1993), the Structured Clinical Interview for Separation Anxiety Symptoms (SCI-SAS; Cyranowski *et al*., 2002), the Adult Separation Anxiety Checklist (ASA-CL27; Manicavasagar, Silove, Wagner, & Drobny, 2003) and the ANPS, in addition to providing information on early separation trauma, and completing the two obsessionality and two low mood measures used in Studies I and II. Results: Independent *t* tests confirm that the high and low obsessionality groups were significantly different: $\overline{X}_1 = 46.93$; $\overline{X}_2 = 28.96$; $t = -7.80$; $p < .01$; $F = 6.25$ with $p < .01$; as were high and low scores on measures of low mood: $\overline{X}_1 = 29.38$; $\overline{X}_2 = 60.75$; $t = -11.62$; $p < .01$; $F = 1.68$ with $p = .22$. Independent *t* tests confirmed the hypothesis that separation-distress fell into significantly distinct populations when the group is divided according to high and low scores on obsessionality (r = -.13; $\overline{X}_1 = 45.85$; $\overline{X}_2 = 27.20$; $t = -4.74$; $p < .01$; $F = 4.54$ with $p < .01$), as well as on low mood (r = -.04; $\overline{X}_1 = 44.64$; $\overline{X}_2 = 28.64$; $t = -3.86$; $p < .01$; $F = 2.38$ with $p = .04$). Therefore separation-distress was significantly higher in participants who scored higher on both obsessionality and low mood. Dependent *t* test analysis revealed that low mood and obsessionality are not significantly different: $\overline{X}_{Obsessionality} = 44.01$; $\overline{X}_{Low\_mood} = 45.08$; *diff* = 1.08; Std.dv.diff. = 6.34; $t = 1.19$; $p = .0241$. They are therefore comorbid in this sample. Chi-square contingency table analysis showed that separation trauma was not significant in predicting whether non-clinical participants would fall into the high or low obsessionality and low mood groups as adults. For high and low obsessionality groups, $\lambda^2 = .91$ and at $\alpha = .05$, $k = 1$, $\lambda^2_{.05}(1) = 3.84$. Therefore the obtained value is less than the critical value, and differences in the incidence of separation trauma in upper and lower scoring non-clinical OCD participants are due to chance. Similarly for high and low low mood groups, separation trauma plays no significant role in determining whether participants will fall within the high or low scoring group as adults: $\lambda^2 = 3.19$ and at $\alpha = .05$, $k = 1$ and $\lambda^2_{.05}(1)$

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= 3.84. The four separation-distress measures demonstrated good internal consistency (inter-item correlation and split-half reliability) and adequate convergent validity in the non-clinical sample. The ANPS showed some divergence from the other three scales. Conclusion: Separation-distress was significantly implicated in obsessionality and low mood. High scores on measures of obsessionality and low mood were not contingent on separation trauma.

Study IV

Aim: The final study tested the hypothesis that separation-distress and separation trauma are significantly and comparably heightened in both clinical OCD and clinical depression. Method: A large clinical sample (N = 84) and a well matched control group (N = 75) were recruited. The clinical evaluative measure, the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman *et al*., 1989a, b), was added to the collection of questionnaires administered in Study III. Results: Groups were clearly and significantly dissociable in terms of clinical and control OCD and depression scores. *t* tests for independent groups revealed that the clinical and control participants differed significantly in the hypothesized direction, in terms of separation-distress results: $\bar{X}_1 = 53.21(19.29)$; $\bar{X}_2 = 32.84(13.49)$; $t = 7.58$; $df = 155$; $p < .01$; $t$(sep.var.est) = 7.73; $p$ 2-sided < .01; $F = 2.04$; Levene (1, 155) = 13.04, $p < .01$. Two mediation models were hypothesized for the interaction of OCD, depression and separation-distress. According to tests of joint significance and mediation analyses (based on MacKinnon *et al*., 2002), depression significantly mediates the relationship between OCD and separation-distress. This confirms theories of comorbidity and the interrelation amongst the three variables. Chi-square contingency table analysis showed that, contrary to the non-clinical results in Study II, early separation trauma did influence the distribution of OCD and depression scores into clinical and control groups ($\lambda^2 = 6.74$, df = 1, at $\lambda^2 = 6.63$). Analysis of frequencies of separation-distress scores in clinical and control OCD and depression groups are independent of incidences of separation trauma ($\lambda^2 = 5.93$ and for $\alpha = .05$ with k = 1, $\lambda^2_{.05}(3) = 7.82$)., indicating that these two variables operate dissociably in the clinical variants of the disorders, in this sample. Similarly, contingency table analysis shows that whether participants experienced separation trauma during early childhood has no effect on whether they fall into the upper or lower half of OCD ($\lambda^2 = .20$ with $\alpha = .05$ and k = 1, $\lambda^2_{.05}(1) = 3.84$) or depression scores. Scale validation analyses indicated good convergent and divergent validity, as well as internal consistency for all four separation-distress scales in clinical and control groups. The ANPS again showed some characteristic difference from the other three scales. Conclusion: Separation-distress is an important and consistent affective mechanism of clinical OCD and depression. A clinical diagnosis of OCD and/or depression in adulthood is highly contingent on the experience of separation trauma during critical early periods in childhood.

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"Man is the pie that bakes and eats its self, and the recipe is separation."

Alisdair Gray (*Lanark*, 1981)

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## Chapter One Introduction

While debate continues about the best way to approach cognition, emotion, their co-evolution, their subjectively experienced distinctiveness and their apparently ultimate mutual dependence in the brain, it seems an affective neuroscience perspective (Panksepp, 1998) has the conceptual tools to move such research forward successfully. In this thesis, a series of studies are presented in which the affective neuroscience perspective is applied to an important question in emotion research, but one which also has clear cognitive resonance. The aim is to fill an important gap in the empirical literature of Obsessive-Compulsive Disorder (OCD), regarding the central role of emotion in the disorder. Converging evidence from depression research also forms part of the rationale, and contributes towards testing the hypothesis in this research, about OCD. The central question is whether separation-distress may constitute a central affective mechanism for OCD. It is hypothesized that a tendency towards experiencing excessive feelings of separation-distress, which reflect sensitivity of the basic emotion substrate, PANIC (Panksepp, 1998), is an important underlying factor in the generation of OCD. Additionally, and owing to the convergence of research on OCD and depression, investigation of the importance of separation-distress in depression will also be pursued. Finally, separation trauma experiences during critical periods in early childhood will be investigated, in order to compare its role in these disorders to that of separation-distress. Following are the rationale and literature review of the thesis.

OCD is classified in the Diagnostic and Statistical Manuals of Mental Disorders (DSM) an anxiety disorder, characterized by intrusive, recurrent and unwanted thoughts (obsessions) and/or repetitive behaviours and mental acts or neutralization strategies (compulsions) that one feels driven to perform in the hope of alleviating the obsessions. OCD has a lifetime prevalence of 2 to 3% in the population (Robins *et al*., 1984 in Maltby, Tolin, Worhunsky, O'Keefe, & Kiehl, 2005). From an initial interest in researching the relation between cognition and emotion in OCD, the convergence of several interesting lines of research led to the postulate of this thesis. The starting point was a focus on cognitive conflict-monitoring. Conflict-monitoring refers to a process of cognitive control, whereby one detects discrepancies in information processing (Botvinick, Cohen, & Carter, 2004). Studies show that activation of the anterior cingulate cortex (ACC), a region of the distributed limbic system network (Bush, Luu, & Posner, 2000) is directly implicated in conflict-monitoring. Activation of the anterior cingulate cortex (ACC) is also highly correlated with symptom severity in OCD (Baer, Wetter, Nichols, Greene & Berry, 1995; Breiter et al., 1996; Breiter & Rauch, 1996; Gehring, Himle & Nisenson, 2000; Schwartz, Stoessel, Baxter, Martin & Phelps, 1996; van Veen & Carter, 2002a). In the cognitive research paradigm, these findings led to the conceptualisation of overactive conflict-monitoring as a possible cognitive mechanism of OCD, positioning it as a pathology of hyperactive error-detection (Thorpe, Rolls & Maddison, 1983; Schwartz *et al*., 1996). To assess conflict-monitoring, cognitive research was carried out with interference paradigm tasks such as the Stroop test (Stroop, 1935) and the Eriksen Flanker task (Eriksen & Eriksen, 1974). Interference tasks require participants to impose one stream of processing over the other to make an accurate response, when presented with incongruent stimuli (Stroop, 1935; van Veen & Carter, 2002a).

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In addition to directing response-override in this manner, the dorsal portion of the ACC also adjusts cognitive control in order to choose amongst responses and recognise errors (Botvinick, Cohen, & Carter, 2004). ACC engagement during cognitive conflict is evident in other response-override tasks, such as the Simon task (Peterson *et al*., 2002), the global-local paradigm (Lux *et al*., 2004) and the go/no-go paradigm (Durston, 2002), confirming that it is dedicated, amongst other tasks, to the fine control of conflict in cognition. Conflict-detection is also active when participants performing speeded response tasks compare their correct response with a belated perception of an error they have made. Recognition of the discrepancy is reflected by a large negative deflection of neural activity called error-related negativity (ERN; Botvinick, Cohen, & Carter, 2004).

Neuropsychological findings (arising mainly from imaging work done with these cognitive tests) clearly demonstrate that the ACC shows significant hypermetabolism in the brains of OCD patients during rest conditions, symptom provocation, and whilst they experience cognitive conflict during interference tasks (Gehring et al., 2000; Ursu, Stenger, Shear, Jones, & Carter, 2003). OCD patients do not perform with less accuracy than normal controls on error-detection tasks: they simply believe that they do (Fitzgerald et al., 2005). This reinforces the significance of error *perception* and the subjective experience of conflict in which the ACC plays a mediating role (Fitzgerald et al., 2005). The ACC has distinct regions, and the notion of functional dissociation between affective and cognitive anterior cingulate divisions is well supported (Bush, Luu, & Posner, 2000; Whalen, 1998). Although both cognitive and affective divisions are recruited for the processing of errors, the different divisions handle different aspects of the overall task (Bush, Luu, & Posner, 2000; Whalen, 1998).

Apart from the important cognitive role described above, the ACC is also an integral part of the basic neural emotion substrate system, which Panksepp (1998) describes as the PANIC system (to identify them as neural substrates, basic emotions are denoted with upper case letters throughout the thesis, in accordance with the convention introduced by Panksepp, 1998). PANIC is the neural substrate for conscious feelings of separation-distress (Panksepp, 1998). This emotion, and the feelings it generates, arise at their most fundamental level from panic at being separated from one's primary source of care, comfort, shelter and provision (principally one's mother, in all mammalian species). Considering the implication of the ACC in separation-distress and conflict-monitoring, and the strong tie between neural activity in conflict-monitoring and OCD, these lines of evidence led to the main hypothesis of the study: that separation-distress plays a significant role in OCD. Fear anxiety, for which an entirely different neuropsychiatry has been described (embodied by the FEAR emotion substrate; Panksepp, 1998), has historically and conventionally been accepted as the basic emotion involved in OCD. This is reflected by classification of the disorder in successive editions of the DSM. OCD has continuously been classed as an Axis I Anxiety Disorder (DSM-I; DSM-II; DSM-III-R; DSM-IV-TR, 2000). The involvement in OCD of separation-distress – a form of anxiety distinct from fear anxiety, more commonly associated with mood disorders than anxiety disorders – is counterintuitive and not immediately obvious.

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An empirical definition is applied to *emotion* throughout this thesis, based on accumulating evidence that different basic emotions are associated with distinct physiological substrates; that is, each is paired with a specific pattern of physiological activity (e.g., Bechara & Naqvi, 2004; Rainville, Bechara, Naqvi, & Damasio, 2005; Damasio *et al*., 2000). The PANIC emotion substrate is an example of one such collection of neurophysiological activations, which gives rise to the feeling of separation-distress. The neural substrate for PANIC is a distributed network involving the interaction of many brain structures: the midbrain periaqueductal grey, medial diencephalon (especially the dorsomedial thalamus), the ventral septal area, the preoptic area, many sites in the bed nucleus of the stria terminalis, the ACC and some sites in the amygdala and hypothalamus (Panksepp, 1998).

The empirical literature is mainly consists mainly in a cognitive neuroscience approach to OCD. The solid foundation provided by information-processing research can now be used as a basis for affective research, so that emotion in OCD may be better understood. The study of emotion in OCD has been neglected – partly because the neurological, conceptual and technological tools to carry out emotion research have only recently been developed. There is a marked lack of focus on the emotional underpinnings of the disorder, which is ironic in light of its clearly affective nature, and subjective reports of emotional turmoil by patients. Empirical OCD research has been dominated by the information-processing paradigm, and described in depth from a cognitive psychological point of view.

Close examinations have been carried out concerning the primary and executive disruptions of the disorder, for example, obsessional slowness (Sawle, Hymas, Lees, & Frackowiak, 1991), poor insight (Aigner, 2005), visuospatial dysfunction (Boldrini *et* al., 2004; Okasha *et* al., 2000; Shin, Hyon Ha, Kim, & Kwon, 2004), cognitive inflexibility in task switching (e.g., Gu *et al*., 2008; Okasha *et al*., 2000), and accelerated anticipatory eye saccades (Spengler, 2006). Further, research has been done to show complex characteristics of the disorder that have far-reaching cognitive and social implications, such as the tendency of OCD patients to agree and identify with negative affirmations far more quickly than with positive ones (Sheppard & Teasdale, 2000). These studies illustrate the cognitive characteristics of OCD patients in detail (in this case, the biased way they condone dysfunctional, negative statements). They do not, however, provide comprehensive insight into the nature of the disorder, or take account of its emotional character. The aim of this thesis is to contribute towards a better affective conceptualisation of OCD. The four studies presented in this thesis were therefore designed to contribute to the limited affective literature on the disorder. Further, the thesis will investigate whether OCD may accurately be conceptualised as a disorder of a specific emotion. OCD has always been recognised as involving high levels of emotion – but these have been considered more a result than a foundational disturbance.

There are two distinct types of anxiety. The first, *fear* anxiety, which is traditionally implicated in OCD according to DSM classification (DSM-IV-TR, 2000), is characterized on a neurobiological level by sympathetic autonomic nervous system arousal (sweating, tachycardia, pupillary dilation, increased blood flow to the muscles and respiration) and consistent feelings of dread (Kandel, Schwartz, & Jessell, 2000). The second, *panic* anxiety, which is implicated in what are described in DSM classification as mood

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disorders, and is reflected by the parasympathetic autonomic response, expressed behaviourally by withdrawal from the environment (Panksepp, 1998) and physiologically by blood vessel dilation, pupillary constriction, increased peristalsis and saliva production (Kandel, Schwartz, & Jessell, 2000). The two emotions are for the most part implicated in different categories of disorder: FEAR in the Axis I Anxiety Disorders, which include OCD, Generalized Anxiety Disorder (GAD), Specific Phobia, Social Phobia, Panic Disorder (PD; with or without agoraphobia), Posttraumatic Stress Disorder, Acute Stress Disorder, and Anxiety Disorder; and panic in the Axis I Mood Disorders of Dysthymic Disorder, Major Depressive Disorder, Depressive Disorder, Depressive Disorder Not Otherwise Specified, Bipolar Disorder and Cyclothymic Disorder, and Mood Disorder (DSM-IV-TR, 2000). Emotion in OCD has been classified throughout diagnostic mental health history as having its foundation in fear anxiety (which is generated by the basic emotion substrate, FEAR; Panksepp, 1998). Given the findings regarding ACC hypermetabolism in OCD and its concurrent role in the basic emotion substrate system of PANIC (Panksepp, 1998), however, the intriguing possibility exists that the quality of anxiety in OCD may more accurately reflect *panic* than fear, and therefore may be generated by the PANIC rather than FEAR emotion substrate.

Further evidence to support this line of reasoning involves the disorder of depression. Major Depressive Disorder (MDD), as it is characterised in the DSM, is a mood disorder diagnosed when an abnormal depressed mood persists for most of the day, nearly every day, for at least two weeks, and is accompanied by loss of all interest and pleasure, fatigue, self-reproach, poor concentration, morbid thoughts of death, and disturbances in sleep, weight, appetite and activity (DSM-IV-TR, 2000). Lifetime prevalence rates for depression are estimated at up to 17.1% (Blazer, Kessler, McGonagle, & Swartz, 1994). Like OCD, depression causes marked impairment of normal functioning (DSM-IV-TR, 2000). The two disorders appear in many ways to occupy opposing ends of a spectrum of normality: OCD is a pathology of overactivity in which patients ruminate on future events. They also actively resist their obsessions and compulsions. Depressive rumination, however, typically focuses on past events, produces emotional dysphoria and is not forcefully resisted. In depression, withdrawal and apathy overcome the patient. Given, these apparently opposing characteristics, the disorders seem very different. However, there is good reason to hypothesise that they may be similar at an affective level, involving comparable activation of underlying emotion command systems.

The first line of evidence is the comorbidity of OCD and depression. It is common for one psychiatric disorder to occur simultaneously with one or more others in one person. Comorbidities amongst psychopathologies are widely discussed in the literature. There is evidence of a high overlap amongst various anxiety disorders, such as panic disorder and GAD, which are comorbid with social phobia and agoraphobia (Brown, Anthony, & Barlow, 1995; Noyes et al., 1992). Personality pathology is highly prevalent in anxiety (e.g., Dyck et al., 2001). Co-varying illnesses form coherent symptom clusters of what may be considered more theoretically overarching spectrum disorders: for example, Brown, Antony and Barlow (1995) suggest that anxiety pathologies arise from the existence of a general neurotic syndrome. Antisocial personality disorder, drug and alcohol abuse, mania and phobia demonstrate high overlap with

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clinical schizophrenia, representing another cluster of comorbidity, with each of those disorders occurring in one sixth to one quarter of schizophrenics in one study (Bland, Newman, & Orn, 1987).

There seems to be no precedent, however, for the extremely high comorbidity rates of OCD and depression. Comorbidity is reportedly as high as 72.9% (Menzies *et al*., 1997 in Menzies & de Silva, 2003; Zitterl et al., 2000, respectively) and OCD patients exhibit a lifetime prevalence rate of 60-70% for depression (Graybiel & Rauch, 2000). There is much evidence that depression and OCD share this extremely high comorbidity (e.g., Cavedini, Ferri, Scarone, & Belodi, 1998; Baxter, Schwartz, Guze, Bergman, & Szuba, 1990; Basso, Bornstein, Carona, & Morton, 2001; Bhattacharyya, Reddy, & Janardhan, 2005; Boone, Philpott, Kaur, & Djenderedjian, 1991; Moritz et al., 2001; Moritz et al., 2004), and a thorough search of the literature reveals no readily apparent explanatory mechanism for this phenomenon - the comorbidity is clearly recognized and described, but there are very few attempts to bridge this causal gap. There is a lack of understanding about the pathophysiological mechanisms of depressive episodes in those with OCD (Cardoner *et al*., 2007). There is no existing broader, common category to which they may be ascribed. Researchers have attempted explanations, including that (1) depression can reasonably be anticipated as a response to the unbearable stress imposed by OCD on a previously functional life; (2) unspecified neurochemical and neuroanatomical changes in one disorder render the brain vulnerable to the other; and (3) genetic heritage accounts for the tendency to suffer from both OCD and depression. If there is a genetic component, the mechanism of inheritance remains unknown (Karayiorgou, et al., 1999).

Another relevant finding in the literature comes from a study by Barlow et al (1985 in Marks, 1987), which demonstrated that 83% of the study participants with anxiety and depression also suffered from clinically significant panic, once again lending support to the phenomenological overlap amongst the focal aspects of this thesis. Marks (1987) notes the urgent need to review the well recognized relationship between anxiety (a disorder of which category OCD is traditionally recognized) and depression in its own right, as does Panksepp (1998) who has noted that the role of the basic emotion systems (and he makes special reference to PANIC/separation-distress) "is not yet well recognized in affective turmoil" (p.278).

Depressive disorders are the most frequent comorbid disturbance in OCD (Swedo et al., 1989 in Hong *et al.*, 2004), with an estimated prevalence of 30-80% of OCD patients experiencing comorbid major depressive disorder (e.g., Barlow et al., 1986; Bellodi et al., 1991; both in Hong et al., 2004). Furthermore, in a study to investigate the clinical correlates of Recurrent major Depressive Disorder (RDD) in OCD, it was found that compared with OCD patients without RDD, OCD patients with RDD experienced a significantly earlier onset age of OCD, more severe symptoms, an increased likelihood of comorbid separation anxiety disorder, body dysmorphic disorder and social phobia, and were more likely to have a family history of RDD (Hong et al., 2004).

OCD probands with comorbid RDD had significantly more severe obsessive-compulsive symptoms than their counterparts without RDD (in accordance with Perugi *et al*., 1997 in Hong *et al*., 2004) – the authors



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suggest two explanations: (1) "the psychopathological process of OCD may render the brain more vulnerable to the development of additional pathology, manifesting in the comorbid condition (Nestadt, *et al*., 2003 in Hong *et al*., 2004)"; or (2) alternatively, "individuals with early onset and more severely impairing obsessive-compulsive symptoms may become more discouraged, stigmatized and ultimately prone to depression because of the impact of their illness on their emotional, social, and academic development" (Hong *et al*., 2004: 90). In this thesis, the possibility of extending the purely psychological/developmental explanation given in (2) will be investigated, as will the vague neuropsychological explanation offered in (1) – it will take both into account and, should the hypothesis that separation-distress exists as a common mechanism for both disorders be confirmed, it will still be consistent with both, but may have greater explanatory power.

The second line of evidence involves imaging research on patients with depression. Recently, evidence has been found that patients with clinical depression also demonstrate a reliable increase in anterior cingulate cortex (ACC) metabolism (Mayberg, 2007). This was a new and unexpected finding according to what is already known of the brain pathology involved in depression, and has been described in detail in the context of Deep Brain Stimulation (DBS) and other studies of brain function in depression (Mayberg, 2003; 2007; Mayberg *et al*., 1997, 1999, 2005). This overlap with the imaging findings in relation to OCD adds support to the hypothesis that the brain mechanisms of the disorders overlap at a foundational level, and that both may involve malfunctioning of discrepancy detection between the internal and external environment – an inability to reconcile ruminative thoughts with reality.

Various authors have expressed dissatisfaction with the development of the DSM and the way it presents psychopathologies in general (e.g., Widiger & Clark, 2000). There is evidence that the relationship between OCD and depression is beginning to be recognized. Zinbarg *et al*. (1994; 1998) challenged the DSM-IV-TR (2000) anxiety disorder classifications, and proposed the inclusion of an "anxiety-depressive" disorder category in the DSM-V (which has been placed in the DSM-V appendix, pending further investigation). Other researchers also suggest that the frequent co-occurrence of OCD and depression warrants consideration of OCD as an affective variant (e.g., Crino & Andrews, 1996). This thesis hypothesizes that the quality of emotional disorder in OCD will reliably be shown to consist significantly in panic anxiety rather than fear anxiety. Further, it is hypothesized that separation-distress will be similarly implicated in depression. In this case it may be possible to categorize OCD more accurately as a mood disorder than an anxiety disorder. This would engender a better understanding of the nature of OCD, as well as its relationship with depression.

The introduction of depression into the thesis design is intended to contextualise conclusions drawn regarding separation-distress in OCD. A further variable also needs to be investigated: the influence of separation trauma in early childhood on OCD in adult life. Early separation trauma needs to be distinguished in the research paradigm from the feeling state of separation-distress. If an excess of separation-distress is experienced due to overactivation of the PANIC emotion system, it is reasonable to believe that early experiences of separation from one's primary caregiver may also be

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uncharacteristically prevalent in those with OCD. There is a large body of literature reflecting the importance of separation and loss as antecedents to adult psychopathology; in particular, as predictors of affective disorders (Silove *et al*., 1993). Several theorists, from a variety of research perspectives, have investigated the disturbance of attachment in the development of psychopathology (Greenberg, 1999). Bowlby (1960) devoted considerable attention to this area of research, concluding from his work that secure attachment in infancy and early childhood provides the best conditions for a person to develop effective emotional regulation. Critical ages, length of separation, extent of confinement during separation and the number of substitutes presented for the maternal figure during separation all play a role to determine how intense and long lasting the effects of separation will be (Bowlby, 1960). The following critical age groups have been researched and are considered pivotal in the development of secure attachment: 0 to 4 years (Freud, A.; Burlingham, 1942, 1944); 6-12 months (Spitz & Wolf, 1946); 18 months to 4 years (Robertson, 1948-52); and 13 months to 3 years (Heinecke, 1956, 1966). Dynamics change with development, e.g., once children are over 6 months, they show a consistent response pattern to separation from their mothers (Bowlby, 1960). It may be that an increase in strength and a more easily aroused fear response make children more vulnerable to separation reactions and complications over six months (Bowlby, 1960). The physiological, psychological and psychoanalytical literatures on separation overlap considerably.

Between the ages of 15 and 30 months, behaviour in response to separation aligns closely with the neurobiological model of separation-distress. It consists of three stages: Protest - Despair - Separation (Bowlby, 1973), which reflect the biologically primed separation-distress response to activation of the underlying PANIC substrate (e.g., Panksepp, 1998). Through repeated and closely monitored case studies, Bowlby (1960) determined that human infants display a predictable pattern of response when separated from their mothers (or primary caregivers) at early ages. The initial reaction consists of severe protest, crying, and demonstrating a wish to be reunited with their mother. After a lapse of time, behaviour changes to a quiet despair in which it is hypothesized that the child changes his approach and hopes that his mother will return to him; the neurobiological equivalent states that this approach is aimed at reducing vulnerability whilst separated from the caregiver, so that she has a better chance of finding the infant. The final stage resembles a kind of detachment whereby the child seems to have progressed past despair and become so despondent with separation from his key caregiver that he becomes permanently indifferent. Once children reach this stage, they usually are not joyous when reunited with their mothers, and treat them with the indifference of strangers. Apart from laying down very strong foundations for critical ages during which specific types of attachment styles are likely to develop in children, Bowlby's (1973) findings align with the neurobiological model of separation-distress, and make a strong case for a close investigation of both early separation trauma and separation-distress in adult psychopathology.

There are links between early separation trauma and depression that further motivated the inclusion of depression in this thesis. As noted, separation experiences in early life appear to be an important contributing factor to the development of social and other anxiety disorders in adult life (e.g., Bandelow *et al*., 2004; Bandelow *et al*., 2005; Bifulco, Brown, & Harris, 1987; Farelli *et* al., 1986; Furukawa *et al*., 1999).



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In a large sample of young people, Lewinsohn *et al*. (1997 in Pini *et al*., 2005) found that Major Depressive Disorder (MDD) was significantly more likely than Panic Disorder (PD) to follow separation anxiety and simple phobia. Wijeratne and Manicavasagar, Silove, Wagner and Drobny (2003 in Pini *et al*., 2005; Manicavasagar, Silove, Curtis, & Wagner, 2000) found comparable evidence in an elderly sample: those with elevated separation anxiety levels had a significantly greater lifetime prevalence of anxiety or affective disorders, suggesting that the relationship between separation anxiety and depressive and anxiety disorders may be stable and persistent across a person's lifespan.

A study by Sakado *et al* (2000) found that lifetime MDD was significantly correlated with low levels of maternal care (as measured by the 'care' scale of the Parental Bonding Instrument; PBI, Parker, Tupling, & Brown, 1979) and higher levels of interpersonal sensitivity (as measured by the Interpersonal Sensitivity Measure; IPSM, Boyce & Parker, 1989). Neurological findings provide similar evidence: several epidemiological studies provide strong evidence that early traumatic experiences persistently – and perhaps permanently – sensitise central nervous system circuitry which is integral in the regulation of stress and emotion: authors postulate that this could be the underlying biological substrate of an increased vulnerability to stress, as well as to the development of affective disorders such as depression and anxiety (Heim & Nemeroff, 2001). Early exposure to the trauma of separation converges well with this model, setting the stage for neurobiological change that has far-reaching consequences into adulthood. It is important to note the complexity of the current research question: it is possible that early traumatic separation experiences may have a dissociable influence on OCD (and depression) to that of separation-distress. It is important to evaluate potentially variable or overlapping effects that both these factors – specific instances of physical separation as opposed to a type of affective vulnerability towards PANIC and separation-distress – have on the development of OCD and depression.

Importantly, it appears that early parental separation in childhood, not due to death, may more significantly indicate risk for adult depression than parental death itself (Perris, Holmgren, von Knorring, & Perris, 1986; Roy, 1985). Kendler *et al* (in Furukawa *et al*., 1999) found that parental separation but *not* parental death was associated with an increased risk for depression, and Browne *et al* (1995a in Furukawa *et al*., 1999) similarly found that prolonged separation from parents was more strongly linked with depression than was parental death. This lends good support to the hypothesis proposed here, that separation distress from key attachment figures is instrumental in contributing towards an integral emotional disturbance underlying depression and OCD. In a study that sought to differentiate the effects of childhood parental loss on the development of either Major Depressive Disorder (MDD) or Bipolar Disorder (BD), Furukawa et al (1999) found their most significant result to be that females under the age of 54 years with unipolar depression had experienced periods of separation from their mothers during childhood that was largely disproportionate to the other groups.

There are strong phenomenological similarities between OCD and separation anxiety disorder, also recommending research into how these disorders relate. Additionally Juvenile Separation Anxiety Disorder (JSAD) is accorded status as an individual pathology in the DSM (Cyranowski *et al*., 2002; DSM-

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III-R, 1987: 58-61), in which it is defined in terms of characterisation by nine specific criteria, three or more of which are needed to confirm a categorical diagnosis. However, studies suggest that symptoms can extend into adulthood and "may manifest as extreme anxiety about being separated from *(or harm befalling)* spouses or children as well as parents. Affected adults experience frustrating limitations in their lives imposed by the need to maintain proximity to, or at least close contact with, their key attachment figures" (Manicavasagar, Silove, Wagner, & Drobny, 2003: 146). Symptoms may be distinguished from those of dependent personality disorders, in which people exhibit just as intense a need to rely upon others, but with far less restriction in discriminating specific people: a wide net of friends, family and even acquaintances are relied upon excessively, and for a variety of different reasons, whereas those with pathological levels of separation anxiety have obsessive concerns that typically focus on only one or two key attachment figures (Bowlby, 1969 in Manicavasagar Silove, Wagner, & Drobny, 2003; Pini *et al*., 2005). With separation anxiety, attachment seems focused more on the characteristics of a key person in patients' lives; whereas with dependent personalities, the obsession revolves more closely around the actual act of relying upon people in general, to an inappropriate degree. Additionally, during research into separation anxiety, subjects described the separation anxiety symptoms they experienced as "*ego-dystonic*, *intrusive*, *unwanted*, and the foremost major source of their disabling anxiety"; additionally, they were disturbed by their symptoms, knowing them to be "*excessive, unrealistic*, and *inconsistent with their general level of confidence in other areas of life*" (Manicavasagar, Silove, & Curtis, 1997: 279; italics added). The patient's subjective descriptions of separation-anxiety form a virtually seamless overlap with those of OCD. The parallel is emphasized by their rational concessions that their fears are unfounded, yet uncontrollable. This represents the hallmark divergence of mind described by OCD patients. Panic at the prospect of separation and loss has not, however, been considered as an underlying factor in obsessive-compulsive mentality. Striking phenomenological, theoretical and conceptual similarities likewise exist between OCD and three of the nine diagnostic criteria for the DSM-III-R (1987: 60-61) diagnosis of separation anxiety disorder in childhood. Whilst all nine factors demonstrate compelling convergence with an obsessive-compulsive mindset, the three most notable (numbered as they are in the DSM directory) include, (1) worries about losing attachment figures, (2) worries that an untoward event will lead to separation, and (8) distress about actual or anticipated separation (criteria paraphrased in Cyranowski *et al*., 2002).

Further, separation anxiety is often reported to predate other, comorbid anxiety disorders. There is evidence that where comorbidity exists between separation anxiety and other psychological disorders, separation anxiety symptoms are a chronological precursor to other types of anxiety disorders (Manicavasagar, Silove, & Curtis, 2003). Also, in a phenomenological study of adult separation anxiety, 96% of subjects with comorbid anxiety disorders maintained "that separation anxiety was *directly* associated with the onset of those disorders" (Manicavasagar *et al*., 1997: 280). Although such evidence may be criticised for its subjective nature and therefore the possibility for inherent bias in self-analysis and report, the counter argument is that self-motivated and self-reflexive material is relevant, integral and indispensable to this research, and is supportive of its rationale. Specifically, this evidence supports the precedence of disturbed emotion in the development of OCD and its associated cognitions. It seems

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plausible that disturbances in neurologically-based affective substrates may be important in forming the conditions that generate OCD and its associated cognitions, as opposed to the opposite model in which cognition leads to anxiety, as has traditionally been assumed.

The modest body of psychological research on separation anxiety supports the theories of early attachment theorists (e.g., Bowlby, 1960; Dozier, Chase Stovall, & Albus, 1999 in Pini *et* al., 2005; Fairbairn, 1952; Klein, 1980): pathologically heightened sensitivity to separation anxiety is directly associated with the development of a broad range of adult psychiatric conditions (e.g., Pine *et al.*, 1998 and Otto *et al*., 2001 in Pini *et al*., 2005). However, none of these studies have focused on the role of separation anxiety in OCD. In fact, it has been suggested that research including a focus on OCD is needed in order better to understand the role of separation anxiety in the genesis of emotional disorder (Manicavasagar, Silove, & Curtis, 1997). This study will address the gap in the literature by focusing on separation-distress in OCD. Separation-distress is the term chosen, according to the neuropsychological framework of this thesis, for anxiety of a *panic* or *separation* type of quality.

In an exploration of the relationship between age of Panic Disorder (PD) onset and anxiety disorder comorbidity, Goodwin, Lipsitz, Chapman, Mannuzza, and Fyer (2001) found that earlier PD onset was evident in patients with comorbid OCD, obsessive-compulsive symptoms and childhood separation anxiety disorder; and further, that patients with *both* OCD and childhood separation anxiety disorder had even earlier onset ages of PD than those with either one or the other of these pathologies. This underscores the link between clinical OCD, a mentality of obsessive-compulsive cognition and emotion, panic, and separation-distress. It simultaneously strengthens the proposal that heightened separation-distress could be an important disturbance in OCD related affective turmoil. Results also showed that obsessive-compulsive symptoms have a moderate, statistically significant effect on age of PD onset: those with obsessive-compulsive symptoms developed PD slightly but significantly later than those with OCD, but well before those with neither; mean ages of onset in years were as follows for the OCD, obsessive-compulsive and Specific Phobia (as an example of control) groups, respectively: 21.6 (5.2) *vs*. 22.1 (6.4) *vs*. 25.2 (8.4) (Goodwin *et al*., 2001:1308), providing a convincing model of how the gradual incline into OCD may be structured. Therefore the findings suggest that obsessive-compulsive symptoms may be better conceptualised along a spectrum rather than as a categorical disorder. However, evidence remains to be gathered in support of this suggestion.

The inclusion of obsessionality and low mood, as well as clinical OCD and depression, in this thesis, will possibly shed light on this question. Spectrum approaches are gaining momentum in the literature, and are argued for by the overlap of neurobiological and phenomenological features of disorders traditionally requiring differential diagnoses (Stein, 2000). There is now a large body of neurochemical, neuroanatomical, animal study, neuroimmunological and genetic evidence to suggest that disorders as diverse as Tourette's syndrome, PD, OCD, Body Dysmorphic Disorder (BDD), hypochondria, trichotillomania, social anxiety, compulsive gambling, eating disorders and depersonalization may represent a heterogeneous collection of OCD spectrum disorders (Stein, 2002). Axis II personality

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disorders such as Obsessive-compulsive personality disorder (OCPD) have also been proposed as part of a spectrum of OCD disorders. There is debate regarding the potential qualitative and quantitative differences between clinical and non-clinical variants of both OCD and depression (e.g., Barlow, 2004; Mataix-Cols & van den Heuvel, 2006). The question of whether separation-distress and separation trauma follow similar or distinctly different courses in clinical and non-clinical populations will be elucidated in this study. This could shed light on whether a spectrum approach or categorical perspective is closer to a realistic understanding of the disorders. In answering this, an important contribution will be made to the literature on OCD and depression and the nature of their classification and relationship with each other.

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## Study I. Separation-distress and cognitive conflict-monitoring in obsessionality

The first study will investigate whether separation-distress and conflict-monitoring may be considered affective and cognitive mechanisms of obsessionality, respectively. Given the hypermetabolism of error-related activity in OCD (e.g., Baxter *et al*., 1990; Gehring *et al*., 2000; van Veen & Carter, 2001; 2002a,b), discussed in Chapter 1, it is relevant to research its relation to the role of the anterior cingulate cortex (ACC) in generating feelings of separation-distress. There are good reasons to conceptualise overactive conflict-monitoring and heightened separation-distress as cognitive and affective components of the disorder. These include evidence that the ACC plays an important role in generating feelings of separation-distress through mediation of the basic emotion substrate system PANIC (Panksepp, 1998; 2003a,b; 2006), and that this distributed emotion substrate network is also involved in the subjective experience of pain (Eisenberger, Lieberman, & Williams, 2003; Eisenberger & Lieberman, 2004), Amongst a few specified structures, the ACC has been shown to contribute to underlying emotional distress (e.g., Panksepp, 1998; Sinha, Lacadie, Skudlarski & Wexler, 2006).

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### Research hypotheses

Study I was approached methodologically according to three main hypotheses, which evolved throughout the conceptualisation and literature review. They are as follows:

Hypothesis One ($H_1$):
Scores on measures of PANIC/separation-distress will be significantly higher in those who also score highly in measures of obsessionality, compared with those with low obsessionality scores. PANIC/separation-distress will be assessed with the Affective Neuroscience Personality Scale (ANPS; Davis, Panksepp, & Normansell, 2003). The developers of the scale use SADNESS to denote the items relevant to the assessment of PANIC/separation-distress. Significant increases in scores on this measure are expected to correspond to significantly higher outcomes on obsessionality measures. Confirmation of this hypothesis would provide reason to investigate separation-distress further, as an emotion of primary importance in obsessionality and OCD.

Hypothesis Two ($H_2$):
Conflict-monitoring, evaluated by a meta-cognitive variation of the Stroop task (Stroop, 1935), is a cognitive mechanism of obsessionality. It is hypothesized that higher scores on the measures of obsessionality will be predictive of higher scores on the Stroop task used in this study, hence providing evidence for the role of cognitive conflict-monitoring in the underlying pathology of obsessionality.

Hypothesis Three ($H_3$):

Conflict-monitoring and separation-distress are significantly correlated. Therefore, scores on the meta-cognitive Stroop task and on the ANPS SADNESS subscale are hypothesized to be significantly correlated.

$H_1$, and especially $H_2$, were of primary interest in this study. $H_2$ aims to validate neurocognitive and imaging research that characterises conflict-monitoring as a cognitive manifestation of obsessionality. $H_1$ aims to investigate whether the affective experience of separation-distress, mediated by the neurobiological emotion system network that generates PANIC responses – is higher in participants with high obsessionality scores. This would indicate that separation-distress may be an important underlying emotion in obsessionality.

Study design and measurement

Three questionnaires and one short cognitive task were given to gather data. Questionnaires were considered the most time-effective means of data collection in a study such as this, which required a large sample, and it was also hoped that their nature would strengthen the possibility of capturing the vast spectrum of behavioural, cognitive and affective symptoms included under the broad banner of obsessionality. The first two questionnaires are validated and widely used assessments of OCD and were used to position participants on a spectrum in terms of their tendencies towards obsessionality. A vast number of OCD measures exist. Although one established questionnaire would have been the simplest and most time-efficient way to collect data, it seemed best to include at least two in this study. This was an attempt to balance strengths and weaknesses which emerged during a comprehensive review of available measures.

OCD MEASURES:

*Meta-Cognitions Questionnaire (MCQ)* (Cartwright-Hatton & Wells, 1997; *Appendix A*)

The five factors or subscales of the Meta-Cognitions Questionnaire (MCQ) have been found to predict worry-proneness, proneness to obsessional symptoms, and anxiety. It has been included because its items were derived not only from outpatients with OCD, Generalised Anxiety Disorder, Panic Disorder and Hypochondriasis, but also from normal (non-clinical) undergraduate students. It is therefore well suited to assess obsessionality in non-clinical participants. It was literally designed to detect worry-*proneness* (Cartwright-Hatton & Wells, 1997), and as such is a good non-clinical assessment, for the purposes of this study.

The MCQ assesses beliefs about worry, intrusive thoughts and cognitive functioning, as well as individual differences in the ability to monitor thought. Participants respond to each item on a 4 point Likert scale (1 = 'do not agree' to 4 = 'agree very much'). Its five subscales were derived from repeated factor analytic

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studies, and are as follows: (1) Positive beliefs about worry, (2) Negative beliefs about the uncontrollability of thoughts and corresponding danger (e.g., my worrying thoughts are uncontrollable; worrying is dangerous for me), (3) Lack of cognitive confidence (e.g., I do not trust my memory), (4) Negative beliefs about thoughts in general, including themes of superstition, punishment and responsibility (e.g., it is bad to think certain thoughts; I will be punished for not controlling certain thoughts; if a bad thing happens which I have not worried about, I feel responsible), and 5. Cognitive self-consciousness (e.g., I pay close attention to the way my mind works).

Item selection and preliminary factor analysis were done on items drawn from two sources: a semi-structured interview with undergraduate students and cognitive therapy transcripts from anxiety outpatient therapy sessions. Participants reported how their over-worrying had started and described its associated problems. Principal components factor extraction suggested a six factor solution, which was then reduced to five after factor structure reliability revealed item loadings of more than 0.4 on 60 items, representing five clear content dimensions. Some inter-item correlation was detected, but was low enough to empirically distinguish the subscales. Reliability, validity (Wells & Papageorgiou, 1998), Cronbach's alpha (0.72-0.89; Cartwright-Hatton and Wells, 1997) and test-retest reliability (0.76-0.89 over 5 weeks) are established (Wells & Papageorgiou, 1998). Wells and Papageorgiou (1998) report that "in accord with [their] theoretical predictions, MCQ subscales were positively correlated with a range of obsessive-compulsive symptoms".

Concurrent validity was established with the Spielberger Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1983), Padua Inventory (Sanavio, 1988), Private Self Consciousness Scale (Fenigstein, Scheier, & Buss, 1975), Anxious Thoughts Inventory (Wells, 1994a), and Cognitive Failures Questionnaire (Broadbent, Cooper, Fitzgerald, & Parkes, 1982). The MCQ shows discriminant validity for Generalised Anxiety Disorder (GAD) and OCD with other emotional disorders and non-clinical presentations. GAD and OCD patients scored significantly higher than the other clinical and the non-clinical groups on various MCQ subscales, and OCD patients scored significantly higher than all the other groups on Cognitive Self-Consciousness (Cartwright-Hatton & Wells, 1996). Significant correlation with the subscale of uncontrollable mental activities of the Padua Inventory (PI) (Cartwright-Hatton & Wells, 1997) is also reported, and suggests that these two scales may be used effectively in combination. MCQ subscales and *Impaired control of mental activities* and *Checking* Padua Inventory factors correlated highly.

Given the non-clinical nature of the MCQ, it was used in conjunction with the Padua Inventory, to introduce more of a clinical evaluative perspective on obsessionality symptoms in this sample.

*Padua Inventory (PI)* (Sanavio, 1988; *Appendix B*)

The PI is a more conventional clinical diagnostic tool for OCD, discriminating well between OCD patients and those with other neurotic disorders. It was thought that the PI was therefore well suited for detecting



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participants with a very high predilection for obsessionality. This measure is becoming a widely used assessment tool for OCD symptoms (Wells & Papageorgiou, 1998). Internal consistency and reliability are satisfactory (Sanavio, 1988). Convergent validity has been shown with the Maudsley Obsessive-Compulsive Scale (0.70; Hodgson & Rachman, 1977), Leyton Obsessional-Compulsive Inventory (0.71 with Symptom and 0.66 with Trait scales; Cooper, 1970) and Self-rating Obsessional Scale (0.61; Sandler & Hazari, 1960) (Sanavio, 1988).

During development of the 60-item scale, four factors were identified: (1) Impaired control of mental activities (e.g., lower ability to remove undesirable thoughts, difficulty dealing with simple decisions and doubts); (2) Becoming contaminated; (3) Checking behaviours, and (4) Urges and worries of losing control over motor behaviours (Sanavio, 1988). For the purposes of Study I, these factors provide well-delineated obsessionality categories, which are likely to be useful during data analysis. If results do show that conflict-monitoring and separation-distress were more highly correlated with specific aspects of obsessionality rather than with overall obsessionality scores, these factors will be useful categories to investigate. The PI correlates well with other OCD symptom scales and effectively discriminates between OCD patients and those with other neurotic disorders (Sanavio, 1988).

Although it has more clinical relevance, the PI was also comprehensively developed and is therefore not exclusively applicable to clinical OCD. As discussed, intrusive, undesired obsessions and ruminations have been recognized as an everyday occurrence (e.g., Rachman & de Silva, 1978; Salkovskis & Harrison, 1984), emphasizing that evaluations should, at least to some extent, be applicable to both obsessionality in a non-clinical sample as well as OCD in a clinical setting. The PI was derived from interviews with OCD and neurotic patients, as well as with normal controls. 200 initial statements describing obsessional thoughts and behaviours were reduced to 76 after testing with small groups of psychosomatic, depressive and anxious patients for the potential of these items to discriminate amongst affective disorders. Factor analysis in a non-clinical study with the 76 items suggested a final reduction to 60 items, and an accurate four factor solution (these factors were described above).

The MCQ and PI were also chosen for their clear and well developed factor structure. Together they consist of nine different factors, which provide clear opportunities for data analysis, given the heterogeneity of obsessive-compulsive symptom profiles (e.g., Lochner & Stein, 2003). The variable factors inherent to these two assessments provide the opportunity to investigate relationships between separation-distress, other basic emotions and obsessionality subtypes in this study.

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SEPARATION-DISTRESS MEASURE

*Affective Neuroscience Personality Scales (ANPS)* (Davis, Panksepp, & Normansell, 2003; see *Appendix H*)

Separation-distress was evaluated by the ANPS subscale, SADNESS, which includes items that assess the prevalence of a respondent's tendency towards activation of the PANIC emotion substrate, and its associated feelings of separation-distress (Davis, Panksepp, & Normansell, 2003). The ANPS form an integrative questionnaire, which assesses participants' affective profiles in terms of six basic-emotion categories – SEEK, FEAR, CARE, ANGER, PLAY, SADNESS, and an additional category, Spirituality. The questionnaire consists of 110 items; 14 pertain to each of the six main subscales of emotion, whilst 12 provide the measurement for Spirituality. There are 14 criterion items, evenly dispersed after each section of seven authentic items: that is, items 1 to 7 are one each of the factors listed above, following each other in that order, and item 8 is a criterion. The second SEEK item follows as item 9, and so on. Participants respond using a 4 point Likert scale, with 1 = *Strongly Agree*, 2 = *Agree*, 3 = *Disagree*, and 4 = *Strongly Disagree*. To guard against response sets and transparency of item meaning, the questionnaire has been structured so that scoring of sets of items alternate between negative and positive. For the negatively-scored sets, scoring is reversed so that an answer of *Strongly Agree* is scored as 4 instead of as 1, as it appears on the questionnaire sheet. Similarly, *Agree* is scored as 3 instead of 2, *Disagree* as 2 instead of 3, and *Strongly Disagree* as 1 instead of 4. Preservation of scoring integrity is achieved by manipulation of item phrasing. The positively scored sets simply require the participants' actual responses to be recorded. The resultant overall scores are a maximum of 56 for each of the six main subscales, and of 48 for the Spirituality measure.

SADNESS is the subscale of central importance in this study. However, the other emotion subscale scores are anticipated to provide significant opportunities for data analysis secondary to the main hypotheses of the study. As discussed in the introductory chapters, fear anxiety is well established as a crucial emotion in OCD. Given the traditionally established implication of fear anxiety in OCD, scores on the FEAR subscale (an assessment of the subjective feelings generated by the FEAR basic neurobiological emotion system) will be compared with PANIC/separation-distress scores. This will contribute towards determining whether OCD, fear anxiety and separation-distress are related to a dissociable degree.

As discussed in Ekman and Davidson (1994), it is crucial that highly sound test-retest and internal consistency be established for biological trait measures that are specifically designed to assess emotion-related activity, no less so than traditional measures of cognitive functions. Items and factors chosen to represent emotion variables cannot be considered universal. Some CARE subscale items, for example, relate to children and the impulse to care for them; but caring need not always relate to caring for a child. However, the items are based on maternal neurobiology and a general tendency towards care, and are therefore relevant. The ANPS is highly appropriate to this thesis owing to its natural overlap with the theoretical framework.

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COGNITIVE CONFLICT-MONITORING

In addition to the evaluation of separation-distress, participants must be evaluated for conflict-monitoring, in order to gauge (1) whether conflict-monitoring and separation-distress are closely related, as expected, and, potentially, *how* this might be so, as well as (2) whether there was a significant correlation between obsessionality and the cognitive and affective components in question. To assess conflict-monitoring, the Stroop Test (Stroop, 1935) was adapted to the purposes of this study. Numerous variations of the Stroop Test exist. Basically, they all assess divided (or selective) attention and inhibition; how the brain deals with incongruency between automatic and effortful cognitive processing skills. They evaluate the ability to inhibit an over-learned or prepotent verbal response (Stroop, 1935). In the Colour/Word Stroop, participants are presented with the names of colours printed in a non-corresponding colour – such as the word BLUE written in green ink. Participants are instructed to respond to the colour of the ink and *not* to the written word (as one is automatically inclined to do). Thus there is conflict between one's unavoidable, immediately activated response and the response one is required to impose wilfully over an automatic urge.

Participants were administered the pencil-and-paper form of the Delis-Kaplan Executive Function System (D-KEFS) Colour-Word Interference (Stroop) Test (Delis, Kaplan & Kramer, 2001). Their performance was recorded by the researcher according to the standardized procedure (Total Time to Complete, Total Uncorrected Errors and Total Self-Corrected Errors was recorded for each of the four stimulus conditions of the task: Colour Naming, Word Reading, Inhibition, and Inhibition/Switching). They were then asked to provide an estimate of their overall performance on the four stimulus conditions, in the form of a percentage (the percentage of items they thought they answered correctly).

Such data would provide various possibilities for analysis, but the central concern was how closely participants' actual and perceived scores related, providing a crude but arguably adequate (for the purposes of this study) measure of meta-cognitive conflict-monitoring. This method also addressed the problem of lack of symptom-relevance in previous studies of cognition in OCD. The current approach ensured that meta-cognition – essential to the nature of obsessionality – was assessed in the context of conflict. A pilot study was carried out with individuals not participating in the final study, in order to refine the method and scoring of the Meta-Cognitive Stroop measure, and to ensure that the researcher was competent in its standardised administration before beginning data collection.

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Sampling

A non-clinical sample was chosen. This decision is defensible based on research showing that "obsessional ruminations and unpleasant cognitive intrusions" (Sanavio, 1988: 1) are common in non-clinical groups (e.g., Rachman & de Silva, 1978; Salkovskis & Harrison, 1984). Wells and Papageorgiou (1998) note that worry and obsession, although associated with significant distress and often partly diagnostic of emotional disorders such as OCD and Generalised Anxiety Disorder (GAD), occur frequently

and normally in the non-clinical population. Therefore non-clinical samples are generally accepted as adequate OCD research analogues (Burns et al., 1986).

From careful study of the development and norming of the MCQ and the PI, an initial sample of 1000 college students was located, based largely on the fact that OCD has a lifetime prevalence of two to three percent worldwide (Robins *et al*., 1984 in Maltby *et al*., 2005; Weissman et al., 1994 in Whiteside et al., 2004). In order to obtain significantly high- and low-scoring groups on the obsessionality spectrum with which to continue the conflict-monitoring and separation-distress research, a sufficiently large enough sample had to be tested. It was hoped that a score distribution matching the small percentage of clinical occurrence – as opposed to a clinical diagnosis of OCD – would provide persuasive support for any conclusions drawn from the research.

Data was gathered from college participants not diagnosed with clinical disorders. A large undergraduate sample of 1119 participants completed the obsessionality evaluations (MCQ and PI) in order to place them on a continuous spectrum in terms of obsessionality scores. Two extreme scoring groups from each end of the spectrum – a high obsessionality group and a low obsessionality group – were drawn from the large (N = 1119) sample. The two groups represented 1% of the overall sample population, therefore constructing sample groups which matched the distribution of OCD in the world population, as discussed above. The two groups in fact represented the occurrence of OCD within this population to a greater extent than the lifetime worldwide prevalence, even though clinical diagnosis was not a feature of the study.

The exact number of participants in each of the two groups was decided upon according to analysis of the distribution, standard deviations and statistical power of the data collected from the eventual 1119 students. However, based on preliminary research of previously obtained data distribution resulting from use of the MCQ and the PI (Cartwright-Hatton & Wells, 1997; Sanavio, 1988), it was possible to estimate that the groups would consist of between 15 and 25 participants each. All participating students were informed that they might be asked to participate in the second stage of the testing process, depending on their test scores. The second stage consisted of assessment with the SADNESS Affective Neuroscience Personality Scale (ANPS; Davis, Panksepp, & Normansell, 2003) and the Meta-Cognitive Stroop evaluation.

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Data collection procedures

A vast number of participants were needed to complete the initial questionnaires (MCQ and PI), in order to ensure a sample size that would allow significant differences between the two extreme scoring groups to emerge. Thus, the following recruitment measures were decided upon: (1) Entry into a R1 000 raffle draw was offered for participation in the research study, and (2) A system was devised whereby the college students were informed of the study and of the R1 000 reward being offered for participation, and

were then directed to complete the questionnaire online in their own time, as it seemed that this would be the most practical and efficient data collection technique.

Online questionnaires were created using *Perseus SurveySolutions 3.0* (1997-2000). After ethical clearance, class lists for nine 2005 undergraduate courses at UCT were accessed through the UCT staff and administration internet system, with the help of the Psychology Department secretaries. Class lists consisted of student numbers, which were then edited in *Microsoft Excel* to form email addresses by concatenating them with the standard UCT email address post-script. The classes were chosen for volume and also to represent the wide variety of faculties at UCT undergraduate level. They included first year Statistics, Economics, English, Mathematics and Psychology courses; second-year Mathematics and Economics courses; and a third-year Accounting course.

A consent form was included on the questionnaire web page created for data collection. It consisted of a brief explanation that the study was part of neuropsychology research aiming to investigate the way specific thoughts and emotions are interrelated. Participants were asked to fill in their name, telephone numbers and e-mail addresses, so that they could be contacted for the second round of testing, if required, or to claim the R1 000 raffle reward. To safeguard participant recruitment for the conflict-monitoring and separation-distress testing to follow in the second stage of the research, it was made clear that only those completing their full participation in the study (i.e. both stages, if requested) would be included in the draw for the R1 000 raffle reward. Aside from the reasons discussed above regarding OCD prevalence and data distribution in previous research using the MCQ and PI, the very large sample was also a precaution taken with the knowledge that some participants may decline from further involvement. The sample size was large enough to ensure a response range from which extreme high obsessionality and low obsessionality groups could be drawn, even with some participant drop-out. Lastly, the consent form specified that all participants agreed to take part in the study on a voluntary basis and that anonymity was guaranteed.

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The online system was extremely effective. Emails were sent to 10 000 students, advertising the study and urging their participation, with the possible reward as encouragement. 1119 valid responses were obtained (after deletion of repeat entries and of questionnaires with missing data).

The 50 participants selected for the second stage of testing were contacted by telephone to arrange a suitable time for their evaluation appointment. All testing was carried out in the UCT Psychology Department, in tutorial rooms. Participants were asked to collect the ANPS questionnaire from the Psychology Department secretary's office and to fill it in before the appointment, in an attempt to shorten the appointment time and ensure greater co-operation. At their appointment, participants had the Stroop Test procedure explained to them, and administration of the test followed. They were then encouraged to ask any questions they had regarding the research procedures or the nature and purpose of the research study. They were given the option of a report back on their individual data in relation to others in the study, and of the whole study on its completion. 41 of the 50 participants completed the second stage of

testing: 21 from the low obsessionality group and 20 from the high obsessionality group. It was decided that this was an acceptable sample size for a study of this magnitude.

Data capturing and editing

The web page was created so that all questionnaire responses would be emailed to a main UCT server in a Psychology Department computer lab, in the form of response.tsv files: each question (numbered from 1 to 65 and from 1 to 60 on the web page, but from 1 to 125 in the survey program setup for purposes of response collection) appeared as a file, and contained all the responses received for that item. These results were then imported into *Microsoft Excel*, in order to calculate overall obsessionality scores (an average of scores on the two questionnaires) for each participant and create a range of scores from which the high and low obsessionality groups could be selected.

Data collected from the ANPS questionnaires was scored manually: all individual participant scores were entered into an *Excel* spreadsheet; the items that required reverse scoring were altered and input as raw data to facilitate straightforward summing of factors using *Excel* formulas. The seven factors were summed to obtain an affective profile for each of the 41 participants.

Data analysis

Descriptive and inferential statistics were used to analyse the quantitative data. The MCQ and the PI were scored according to their manuals, in order to obtain a range of tendencies towards obsessionality displayed by the participants. The cognitive and affective tests were scored to position the participants in terms of their predilections towards conflict-monitoring and separation-distress. Overall obsessionality scores as well as scores for each of the nine individual factors that make up the MCQ (five factors) and the PI (four factors) were calculated for each participant. Correlational analyses were used to rank the nine factors from highest to lowest in terms of their correlation with overall obsessionality scores. Descriptive information of this nature was intended to guide subsequent analyses, and was also useful in its own right, by providing a more detailed characterisation of the data.

Independent *t*-tests were performed on the high and low obsessionality groups, to determine whether they were significantly different and so that further analyses could be conducted using these two sets of scores. Independent *t*-tests were used to calculate whether high *vs* low obsessionality grouping had a significant effect on participants' separation-distress and conflict-monitoring scores. Score sets were also correlated within groups, to determine whether each group differed significantly in terms of its scores on separation-distress and conflict-monitoring. It was kept in mind that further correlations might be employed to probe more specific relationships that could possibly exist between various obsessionality factors and conflict-monitoring, depending on the outcome of the preceding analyses. These analyses were performed with the aim of investigating whether separation-distress is significantly implicated in

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obsessionality, as well as to re-establish the empirically supported link between conflict-monitoring and obsessionality.

Limitations

Arguably the most apparent weakness pervading this design is uncomplicated data analysis. Correlational relationships amongst factors will form a substantial part of the analysis, and it may be debated whether this level of analysis can fairly be brought to bear on the complex research questions under consideration. However, with the addition of the independent *t*-test, the statistics used here answer the questions posed, and the questions are important steps in the series of four studies constituting this thesis. Conceptual complexity should not be confused with the straightforward research questions, concerning whether hyperactivity in specific cognitive and affective tendencies co-vary with higher obsessionality, and whether those cognitive and emotional aspects co-vary to such an extent that they could be considered manifestations of the disorder in their respective domains. Independent *t*-tests were an adequate tool to detect significant differences between the groups, whilst correlation assisted in providing the best indication of relationships amongst the three factors.

Another shortcoming is using data from a convenience sample of college students. However, this study is the first in a series that will investigate both non-clinical and clinical samples, and that therefore will address both obsessionality and OCD. The focus here is on relating sensitivity in two specific domains (i.e. conflict-monitoring and separation-distress) with higher obsessionality scores. Therefore the conclusions drawn will not be diminished by sampling concerns. And in fact the strong sampling parameters adhered to in this study have provided significantly different groups for analysis, which should reduce any concerns over the type of sample used.

Finally, it should be taken into account that using online data collection techniques does introduce the possibility of data corruption: errors may occur in the response collection files or when importing the files into *Excel*. However, owing to the need for such a large sample, web-based questionnaires were the best possibility. Data corruption is a danger of research regardless of the method of collection. Care was taken to avoid error by excluding duplicate entries, scanning for missing data using the statistical program, and remaining alert to inconsistencies in the data throughout analysis.

Ethical considerations

All participants were informed of the nature and purposes of the thesis and their consent was obtained on the consent form attached to the online questionnaires. The consent form explained clearly that participation in this research was voluntary and that subjects were completely within their right to withdraw at any point in the research process. It was not expected that the three questionnaires and the cognitive task used to collect data would upset the participants (especially since a non-clinical sample was being investigated). However, the consent form advised that participants could ask for any further

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information regarding what was being studied, should it have raised any doubts as to their own mental health. They were encouraged to email the researcher with any queries they had.

A few queries were received from participants who were slightly concerned by the relevance some of the questionnaire items seemed to have for them personally. These were dealt with by explaining the nature of the questionnaires and how they were being used in this study. All questions asked at the testing appointments during the second stage of data collection were answered in full. The participants were offered any further help or knowledge they might have required and were encouraged to email or to set up an appointment with the researcher should they have felt this to be necessary. Plans were made to refer participants to the appropriate clinical professionals, should this need have arisen. As a reward for their time, all participants were entered into a draw for R1 000. After the second stage of testing and data collection was complete, the draw was done and the winner was awarded the prize.

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**Chapter Three Study I Results**

Throughout the following chapter, as well as the discussions in the next chapter, the two groups were referred to as the high obsessionality and low obsessionality groups. Throughout analyses, $\overline{X}_1$ was used to refer to the mean of the low obsessionality group, and $\overline{X}_2$ to the mean of the high obsessionality group. Conflict-monitoring was occasionally abbreviated as CM and separation-distress as S-D, for the purposes of statistical tables and to be concise.

After the first stage of data collection (MCQ and PI web-based questionnaires), preliminary correlational analyses were carried out to obtain a better descriptive overview of the data. For each of the 1119 valid responses, scores on each of the nine factors that constituted the two questionnaires were calculated. Participants' scores on the individual factors were then correlated with their overall obsessionality score, in order to gauge how indicative of obsessionality each of the factors was. Following are the factors and their attendant correlations, ranked from highest to lowest in terms of their accordance with overall scores on obsessionality in this sample: PI Factor 1, *Impaired control over mental activities* (.89); PI Factor 3, *Checking behaviours* (.73); MCQ Factor 2, *Uncontrollability and danger* (.69); MCQ Factor 4, *Themes of superstition, punishment and responsibility* (.68); MCQ Factor 1, *Positive beliefs* (.65); PI Factor 2, *Becoming contaminated* (.63) and PI Factor 4, *Urges of losing control over motor behaviours* (.63); MCQ Factor 3, *Cognitive confidence* (.59); MCQ Factor 5, *Cognitive self-consciousness* (.34). The ranking listed here was considered useful as an approach to organising further analysis. Should overall obsessionality not have related to conflict-monitoring or to separation-distress, for example, analyses may have been needed to determine whether specific aspects or components of obsessionality are related to separation-distress or to conflict-monitoring.

Howell (2002) does not recommend performing post-hoc power calculations, and especially in the case of significant results, there is no need to provide any further statistical support from this perspective. Based on previous research with the MCQ and PI, a sample size of either 20 or 25 from each end of the obsessionality spectrum was estimated to provide adequate power for the statistical analyses to be conducted. 25 participants were contacted for each of the two groups, but participant drop-out resulted in an end total of 41 participants for the second stage of testing (21 from the low obsessionality group and 20 from the high obsessionality group). The two sample groups were therefore drawn from the two extreme ends of the obsessionality spectrum (which was constructed from the initial 1119 questionnaire responses)

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<u>The two sample groups (high *vs* low obsessionality)</u>

Before any statistical analyses were performed, the two groups were analysed to determine whether they were significantly different; that is, whether their means reflected separate sample populations. An

independent *t*-test showed that the two sets of scores were significantly different: $\overline{X}_1 = 158.619$, $\overline{X}_2 = 404.6$; Levene F (1, 39) = 17.34 at $p < .01$, therefore *t* for separate variances = 41.62, $p < .01$. The significance of these results is strengthened further by the fact that the *t*-test was one-tailed: it was specified before data collection that the mean obsessionality scores were expected to be greater in the high obsessionality sample group than in the low obsessionality group. Results showed that the population means were different in the hypothesized direction. Therefore the high and low obsessionality groups were significantly different. This finding strengthens any conclusions that may be drawn from further analyses using the data.

Obsessionality, separation-distress and conflict-monitoring

After the second and final stage of data collection (separation-distress and conflict-monitoring assessment) was complete, initial statistical analyses were aimed at detecting the effect that the high *vs* low obsessionality grouping had on separation-distress and conflict-monitoring scores. This would address two of the three main research hypotheses. Inferential analyses were carried out to investigate these relationships, as well as possible differences between the high and low obsessionality groups in terms of the other emotion subscales, evaluated by the Affective Neuroscience Personality Scale (ANPS; Davis, Panksepp, & Normansell, 1998). Independent *t*-tests were carried out on the scores of the two groups, for each of the emotion subscales and for the differential scores obtained on the Meta-Cognitive Stroop test. For the statistical tests in which the means were hypothesized to differ in a specific direction (prior to commencement of data collection), one-tailed *t*-tests were performed.

Firstly, it was found that conflict-monitoring scores did not differ significantly between groups: $\overline{X}_1 = 21.21$, $\overline{X}_2 = 26.08$; Levene (.98, 39) = .34, therefore the variances did not differ significantly and $t = 1.16$, $p = .13$. It should be noted, however, that the means did differ in the hypothesized direction, with the high obsessionality group scoring slightly higher on average than the low obsessionality group on conflict-monitoring. Since a significant finding was hypothesized on this measure, descriptive statistical analyses were carried out on the conflict-monitoring score set, in order to determine its suitability for analysis.

*Table 1*

*Descriptive statistics for conflict monitoring measure*

| Valid N | $\overline{X}$ * | *Std.dev* | Confidence (-95.00%) | Confidence (+95.00%) | Min. | Max. | Variance | Skewness |
|---|---|---|---|---|---|---|---|---|
| 41 | 23.59 | 13.47 | 19.33 | 27.84 | -.50 | 55.50 | 181.50 | .17 |

**where $\overline{X}$ = mean score*

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It was apparent from Table 1 that the standard deviation (*std.dev* = 13.47) of the total group of conflict-monitoring scores was large enough relative to the population mean of $\bar{X}$ = 23.59, to represent a normally distributed population. Therefore, any relationship between conflict-monitoring and obsessionality should have been revealed by correlation or any other analyses on this data. The data set was sound and suitable for analysis, to answer the questions posed by the research hypotheses. A normal probability-plot was constructed with the data to re-confirm this conclusion.

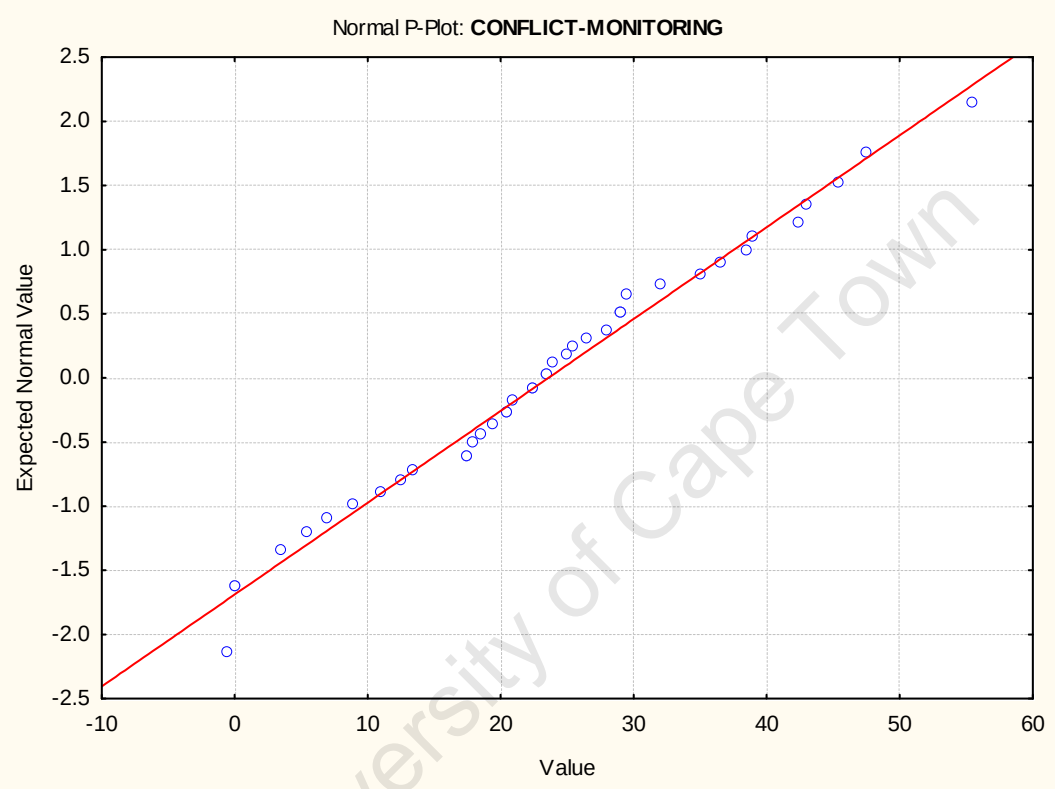


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*Fig.1 Normal probability-plot of score distribution for conflict-monitoring measure*

Figure 1 further illustrates the normality of the data and the fact that it was adequate to draw conclusions from the analyses performed on it. Effect size for the data set was .37, which indicated a relatively substantial difference between the two groups, reflecting something between a small (.20) and medium (.50) effect size, as proposed by Cohen (1988 in Howell, 2002).

Second, it was found that separation-distress scores (as assessed by the ANPS SADNESS subscale; Davis, Panksepp, & Normansell, 2003) differed significantly between the two groups, in the hypothesized direction: $\bar{X}_1$ = 30.90, $\bar{X}_2$ = 40.55; t = -6.59, $p < .01$; Levene's test (3.17, 39) = .08. Therefore, scores on separation-distress were significantly higher in the high obsessionality group.

Obsessionality related to other emotions assessed with the *Affective Neuroscience Personality Scales*

Scores on the ANPS subscale SEEK did not differ significantly between the two groups: $\overline{X}_1 = 40.81$, $\overline{X}_2 = 38.45$; *t*-value for separate variance estimates = 1.61, $p = .12$; Levene (10.88, 39) = .00. This *t*-test was 2-sided, as no direction was hypothesized for the differing population means prior to data collection. Those reported below were one-tailed, except for CARE and SPIRITUALITY, for which no directional hypothesis was advanced.

FEAR subscale scores on the ANPS differed significantly between the two groups: $\overline{X}_1 = 29.76$, $\overline{X}_2 = 43.50$; $t = -8.19$, $p < .01$; Levene (3.76, 39) = .06.

ANGER subscale scores on the ANPS differed significantly between the two groups: $\overline{X}_1 = 32.86$, $\overline{X}_2 = 39.45$; $t = -3.04$, $p < .01$; Levene (3.62, 39) = .06.

CARE subscale scores on the ANPS did not differ significantly between the two groups: $\overline{X}_1 = 40.38$, $\overline{X}_2 = 41.60$; $t = -.68$, $p = .50$; Levene (1.81, 39) = .19.

PLAY subscale scores on the ANPS did differ significantly between the two groups: $\overline{X}_1 = 44.00$, $\overline{X}_2 = 37.65$; $t = 3.91$, $p < .01$; Levene (.26, 39) = .61,

SPIRITUALITY subscale scores on the ANPS did not differ significantly between the two groups: $\overline{X}_1 = 30.19$, $\overline{X}_2 = 31.30$; $t = -.67$, $p = .51$. Levene (.71, 39) = .40.

In summary, from these initial analytical investigations, it emerged that scores on separation-distress, fear anxiety, anger and seriousmindedness (as evaluated by the ANPS subscales SADNESS, FEAR, ANGER and PLAY, respectively) are significantly influenced by whether the participant falls into the high or low obsessionality group. High obsessionality participants scored significantly higher on the scales measuring separation-distress, fear anxiety and anger; and lower on the PLAY subscale – indicating the inverse trait of a greater propensity for serious-mindedness than their low obsessionality counterparts.

Conflict-monitoring and separation-distress

Two sets of correlations were carried out to determine whether separation-distress and conflict-monitoring were related. For both groups, correlational analyses were carried out on overall conflict-monitoring scores as related to SADNESS subscale scores on the ANPS. Neither group showed significant evidence of a relationship between separation-distress as measured by SADNESS and conflict-monitoring: $r^2 = .05$, $t = .99$, $p = .33$.

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MCQ and PI factors related to conflict-monitoring and separation-distress

As mentioned above, further analyses were performed to investigate whether any of the specific factor items of the MCQ and PI were significantly related either to separation-distress or to conflict-monitoring. Since conflict-monitoring scores failed to reveal a significant relationship with overall obsessionality, it was beneficial to examine whether any of the individual factors were closely related to this measure. Although it was clear that separation-distress was strongly related to overall obsessionality in this sample, it was also considered worthwhile to define interactions amongst obsessionality factors and separation-distress in more detail. Again, to strengthen any differences found between groups with regards to the obsessionality questionnaire scale factors, independent *t*-tests were performed on the scores from the two groups, for each of the nine factors.

*Table 2*

*Independent t-test results for OCD vs non OCD group on all nine OCD factors*

| Obsessionality factor | Valid N | $\bar{X}_1$ | $\bar{X}_2$ | *t* | *df* |
|---|---|---|---|---|---|
| MCQ 1 | 41 | 24.24 | 53.55 | -18.39** | 30.41 |
| MCQ 2 | 41 | 23.19 | 50.80 | -19.22** | 39 |
| MCQ 3 | 41 | 11.33 | 27.90 | -13.92** | 21.92 |
| MCQ 4 | 41 | 19.33 | 37.70 | -17.21** | 39 |
| MCQ 5 | 41 | 14.00 | 20.20 | -6.56** | 39 |
| PI 1 | 41 | 18.14 | 66.30 | -25.04** | 20.49 |
| PI 2 | 41 | 13.29 | 37.10 | -12.41** | 22.24 |
| PI 3 | 41 | 9.23 | 29.15 | -13.71** | 20.32 |
| PI 4 | 41 | 7.48 | 22.75 | -11.29** | 19.67 |

***all results were significant at the level of p < .01*

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Results presented in Table 2 demonstrated that participants from the high and low obsessionality groups scored significantly differently on all nine factors.

MCQ and PI factors related to conflict-monitoring

More detailed correlations between conflict-monitoring scores and the nine separate obsessionality questionnaire factors were carried out, since no significant differences were found between the high and low obsessionality groups on this measure. Analyses were performed for each of the two groups separately, as well as for the two groups combined. As mentioned above, previous results indicating the

rank of factors in terms of their correlation with overall obsessionality scores were used to decide the order in which these factors were analysed. Based on this order, each factor was considered less likely than the preceding one to reveal a significant relationship to conflict-monitoring. In Table 3 below, the factors are reordered as they occur in the questionnaires.

*Table 3*

*Correlational statistics for the relationship between obsessionality factors and conflict-monitoring*

| Obsessionality factor | | $r^2$ | *t* | *P* | *Mean* | | *Std.dev.* | | r(X,Y) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | CM | Obsessionality factor | CM | Obsessionality factor | |
| MCQ 1 | Combined | .02 | .81 | .43 | 23.59 | 38.54 | 13.47 | 15.65 | .13 |
| | Low | .09 | -1.39 | .18 | 21.21 | 24.24 | 14.98 | 3.63 | -.30 |
| | High | .00 | -.15 | .88 | 26.08 | 53.55 | 11.54 | 6.19 | -.04 |
| MCQ 2 | Combined | .04 | 1.26 | .21 | 23.59 | 36.66 | 13.47 | 14.69 | .20 |
| | Low | .05 | .95 | .35 | 21.21 | 23.19 | 14.98 | 4.50 | .21 |
| | High | .01 | -.40 | .70 | 26.08 | 50.80 | 11.54 | 4.70 | -.09 |
| MCQ 3 | Combined | .05 | 1.41 | .17 | 23.59 | 19.41 | 13.47 | 9.16 | .22 |
| | Low | .00 | -.02 | .98 | 21.21 | 11.33 | 14.98 | 1.46 | -.00 |
| | High | .06 | 1.04 | .31 | 26.08 | 27.90 | 11.54 | 5.13 | .24 |
| MCQ 4 | Combined | .01 | .64 | .52 | 23.59 | 28.29 | 13.47 | 9.89 | .10 |
| | Low | .06 | -1.11 | .28 | 21.21 | 19.33 | 14.98 | 3.57 | -.25 |
| | High | .02 | -.63 | .54 | 26.08 | 37.70 | 11.54 | 3.25 | -.15 |
| MCQ 5 | Combined | .02 | .93 | .36 | 23.59 | 17.02 | 13.47 | 4.33 | .15 |
| | Low | .03 | .71 | .48 | 21.21 | 14.00 | 14.98 | 2.83 | .16 |
| | High | .02 | -.16 | .55 | 26.08 | 20.20 | 11.54 | 3.22 | -.14 |
| PI 1 | Combined | .04 | 1.21 | .23 | 23.59 | 41.63 | 13.47 | 25.08 | .19 |
| | Low | .01 | .40 | .69 | 21.21 | 18.14 | 14.98 | 1.71 | .09 |
| | High | .00 | .29 | .78 | 26.08 | 66.30 | 11.54 | 8.44 | .07 |
| PI 2 | Combined | .05 | 1.41 | .17 | 23.59 | 24.90 | 13.47 | 13.44 | .22 |
| | Low | .01 | .40 | .69 | 21.21 | 13.29 | 14.98 | 2.47 | .20 |
| | High | .02 | .63 | .54 | 26.08 | 37.10 | 11.54 | 8.24 | .15 |
| PI 3 | Combined | .02 | .85 | .40 | 23.59 | 18.95 | 13.47 | 11.03 | .14 |
| | Low | .01 | .36 | .72 | 21.21 | 9.24 | 14.98 | 1.22 | .08 |
| | High | .02 | -.67 | .51 | 26.08 | 29.15 | 11.54 | 6.38 | -.16 |
| PI 4 | Combined | .01 | .52 | .61 | 23.59 | 14.93 | 13.47 | 8.78 | .08 |
| | Low | .05 | -.96 | .35 | 21.21 | 7.48 | 14.98 | .81 | -.22 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High | .06 | -1.04 | .31 | 26.08 | 22.75 | 11.54 | 6.00 | -.24 |

*Valid N = 41 for all factors;*
*Conflict-monitoring was abbreviated to CM; the low obsessionality group was referred to as "Low" and the high obsessionality group as "High";*
*Direction of correlation is shown in the last column, r(X,Y)*

Results reported in Table 3 illustrated that there were *no* significant effects. Again it was noted that these results are based on a normally distributed conflict-monitoring score population, which should have revealed any significant differences that did occur in the data. It was also noted that, although none of the results reported in Table 3 were significant, the effect size for this measure was .37, which represents a moderate difference between the scores of the two groups (see discussion under Table 1, p.34).

Correlations of MCQ and PI factors with separation-distress

The same analysis was carried out to compare the relationships of particular obsessionality factors with separation-distress. Again, the high and low obsessionality group scores were treated independently, as well as combined for a comparative measure.

*Table 4*

*Correlational statistics for the relationship between obsessionality factors and separation-distress*

| Obsessionality factor | | $r^2$ | *t* | *p* | *Mean* | | *Std.dev.* | | r(X,Y) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | S-D | Obsessionality factor | S-D | Obsessionality factor | |
| MCQ 1 | Combined | .55 | 6.91** | .01 | 35.61 | 38.54 | 6.73 | 15.65 | .74 |
| | Low | .00 | -.06 | .96 | 30.90 | 24.24 | 3.83 | 3.63 | -.01 |
| | High | .13 | 1.64 | .12 | 40.55 | 53.55 | 5.44 | 6.19 | .36 |
| MCQ 2 | Combined | .58 | 7.27** | .01 | 35.61 | 36.66 | 6.73 | 14.69 | .76 |
| | Low | .01 | .41 | .69 | 30.90 | 23.19 | 3.83 | 4.50 | .09 |
| | High | .24 | 2.37* | .03 | 40.55 | 50.80 | 5.44 | 4.70 | .49 |
| MCQ 3 | Combined | .37 | 4.75** | .01 | 35.61 | 19.41 | 6.73 | 9.16 | .61 |
| | Low | .07 | -1.18 | .25 | 30.90 | 11.33 | 3.83 | 1.46 | -.26 |
| | High | .05 | -.95 | .35 | 40.55 | 27.90 | 5.44 | 5.13 | -.22 |
| MCQ 4 | Combined | .41 | 5.20** | .01 | 35.61 | 28.29 | 6.73 | 9.89 | .64 |
| | Low | .01 | .31 | .76 | 30.90 | 19.33 | 3.83 | 3.57 | .07 |
| | High | .16 | -1.83 | .08 | 40.55 | 37.70 | 5.44 | 3.25 | -.40 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MCQ 5 | Combined | .25 | 3.65** | .01 | 35.61 | 17.02 | 6.73 | 4.33 | .50 |
| | Low | .24 | -2.47 | .02 | 30.90 | 14.00 | 3.83 | 2.83 | -.49 |
| | High | .06 | 1.09 | .29 | 40.55 | 20.20 | 5.44 | 3.22 | .25 |
| PI 1 | Combined | .55 | 6.97** | .01 | 35.61 | 41.63 | 6.73 | 25.08 | .74 |
| | Low | .13 | 1.68 | .11 | 30.90 | 18.14 | 3.83 | 1.71 | .36 |
| | High | .06 | 1.11 | .28 | 40.55 | 66.30 | 5.44 | 8.44 | .25 |
| PI 2 | Combined | .37 | 4.79** | .01 | 35.61 | 24.90 | 6.73 | 13.44 | .61 |
| | Low | .01 | .38 | .71 | 30.90 | 13.29 | 3.83 | 2.47 | .09 |
| | High | .04 | -.85 | .40 | 40.55 | 37.10 | 5.44 | 8.24 | -.20 |
| PI 3 | Combined | .44 | 5.59** | .01 | 35.61 | 18.95 | 6.73 | 11.03 | .67 |
| | Low | .17 | 1.97 | .06 | 30.90 | 9.24 | 3.83 | 1.22 | .41 |
| | High | .00 | -.18 | .86 | 40.55 | 29.15 | 5.44 | 6.38 | -.04 |
| PI 4 | Combined | .42 | 5.30** | .01 | 35.61 | 14.93 | 6.73 | 8.78 | .65 |
| | Low | .09 | -1.40 | .18 | 30.90 | 7.48 | 3.83 | .81 | -.31 |
| | High | .00 | .27 | .79 | 40.55 | 22.75 | 5.44 | 6.00 | .06 |

*Marked results were significant at the level of *p < .05; **p < .01*
*Valid N = 41 for all factors;*
*Separation-distress was abbreviated to S-D;*
*Direction of correlation is shown in the last column, r(X,Y)*

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Results presented in Table 4 supported earlier findings that participants' scores on separation-distress were significantly influenced by their grouping in either the high or low obsessionality group. Values in Table 4 illustrated that when the two groups' obsessionality scores were correlated with their separation-distress scores, these two measures were significantly correlated, for all nine factors. Further, for the MCQ Factor 2 (*Negative beliefs about the Control of Thoughts and Corresponding Danger*), the high obsessionality group's separation-distress and obsessionality scores are significantly correlated when treated as a separate group, whereas the low obsessionality group's scores are not. Similarly, for the MCQ Factor 5 (*Cognitive Self-Consciousness*), the low obsessionality group's separation-distress and obsessionality scores are significantly correlated when treated as a separate group, whereas the high obsessionality group's scores are not.

Conflict-monitoring (raw scores), obsessionality and separation-distress

Given the unexpected results indicating that there was no significant relationship between the measure of conflict-monitoring used in this study and those of obsessionality and separation-distress, some final statistical analyses were carried out using the raw scores obtained on the Stroop test by participants of the second part of the study. First participants' overall score out of 200 (each of the four Stroop stimulus conditions consists of 50 items) was taken as a measure of conflict-monitoring, and correlated with (a)

overall obsessionality scores (see Table 5) and (b) separation-distress scores (as measured by the ANPS SADNESS subscale; see Table 6).

*Table 5*

*Correlational statistics for the relation between overall obsessionality and conflict-monitoring (out of 200) scores*

| | Mean | *Std. dev* | r(X,Y) | $r^2$ | *t* |
|---|---|---|---|---|---|
| Conflict-monitoring | 193.56 | 4.10 | 1.00 | 1.00 | -1.82 |
| Obsessionality | 278.66 | 125.86 | -.28 | .08 | -1.82 |

*Table 6*

*Correlational statistics for the relation between overall separation-distress and conflict-monitoring (total out of 200) scores*

| | Mean | *Std.dev* | r(X,Y) | $r^2$ | *t* | *p* | N |
|---|---|---|---|---|---|---|---|
| Separation-distress | 35.61 | 6.73 | 1.00 | 1.00 | -1.30 | .20 | 41 |
| Conflict-monitoring | 193.56 | 4.10 | -.20 | .04 | -1.30 | .20 | 41 |

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Second, *t*-tests (independent by group) were carried out to investigate whether high *vs* low obsessionality grouping had an effect on conflict-monitoring and separation-distress scores. In both analyses, GROUP (high *vs* low obsessionality) was used as the independent variable, with conflict-monitoring (score out of 200) and obsessionality (overall score) serving as the two dependent variables. Results are given below, in Tables 7 and 8.

*Table 7*

*Independent* t-*test analysis of overall obsessionality and conflict-monitoring (total out of 200) scores*

| Variable | $\overline{X}_1$*(Std.dev)* | $\overline{X}_2$*(Std.dev)* | *t* | *df* | *p* (2-sided) | $t_{sep.var.est.}$*(df)* |
|---|---|---|---|---|---|---|
| Conflict-monitoring | 194.71*(3.32)* | 192.35*(4.56)* | 1.91 | 39 | .06 | 1.89*(34.65)* |
| Obsessionality | 158.62*(5.19)* | 404.70*(25.87)* | -42.73** | 39 | .00 | -41.75*(20.46)*** |

*Valid N low obsessionality = 21; N = 20 high obsessionality;*
***p < .01;*
*Levene low obsessionality (1,39) = 2.14, p = .15; F = , p ; Levene low obsessionality (1,39) = 17.14, p < .01; F = , p*

It is important to note that the significant scores reported in Table 7 reflected and confirmed previous findings; that is, that the two groups are significantly different on measures of obsessionality.

*Table 8*

*Independent* t-*test analysis of overall separation-distress and conflict-monitoring (total out of 200) scores*

| Variable | $\overline{X}_1$*(Std.dev)* | $\overline{X}_2$*(Std.dev)* | *t* | *df* | *p*(2-sided) | $t_{sep.var.est.}$*(df)* |
|---|---|---|---|---|---|---|
| Separation-distress | 30.90*(3.83)* | 40.55*(5.44)* | -6.59** | 39 | .00 | -6.53*(33.98)*** |
| Conflict-monitoring | 194.71*(3.32)* | 192.35*(4.56)* | 1.91 | 39 | .06 | 1.89*(34.65)* |

*Valid N low obsessionality = 21; N = 20 high obsessionality;*
***p < .01;*
*Levene low obsessionality (1,39) = 3.18, p = .08; F = 2.02, p = .13; Levene low obsessionality (1,39) = 2.14, p = .15; F = 1.89, p = .17*

Similarly, from Table 8, it was evident that separation-distress was significantly different between the two groups (a finding already established), whilst analyses continued to reflect a non-significant effect in terms of the scores on the evaluation of conflict-measuring.

Third, *Total Error Score* could also be considered a raw measure of participants' conflict-monitoring levels, and was included in these analyses for the purpose of thorough investigation. Results are presented in Tables 9 and 10.

*Table 9*

*Correlational statistics for the relation between overall obsessionality and conflict-monitoring (total error score) scores*

| | Mean | *Std.dev* | r(X,Y) | $r^2$ | *t* | *p* | N |
|---|---|---|---|---|---|---|---|
| Conflict-measuring | 6.44 | 4.10 | 1.00 | 1.00 | 1.82 | .08 | 41 |
| Obsessionality | 278.66 | 125.86 | .28 | .08 | 1.82 | .08 | 41 |

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*Table 10*

*Correlational statistics for the relation between overall separation-distress and conflict-monitoring(total error score) scores*

| | Mean | *Std.dev.* | r(X,Y) | $r^2$ | *t* | *p* | N |
|---|---|---|---|---|---|---|---|
| Separation-distress | 35.61 | 6.73 | 1.00 | 1.00 | 1.30 | .20 | 41 |
| Conflict-monitoring | 6.44 | 4.10 | .20 | .04 | 1.30 | .20 | 41 |

Similarly, *Total Completion Time* on the Stroop task was reasonably used as a raw measure of conflict-monitoring, since "the primary method for analysing performance on the D-KEFS Colour-Word Interference Test is based on the number of seconds that the examinee takes to complete each of the four conditions" (Delis et al., 2001, p. 97) and "the completion-time score for each condition provides a global measure of performance on that task" (Delis, Kaplan, & Kramer, 2001: 101). Therefore analyses were carried out using *total completion time* to represent the conflict-monitoring variable.

*Table 11*

*Correlational statistics for the relation between overall obsessionality and conflict-monitoring (total completion time) scores*

| | Mean | *Std. dev* | r(X,Y) | $r^2$ | *t* | *p* | N |
|---|---|---|---|---|---|---|---|
| Conflict-monitoring (*total completion time*) | 164.02 | 27.04 | 1.00 | 1.00 | 1.46 | .15 | 41 |
| Obsessionality | 278.66 | 125.86 | .23 | .05 | 1.46 | .15 | 41 |

*Table 12*

*Correlational statistics for the relation between overall separation-distress and conflict-monitoring (total completion time) scores*

| | Mean | *Std. dev* | r(X,Y) | $r^2$ | *t* | *p* | N |
|---|---|---|---|---|---|---|---|
| Separation-distress | 35.61 | 6.73 | 1.00 | 1.00 | .16 | .87 | 41 |
| Conflict-monitoring *(total completion time)* | 164.02 | 27.04 | .00 | .00 | .16 | .87 | 41 |

The above results showed that there was not a statistically significant difference between the two obsessionality groups in terms of either separation-distress or conflict-monitoring scores – with the latter

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investigated from all possible points of view, i.e. using all possible representations of the overall score. The *average total times* for the two samples are 158.04 seconds (low obsessionality) and 170.30 seconds (high obsessionality). These descriptive statistics reinforced the conclusion of non-significance, since there was no obvious discrepancy between the averages (although they did differ in the hypothesized direction, with high obsessionality participants taking longer overall to complete the test).

Finally, *Total Completion Time* (as a measure of conflict-monitoring) was correlated with a single obsessionality factor from the initial two questionnaires: *Cognitive self-consciousness*, which demonstrated a correlation of .34 with overall obsessionality scores). This factor was chosen since it represented the factor least correlated with overall obsessionality scores and therefore the one that would most likely reveal any kind of relationship with conflict-monitoring.

*Table 13*

*Correlational statistics for the relation between conflict-monitoring (total completion time) and MCQ Factor 5 Cognitive self-consciousness (obsessionality) scores*

| | Mean | *Std.dev* | r(X,Y) | $r^2$ | *t* | *p* | N |
|---|---|---|---|---|---|---|---|
| Conflict-monitoring (*total completion time*) | 164.02 | 27.04 | 1.00 | 1.00 | .02 | .98 | 41 |
| Obsessionality (*MCQ Factor 5*) | 17.02 | 4.33 | .00 | .00 | .02 | .98 | 41 |

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Use of independent *t*-tests confirmed that GROUPING (i.e. low *vs* high obsessionality, according to MCQ5 *Cognitive self-consciousness*) did not affect either (a) *Total Error Score* or (b) *Total Completion Time* (both of which were used as the dependent variable, representing conflict-monitoring, in analyses): (a) $\overline{X}_1$ = 5.29, $\overline{X}_2$ = 7.65; $t$ = -1.91, $p$ = .06, and (b) $X_1$ = 158.05, $X_2$ = 170.30; $t$ = -1.47, $p$ = .15.

Since no significant results were obtained with this factor, it could be concluded that none of the other factors (all of which were more closely related to overall obsessionality scores) would reveal anything contrary.

**Chapter Four Study I Discussion**

Preliminary evidence suggests that anterior cingulate cortex (ACC) activity converges in obsessionality and separation-distress, providing support for the hypothesis that separation-distress plays an important role in obsessionality.

Conflict-monitoring and obsessionality

Based on independent *t*-test and correlational analyses, there did not appear to be a significant difference between the low obsessionality and the high obsessionality group on the measure of conflict-monitoring. Conflict-monitoring scores were not significantly different between the two groups when overall scores on obsessionality were analysed, and no significant differences appeared between them on any one of the nine obsessionality questionnaire factors. Since the score distribution of the conflict-monitoring measure was concluded to be normal (see Table 1, p.34 and Fig.1, p.35; Chapter 3), various conclusions may be drawn from this unexpected finding.

First, it must be considered that there is in fact no difference between people with high and low tendencies towards obsessionality, in terms of the extent to which they monitor conflict. This seems unlikely given previous research showing the established significance of this relationship. Considering that most of the evidence for the relationship between conflict-monitoring and OCD is derived from the neuroimaging paradigm, a second, more realistic explanation for the lack of significance shown here may be that existing differences are subtle enough to escape detection using a meta-cognitive pencil-and-paper task.

Third, it may be that although there is a significant relationship between obsessionality and conflict-monitoring in reality, this simply is not reflected in the current sample. Perhaps a clinical sample might have shown significant results. This argument may be challenged on the grounds of the large sample and sound sampling technique, and the result that the high obsessionality group represents the incidence of OCD in the world population. The high obsessionality group constitutes two percent of the sample; and the estimated lifetime prevalence of OCD is two to three percent (Robins et al., 1984 in Maltby et al., 2004). However, scores are still lower than might be expected in a clinical sample and this could account for the insignificant results. It is also possible that the two groups were too small to detect differences. Power calculations carried out prior to collecting data did, however, indicate that a sample size of 20 in each group would be sufficient to obtain a respectable power statistic.

Fourth, the conflict-monitoring measure used in this study (obtaining differential scores on a 'Meta-Cognitive' Stroop) could have been too weak to detect differences. Reliability of the measure is unestablished, since no similar use of the Stroop test (nor any other suitable conflict-monitoring measure) could be found in the literature. It was impossible to establish reliability in this study, since only one measure of discrepancy-detection was used. Reliability could be low, contributing to the lack of

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observed significance. Based on all these considerations, it seems most likely that removing the measure from the neuroimaging paradigm and using a weak conflict-monitoring measure are responsible for the lack of significance found in support of the second hypothesis. Thus for $H_2$, it is necessary to accept the null hypothesis that conflict-monitoring does not constitute a cognitive mechanism of obsessionality, based on this research sample. The fact that various conceptualisations of the overall conflict-monitoring score were used to represent the measure, added weight to the conclusion that, in this sample at least, whether participants were in the high or low obsessionality group had no effect on their scores on the measure of conflict-monitoring.

Separation-distress and obsessionality

Based on independent *t*-test and correlation analyses, there was shown to be a significant difference between the high and low obsessionality groups in their scores on measures of separation-distress. Separation-distress scores were significantly different between the two groups when overall obsessionality scores were analysed, and significant differences were also revealed between the groups when further, detailed correlational analyses of the nine obsessionality questionnaire factors were carried out. Additionally, the groups scored significantly differently on the separation-distress factor in the hypothesized direction, with participants in the high obsessionality group scoring significantly higher than those in the low obsessionality group: $\overline{X}_1 = 30.90$, $\overline{X}_2 = 40.55$, with a *t*-value ($t = 6.59$; $p < .01$) of sufficient magnitude to enhance this finding further. Participants in the high obsessionality group effectively scored on average over six standard deviations higher than those in the low obsessionality group. Thus it was possible to reject the second null hypothesis and accept $H_1$: that PANIC (the basic emotion substrate for the conscious feeling state of separation-distress; Panksepp, 1998) is significantly implicated in tendencies towards obsessionality, and may be conceptualised as a possible affective correlate or mechanism of obsessionality. The psychoanalytic perspective of OCD as an obsessional neurosis involving heightened separation-distress (i.e., a pathological difficulty with letting go and accepting loss) lends further support to this finding, as well as implying continuity between obsessionality and OCD. The question of continuity will be further investigated and discussed throughout the following chapters.

The link between conflict-monitoring and separation-distress cannot be dismissed definitively. Although not proven by conflict-monitoring results in this study, previous research strongly implicates excessive ACC activity in OCD. As discussed, the extended neural network regions dedicated to the PANIC/separation-distress emotion substrate and conflict-monitoring overlap to a large extent. Therefore, if obsessionality and OCD prove to be continuous, then neural activity indicative of conflict-monitoring could still reasonably be predicted in studies of obsessional groups as well as in clinical OCD groups.

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Detailed analyses were conducted to determine to what extent each of the nine obsessional questionnaire factors were related to separation-distress scores. Results showed that when the high and low obsessionality groups' scores were correlated with their separation-distress scores, obsessionality and separation-distress were significantly correlated for all nine factors. The factors were ranked in the following order, in terms of the percentage each contributed to significantly higher scores on separation-distress: obsessionality as represented by MCQ Factor 2, *Uncontrollability and danger*, explains 58% of the variance of separation-distress scores between the two groups ($r^2 = .58$); MCQ Factor 1, *Positive beliefs about worry*, and PI Factor 1, *Impaired control over mental activities*, both explain 55% ($r^2 = .55$); PI Factor 3, *Checking behaviours*, explains 44% ($r^2 = .44$); PI Factor 4, *Urges and worries of losing control over motor behaviours*, explains 42% ($r^2 = .42$); MCQ Factor 4, *Superstitions of punishment and responsibility*, explains 41% ($r^2 = .41$); PI Factor 2, *Becoming contaminated*, and MCQ Factor 3, *Cognitive confidence*, both explain 37% ($r^2 = .37$); and MCQ Factor 5, *Cognitive self-consciousness*, explains 25 % ($r^2 = .25$). These statistics show that whether participants were in the high or low obsessionality group had a substantial effect on their affective profile in terms of their separation-distress scores (as measured by the ANPS SADNESS subscale. As mentioned in the previous chapter, "SADNESS" is the term used to refer to the scale measuring underlying PANIC, the basic emotion brain substrate system for separation-distress; Davis, Panksepp, & Normansell, 2003). The $r^2$ statistics obtained in these analyses are large (Howell, 2002) and provide an exceptionally high percentage of the explanation in the score variance between the groups, which strongly supports the hypothesis that PANIC or separation-distress is implicated as a central emotion in obsessionality.

The power calculations for Pearson's *r* in these analyses reveal power coefficients as follows, using the same ranked order in which factors are presented above: .99, .98, .98, .95, .94, .93, .90, .90 and .72. These are very high power coefficients for Pearson's *r* (Howell, 2002); a fact which further strengthens the conclusion that separation-distress is significantly related to obsessionality. Further, for MCQ Factor 2 *Negative beliefs about the Control of Thoughts and Corresponding Danger*, the high obsessionality group's separation-distress and obsessionality scores are significantly correlated when treated as an independent group (with a power coefficient of .87), whereas the low obsessionality group's scores are not. Similarly, for MCQ Factor 5 (*Cognitive Self-Consciousness*), the low obsessionality group's separation-distress and obsessionality scores are significantly correlated when treated as an independent group (with a power coefficient of .78), whereas the high obsessionality group's scores are not. These two results – relating to the obsessionality factors most and least correlated with separation-distress – strengthen the evidence that, in terms of separation-distress, the score populations are independent.

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Conflict-monitoring and separation-distress

The variables separation-distress and conflict-monitoring were not significantly related in this study, evidenced by non-significant results for analyses of the relationship between scores on the separation-distress and conflict-monitoring measures. This was to be expected, based on the preceding analyses that

showed a non-significant relationship between obsessionality and conflict-monitoring, but a significant relationship between obsessionality and separation-distress. It follows logically that no significant results would be obtained by comparing separation-distress with conflict-monitoring. It is debatable to what extent this result affects the conclusions that may be drawn from this study. This is discussed below.

Other emotions and obsessionality

Analyses not central to the hypotheses of this study but nevertheless beneficial in understanding and drawing conclusions from the findings, involved the six affective categories that were assessed by the ANPS in addition to separation-distress. These were: FEAR (anxiety), SEEK (curiosity-driven, goal-directed behaviour), ANGER, CARE, PLAY (an inverse evaluation of seriousmindedness), and SPIRITUALITY. Independent *t*-tests showed that anxiety, anger and seriousmindedness (as evaluated by the ANPS subscales FEAR, ANGER and PLAY, respectively) are also significantly related to obsessionality, whereas curiosity/goal-directed behaviour, spirituality and caring (assessed by SEEK, SPIRITUALITY and CARE, respectively) are not. For the FEAR subscale, the means differed in the expected direction (based on the substantial body of empirical literature regarding anxiety in OCD, e.g., Dorfan & Woody, 2006; Kim & Gorman, 2005; Mancini & Gangemi, 2004; Whiteside, Port, Deacon & Abramowitz, 2006); with those in the high obsessionality group scoring significantly higher on FEAR than those in the low obsessionality group. Participants in the high obsessionality group scored significantly higher on the ANGER subscale than those in the low obsessionality group, whereas this result was reversed for scores on the PLAY factor: high obsessionality participants had markedly lower scores on this subscale compared with those in the low obsessionality group.

Although no directional hypotheses were specified for the latter two results, they were in accordance with general expectations of OCD mentality: anger is invariably linked to frustration and fear, predicting a higher score on the ANGER subscale for those in the high obsessionality group. Offer, Lavie, Gothelf and Apter (2000), for example, found that several defences distinguished different groups of psychiatric patients from controls, and that a few defences – namely projection, displacement and regression – correlated significantly with anger and especially distinguished the OCD patients from other psychiatric groups and from controls. Seriousmindedness is predicted by the rigidity, obsessive attention to detail and goal-setting characteristic of OCD – as well as by heightened levels of fear in those with or inclined towards OCD (Cassin & von Ranson, 2005; Nelson, Abramowitz, Whiteside & Deacon, 2006; Spano, 2001). These characteristics manifest in the inverse characteristic of a significantly lower tendency towards playfulness. Since the findings for the high obsessionality group are in line with empirical research for OCD, this is again suggestive of continuity between obsessionality and OCD.

It is noteworthy that there was a larger differential score between the two groups on the FEAR subscale: $\overline{X}_1 = 29.76$, $\overline{X}_2 = 43.50$, than on the SADNESS subscale: $\overline{X}_1 = 30.90$, $\overline{X}_2 = 40.55$), in this sample,

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as well as a larger attendant *t* statistic (8.19 for FEAR *vs* 6.59 for SADNESS). Both analyses were, however, significant at the level of $p < .01$. The factors ANGER: $\bar{X}_1 = 32.86$, $\bar{X}_2 = 39.45$, and then PLAY: $\bar{X}_1 = 44.00$, $\bar{X}_2 = 37.65$, followed in terms of their respective differential sizes, completing the rank of the four affective scales that yielded significant differences in this sample. The most important observation here concerns the FEAR and SADNESS scales, since the former is traditionally established as the central emotion in OCD and the latter is the affect under investigation in this study of obsessionality. It was hypothesized that separation-distress (i.e. the feeling state generated by the basic emotion substrate system, PANIC; Panksepp, 1998), is central to obsessional thought, feeling and behaviour. Fear anxiety (which is generated by the basic emotion substrate FEAR and referred to as the "FEAR" subscale on the ANPS) was still expected to be involved in obsessionality, but could potentially be the result of an underlying increase in PANIC, rather than the primary cause of obsessionality. Though scores on the FEAR subscale of the ANPS implemented in this study did yield a greater differential than the SADNESS scale, this could of course not confirm which emotion is the catalyst and which the result (or whether indeed the two are even related in this manner). However, the study does provide evidence both to re-confirm the importance of fear anxiety in the disorder and to argue that separation-distress is just as critical in the affective manifestation thereof. The significant differences between the high and low obsessionality groups in terms of fear anxiety adds weight to the significant findings of this study regarding separation-distress. The importance of fear anxiety supports the new findings with established research, in the same set of data.

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Conclusions

It is important to put the lack of significance obtained for $H_2$ in perspective. The relationship between obsessionality, conflict-monitoring and separation-distress was an important part of the study rationalisation, which provided reason to research the connection between separation-distress and obsessionality, which was indeed significant (and is the main focus of the study). It is therefore less relevant that no significant effect was found between conflict-monitoring and obsessionality. It might be argued that the finding for $H_2$ is significant, precisely because the rationale for proposing $H_1$ in this study was based upon it. It remains to be confirmed whether the significance of the separation-distress findings in $H_1$ would rely on significant conflict-monitoring findings in $H_2$. However, reasonable alternative explanations have been provided for the non-significance of $H_2$ and therefore this consideration does not invalidate the findings.

Regarding the implications for emotion in obsessionality, it appears that separation-distress (or the basic emotion, PANIC, which underlies the consciously experienced feeling of separation-distress at a neurophysiological level; Panksepp, 1998) is critically implicated in obsessionality. Based on the strong sampling procedures in this study, it is reasonable to predict and hypothesize its involvement in clinical OCD, too. Although fear anxiety was significantly implicated obsessionality in this study, separation-

distress was as highly related (and in some analyses with specific factors, more significantly related) to obsessionality. Clearly, fear anxiety is also crucial in the cognitive and emotional experience of obsessionality. However, the established knowledge that it is the central or underlying emotion is brought into question by the current findings. Furthermore, the unexpected and counterintuitive involvement of another type or quality of anxiety altogether – PANIC/ separation-distress – has been established as new knowledge.

This study provides motivation to investigate more closely whether a pathological sensitivity to or activation of the PANIC basic emotion system, and therefore a heightened tendency to experience separation-distress, could be an important mechanism of obsessionality and/or OCD. Potential benefits of such research would be to re-establish the affective nature of the disorder from a neurobiological perspective, as well as to challenge the straightforward and accepted notion that fear anxiety is the principle emotion involved in OCD. The proposal will be that separation-distress (as mediated by the basic emotion substrate system, PANIC; Panksepp, 1998) is an important underlying variable in the development and maintenance of OCD.

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**Chapter Five Study II Method**

**Study II. Characteristics and comorbidity of obsessionality and low mood**

Introduction

The purpose of Study II was to re-examine the occurrence of obsessionality, in a new non-clinical sample. Given findings in Study I that PANIC (the basic emotion substrate associated with consciously felt separation-distress; Panksepp, 1998) appears to be significantly implicated in obsessionality, Study II included the evaluation of low mood. The rationale for introducing low mood and depression as variables in subsequent studies was described in Chapter 1. The hypothesis is that participants with high scores on measures of low mood will show similarly elevated scores on measures of separation-distress, as well as on the same measures of obsessionality employed in Study I. This line of reasoning is based on several factors which align the cognitive research of OCD with that of depression. These include the reliably high yet unaccounted for comorbidity of OCD and depression, the established influence of separation trauma in early childhood, and the fact that hypermetabolism of the anterior cingulate cortex (ACC) has been established in the brains of those with clinical depression (Mayberg, 1997), as well as those with OCD. All these factors were discussed in greater detail in Chapter 1. Based on these observations, comparable findings for depression would underscore the findings already reported for obsessionality. If separation-distress proves to be implicated in low mood, too, this will strengthen its importance as an underlying emotion in obsessionality. Therefore, the rationale discussed in Chapter 1 regarding maladaptive cognitive processing of errors appears to apply in the case of depression as well as of OCD.

However, before the relationships amongst obsessionality, low mood and separation-distress are investigated, it is reasonable to progress from a preliminary study on the mechanisms of separation-distress in obsessionality to an extension of the study which will re-evaluate obsessionality in a non-clinical sample, as well as introduce the variable of low mood. The co-occurrence of these variables is hypothesized. Obsessionality and low mood are evaluated in Study II, as opposed to the clinical disorders of OCD and depression. This poses a problem in that it cannot yet be assumed that the variables of interest are continuous (i.e., that obsessionality and low mood are the non-clinical precursors of clinical OCD and depression). Therefore, Study II was carried out to determine the characteristics of a non-clinical sample population in terms of obsessionality and low mood. These results will determine how to proceed in terms of analysing the sample further in terms of separation-distress and separation trauma (the questions addressed in Study III; Chapters 8, 9 and 10). The addition of these concepts to the progression of studies here will contribute towards understanding whether obsessionality and OCD, low mood and depression may be considered potentially continuous variables.

A new non-clinical population will be sampled and evaluated on measures of obsessionality and low mood. The new hypothesis is that obsessionality and low mood co-occur at significant levels. Study II therefore introduces low mood as a variable which may elucidate findings regarding the emotional basis

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of obsessionality. It is an important extension of the previous study, and adds another level by which eventually to understand the relationships amongst obsessionality, low mood and separation-distress. It seems reasonable to consider that PANIC/separation-distress may constitute a common affective endophenotype of the two disorders. A further aim of Study II is to characterise the occurrence of obsessionality and low mood in the non-clinical sample.

Hypotheses

High scores on measures of obsessionality will be strongly and significantly associated with high scores on measures of low mood.

Measurement

Questionnaires were chosen carefully, to assess cognitions, emotions and behaviours characteristic of obsessionality and depression. They were chosen for overall qualitative scope, allowing evaluation of obsessive and low mood tendencies. Data from the total number of participants (N = 1077) was analysed to gain a general perspective of the incidence of obsessionality and low mood tendencies in this broad sample (from the MCQ, PI, PANAS and MDI only).

Alongside reliability, validity and sensitivity, psychometric qualities including factor analytic development, symptom clusters and item analysis were considered in choosing the evaluations. The psychometric properties and construction of the MCQ, PI and ANPS were discussed in Chapter 2. Additional assessments used in Study II are outlined below.

OBSESSIONALITY MEASURES

1. *Meta-Cognitions Questionnaire (MCQ)* (Cartwright-Hatton & Wells, 1997; *Appendix A*)

2. *Padua Inventory (PI)* (Sanavio, 1988; *Appendix B*)

LOW MOOD MEASURES

Rather than long measurement tools, shorter scales derived from repeated factor analysis and with evidence of high content validity were chosen. It has been suggested that severity measures for affective disorders should be brief in order to maintain high applicability and compliance (Bech, Rasmussen, Raabaek Olsen, Noerholm, & Abildgaard, 2001). Measures were researched and selected accordingly. Although comprehensive scales are valuable, the length and demands of the set of questionnaires used here required careful selection on the basis of item relevance.

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1. *Major (ICD-10) Depression Inventory (MDI)* (WHO, 1993; Olsen, Jensen, Noerholm, Martiny, & Bech, 2003; *Appendix D*)

The Major Depression Inventory (MDI; Olsen *et al*., 2003) was developed to complement traditional ratings scales for Major Depressive Disorder (MDD) (e.g., the Hamilton Depression Scale; Hamilton, 1967). This was achieved by including MDD symptom clusters reflected by both DSM-IV (APA, 1994) and ICD-10 (WHO, 1993) diagnostic categories (Bech *et al*., 2001). The MDI relates to MDD as classified by the DSM-IV (APA; 1994) and mild to moderate depression defined by the ICD-10 (WHO, 1993) (Bech, 1997, and Bech & Wermuth, 1998 in Bech *et al*., 2001). Its phraseology is closely related in content to the Beck Depression Inventory-II (BDI; Beck, Mendelson, & Erbaugh, 1961) and mirrors the Y-BOCS (Goodman *et al*., 1989a; 1989b), which provides the 'clinical' OCD assessment for both studies in this thesis and is a recognised and well established measure of OCD (Deacon & Abramowitz, 2005). Therefore it is well suited for the evaluation of depression in the following studies.

Scoring parameters are provided for the MDI, to rate whether the score reflects mild, moderate, severe or major depression. It consists of 10 items on a Likert scale ranging from 0-5 (0 = At no time; 1 = Some of the time; 2 = Slightly less than half the time; 3 = Slightly more than half the time; 4 = Most of the time; 5 = All the time). Items 8 and 10 are divided into two items each. The highest score is retained for each of these items. Therefore 12 items are answered but only 10 constitute the final score (a maximum of 50 points). Items relate to frequency over the last two weeks, in accordance with the evaluative time frames of the DSM-IV and ICD-10. The MDI has adequate internal and external validity (Olsen, Jensen, Noerholm, Martiny, & Bech, 2003), sensitivity and specificity (Bech *et al*., 2001), as shown in studies assessing people with varying severities of the disorder). The MDI is intended as a scale both for leading to diagnostic algorithms for the DSM and the ICD-10 and as a measuring instrument in which the total score is a sufficient statistic in itself (Olsen *et al*., 2003) – which makes it very well suited to the design and purposes of these studies.

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2. *The Positive and Negative Affect Scales (PANAS)* (Watson, Clark, & Tellegen, 1988; *Appendix E*):

The MDI will be supplemented by the Positive and Negative Affect Scales (PANAS). Each is a 10-item scale that has shown reliability and validity in evaluating the primary emotion dimensions of positive and negative affect. Positive affect (PA) is characterised by enthusiasm, high activity, energy, focus, engagement and alertness; whilst low PA involves sadness and lethargy. NA is characterised by subjective distress, including anger, fear, nervousness, guilt, disgust and contempt; whilst low NA is expressed as calmness and serenity (Watson, Clark, & Tellegen, 1988). Depression may be conceptualised as a disorder characterised by low PA; and anxiety disorders as an excess of NA (Watson, Clark, & Tellegen, 1988). Neurobiological, behavioural and psychological research provides evidence that these two factors may be regarded as the foundation for many emotions. Emotion may be considered to be founded on the fundamental poles of good and bad, which motivate approach and withdrawal responses (e.g., Damasio, 1999) and generate the full range of human emotions. In various studies involving basic emotions, PA and

NA have emerged as the primary factors in factor analyses of self-rated mood and as the first two dimensions in multidimensional facial expression analysis (Diener, Larson, Levine, & Emmons, 1985; Russell, 1980, 1983; Stone, 1981; Watson, Clark, & Tellegen, 1984; Zevon & Tellegen, 1982; in Watson, Clark, & Tellegen, 1988).

High internal consistency (Cronbach's coefficient □'s□of between 0.86 and 0.90 for PA; and between 0.84 and 0.87 for NA) has been shown; as well as low correlation between the two scales (Pearson's correlation coefficient (*r*) of between -0.12 and -0.23). PA and NA therefore share only 1-5% of their variance and are independent variables. Their test-retest reliability is good (PA = 0.86; NA = 0.87; r = -0.09). Stability increases as the temporal period between instances of testing lengthens, suggesting these coefficients may in fact be used to indicate trait measures of affect. This also recommends them to the studies in this thesis, in which the aim is to assess relatively stable affective tendencies. Convergent validities (with □s between 0.89 and 0.95) and discriminant validities (with □s between -0.02 and -0.18) are good. Psychometrics were assessed in college, adult and clinical samples. Two dominant factors consistently emerged throughout principal components factor analysis, accounting for two thirds of the common variance in the sample sets (ranging from 62.8% (*moment*) to 68.7% (*general*)). Item validity is high, owing to the purity of the factor markers chosen. Very high initial factor loadings and very low secondary factor loadings mean only one of factors is accurately reflected in each instance.

The Positive and Negative Affect Scales show high external validity with established assessment tools, e.g., the Hopkins Symptom Checklist (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covey, 1974), the BDI (Beck, Mendelson, & Erbaugh; 1961), and the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970). Differential correlation with the BDI (Beck, Mendelson, & Erbaugh, 1961) – NA positively and PA negatively – supports the affective complexity of depression symptoms. This evidence also recommends the PANAS as useful a complement to older, established measures in depression research (Watson, Clark, & Tellegen, 1988). The PANAS is a suitable addition to evaluation with the Major Depression Inventory (MDI) in this and subsequent studies, because the MDI and BDI overlap considerably in item content. The BDI has recently been revised to align more closely with DSM-IV criteria for a diagnosis of Major Depressive Disorder (Beck, Steer, Ball, & Ranieri; 1996), which the MDI reflects closely.

During factor analytic development of the ANPS (Davis, Panksepp and Normansell; 2003), only two factors emerged with eigenvalues greater than 1. FEAR, ANGER and SADNESS (factor loadings of 0.74-0.89) were in the first component (identified as *negative affect*); SEEK, PLAY and CARE, with similar factor loadings (except SEEK=0.55), were in the second component (*positive affect*). The authors note that their results repeat Watson, Clark and Tellegen's (1988) findings for PA and NA factors. Research is revealing the independence of positive and negative affect; they are not necessarily highly negatively correlated, as has long been assumed (Watson, Clark, & Tellegen, 1988). That they have dissociable roles in depression has long been recognized (e.g., James, 1902). Understanding this will have an impact on the

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way affective psychopathologies are approached and the manner in which emotion and feeling operate in affective disorders.

Study design

For Study II, the aim was to recruit a large sample (1000 participants). This was so that when a subset of the sample is tested in Study III, the smaller groups will hopefully reflect lifetime worldwide prevalence of OCD (2-3%; Robins *et al*., 1984 in Maltby *et al*., 2004), as was the case in Study I. Conclusions drawn from the results would then be strengthened by strong sampling parameters, as in Study I (Chapters 2 and 4). Lifetime prevalence rates for depression, estimated by epidemiological studies to be as high as 17.1% (Blazer, Kessler, McGonagle, & Swartz, 1994), would therefore also potentially be matched with a large sample. Clinical disorder prevalence rates are based on definitive criteria. Therefore it is hypothesized that significantly different high and low scores on obsessionality and low mood will likely be present in a large enough non-clinical sample. For Study II, however, only the initial large sample was required.

Sampling

Participants were 1077 undergraduate students at the University of Cape Town (UCT), South Africa. They were registered for first, second or third year courses spanning the academic years 2007-2009. Emails describing the study and inviting participation were sent to eligible participants, as in Study I, but to a wider range of students. The email included raffle prize information and the link to the questionnaire website. A unique site was created for the collection of data during this study (see *Appendix K*). Student numbers and email addresses were provided by department secretaries. The sample includes students from *Commerce*, *Engineering and the Built Environment*, *Humanities*, *Medicine* and the *Health Sciences*. A small number of postgraduate Commerce students were accepted, since the research study login alert could not be confined to undergraduates for this faculty; one of the nine computer laboratories is used by both undergraduate and postgraduate students.

Information Technology UCT staff from the departments listed below helped with participant recruitment. They placed pop-up login alerts in the computer laboratories of undergraduate students, inviting participation in the study. Login alerts were re-activated at various times so that newly registered students or those accessing computer laboratories in a new department would see them. A broader range of participants were exposed to the study in this way. Below are the faculties and variety of departments from which participants were drawn.

*Humanities* (African Studies, Dance, Drama, Education, English Language and Literature, Film and Media Studies, Historical Studies, Languages and Literatures, Fine Art, Philosophy, Political Studies, Psychology, Religious Studies, Social Anthropology, Social Development, Sociology, Music)

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*Health Sciences* (Anaesthesia, Child and Adolescent Health, Clinical Laboratory Sciences, Health and Rehabilitation Sciences, Human Biology, Medicine, Obstetrics and Gynaecology, Psychiatry and Mental Health, Public Health & Family Medicine, Radiation Medicine, Surgery)

*Commerce* (Accounting, Actuarial Science, Economics, Information Systems, Management Studies, Statistical Sciences, Finance, Marketing, Organizational Psychology, Professional Communication)

*Engineering and the Built Environment* (Architecture, Planning and Geomatics, Chemical Engineering, Civil Engineering, Construction Economics and Management, Electrical Engineering, Mechanical Engineering)

*Science* (Archaeology, Astronomy, Botany, Chemistry, Computer Science, Environmental and Geographical Sciences, Geological Sciences, Mathematics and Applied Mathematics, Molecular and Cell Biology, Oceanography, Physics, Statistical Sciences, Zoology)

Continuous site maintenance was performed in order to update students regarding study progress and raffle draw dates.

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Data collection

To encourage registration and quick questionnaire completion, a user-friendly web-based questionnaire system was designed (*Appendix K*). A professional webmaster and graphic designer was commissioned to conceptualise, design, implement and co-manage a website specifically for the study (http:\\www.guineapig.co.za). The webmaster and researcher had sole administrative status and password-protected access to the site (*Appendix L* outlines how the website was made confidential to protect anonymity and restrict registration only to UCT students).

The site included a brief description of the study, as well as criteria for participation. Consent had to be given (an 'Accept' box had to be checked) before participants were able to register and take part (the Information and Consent section is in *Appendix M*). Participants could log in and complete the four questionnaires at their own pace and convenience, removing time pressure and hopefully increasing accuracy and concentration.

Data capturing and editing

All data were collected in the *Data* section of the website, constructed specifically to receive responses. The *Components* section contained all the response sets for each individual questionnaire, separately. These data sets were then exported to *Excel* (also a function of the web server, executed manually) so that they could be organized and prepared for statistical analysis.

Data analysis

Both descriptive and inferential data analyses were used to answer the research questions. The statistical software program *Statistica8* (StatSoft Power Solutions, 2009) was used to perform most of the statistical operations; others were calculated manually, to confirm results, and to make certain comparisons.

Individual responses to each questionnaire item were recorded by the site. Valid response sets were exported to *Excel* for scoring. An overall score was calculated for each questionnaire, as well as scores for the factors within each scale, except for the Major Depression Inventory (MDI), for which only an overall score is required (the original 12-item score was manually converted to the final 10-item score). However, the possibility was left open to analyse MDI data more closely in terms of the specific scoring that relates to different ICD-10 and DSM-IV diagnostic criteria. Such analyses may prove useful, although the purpose here is to ascertain obsessionality and low mood as continuous variables rather than to provide clinical diagnoses. Thus individual item responses along with calculated totals were recorded for each of the 1077 participants in *Excel*. MCQ and PI scores were combined and averaged according to the total possible score, and the totals were arranged in ascending order to represent a spectrum of obsessionality. Similarly, MDI scores and the NA subscale of the PANAS were combined and averaged, to obtain a range of low mood scores.

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Limitations

*Self-report data*. This technique is flawed because of potential difficulties in recalling experiences and emotions accurately. Researchers note that it is difficult to know to what extent adults' thoughts and feelings about attachment reflect their actual past experiences (De Haas, Bakermans-Kranenburg, & van IJzendoorn, 1994). Response bias may also represent a difficulty, whereby people repeat patterns of answers, tending towards either yes or no, or the middle option, depending on the question format (Mouton, 2001). Responses to items may be repeated without consideration of the question. Another challenge is social desirability, whereby people feel obliged to give socially acceptable, uncontroversial responses – especially to moral, ethical and emotionally laden questions (Mouton, 2001; Randall & Fernandes, 2004). Anonymity during data collection was hoped to encourage more honest and reliable answers. Downfalls in self-report methodology are, however, inescapable in a study of this nature, since the subjective experience of separation-distress is of critical importance to the research questions. Subjective experience has become increasingly accepted as crucial to psychological and social science research (e.g., Nicolson, 1995; Russell & Jarvis, 2003).

*Unreported/undiagnosed presence of psychopathology* could represent a silent confounding variable in the non-clinical pool of subjects. Although only those without diagnoses were asked to participate, it was not possible to confirm this.

Ethical considerations

This research study was carried out under the Ethical Code for Professional Conduct specified by the Professional Board for the Psychology Health Professions Council of South Africa (http://www.uct.ac.za/depts/psychology/) and the Research Ethics Code in line with UCT policy (http://www.uct.ac.za/downloads/uct.ac.za/about/policies/ethicscode.pdf), in order to protect potentially vulnerable groups during psychological research. For the *Guineapig* website, the equivalent of signed consent consisted of a form preceding online questionnaires. The site was coded specifically so that consent conditions had to be accepted before the participant's responses would be admitted to the data bank (by virtue of a compulsory 'Accept' button on the website). The consent form explained the nature and purposes of the study, and included an emphasis on the participant's right to withdraw at any time during the research process. Sending mass emails to students in order to invite participation was approved by the departmental ethics committee for this thesis.

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**Chapter Six Study II Results**

Descriptive statistics for the large initial intake of data from the non-clinical sample (N = 1078) are given below in order to characterise the non-clinical sample population in terms of obsessionality and low mood. As outlined in Chapter 5, each of the four evaluative measures consisted of specific obsessionality and low mood factors, which were used to describe in detail the population parameters of obsessionality and low mood in a non-clinical population.

The overall number of registered participants was 1077; although there were variable totals of participants who completed each of the four evaluations. Valid N for each questionnaire is given in *Table 1* (pp.60-61), as are means and standard deviations (in parentheses) for each total and factor or subscale score. Raw scores are presented, as well as percentage representations of total possible scores, which are listed below the raw scores.

From the detailed results presented in Table 1, several points are evident. First, scores on the Meta-Cognitions Questionnaire (MCQ) were high. The percentage scores for Total MCQ and for all five MCQ factors were comparable (ranging from 48.27 to 59.402% of the total possible attainable scores for each). Similarly, the attendant standard deviations were comparably distributed about the means (ranging from 10.49 to 15.47). Internal consistency statistics for the MCQ scale demonstrated a standardized Cronbach $\alpha$ of .737, average inter-item correlation of .368; correlation of .494 between the first and second halves of the scale, and split half-reliability of .661.

Scores on the Padua Inventory (PI) were significantly lower than those on the MCQ ($Mean_{PI}$ = 31.951, $Mean_{MCQ}$ = 53.628; t = 19.683, $p < .01$; $F = 4.265$, $p < .01$. Results indicated that, as anticipated, the occurrence of positive affect (63.009%) exceeded that of negative affect (46.610%) in the non-clinical sample ($t = 17.40$; $p < .01$) and that scores on the Negative Affect (NA) subscale and the Major Depression Inventory (MDI) were comparable ($t = 0.71$; $p = 0.48$). The reported incidence of negative affect appeared high.

In terms of performance on the nine obsessional symptom factors in this study, an average severity of only 18.75% was reported for *Urges and worries of losing control over motor behaviours*, 24.54% for *Checking behaviours*, 24.57% for *Becoming contaminated*, and 27.50% for *Impaired control over mental abilities*; whereas a severity of 48.27% was endorsed for *Positive beliefs about worry*, 49.48% for *Lack of cognitive confidence*, 51.80% for thoughts involving S*uperstition, punishment and responsibility*, 56.65% for *Cognitive self-consciousness* and 59.40% for *Uncontrollability and danger*.

The endorsement of low mood items was also high; with a severity of 45.060% reported for symptoms identified by the MDI, and 46.610% for negative affect as assessed by the ten NA items. 95% confidence

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*Table 1*
*Descriptive statistics for raw and percentage scores* denoting obsessionality and low mood characteristics in Study II.*

| Variable | Valid N | Mean(*Std.dev*) | $CI_{0.95}$ Mean | Median | Min. | Max. | Variance** | *SE*** |
|---|---|---|---|---|---|---|---|---|
| MCQ TOTAL | 461 | 137.289(26.844) | 134.83 ≤ μ ≤ 139.75 | 135.000 | 64.000 | 220.000 | 720.606 | 1.250 |
| | | 53.628(10.486) | 52.67 ≤ μ ≤ 54.59 | 52.734 | 25.000 | 85.938 | 109.956 | 0.488 |
| MCQ1 | 461 | 36.683(10.257) | 35.74 ≤ μ ≤ 37.62 | 36.000 | 19.000 | 72.000 | 105.213 | 0.478 |
| | | 48.268(13.496) | 47.03 ≤ μ ≤ 49.50 | 47.368 | 25.000 | 94.737 | 182.155 | 0.629 |
| MCQ2 | 461 | 38.017(9.901) | 37.11 ≤ μ ≤ 38.92 | 37.000 | 16.00 | 63.00 | 98.034 | 0.461 |
| | | 59.402(15.471) | 57.99 ≤ μ ≤ 60.82 | 57.813 | 25.000 | 98.438 | 239.342 | 0.721 |
| MCQ3 | 461 | 19.792(5.943) | 19.25 ≤ μ ≤ 20.34 | 19.000 | 10.000 | 37.000 | 35.322 | 0.277 |
| | | 49.479(14.858) | 48.12 ≤ μ ≤ 50.84 | 47.500 | 25.000 | 92.500 | 220.761 | 0.692 |
| MCQ4 | 461 | 26.935(7.073) | 26.29 ≤ μ ≤ 27.58 | 26.00 | 13.000 | 49.000 | 50.026 | 0.329 |
| | | 51.798(13.602) | 50.55 ≤ μ ≤ 53.04 | 50.000 | 25.000 | 94.231 | 185.008 | 0.633 |
| MCQ5 | 461 | 15.861(3.261) | 15.56 ≤ μ ≤ 16.16 | 16.00 | 6.000 | 23.000 | 10.637 | 0.152 |
| | | 56.647(11.648) | 55.58 ≤ μ ≤ 57.71 | 57.143 | 21.423 | 82.143 | 135.679 | 0.543 |
| PI TOTAL | 562 | 54.956(37.246) | 51.87 ≤ μ ≤ 58.04 | 45.000 | 1.000 | 186.00 | 1387.230 | 1.571 |
| | | 31.951(21.654) | 30.16 ≤ μ ≤ 33.75 | 26.163 | 0.581 | 108.140 | 468.912 | 0.913 |
| PI1 | 562 | 18.703(13.609) | 17.58 ≤ μ ≤ 19.83 | 15.000 | 0.000 | 60.000 | 185.197 | 0.574 |
| | | 27.504(20.013) | 25.85 ≤ μ ≤ 29.16 | 22.059 | 0.000 | 88.235 | 400.512 | 0.844 |
| PI2 | 562 | 10.810(8.647) | 10.09 ≤ μ ≤ 11.53 | 8.000 | 0.000 | 39.000 | 74.768 | 0.365 |
| | | 24.567(19.652) | 22.94 ≤ μ ≤ 26.20 | 18.182 | 0.000 | 88.636 | 386.196 | 0.829 |
| PI3 | 562 | 7.854(6.959) | 7.28 ≤ μ ≤ 8.43 | 6.000 | 0.000 | 32.000 | 48.424 | 0.294 |
| | | 24.544(21.746) | 22.74 ≤ μ ≤ 26.35 | 18.750 | 0.000 | 100.000 | 472.894 | 0.917 |
| PI4 | 562 | 5.251(5.380) | 4.81 ≤ μ ≤ 5.70 | 3.000 | 0.000 | 32.000 | 28.944 | 0.227 |
| | | 18.753(19.214) | 17.16 ≤ μ ≤ 20.35 | 10.714 | 0.000 | 114.286 | 369.185 | 0.811 |
| PANAS TOTAL**** | 666 | 54.809(9.460) | 54.09 ≤ μ ≤ 55.53 | 55.000 | 30.000 | 82.000 | 89.487 | 0.367 |
| PA | 666 | 31.505(7.491) | 30.93 ≤ μ ≤ 32.07 | 32.00 | 13.000 | 50.000 | 56.121 | 0.290 |
| | | 63.009(14.983) | 61.87 ≤ μ ≤ 64.15 | 64.000 | 26.000 | 100.000 | 224.484 | 0.581 |
| NA | 666 | 23.305(7.911) | 22.70 ≤ μ ≤ 23.91 | 22.000 | 10.000 | 49.000 | 62.582 | 0.307 |
| | | 46.610(15.822) | 45.41 ≤ μ ≤ 47.81 | 44.000 | 20.000 | 98.000 | 250.329 | 0.613 |
| MDI TOTAL | 804 | 22.530(8.538) | 21.94 ≤ μ ≤ 23.12 | 22.000 | 4.000 | 48.000 | 72.892 | 0.301 |
| | | 45.060(17.075) | 43.88 ≤ μ ≤ 46.24 | 44.000 | 8.000 | 96.000 | 291.568 | 0.602 |
| 1st 3 items | 804 | 6.947(2.995) | 6.74 ≤ μ ≤ 7.15 | 7.000 | 0.000 | 15.000 | 8.967 | 0.106 |
| | | 46.310(19.964) | 44.93 ≤ μ ≤ 47.69 | 46.667 | 0.000 | 100.000 | 398.544 | 0.704 |
| 7 remaining items | 804 | 15.583(6.059) | 15.16 ≤ μ ≤ 16.00 | 15.000 | 1.000 | 35.000 | 36.709 | 0.214 |
| | | 44.524(17.311) | 43.33 ≤ μ ≤ 45.72 | 42.857 | 2.857 | 100.000 | 299.666 | 0.611 |
| AVERAGED OCD | 562 | 167.571(69.112) | 161.85 ≤ μ ≤ 173.30 | 173.000 | 6.000 | 336.000 | 4776.481 | 69.112 |
| | | 42.605(14.282) | 41.42 ≤ μ ≤ 43.79 | 41.706 | 3.488 | 102.326 | 203.966 | 0.602 |
| AVERAGED Depression | 804 | 41.835(15.068) | 40.79 ≤ μ ≤ 42.88 | 42.000 | 4.000 | 85.000 | 227.047 | 0.531 |
| | | 41.825(12.333) | 40.91 ≤ μ ≤ 42.68 | 41.363 | 8.000 | 84.000 | 152.096 | 0.435 |

*Initial data describing score profiles on measures of obsessionality and low mood in Study III; Overall N = 1078*

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**Total raw score statistics are listed above total percentage score statistics for each variable/factor; e.g., for MCQ TOTAL, the mean raw score = 137.289, which represents 53.628% of the total possible score total of 256 (64 MCQ items with a maximum score of 4 points each)*

***where $s^2$ (sample variance) = $\sum(X - \bar{X})^2/(N-1)$*

****SE refers to the standard error of the sampling distribution (i.e. the standard error of the difference between means), where SE = $\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$*

*****There are no percentage calculations for PANAS TOTAL, since the raw scores are already out of 100*

*MCQ Meta-Cognitions Questionnaire; MCQ1 Positive beliefs about worry; MCQ2 Uncontrollability & danger; MCQ3 Lack of cognitive confidence; MCQ4*SPR = Themes of Superstition, Punishment & Responsibility; MCQ5 Cognitive self-consciousness ; PI Padua Inventory; PI Impaired control over mental abilities; PI2 Becoming contaminated; PI3 Checking behaviours; PI4 Urges & worries of losing control over motor behaviours; PANAS Positive & Negative Affect Scale; PA Positive affect; NA Negative affect; MDI Major depression inventory*

intervals for all factor means were small, indicating a higher probability that the sample means reported accurately reflected population means.

In order to obtain an average for obsessionality, the MCQ and PI total scores were added and divided by the total possible score on all nine factors of these two questionnaires combined ($\sum_{MCQ+PI} = 496$); for low mood, the NA portion of the PANAS and the MDI total were combined and divided by their total possible score ($\sum_{NA+MDI} = 110$), to provide a general indication of tendencies towards low mood in the non-clinical sample:

*Table 2*

*Incidence of obsessionality and low mood in the non-clinical sample*

| | **% of total possible scores on the combined assessments** | | | | |
|---|---|---|---|---|---|
| | Mean | Lower CL* | Upper CL | Std.dev. | Valid N |
| **Obsessionality** | 42.605 | 41.422 | 43.788 | 14.282 | 562 |
| **Low mood** | 41.825 | 40.971 | 42.679 | 12.333 | 804 |

**CL = Confidence Limit*

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These results indicated that scores on obsessionality and low mood scores averaged over all factors were highly comparable in this sample. Participants scored over 40% of the total possible average scores on the continuous variables of obsessionality and low mood, which were positively and significantly correlated at r = .500 ($p < .01$).

Correlations and independent *t* tests amongst the main measurements for obsessionality and low mood revealed the following relationships.

*Table 3*

*Correlations amongst total scores on measures of obsessionality and low mood*

| Variable | MCQ | PI | NA | MDI |
|---|---|---|---|---|
| MCQ* | 1.000 | .018 | -.031 | .037 |
| PI | .018 | 1.000 | .046 | .016 |
| NA | -.031 | .046 | 1.000 | .074 |
| MDI | .037 | .016 | .074 | 1.000 |
| Means | 53.628 | 31.951 | 46.286 | 38.106 |
| *std.dev* | 10.486 | 21.672 | 15.463 | 13.641 |

**MCQ Meta-Cognitions Questionnaire; PI Padua Inventory; NA Negative Affect; MDI Major Depression Inventory*

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It was clear from the table above that the individual measures chosen to evaluate obsessionality and low mood were not significantly related in this sample. Score distribution did not appear to conform to a pattern. The highest positive correlation was obtained between total scores on the MDI and the NA measures, although the relationship was still weak and non-significant. For increases in MCQ scores, decreases were observed on the NA, but this effect was non-significant and very small. Conversely, a weak positive correlation was seen between the NA and PI. The MDI and MCQ showed a slightly stronger relationship than the MDI and PI.

Below, results for the analyses of differences observed amongst the four main measurement variables are presented. An extension of the table provides more detailed statistical descriptions of the differences between means ($\mu_1 - \mu_2$), pooled variance ($s_p^2$)[1] and 95% confidence intervals, which determine the probable accuracy of obtained differences between means.

*Table 4*

*Differences between groups (groups were treated as independent samples)*

| Measures compared* | $N_1$ | $N_2$ | *t(df)* | $t_{sep.var.est.}$*(df)* | *F* |
|---|---|---|---|---|---|
| MCQ *vs*. PI | 461 | 562 | 19.683*(1021)*** | 20.928*(843.519)*** | 4.265** |
| MCQ *vs*. NA | 461 | 666 | 8.340*(1125)*** | 8.954*(1123.015)*** | 2.277** |
| MCQ *vs*. MDI | 461 | 804 | 21.185*(1263)*** | 22.961*(1186.483)*** | 1.841** |

| | | | | | |
|---|---|---|---|---|---|
| PI *vs*. NA | 562 | 666 | -18.634*(1226)*** | -18.312*(1060.058)*** | 1.873** |
| PI *vs*. MDI | 562 | 804 | -10.843*(1364)*** | -10.229*(945.096)*** | 2.316** |
| NA *vs*. MDI | 666 | 804 | 11.549*(1468)*** | 11.435*(1352.014)*** | 1.236** |

**Groups were treated as independent samples, which is defensible on the basis that different groups of participants completed different questionnaires.*
***marked results were significant at the level of p < .01*

[1]*pooled variance ($s_p^2$) refers to the mathematically weighted average of the variances of two sample populations with different means and standard deviations* (Howell, 2002)

*Pooled variances, pooled standard deviations, effect sizes, and t values for differences in scores amongst non-clinical groupings on obsessionality and low mood measures*

| Measures compared | $s_p^2$ | $s_p$ | d | $\mu_1 - \mu_2$ | Lower CL | Upper CL |
|---|---|---|---|---|---|---|
| MCQ *vs*. PI | 307.189 | 17.527 | 1.237 | 21.714 | 19.555 | 23.873 |
| MCQ *vs*. NA | 192.932 | 13.890 | .529 | 7.342 | 5.692 | 8.992 |
| MCQ *vs*. MDI | 168.780 | 12.992 | 1.195 | 15.522 | 14.034 | 17.010 |
| PI *vs*. NA | 350.349 | 18.718 | .768 | 14.372 | 12.271 | 16.473 |
| PI *vs*. MDI | 312.060 | 17.665 | .351 | 6.192 | 4.288 | 8.096 |
| NA *vs*. MDI | 224.154 | 14.972 | .511 | 7.645 | 6.107 | 9.183 |

**where $s_p^2 = (N\text{-}1)s_1^2 + (N_2\text{-}1)s_2^2/N_1 + N_2 - 2$; and $s_p$ is the square root of the pooled variance (or the pooled standard deviation); Cohen's $d = \bar{X}_1 - \bar{X}_2/s_p$;*
*$\mu_1 - \mu_2$ refers to the difference between means;*
*CL = Confidence Limit*

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In relation to Table 1, the differences amongst various groups were shown to be significant in the following ways. Differences between means were observed between measures and evaluated for magnitude of effect. Scores were significantly higher on the MCQ than on the PI (means were reported in Table 3, p.62). The MCQ also yielded significantly higher scores than the NA and the MDI. Participants revealed a tendency to score higher on the measures of low mood – the NA and MDI – than on the PI. Lastly, NA scores were significantly higher than MDI scores.

It is evident from the first half of Table 4 that there were large differences between all groups under comparison. Whilst the *t* statistic provides an estimation of the magnitude of an effect, the *F* statistic is also important in terms of testing the null hypothesis (Howell, 2002), which in the case of the main relationships analysed here, related to determining whether differences between mean scores on the

various measures were due to chance. *F* is calculated by dividing the estimated population variance of one sample by the estimated population variance of the sample to which it is being compared; a value of 1 indicates that the variances are roughly equal, and therefore that there is no real difference between the populations in terms of variance (Howell, 2002). All *F* values reported here were significant and therefore showed a large divergence from 1.

There was a large significant difference between scores on the MCQ and the PI ($\mu_1 - \mu_2 = 21.714$; $t = 19.683$; $p < .01$). There was also a notable difference in scores on measures of worry/obsessionality as gauged by the MCQ and those of negative affect reflected by the NA ($t = 8.340$; $p < .01$). The MDI differed most significantly from the MCQ, with $t = 21.185$; $p < .01$. The relativity of the data is seen in the results of analyses between the PI and NA, whereby scores on NA were significantly lower than those of worry assessed by the MCQ, but were, nevertheless, significantly higher than PI scores. Analysis of differences on the PI and MDI measures showed a significant discrepancy in scores ($\mu_1 - \mu_2 = 6.192$, $t = 10.843$, $p < .01$). Scores on the MDI were higher than the NA ($\mu_1 - \mu_2 = 8.180$; $t = 11.549$, $p < .01$).

It was important to note how large the standard deviations were for assessments used to gather data in the non-clinical sample. Normal distribution plots for each population of scores (see *Appendix O*) indicated that scores did not cluster around the mean, and showed a non-specific pattern of distribution. This is important as it shows how far scores diverged from the sample means, and therefore that the range of obsessionality and low mood scores was wide and not normally distributed in this non-clinical population. *t* statistics indicated that the differences amongst scores on the various measures were large.

Lastly, each obsessionality factor was correlated with overall obsessionality score in order to determine which was most representative of this variable, i.e. which factor was most clearly representing the underlying construct of obsessionality. The ranked order of obsessionality factors is given here from highest to lowest, in terms of the correlation coefficient indicating its relationships with overall obsessionality: PI1 (r = .760), PI3 (r = .670), PI2 (r = .560), PI4 (r = .520), MCQ1 (r = .480), MCQ4 (r = .470), MCQ2 (r = .460), MCQ3 (r = .400), MCQ5 (r = .240).

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**Chapter Seven Study II Discussion**

The purpose of this study was to characterise the severity and distribution of obsessionality and low mood in a non-clinical population, as well as to determine the interrelations amongst these variables. It was hypothesized that obsessionality and low mood would co-occur in this sample population.

First, scores on the Meta-Cognitions Questionnaire (MCQ) were high, reflecting the fact that this questionnaire was constructed for the assessment of worry proneness in the general, non-clinical population (Cartwright-Hatton & Wells, 1997). The percentage scores for Total MCQ and for all five MCQ factors were comparable (ranging from 48.268 to 59.402% of the total possible attainable scores for each). Similarly, the standard deviations associated with all of these scores were comparably distributed about the means (ranging from 11.648 to 15.471). Consistent results like these suggest that the factors were evaluating a continuous, underlying psychological construct. This was confirmed by internal consistency statistics for the MCQ; in this sample, the scale demonstrated a standardized Cronbach α of .737, average inter-item correlation of .368; correlation of .494 between the first and second halves of the scale, and split half-reliability of .661.

Scores on the Padua Inventory (PI) were significantly lower than those on the MCQ ($Mean_{PI}$ = 31.951, $Mean_{MCQ}$ = 53.628; t = 19.683; $p < .01$), reflecting the fact that the PI was intended and is used primarily for clinical assessment (Sanavio, 1988). Since no participants with a reported clinical diagnosis of OCD were included in this study sample, it was in line with expectations that scores on the PI would be noticeably and significantly lower than those on the more general scale of worry-proneness, the MCQ. The higher incidence of positive affect (63.01%) in comparison with negative affect (46.61%), with $t = 17.40$, $p < .01$, was expected in a sample of non-clinical participants. Scores on the Negative Affect (NA) subscale and the Major Depression Inventory (MDI) were comparable ($t = 0.71$; $p = 0.48$), indicating that both are applicable for use in a non-clinical research group, and that participants showed little variation in their responses to items concerned with the evaluation of negative affect. Thus although the reported incidence of negative affect perhaps appeared somewhat high, this may be resolved by understanding that both the Positive and Negative Affect Scale (PANAS) and the MDI were developed using both clinical and non-clinical participants, and were intended for evaluative use in both these population groups (Watson, Clark, & Tellegen, 1988; Bech, Rasmussen, Olsen, Noerholm, & Abildgaard, 2001; Olsen *et al*., 2003). Therefore, ordinary tendencies towards low mood are well evaluated by both questionnaires.

The calculated average overall scores (see Table 2, p.61) indicated that mean performances on obsessionality and low mood were highly comparable in this sample – and that they were relatively high. High overall obsessionality and low mood scores may have been inflated by the high endorsement of non-clinical items that are well suited to assess general worry and low mood, or may simply reflect the suitability of the assessments for non-clinical populations. Participants scored over 40% of the total possible average scores on the continuous variables of obsessionality and low mood, which were

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positively and significantly correlated at r = .500 ($p < .01$). The correlation coefficient confirms that participants demonstrated significantly related scores overall, on measures of obsessionality and low mood. These variables can therefore be said to be comorbid in this sample.

It appeared from results presented in Table 3 (p.62) that scores on the various obsessionality and low mood assessments were not significantly related to one another in this sample. This was perhaps to be expected and may be interpreted as a reflection of the fact that participants were diagnosed with neither OCD nor depression. The individual test scores were therefore distributed non-specifically and did not conform to a pattern, which would more readily be expected of a clinical score distribution. It was important to note how large the standard deviations were for assessments used to gather data in the non-clinical sample. Normal distribution plots for each population of scores (see *Appendix O*) indicated that scores did not cluster around the mean, and showed a non-specific pattern of distribution. This is important as it shows how far scores diverged from the sample means, and therefore that the range of obsessionality and low mood scores was wide and not normally distributed in this non-clinical population. *t* statistics indicated that the differences amongst scores on the various measures were large.

In relation to Table 1, the differences amongst various groups were shown to be significant in the following ways. Differences between means were observed between measures and evaluated for magnitude of effect. Scores were significantly higher on the MCQ than on the PI (means were reported in Table 3), indicating that a general tendency towards everyday worrying is far higher in the general non-clinical population than obsessionality as evaluated by the PI. The large difference between scores on the two measures was interpreted to account for the apparently inflated levels of obsessionality in the non-clinical sample. The MCQ also yielded significantly higher scores than the NA and the MDI. Participants revealed a tendency to score higher on the measures of depression – the NA and MDI – than on the PI, indicating the suitability of these depression instruments as an evaluation of general low mood in the non-clinical sample (as discussed in the scale selection methodology section, Chapter 5). Lastly, NA scores were significantly higher than MDI scores, which served to differentiate between the slightly greater clinical orientation of the latter, which was developed specifically with the intention for use in both clinical and non-clinical samples, whereas the NA subscale, as part of the PANAS, was developed as a more general measure of negative mood experienced over specified preceding time periods (Watson, Clark, & Tellegen, 1988).

The large significant difference between scores on the MCQ and the PI ($\mu_1 - \mu_2 = 21.714$; $t = 19.683$; $p < .01$) was expected, based on the purpose of the two evaluative measures; the MCQ is a general measure of worry proneness and therefore is highly applicable to a non-clinical sample; whereas the PI was structured more specifically to assess clinical populations of OCD patients. The difference in scores on measures of worry/obsession as gauged by the MCQ and those of negative affect reflected by the NA ($t = 8.340$; $p < .01$) may be interpreted by recognizing that although worrying was prevalent in the non-clinical sample, negative affect did not prove to be as prevalent. Similarly, with reference to the difference between means reported for the MCQ and MDI ($\mu_1 - \mu_2 = 15.522$; $t = 21.185$, $p < .01$), it was evident that in

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this sample, participants did not display as high tendencies towards clinical depression as towards general worry. The relativity of the data is seen in the results of analyses between the PI and NA, whereby scores on NA are significantly lower than those of worry assessed by the MCQ, but are, nevertheless, significantly higher than PI scores. This indicates that negative emotion in the non-clinical sample is more prevalent than a clinical indicator of obsessionality (reflected by PI scores). Analysis of differences on PI and MDI measures showed a significant discrepancy in scores ($\mu_1 - \mu_2 = 6.192$, $t = 10.843$, $p < .01$), which is attributable to the fact that the PI is largely a measure of obsessionality in clinical populations, which are low in this sample, as expected. The MDI, however, is a measure of low mood which may be applied to non-clinical as well as clinical participants, and therefore high average scores on this measure would not be enough to provide diagnostic conclusions for participants, without further examination. Scores on the MDI were higher than the NA ($\mu_1 - \mu_2 = 8.180$; $t = 11.549$, $p < .01$), and it was therefore apparent that tendencies towards low mood are slightly more highly represented by this measure.

The results of this study appear to support the notion that obsessionality and OCD, as well as low mood and depression, occur along a spectrum. Obsessionality and low mood appear to co-occur, as OCD and depression do in the clinical literature. In terms of previous research, it has been noted that conclusions based on non-clinical analogue samples, regarding psychopathologies, are stronger when the disorder in question "is an incremental phenomenon which ranges from non-pathological to pathological levels rather than representing distinct states at different measured levels" (Gibbs, 1996: 731). Essential factors in the progression from obsessionality in a non-clinical sample to clinical OCD include the ease with which obsessive thoughts can be dismissed Rachman & de Silva, 1978; Salkovskis & Harrison, 1984), as well as the proclivity to resist those obsessions (Oltmanns & Gibbs, 1995). It appears that obsessionality and clinical OCD are similar in terms of symptom profile, comorbid psychopathology, associated personality and psychological characteristics, cognitive dysfunction and coping strategies – and therefore that obsessional participants can be said to demonstrate the same kind of symptomatology as their clinical counterparts, but to a less severe degree, and typically without the large variety of symptom types seen in clinical cases (Gibbs, 1996). In this way, they arguably provide a useful analogue for research.

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**Chapter Eight Study III Method**

**Study III. Separation-distress and early separation trauma in obsessionality and low mood**

Introduction

The purpose of this study was to compare participants with significantly different high and low scoring overall responses on measures of obsessionality and low mood, in terms of their inclination towards separation-distress and their experiences of separation trauma. Re-examining the hypothesis that separation-distress is an important underlying emotion in obsessionality will evaluate the reliability of findings in Study I. In the new sample groups, high obsessionality and high separation-distress scores will be correlated to determine their relationship. As discussed in Chapter 5, Study II (Chapters 5, 6 and 7) laid the foundations for Study III by describing the non-clinical population of obsessionality and low mood scores. In Study III, a subset of the large sample population in Study II will be analysed in order to determine whether those participants with higher obsessionality and low mood scores also score higher on measures of separation-distress. An additional question is whether the occurrence of separation trauma experiences in the early childhood experiences of participants is predictive of high scores on measures of obsessionality, low mood and separation-distress. Based on the previous two studies, It was reasonable to progress from preliminary investigations of the mechanism of separation-distress and conflict-monitoring in obsessionality (Study I), as well as of the occurrence of obsessionality and low mood in a non-clinical sample (Study II), to a study of the hypothesized implication of separation-distress in both obsessionality and low mood. Since obsessionality and low mood were shown to co-occur in Study II, it is reasonable to hypothesize that separation-distress will be implicated in low mood, too.

As mentioned above, the second important extension in this study is the evaluation of whether separation-distress affect and early trauma experiences are comparable or differ in their relationship with obsessionality and low mood. As discussed in Chapter 1 (pp.16-17), separation trauma in this study refers to actual physical instances of separation from one's primary caregiver, experienced over certain critical periods of time. Separation-distress, in contrast, refers rather to the conscious feeling state or affective manifestation of the basic emotion substrate, PANIC (Panksepp, 1998). It is geared at its most foundational level towards maintaining proximity to one's primary caregiver. The aim of Study III is to characterise how these variables operate in relation to obsessionality and low mood.

With the addition of more measures for obsessionality, low mood and separation-distress, an assessment of scale validity will also be possible. A formal validity study will be carried out to determine how well the additional separation-distress measures used in Study III converged with scale measurements in Study I.

Further, Study III will provide further evidence for whether obsessionality and low mood may be regarded as variables that are continuous clinical OCD and depression.

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Hypotheses

$H_1$ High scores on measures of separation-distress will predispose participants to high scores on measures of obsessionality and low mood.

$H_2$ The experience of separation trauma during one or more critical periods during childhood will be strongly associated with high scores on measures of obsessionality and low mood.

$H_3$ Scores on measures of obsessionality and low mood will be strongly related; i.e. high obsessionality scores will predict high scores on low mood measures, and vice versa.

Measures

Participants from the sample in Study II were encouraged to complete a wider range of surveys than in Study II. This was in order to investigate obsessionality, low mood and separation-distress as continuous measures. It was also to obtain an adequate pool of participants who had completed all the measures on each variable. This was in order to compare high and low scores on obsessionality and low mood amongst those participants, and to see whether separation-distress and separation trauma indicated performance on obsessionality and low mood. All nine measures mentioned here were used to gather data for this study. The psychometric properties and construction of the MCQ, PI and ANPS were discussed in Chapter 2; and those of the MDI and PANAS in Chapter 5. Additional assessments used in Study II are discussed in detail below.

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OBSESSIONALITY MEASURES

1. *Meta-Cognitions Questionnaire (MCQ)* (Cartwright-Hatton & Wells, 1997; *Appendix A*)

2. *Padua Inventory (PI)* (Sanavio, 1988; *Appendix B*)

LOW MOOD MEASURES

1. *Major (ICD-10) Depression Inventory (MDI)* (WHO, 1993; Olsen, Jensen, Noerholm, Martiny, & Bech, 2003; *Appendix D*)

2. *The Positive and Negative Affect Scales (PANAS)* (Watson, Clark, & Tellegen, 1988; *Appendix E*):

SEPARATION-DISTRESS MEASURES

1. *Separation Anxiety Symptom Inventory (SASI)* (Silove *et al*., 1993; *Appendix F*)

The SASI is a 15 item self-report measure developed to address some of the research difficulties in trying to assess impact of early separation anxiety on the development of adult psychopathology (Silove *et al*., 1993). This connection was recognised early by the psychodynamic tradition and attachment theorists (e.g., Bowlby, 1980; Heinecke, 1956), but has not yet been established in empirical testing. The measure has proven psychometrically sound, with a coherent factorial structure, high internal consistency (Cronbach  > 0.80), and high test-retest reliability over two years (intra-class correlation coefficient =.89; Silove *et al*., 1993). Importantly, Silove *et al* (1993b in Manicavasagar, Silove, & Hadzi-Pavlovic, 1998: 184) showed that "serial SASI scores have been shown to be independent of respondents' levels of anxiety and depression over time," which substantiates the encouraging fact that scoring of separation-distress on this particular measure remains stable over time and is immune to fluctuations in emotional state. Given that many other established measures (even the Y-BOCS as discussed in Chapter 8) lack discriminant validity and confound specific symptoms with general distress, conflating the value of reported psychometric properties (Taylor, 1995), this is an encouraging indicator that the SASI is a strong measurement tool.

2. *Structured Clinical Interview for Separation Anxiety Symptoms (SCI-SAS)* (Cyranowski *et al*., 2002; *Appendix G*)

The SCI-SAS incorporates the nine separation anxiety disorder criteria from the DSM-III-R (1987) and obtains a rating (0 = not at all, 1 = sometimes, 2 = often) of each for both an adult and a childhood time frame (Cyranowski *et al*., 2002:79). Results may be scored categorically (i.e. DSM diagnosis requires three or more criteria to be met) or continuously (the range for each scale is 0-16). Continuous scoring will be used in these studies. The instrument is psychometrically sound, with very high convergent and discriminant validity, as well as good internal consistency and coherent factor structure.

3. *Adult Separation-Anxiety Checklist (ASA-CL27)* (Manicavasagar, Silove, Wagner, & Drobny, 2003; *Appendix H*)

The ASA-CL27 is a further self-report assessment consisting of 27 checklist-type items derived from the substantially lengthier and therefore sometimes clinically impractical Adult Separation Anxiety Structured Interview (ASA-SI; Manicavasagar, Silove, & Curtis, 1997). Test-retest reliability of .89 over 3 weeks, and sensitivity and specificity estimates of 97% and 66% have been obtained in both clinical and heterogeneous non-clinical samples. The measure adheres to a four-point scale similar to others in use here: 0 ('this has never happened'), 1 ('this happens occasionally), 2 ('this happens fairly often') and 3('this happens very often').

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4. *Affective Neuroscience Personality Scales (ANPS)* (Davis, Panksepp, & Normansell, 2003; see *Appendix I*)

See Chapter 2. The ANPS will also be used as a reliability investigation (to determine whether similar results are obtained in the Study III sample as were observed in results obtained in Study I, which represented a strongly samples population.

The results of these four evaluations will be summed to create a continuous measure of separation-distress as it occurs in the participants. As a useful by-product of employing a collection of measures, it will be possible to validate the scales against one another in the context of this thesis, to investigate how uniformly they are measuring the separation-distress construct. Since the concerns of the thesis are generally taxonomic, questionnaires are well suited to answer the research questions and should provide plentiful data.

*Early Separation Trauma*

Timeframes concluded through previous and widely established work to be critical in terms of adverse effects of separation (Burlingham & Freud, 1942, 1944; Spitz & Wolf, 1946; Robertson, 1948-52; Heinecke, 1956-66), were used to assess whether and to what extent participants had experienced early separation trauma. The timeframes used were: 0-6 months, 0-12 months and 0-18 months (under the age of 3 years); 0-6 months, 0-12 months and 0-18 months (under 6 years); and 0-6 months, 0-12 months and 0-18 months (under 12 years). The issue of whether this variable should be classed as nominal or ordinal was resolved by coding the separation periods in such a way that higher numbers denote more relevant periods of separation. Thus although the differences between values cannot be classed as consistent, there is a trend of increased exposure to risk of trauma, which argues for the label of ordinal. Since there is nothing inherently significant about the different periods (i.e. no exponential increase or decrease in threat with increase in age; and therefore no need to distinguish amongst exactly in which timeframes separation occurred), this classification seems most appropriate. In terms of ordinal factors, "it is the underlying variable that we are measuring [in this case, incidences of early separation trauma], not the numbers themselves, that is important in defining the scale" (Howell, 2002: 8).

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Study design

The significance of a large sample (N = 1077) in Study II, was discussed in Chapter 5. The purpose of sampling so widely was so that when a subset of the sample was tested in Study III, the smaller groups would hopefully reflect lifetime worldwide prevalence of OCD (2-3%; Robins *et al*., 1984 in Maltby *et al*., 2004). Conclusions drawn from the results would be strengthened by strong sampling, as in Study I (Chapters 2 and 4). Lifetime prevalence rates for depression, estimated by epidemiological studies to be as high as 17.1% (Blazer, Kessler, McGonagle, & Swartz, 1994), would therefore also potentially be matched with a large sample. Clinical disorder prevalence rates are based on definitive criteria. Therefore

it is hypothesized that significantly different high and low scores on obsessionality and low mood are likely to be present in a large enough non-clinical sample.

As discussed, a subset of participants (N = 49) completed all nine obsessionality, low mood, separation-distress and separation trauma measures for Study III. These 49 participants were divided into two groups of 25 and 24 each (the highest scores and the lowest scores, respectively; on combined measures of obsessionality and low mood). The characteristics of this sample were compared to the large Study II sample, in order to determine whether it represented extreme poles of obsessionality and low mood. The result was that the two groups are statistically different and therefore constitute sound high and low obsessionality/low mood groups for data analysis.

Data collection

A larger raffle prize was offered as motivation for participants (both new and those already registered) to complete the original questionnaires, as well as five more related to separation-distress (the SASI, SCI-SAS, ASA-CL27, ANPS), and information about their experiences of early separation trauma. Methods of data collection were identical to those used in Study II, with respondents registering and taking part through *guineapig.co.za*.

Data capturing and editing

As described in Chapter 5 for Study II, all data were again collected in the *Data* section constructed to receive responses. The *Components* section contained all the response sets for each individual questionnaire, separately. These data sets were then exported to *Excel* (also a function of the web server, executed manually) so that they could be organized and prepared for statistical analysis.

Data analysis

First, the full sets of data were analysed both as a continuous variable, representing the distribution of obsessionality, depression, separation-distress and separation trauma in the sample. The sample was then divided into a high and low scoring group, in order to investigate the relationships further. High and low scoring groups were analysed for obsessionality and low mood separately, as well as for the combined scores on these variables.

The range of separation-anxiety was calculated by averaging scores on the Separation Anxiety Symptom Inventory (SASI), Structured Clinical Interview for Separation-Anxiety Symptoms (SCI-SAS), Adult Separation-Anxiety Symptom Checklist of 27 Items (ASA-CL27) and the SADNESS subscale of the Affective Neuroscience Personality Scale (ANPS).

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Data collected for early separation trauma was ordinal in nature, therefore restricting analytic methods to chi-square contingency analysis. The chi-square statistic will be used to compare observed frequencies of separation trauma with theoretically predicted frequencies, based on the hypothesis that those participants who have experienced early separation trauma will have higher scores on measures of obsessionality, low mood and separation-distress.

Further, participants will be assigned to categories based on number of separation incidences. These groups will be analysed for significant statistical differences in obsessionality, depression and separation-distress. This will determine whether it is suitable to investigate further, the influence of the specific critical periods experienced and the number of specified timeframes over which separation was experienced.

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Limitations

The limitations concerning self-report data and undiagnosed or unreported clinical diagnoses, discussed in Chapter 5 for Study II, apply equally to Study III. Furthermore, it should be noted that a larger sample would have been preferable for Study III, but the time restraints of the large number of questionnaires that needed completion made it difficult to recruit participants, even with the offer of a substantial (R5000) reward.

Ethical considerations

Again, this research study was carried out under the Ethical Code for Professional Conduct specified by the Professional Board for the Psychology Health Professions Council of South Africa (http://www.uct.ac.za/depts/psychology/) and the Research Ethics Code in line with UCT policy (http://www.uct.ac.za/downloads/uct.ac.za/about/policies/ethicscode.pdf), in order to protect potentially vulnerable groups during psychological research. For the *Guineapig* website, the equivalent of signed consent consisted of a form preceding online questionnaires. The site was coded specifically so that consent conditions had to be accepted before the participant's responses would be admitted to the data bank (by virtue of a compulsory 'Accept' button on the website). The consent form explained the nature and purposes of the study, and included an emphasis on participant rights to withdraw at any time during the research process. Sending mass emails to students in order to invite participation was approved by the departmental ethics committee for this thesis.

**Chapter Nine Study III Results**

Following are the results for the group of participants who completed all nine measures in Study III – the same obsessionality and low mood evaluations as in Study II, with the addition of four separation-distress assessments and information regarding early separation trauma experiences.

Before analysing the two groups (high and low scoring), the descriptive characteristics of obsessionality, low mood and separation-distress were examined. These are shown in Table 1 (pp.75-76). It was useful to consider these statistics in comparison with those in Table 1 Study II (pp.60-61), to determine how closely the larger group and the subgroup compared. The purpose of the descriptive detail given in Table 1 for Study III was also to consider the levels of scores on obsessionality and low mood factors in this sample.

Treated as one group, this portion of the non-clinical sample reported 14.101% severity (i.e. 14.101% of the total possible score that could have been obtained) for PI4 *Urges and worries of losing control over motor behaviour*, 20.455% for PI2 *Becoming contaminated*, 23.222% for PI3 *Checking behaviours*, and 26.800% for PI1 *Impaired control over mental abilities*; whereas MCQ1 *Positive beliefs about worry was reported at* 47.333%, MCQ4 *negative thoughts regarding Superstition, punishment and responsibility* by 51.205%, MCQ3 *Lack of cognitive confidence* by 52.100%, MCQ5 *Cognitive self-consciousness* by 55.286%, and by MCQ2 *Uncontrollability and danger* by 59.646%. This was comparable to the score profile in Study II, with identical observations of the least and most representative of the obsessionality factors. There were also similar overall percentage results for severity of symptom clusters. Studies II and III were also both comparable with the factors which related most and least to obsessionality scores in Study I. For this study, the ranked order from highest to lowest correlation with overall obsessionality was as follows: PI1 (r = .823), PI3 (r = .626), MCQ4 (r = .531), MCQ2 (r = .527), MCQ1 (r = .502), PI2 (r = .4558), MCQ3 (r = .4543), PI4 (r = .433) and MCQ5 (r = .352); all significant at the level of $p < .01$. This was very close to the ranking pattern obtained in Study I – only the MCQ2 and 4 and the MCQ3 and PI4 swapped positions in the rankings.

In terms of scores on low mood, participants reported an average severity of 38.974% for items on the Major Depression Inventory (MDI) and of 47.588% for items on the negative affect (NA) scale. This was the same as the pattern reported in Study II although scores were slightly, though not significantly, higher in the Study III. Separation-distress scores obtained on an average of the four measures were as follows: 21.705% for scores on the ASA-CL27, 22.984% on the SCI-SAS Adulthood, 28.024% on the SCI-SAS Childhood, 30.202% on the SASI, and 67.328% on the ANPS SADNESS subscale.

Obsessionality, low mood and separation-distress in the Study III sample were first examined as continuous variables. This data was analysed to investigate whether and to what degree the variables were related as predicted.

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*Table 1*
*Descriptive characteristics of obsessionality, low mood and separation-distress in Study III*

| Variable | Valid N | Mean(*Std.dev*) | $CI_{0.95}$ Mean | Median | Min. | Max. | Variance** | *SE*** |
|---|---|---|---|---|---|---|---|---|
| MCQ TOTAL | 75 | 137.093(28.594) | 130.51 ≤ μ ≤ 143.67 | 135.000 | 76.000 | 203.000 | 817.626 | 3.302 |
| | | 53.552(11.170) | 50.98 ≤ μ ≤ 56.12 | 52.734 | 29.688 | 79.297 | 124.760 | 1.290 |
| MCQ1 | 75 | 35.973(10.819) | 33.48 ≤ μ ≤ 38.46 | 34.000 | 20.000 | 72.000 | 117.053 | 1.249 |
| | | 47.333(14.236) | 44.06 ≤ μ ≤ 50.61 | 44.736 | 26.316 | 94.737 | 202.655 | 1.644 |
| MCQ2 | 75 | 38.173(11.147) | 35.61 ≤ μ ≤ 40.74 | 35.000 | 17.000 | 63.000 | 124.253 | 1.287 |
| | | 59.646(17.417) | 55.64 ≤ μ ≤ 63.65 | 54.688 | 26.563 | 98.438 | 303.35 | 2.011 |
| MCQ3 | 75 | 20.840(6.352) | 19.38 ≤ μ ≤ 22.30 | 21.000 | 10.000 | 37.000 | 40.352 | 0.734 |
| | | 52.100(15.881) | 48.45 ≤ μ ≤ 55.75 | 52.500 | 25.000 | 92.500 | 252.203 | 1.834 |
| MCQ4 | 75 | 26.627(6.939) | 25.03 ≤ μ ≤ 28.22 | 25.000 | 15.000 | 43.000 | 48.156 | 0.801 |
| | | 51.205(13.345) | 48.13 ≤ μ ≤ 54.28 | 48.077 | 28.846 | 82.692 | 178.092 | 1.541 |
| MCQ5 | 75 | 15.480(3.342) | 14.71 ≤ μ ≤ 16.25 | 16.000 | 9.000 | 22.000 | 11.172 | 0.386 |
| | | 55.286(11.937) | 52.54 ≤ μ ≤ 58.03 | 57.143 | 32.143 | 78.571 | 142.499 | 1.378 |
| PI TOTAL | 58 | 51.138(36.329) | 41.59 ≤ μ ≤ 60.69 | 43.500 | 7.000 | 176.000 | 1319.77 | 4.770 |
| | | 21.307(15.137) | 17.33 ≤ μ ≤ 25.29 | 18.125 | 2.917 | 73.333 | 229.127 | 1.988 |
| PI1 | 58 | 18.224(13.277) | 14.73 ≤ μ ≤ 21.72 | 15.500 | 1.000 | 56.000 | 176.282 | 1.743 |
| | | 26.800(19.525) | 21.67 ≤ μ ≤ 31.93 | 22.794 | 1.471 | 82.353 | 381.233 | 2.564 |
| PI2 | 58 | 9.000(8.716) | 6.71 ≤ μ ≤ 11.29 | 5.500 | 0.000 | 39.000 | 75.965 | 8.716 |
| | | 20.455(19.809) | 15.25 ≤ μ ≤ 25.66 | 12.500 | 0.000 | 88.636 | 392.381 | 2.601 |
| PI3 | 58 | 7.431(6.903) | 5.62 ≤ μ ≤ 9.25 | 5.5000 | 0.000 | 32.000 | 47.653 | 0.906 |
| | | 23.222(21.572) | 17.55 ≤ μ ≤ 28.89 | 17.188 | 0.000 | 100.000 | 465.362 | 2.833 |
| PI4 | 58 | 3.948(4.076) | 2.88 ≤ μ ≤ 5.02 | 2.000 | 0.000 | 20.000 | 16.611 | 0.535 |
| | | 14.101(14.556) | 10.27 ≤ μ ≤17.93 | 7.143 | 0.000 | 71.429 | 211.879 | 1.911 |
| PANAS TOTAL**** | 68 | 55.074(9.682) | 52.73 ≤ μ ≤ 57.42 | 55.000 | 37.000 | 79.000 | 93.741 | 1.174 |
| PA | 68 | 31.279(7.047) | 29.57 ≤ μ ≤ 32.99 | 31.500 | 16.000 | 46.000 | 49.667 | 0.855 |
| | | 62.559(14.095) | 59.15 ≤ μ ≤ 65.97 | 63.000 | 32.000 | 92.000 | 198.668 | 1.709 |
| NA | 68 | 23.794(8.582) | 21.72 ≤ μ ≤ 25.87 | 22.000 | 12.000 | 43.000 | 73.658 | 1.041 |
| | | 47.588(17.165) | 43.43 ≤ μ ≤ 51.74 | 44.000 | 24.000 | 86.000 | 294.634 | 2.082 |
| MDI TOTAL | 76 | 19.487(9.667) | 17.28 ≤ μ ≤ 21.70 | 19.500 | 4.000 | 42.000 | 93.453 | 1.109 |
| | | 38.974(19.334) | 34.56 ≤ μ ≤ 43.39 | 39.000 | 8.000 | 84.000 | 373.813 | 2.218 |
| 1st 3 items | 76 | 6.250(3.355) | 5.483 ≤ μ ≤ 7.017 | 6.000 | 0.000 | 15.000 | 11.257 | 0.385 |
| | | 41.667(22.367) | 36.56 ≤ μ ≤ 46.78 | 40.000 | 0.000 | 100.000 | 500.296 | 2.566 |
| 7 remaining items | 76 | 13.237(6.847) | 11.67 ≤ μ ≤ 14.80 | 13.000 | 1.000 | 28.000 | 46.876 | 0.785 |
| | | 37.820(19.562) | 33.35 ≤ μ ≤ 42.49 | 37.143 | 2.857 | 80.000 | 382.665 | 2.244 |
| SASI | 66 | 13.591(9.229) | 11.32 ≤ μ ≤ 15.86 | 11.000 | 2.000 | 41.000 | 85.169 | 1.136 |
| | | 30.202(20.508) | 25.16 ≤ μ ≤ 35.24 | 24.444 | 4.444 | 91.111 | 420.585 | 2.524 |
| SCI-SAS TOTAL | 62 | 8.161(6.705) | 6.46 ≤ μ ≤ 9.86 | 6.500 | 0.000 | 29.000 | 44.957 | 0.852 |
| | | 25.504(20.953) | 20.18 ≤ μ ≤ 30.83 | 20.313 | 0.000 | 90.625 | 439.035 | 2.661 |
| SCI-SAS Childhood | 62 | 4.484(4.207) | 3.42 ≤ μ ≤ 5.55 | 3.000 | 0.000 | 16.000 | 17.696 | 0.534 |
| | | 28.024(26.292) | 21.35 ≤ μ ≤ 34.70 | 18.750 | 0.000 | 100.000 | 691.268 | 3.339 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SCI-SAS Adulthood | | | | | | | | |
| | 62 | 3.677(3.318) | 2.83 ≤ μ ≤ 4.52 | 3.000 | 0.000 | 13.000 | 11.009 | 0.421 |
| | | 22.984(20.737) | 17.72 ≤ μ ≤ 28.25 | 18.750 | 0.000 | 81.250 | 430.039 | 2.634 |
| ASA-CL27 TOTAL | 62 | 17.581(16.167) | 13.47 ≤ μ ≤ 21.69 | 11.000 | 0.000 | 65.000 | 261.690 | 2.054 |
| | | 21.705(19.971) | 16.63 ≤ μ ≤ 26.78 | 13.580 | 0.000 | 80.247 | 398.857 | 2.536 |
| ANPS SEEK | 54 | 40.000(5.552) | 38.48 ≤ μ ≤ 41.52 | 41.000 | 24.000 | 49.000 | 30.830 | 0.756 |
| | | 71.429(9.915) | 68.72 ≤ μ ≤ 74.13 | 73.214 | 42.857 | 87.500 | 98.311 | 1.349 |
| ANPS FEAR | 54 | 38.796(8.247) | 36.55 ≤ μ ≤ 41.05 | 38.500 | 19.000 | 55.000 | 68.014 | 1.122 |
| | | 69.279(14.727) | 65.26 ≤ μ ≤ 73.30 | 68.750 | 33.929 | 98.214 | 216.882 | 2.004 |
| ANPS CARE | 54 | 40.907(5.668) | 39.36 ≤ μ ≤ 42.45 | 41.000 | 26.000 | 54.000 | 32.123 | 0.771 |
| | | 73.049(10.121) | 70.29 ≤ μ ≤ 75.81 | 73.214 | 46.429 | 96.429 | 102.434 | 1.377 |
| ANPS ANGER | 54 | 36.778(6.987) | 34.87 ≤ μ ≤ 38.68 | 36.500 | 19.000 | 51.000 | 48.818 | 0.951 |
| | | 65.675(12.477) | 62.27 ≤ μ ≤ 69.08 | 65.179 | 33.929 | 91.071 | 155.668 | 1.698 |
| ANPS PLAY | 54 | 38.833(6.219) | 37.14 ≤ μ ≤ 40.53 | 39.000 | 22.000 | 53.000 | 38.670 | 0.846 |
| | | 69.345(11.104) | 66.31 ≤ μ ≤ 72.38 | 69.643 | 39.286 | 94.643 | 123.309 | 1.511 |
| ANPS SADNESS | 54 | 37.704(6.881) | 35.83 ≤ μ ≤ 39.59 | 38.000 | 18.000 | 50.000 | 47.345 | 0.936 |
| | | 67.328(12.287) | 63.97 ≤ μ ≤ 70.68 | 67.857 | 32.143 | 89.286 | 150.971 | 1.672 |
| ANPS SPIRITUALITY | | | | | | | | |
| | 54 | 32.482(7.762) | 30.36 ≤ μ ≤ 34.60 | 33.500 | 15.000 | 46.000 | 60.254 | 1.056 |
| | | 67.670(16.172) | 63.26 ≤ μ ≤ 72.08 | 69.792 | 31.250 | 95.833 | 261.521 | 2.201 |
| AVERAGED OCD | 75 | 41.271(11.213) | 38.69 ≤ μ ≤ 43.85 | 39.019 | 20.561 | 77.103 | 125.722 | 1.295 |
| AVERAGED Depression | 76 | 40.776(16.100) | 37.10 ≤ μ ≤ 44.46 | 38.500 | 8.000 | 79.000 | 259.216 | 1.847 |
| AVERAGED Separation-distress | 66 | 32.066(14.804) | 28.43 ≤ μ ≤ 35.71 | 28.738 | 1.402 | 64.019 | 219.151 | 1.822 |

*Statistics describing score profiles of obsessionality, low mood and separation-distress in Study III; Overall N = 75*
**Total raw score statistics are listed above total percentage score statistics for each variable/factor; e.g., for MCQ TOTAL, the mean raw score = 137.289, which represents 53.628% of the total possible score total*
***where $s^2$ (sample variance) = $\sum(X - \bar{X})^2/(N-1)$*
****SE refers to the standard error of the sampling distribution (i.e. the standard error of the difference between means), where SE = $\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$*
*****There are no percentage calculations for PANAS TOTAL, since the raw scores are already out of 100*

*SASI Separation Anxiety Symptom Inventory; SCI-SAS Structured Clinical Interview for Separation Anxiety Symptoms; ASA-CL27 Adult Separation Anxiety Checklist of 27 Items; ANPS Affective Neuroscience Personality Scale*

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*Table 2*

*Correlation results amongst obsessionality, low mood and separation-distress*

| Variable | Obsessionality | Low mood | Separation-distress |
|---|---|---|---|
| Obsessionality | 1.000 | .454** | .526** |
| Low mood | .454** | 1.000 | .476** |
| Separation-distress | .526** | .476** | 1.000 |
| Mean | 42.453 | 43.500 | 32.066 |
| *std.dev* | 11.252 | 14.765 | 14.804 |

*Correlations amongst the basic endophenotypes, obsessionality, low mood, & separation-distress*
**Marked correlations are significant at the level of p < .01; N = 49 (casewise deletion of missing data)*

From the table above, it was evident that obsessionality, low mood and separation-distress were moderately correlated in the non-clinical sample. Obsessionality and separation-distress showed the strongest correlation (r = 0.526, $p < .01$), whilst separation-distress and low mood were also significantly correlated (r = 0 .476, $p < .01$). Obsessionality and low mood had the weakest correlation, but this was still significant. A moderate significant relationship (r = 0.454, $p < .01$) was still shown to exist between obsessionality and low mood.

In an evaluation of the relationship between fear anxiety and separation-distress, these variables were shown to correlate at r = .535, $p < .01$. FEAR was significantly higher than combined scores on the measures of separation-distress: $\overline{X}_1 = 69.279(14.727)$; $\overline{X}_2 = 35.955(12.827)$; Diff = 33.324; $SD_{Diff} = 14.727$; $t = 18.291$; $p < .01$). Next, scores on the FEAR and SADNESS subscales were examined. These were used to evaluate the basic emotion substrates of FEAR and PANIC – the basic emotion substrates which give rise to fear anxiety and separation-distress (Panksepp, 1998). FEAR and SADNESS were very strongly correlated (r = .703; $p < .01$). Further, independent *t* test analysis showed that they were from the same theoretical population group: $\overline{X}_1 = 69.279(14.727)$; $\overline{X}_2 = 67.328(12.287)$; Diff = 1.951; $SD_{Diff} = 10.648$; $t = 1.346$; $p = .184$).

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The Study II sample was then divided into high and low scoring groups for obsessionality and for low mood in order to test whether the groups would yield significantly different poles of high and low obsessionality and of high and low scores for low mood. This was to determine whether the groups would be suitable for further testing regarding how separation-distress and separation trauma were represented in each group. This was also intended as an investigation of the reliability of Study I – to look at whether non-clinical results could be replicated in a new sample.

*Table 3*

*Differences between high and low obsessionality and low mood groups*

| Groups for comparison | $\bar{X}_1$*(std.dev)* | $\bar{X}_2$*(std.dev)* | *t* | *df* | $N_1$ | $N_2$ | F |
|---|---|---|---|---|---|---|---|
| High *vs*. low scoring obsessionality | 33.869*(5.019)* | 54.566*(11.970)* | 7.835** | 47 | 25 | 24 | 5.689** |
| High *vs* low scoring low mood | 29.920*(8.366)* | 60.875*(10.267)* | 11.591** | 47 | 25 | 24 | 1.506 *(p = .326)* |

*Analysis of high- and low-scoring obsessionality and low mood; for obsessionality: $t_{sep.var.est}$ = 7.835; Levene F(1, 47) = 13.648; p < .01; and for low mood: $t_{sep.var.est}$ = 11.543 Levene F(1, 47) = .482; p = .491*
**marked results are significant at the level of p < .05; ** p < .01; $\bar{X}$ = mean score*

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Results reported in Table 7 confirm that high and low scoring groups for both obsessionality and low mood are from independent samples. The groups were therefore suitable for an analysis of the differences between high and low obsessionality and high and low scores on measures of low mood, in this sample. The two groups showed notable differences – *t* values indicated that participants in the high obsessionality group scored an average of almost 8 standard deviations higher on measures of obsessionality than low obsessionality participants; whilst those in the high scoring low mood group scored more than 11.5 standard deviations higher than their low scoring low mood counterparts. Both analyses were independent at the level of $p < .01$.

Owing to the significantly different score populations, further comparison of high and low obsessionality and low mood groups was carried out, according to their corresponding separation-distress scores. *t* tests for independent samples were used to investigate potential differences between groups. To keep open the possibility that separation-distress and incidences of separation trauma may be either higher *or* lower in the high scoring groups, two-tailed experimental hypotheses were tested. The hypothesis tested was scores on separation-distress measures would differ between groups. In the results reported below, $\bar{X}_1$

referred to the mean of the low-scoring group and $\overline{X}_2$ to the mean of the high-scoring group in each case; $SD_1$ and $SD_2$ to their respective standard deviations:

On analysis of the high and low obsessionality groups, separation-distress scores were shown to have emerged from significantly different populations, with the high obsessionality participants demonstrating significantly higher separation-distress scores: $\overline{X}_1$= 27.20, $\overline{X}_2$ = 45.85, $SD_1$ = 8.20, $SD_2$ = 17.44, $t$ = 4.74, $df$ = 46, $p$ < .01, $t_{sep.var.est.}$ = 4.74, p 2-sided < .00, $F$ = 4.54 ($p$ < .01), Levene (1, 46) = 27.05, $p$ < .01.

For low mood, separation-distress scores from the high and low scoring groups also fell into two distinct and significantly distinguishable groups. Again, as hypothesized, separation-distress proved significantly higher amongst participants who scored higher on measures of low mood: $\overline{X}_1$ = 28.64, $\overline{X}_2$ = 44.74, $SD_1$ = 11.10, $SD_2$ = 17.13, $t$ = 3.86, $df$ = 46, $p$ < .01, $t_{sep.var.est.}$ = 3.86, p 2-sided< .00, $F$ = 2.38 ($p$ = .04), Levene (1, 46) = 10.18 ($p$ < .01). Levene tests confirmed that the groups were different, by confirming non-homogeneity of variance in each case.

Dependent $t$ tests are performed when the groups under comparison consist of the same participants, who have completed scores on various measures, which therefore represent different variables that are "matched", "related" or "dependent" (Howell, 2002). It has already been shown that obsessionality and low mood were positively correlated in this group (r = .454; $p$ < .01). When treated as dependent variables and tested for differences, obsessionality, $\overline{X}_1$, and depression, $\overline{X}_2$, were related in the following way: $\overline{X}_1$ = 44.006($SD_1$ = 13.803); $\overline{X}_2$ = 45.082($SD_2$ = 18.165); N = 49; Diff = 1.075 ($SD_{Diff}$ = 6.335); $t$ = 1.188; $p$ = .241.

Therefore obsessionality and low mood appeared to occur at comparable levels and can be said to have emerged from the same sample group.

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Obsessionality and low mood factors related to separation-distress

Given the significant relationships demonstrated so far amongst obsessionality, low mood and separation-distress, an analysis was performed to determine which specific obsessionality and low mood factors most strongly predicted an associated increased proclivity for heightened separation-distress. The sample was treated as a whole and the intention was to investigate which particular aspects of obsessionality and low mood could most accurately be significantly linked with high obsessionality and low mood. Positive affect (PA) was included in the analysis as a hypothesized measure of divergence for low mood, as well as to examine its relationship with separation-distress.

*Table 4*

*Separation-distress related to individual obsessionality and low mood factors in the non-clinical group*

| Obsessionality factor | $r^2$ | *t* | *p* | *Mean* | | *Std. Dev.* | | r(X,Y) |
|---|---|---|---|---|---|---|---|---|
| | | | | Obsessionality factor | S-D | Obsessionality factor | S-D | |
| MCQ 1 | .139 | 3.007** | < .01 | 46.937 | 35.015 | 14.570 | 12.890 | .373** |
| MCQ 2 | .187 | 3.587** | < .01 | 59.456 | 35.015 | 17.528 | 12.890 | .432** |
| MCQ 3 | .176 | 3.457** | < .01 | 52.931 | 35.015 | 15.561 | 12.890 | .419** |
| MCQ 4 | .192 | 3.643** | < .01 | 49.801 | 35.015 | 13.734 | 12.890 | .438** |
| MCQ 5 | .012 | .808 | .422 | 55.480 | 35.015 | 11.745 | 12.890 | .107 |
| PI 1 | .133 | 2.928** | < .01 | 26.800 | 35.015 | 19.525 | 12.890 | .364** |
| PI 2 | .001 | .274 | .785 | 20.455 | 35.015 | 19.809 | 12.890 | .037 |
| PI 3 | .005 | .548 | .586 | 23.222 | 35.015 | 21.572 | 12.890 | .073 |
| PI 4 | .015 | .913 | .365 | 14.101 | 35.015 | 14.556 | 12.890 | .121 |
| MDI 1st 3 items | .166 | 3.342** | < .01 | 42.069 | 35.015 | 22.795 | 12.890 | .408** |
| MDI last 7 items | .192 | 3.654** | < .01 | 39.064 | 35.015 | 19.366 | 12.890 | .439** |
| PA | .054 | -1.780 | .080 | 62.793 | 35.015 | 14.221 | 12.890 | -.231 |
| NA | .248 | 4.301 | < .01 | 47.552 | 35.015 | 17.367 | 12.890 | .498** |

*Relationships between MCQ, PI, MDI and PANAS factors, and separation-distress (percentage scores)*
**Marked results significant at the level of p < .05; **p < .01; N = 58 (casewise deletion of missing data)*
*Separation-distress was abbreviated to S-D; the low obsessionality group was referred to as "Low" and the high obsessionality group as "High"*

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From Table 8 it was evident that the MCQ4 (*Themes of superstition, punishment & responsibility*), followed closely by the MCQ2 (*Uncontrollability & danger*), were most predictive of separation-distress scores amongst the Meta-Cognitions factors; whilst the PI1 (*Impaired control over mental abilities*) was the most highly related to separation-distress amongst the PI factors. Amongst clusters of depression items, negative affect (NA) was the most closely related to separation-distress, but this was only slightly more highly related than both MDI factors, which also showed positive relationships.

Separation-distress scale validation

An additional aim of this study was to examine the four scales used to evaluate separation-distress for their psychometric properties. Various methods were applied to determine their validity, including convergent and discriminant validity, as well as internal consistency, with the intention of contributing to the growing literature on the reliability and validity of separation-distress measures. Information on the

psychometrics of separation-distress evaluations would be very useful, particularly since research into the systematic assessment of separation-distress is in its early phases (e.g., Silove *et al*., 1995).

Construct Validity:

As discussed in methodology sections considering the selection of measurement tools (Chapters 2, 5 and 7), there were theoretical foundations for having chosen the four particular scales used in these studies. The investigation of scale validity addressed whether the SASI, SCI-SAS, ASA-CL27 and ANPS SADNESS could be said to represent the same underlying construct.

Convergent validity

The following table shows correlational values for the four separation-distress scales, based on the results of Study II:

*Table 5*
*Convergent validity: Separation-distress scale correlations*

| Measures | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS |
|---|---|---|---|---|
| SASI | 1.000 | .188 | .226 | .206 |
| SCI-SAS | .188 | 1.000 | .475** | .262 |
| ASA-CL27 | .226 | .475** | 1.000 | .341* |
| ANPS SADNESS | .206 | .262 | .341* | 1.000 |
| | | | | |
| Means | 13.591 | 8.161 | 17.581 | 37.704 |
| *(std.dev)* | *9.229* | *6.705* | *16.177* | *6.881* |
| Percentage means | 29.630 | 26.331 | 21.582 | 67.328 |
| *(std.dev)* | *19.726* | *21.330* | *19.990* | *12.287* |

** p < 0.05, **p < .01; N = 54 (casewise deletion of missing data)*
***Means and standard deviations given for both raw and percentage scores*

There was a marked lack of correlation amongst the four separation-distress scales in this sample. The ASA-CL27 showed a moderately strong, significant *(p* < .01*)* relationship with the SCI-SAS and a slightly weaker one with the ANPS SADNESS subscale (*p* < .05), but no other significant pairings were obtained.

To further investigate convergent validity, scales were compared with measures on which they should be expected to converge, given empirical evidence of a positive relationship between those factors and the



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measurements under investigation. Given the theorized relationship between obsessionality, low mood and separation-distress, as well as a theoretically purported positive relationship between separation-distress and negative affect, these factors were chosen as further variables against which to test for convergence.

*Table 6*

*Correlations between separation-distress and other variables*

| Measures | Obsessionality | Low mood | Negative Affect (NA) | Mean*(std.dev)* |
|---|---|---|---|---|
| SASI | .245 | .374** | .187 | |
| SCI-SAS | .347* | .394** | .405** | |
| ASA-CL27 | .347* | .434** | .351** | |
| ANPS SADNESS | .450** | .493** | .547** | |
| Obsessionality | 1.000 | .503** | .461** | 44.059*(11.237)* |
| Low mood | .503** | 1.000 | .821** | 43.796*(15.049)* |
| NA | .461** | .821** | 1.000 | 47.852*(17.278)* |

**marked correlations were significant at the level of p < .05, **p < .01;*
*N = 54 (casewise deletion of missing data)*

The results from this analysis indicated that the scales did correlate moderately and significantly with obsessionality, low mood and negative affect.

Discriminant validity

Further measures specifically suited to gauging the discriminant validity of the four separation-distress scales used could not be included in this study, since the collection of necessary questionnaires was already time-consuming and the addition of more assessments would have been a possible deterrent to participants. Therefore, since scale validation was not the primary concern of this study, further discriminant and test-retest reliability measurements (i.e. discriminant questionnaires, such as an evaluation of secure attachment, and repeated measures) were excluded from the study design. However, it was possible to conduct some test of discriminant validity, by examining which affective factors correlated negatively with the ANPS SADNESS subscale, and hypothesizing these as measures of an opposing (i.e. positive) construct. Similarly, Positive Affect (PA) from the PANAS should serve as a measure of discrimination, whilst Negative Affect (NA) should correlate highly with measures of separation-distress, a construct essentially related to negative affect.

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*Table 7*

*Correlations amongst divergence factors, to determine discriminant validity*

| Measure | SEEK | PLAY | SPIRITUALITY | PA | NA |
|---|---|---|---|---|---|
| SASI | 0.170 | -0.112 | -0.116 | -0.060 | 0.187 |
| SCI-SAS | -0.120 | -0.063 | 0.255 | -0.295 | 0.405** |
| ASA-CL27 | -0.153 | -0.054 | -0.178 | -0.194 | 0.351** |
| ANPS SADNESS | -0.157 | -0.305 | 0.075 | -0.217 | 0.547** |
| SEEK | 1.000 | 0.643** | 0.115 | 0.151 | -0.074 |
| PLAY | 0.643** | 1.000 | 0.160 | 0.292 | -0.219 |
| SPIRITUALITY | 0.115 | 0.160 | 1.000 | -0.024 | 0.008 |
| PA | 0.151 | 0.292 | -0.024 | 1.000 | -0.291 |
| NA | -0.074 | -0.219 | 0.008 | -0.291 | 1.000 |
| Means | 71.429 | 69.345 | 67.670 | 62.741 | 47.852 |
| Std.dev | 9.915 | 11.104 | 16.172 | 14.292 | 17.278 |

** Marked correlations significant at the level of p < .05, **p < .01*

These results showed that discriminant validity was sound in the non-clinical group – all four separation-distress scales correlated non-significantly, and mostly negatively, with the positive factors of SEEK, PLAY, SPIRITUALITY and PA. Significant relationships with NA were observed again and strong positive correlations amongst PLAY and SEEK contributed towards the distinguishing nature of these factors within this correlation matrix.

Internal Consistency

Tests of internal consistency were used to determine whether the different items within each instrument yielded similar results, and therefore could be said to be measuring or reflecting the same underlying construct; i.e. the degree of consistency in item results *within* a scale was calculated.

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*Table 8*

*Split-half reliability and Inter-item correlation**

| Variable | Split-half reliability (Cronbach α) | Standardized (Cronbach α) | Inter-item correlation | Corr. 1st & 2nd half | Attenuation corrected | Split-half | Guttman split-half |
|---|---|---|---|---|---|---|---|
| *Non-clinical* | | | | | | | |
| SASI | .905 | .905 | .402 | .837 | - | .912 | .911 |
| SCI-SAS | .898 | .900 | .369 | .715 | .864 | .834 | .827 |
| ASA-CL27 | .955 | .954 | .453 | .908 | .993 | .952 | .949 |
| ANPS SADNESS | .301 | .297 | .034 | .383 | - | .554 | .554 |

| | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS |
|---|---|---|---|---|
| Means | 14.286 | 8.122 | 18.531 | 34.519 |
| Std Dev. | 9.798 | 6.966 | 17.017 | 3.994 |

**see Appendix P for details of inter-item correlations with the deletion of each successive variable*

Internal consistency for measures of separation-distress was high overall for the non-clinical group, with Cronbach alpha coefficients ranging from .900 to .954 for the SASI, SCI-SAS and ASA-CL27; the ANPS SADNESS subscale – as with convergent validity measures – showed a departure from the other three scales, in that it had substantially lower split-half reliability, inter-item correlation and correlation between the first and second halves of the scale.

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Impact of Early Separation Trauma

Since data gathered to assess incidence of early separation trauma in participants was of a categorical nature (responses were coded according to the time-frames reported), the main statistical technique employed was Chi-square contingency analysis. However, as discussed in Chapter 8 (p.71), separation trauma in this case could arguably be considered ordinal, since it is possible that the number of categories a participant reports had an influence on their levels of obsessionality, low mood and separation-distress. An initial independent *t* test analysis was carried out by grouping incidences of separation trauma according to the number of timeframe categories reported. The aim was to determine whether it would be feasible to treat separation trauma as an ordinal rather than a categorical variable. There were six separate groups: $X_0$ (those reporting no separation experiences); $X_2$ (those reporting separation in two of the specified timeframes); $X_6$ (separation in six of the nine timeframe categories); $X_7$ (separation in seven timeframes); $X_8$ (separation in eight of the timeframes) and $X_9$ (separation in nine of the categories). These were analysed for independence of variables:

*Table 9*

*Independent t test (separation-trauma treated as an ordinal variable)*

| Groups | N | *df* | *t* | *p* | Levene F(1, *df*) | *p*(Levene) |
|---|---|---|---|---|---|---|
| $X_0$ *vs.* $X_2$ | 45 | 43 | 1.311 | 0.197 | 2.208 | 0.145 |
| $X_0$ *vs.* $X_6$ | 39 | 37 | -0.171 | 0.865 | 1.492 | 0.230 |
| $X_0$ *vs.* $X_7$ | 39 | 37 | -1.191 | 0.241 | 1.492 | 0.230 |
| $X_0$ *vs.* $X_8$ | 39 | 37 | 0.111 | 0.912 | 1.492 | 0.230 |
| $X_0$ *vs.* $X_9$ | 39 | 37 | - 2.511* | 0.017 | 1.492 | 0.230 |
| $X_2$ *vs.* $X_6$ | 8 | 6 | -1.076 | 0.323 | 0.874 | 0.386 |
| $X_2$ *vs.* $X_7$ | 8 | 6 | -2.693* | 0.036 | 0.874 | 0.386 |
| $X_2$ *vs.* $X_8$ | 8 | 6 | -0.629 | 0.552 | 0.874 | 0.386 |
| $X_2$ *vs.* $X_9$ | 8 | 6 | -4.784** | 0.003 | 0.874 | 0.386 |
| $X_6$ *vs.* $X_7$ | 2 | | | | | |
| $X_6$ *vs.* $X_8$ | 2 | | | | | |
| $X_6$ *vs.* $X_9$ | 2 | | | | | |
| $X_7$ *vs.* $X_8$ | 2 | | | | | |
| $X_7$ *vs.* $X_9$ | 2 | | | | | |
| $X_8$ *vs.* $X_9$ | 2 | | | | | |

| | $\underline{X_0}$ | $\underline{X_2}$ | $\underline{X_6}$ | $\underline{X_7}$ | $\underline{X_8}$ | $\underline{X_9}$ |
|---|---|---|---|---|---|---|
| N | 38 | 7 | 1 | 1 | 1 | 1 |
| Means | 37.760 | 31.940 | 39.718 | 51.410 | 36.490 | 66.532 |
| Std.dev | 11.310 | 6.764 | - | - | - | - |

*Independent t test results for number of separation trauma categories experienced.*
**Marked results significant at the level of p < .05; **p < .01*

Results indicated that grouping according to the number of separation trauma categories experienced does not prove significant in terms of how participants scored on measures of obsessionality, and therefore supports interpretation of the variables as categorical as opposed to ordinal. *t* test results showed that all variables originated from the same group, showing no significant variations: $\overline{X}_1$ = 38.55; $\overline{X}_3$ = 51.41; *t* = -1.12; *p* = .23; Levene's F (1, 20) = 1.94 with *p* = .18. $\overline{X}_1$ = 38.55; $\overline{X}_2$ = 32.18; *t* = 1.19;

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$p$ = .25; Levene's $F(1, 24) = 1.23$ with $p$ = .23. $\bar{X}_1 = 38.55$; $\bar{X}_4 = 36.49$; $t$ = .18; Levene's $F(1, 20) = 1.94$ with $p$ = .18.

Likewise, low mood scores were unaffected by the number of separation trauma incidences; as were separation-distress scores.

Chi-Square Contingency Table Analysis

These analyses were carried out to investigate further whether separation trauma may be influential in the distribution into high as opposed to low obsessionality and low mood groups, or incidence of separation-distress in adulthood.

For the first part of the question, chi-square contingency analysis was performed to compare participants who reported instances of early separation trauma in childhood and those who did not, in terms of their scores on the obsessionality measures. It was found that whether participants fell into the high or low obsessionality group was not contingent on whether they had experienced separation trauma ($\lambda^2$ = .903; $\lambda^2_{.05}(1) = 3.84$; $p < .05$). Likewise distribution into the high or low scoring group, as evaluated on measures of low mood, was not contingent on experience of separation trauma ($\lambda^2$ .903; $\lambda^2_{.05}(1) = 3.84$; $p < .05$).

Regarding performance on separation-distress measures, it was found that whether the high and low groups were divided according to the highest and lowest obsessionality *or* low mood scores, the severity of corresponding separation-distress scores also was not contingent on separation trauma (for obsessionality: $\lambda^2 = 2.010$; $\lambda^2_{.05}(1) = 3.84$; $p < .05$; for low mood: $\lambda^2 = 1.231$; $\lambda^2_{.05}(1) = 3.84$; $p < .05$).

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**Chapter Ten Study III Discussion**

The purpose of this study was to compare participants with significantly different high and low scoring overall responses on measures of obsessionality and low mood, in terms of their inclination towards separation-distress and their experiences of separation trauma. Specifically, it was hypothesized that participants who obtained higher scores on measures of obsessionality and low mood would demonstrate a greater propensity for the subjective experience of separation-distress, and would also be more likely to have experienced separation trauma during one or more critical periods during early childhood.

The descriptive statistics presented in Table 1 (pp.75-76) give an indication of the descriptive characteristics of obsessionality, low mood and separation-distress in the Study III sample. On examination of these statistics, two important conclusions could be drawn. First, parameters for the variables obsessionality and low mood were very similar, and therefore the groups used to compare high and low obsessionality and low mood in Study III may be interpreted as adequately representative of a large non-clinical population. Second, various trends of parallel results emerged on comparison of Study III with Studies I and II – an encouraging observation both for the reliability of findings throughout the thesis, and for evidence of the continuity between obsessionality and OCD, low mood and depression.

The degree to which each factor was representative of obsessionality in Study I was re-established and strengthened by an almost identical ranking order in this study. This can be interpreted to mean that the factors showing the highest correlations with manifestation of obsessions and compulsions are realistically evaluating foundational aspects of obsessionality as manifested in non-clinical samples. The factors most highly related to obsessionality were the MCQ2 *Uncontrollability and danger*, PI1 *Impaired control over mental abilities*, PI3 *Checking behaviours*, and MCQ4 *Negative thoughts about superstition, punishment and responsibility*. These should be noted for future studies of emotion in obsessionality, especially considering their relationship with separation-distress factors: the MCQ2 and PI1 showed the strongest correlations with separation-distress scores for this sample.

From Table 2, it was evident that obsessionality, low mood and separation-distress were moderately correlated in the non-clinical sample. Obsessionality and separation-distress showed the strongest correlation ($r = 0.526$, $p < .01$), whilst separation-distress and low mood were also significantly correlated ($r = 0\ .476$, $p < .01$). Obsessionality and low mood had the weakest correlation, but this was still significant. A moderate significant relationship ($r = 0.454$, $p < .01$) was still shown to exist between obsessionality and low mood. Cohen (1988) proposed that a correlation coefficient over 0.5 is large, especially in the social sciences, where the relationship is under the influence of many confounding variables. However, it should also be remembered that in the non-clinical sample, variables were not necessarily expected to relate as strongly as in the clinical population.

The results presented in Table 3 confirmed that the high and low obsessionality groups, as well as the high and low scoring low mood groups, were independent. The high and low obsessionality groups



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differed by almost 8 standard deviations on measures of obsessionality ($t$ = 7.835; $p$ < .01); whilst the high and low low mood groups differed by 11 and a half standard deviations on measures of low mood ($t$ = 11.591; $p$ < .01). Scores in the high and low scoring groups were therefore significantly different enough to have emerged from different theoretical populations. It was important to clarify this point, in order to draw conclusions about how separation-distress functions in these groups, and whether there were significant differences in this feeling state (and its associated emotion, PANIC) that were related to whether participants experienced unusually high obsessionality or low mood. The results showed that separation-distress scores were significantly higher in the high obsessionality group than in the low obsessionality group ($t$ = 4.74; $p$ < .01). Similarly, separation-distress was significantly higher in the group who scored highly on measures of low mood ($t$ = 3.86; $p$ < .01). Results presented here are significant for a number of reasons. Based on the related hypotheses of these studies, they confirm that separation-distress is implicated in obsessionality (providing a measure of reliability for Study I), they confirm the comorbidity of obsessionality and low mood (providing a measure of reliability for Study II), and they answer the question concerning low mood: separation-distress is also implicated in this variable.

Comorbidity of obsessionality and low mood were confirmed by dependent $t$ test analysis, which showed that participants' scores on measures of obsessionality and low mood were not significantly different (*difference* = 1.075; $t$ = 1.188; $p$ < .241), and therefore emerged from the same population of scores.

From Table 4 it was evident that the MCQ4 (*Themes of superstition, punishment & responsibility*), followed closely by the MCQ2 (*Uncontrollability & danger*), were most predictive of separation-distress scores amongst the Meta-Cognitions factors; whilst the PI1 (*Impaired control over mental abilities*) was the most highly related to separation-distress amongst the PI factors. Amongst clusters of depression items, negative affect (NA) was the most closely related to separation-distress, but this was only slightly more highly related than both MDI factors, which also showed positive relationships.

When this sample was treated as a continuous group (N = 49), the participants scored significantly higher on fear anxiety (as represented by scores on the FEAR subscale of the ANPS) than on separation-distress. The difference was relatively large, especially considering that participants were not diagnosed with any anxiety related disorders. However, separation-distress, which is the conscious feeling state associated with the underlying basic emotion substrate, PANIC (Panksepp, 1998), is a form of anxiety, too, although of a different kind. Fear anxiety and panic or separation-distress (as evaluated by the "SADNESS" subscale of the ANPS; Davis, Panksepp, & Normansell, 2003), however, produced similar scores and were not from distinct population groups. As discussed in the final discussion (Chapter 14), this effect seems likely to be due to the discrepancy between the ANPS SADNESS scale and the other three measures of separation-distress – a divergence which emerged in psychometric tests of scale validity. The discrepancy was observed across all four studies. Study III shows that both fear and separation are importantly implicated in the expression of obsessionality and low mood.

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Separation-distress scale validation

The purpose of determining construct validity in psychometrics is to evaluate whether a measurement instrument is assessing the theoretical psychological construct was intended to represent (Cronbach & Meehl, 1955). This presents a problem in that clearly the construct must be defined as represented by *some* measure first, against which subsequent scales may be compared. Construct validity is therefore usually established deductively, by defining a "universe of items and sampling systematically within this universe to establish the test" (Cooper, Lawrence, & Pervin, 1998, p.136). It must be shown that the items being used are a "sample of the universe" of items which is being systematically researched. The concept of this type of validity is based upon showing that a common factor underlies different reported manifestations or measurements of the variable.

There was a marked lack of correlation amongst the four separation-distress scales in this sample. The ASA-CL27 showed a moderately strong, significant *($p < .01$)* relationship with the SCI-SAS and a slightly weaker one with the ANPS SADNESS subscale ($p < .05$), but no other significant pairings were obtained. It was therefore unconfirmed whether these scales were measuring the same underlying construct in this instance, and it was concluded that convergent validity was not strong amongst separation-distress evaluations in the non-clinical sample.

Results (shown in Table 6) from correlation analyses between separation-distress scales and other, related variables (obsessionality, low mood and negative affect) were more encouraging, indicating that the scales did correlate moderately and significantly with these variables. Although the reasoning here is deductive and open to criticism, there was at least evidence of an underlying commonality amongst the factors of interest. In fact, the accuracy of construct validity and its place in determining the scale psychometrics is a matter of some debate (Cooper, Lawrence, & Pervin, 1998), and results should therefore always be interpreted with caution. Discriminant validity appeared strong in this sample, in that scores on separation-distress scales diverged significantly from score obtained on theoretically opposing measures of SEEK, PLAY, SPIRITUALITY and positive affect (PA). Therefore although scores on the four separation-distress scales did not converge extensively in this sample, the evaluations are psychometrically sound in their ability to distinguish from performances on theoretically divergent assessments.

Internal consistency for the separation-distress measures was very high (with Cronbach αs ranging from .900 to .954 for the SASI, SCI-SAS and the ASA-CL27; see Table 8, p.84). This indicated that within each scale, the consistency of items was extremely high, and can be interpreted to be an accurate representation of a single, underlying construct. The ANPS SADNESS, however, again diverged from the other scales in that its internal consistency was less impressive, with substantially lower split-half reliability, inter-item correlation and correlation between the first and second halves of the scale. Divergence of the ANPS could be due to a number of reasons. First, it could indicate a genuine flaw in the

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scale, in that its items do not consistently measure underlying PANIC or separation-distress. However, given its divergence from the other three scales on other forms of validity, too, its inconsistent performance may also be due to the fact that it was developed within an affective neuroscience framework, and therefore more specifically assesses PANIC/separation-distress than do the other scales. In this scenario, it is potentially beneficial to balance this measure with the other, highly convergent group of separation-distress evaluations. Inclusion of all four scales may allow clarity on the underlying construct to emerge.

Although convergent validity was lower than expected (except between the SCI-SAS and ASA-CL27), strong discriminant validity was demonstrated, as was good internal consistency of the SASI, SCI-SAS and ASA-CL27. The SADNESS subscale, as mentioned above, proved less internally consistent in terms of average inter-item correlation and correlations between the first and second halves of the scale. It did, however, show adequate split-half reliability, which is the correlation between a number of randomly divided halves of the scale, computed as an average correlation. Therefore although average inter-item correlation is low for ANPS SADNESS, as well as correlations between first and second halves of the scale, the adequate estimate of split-half reliability provides encouragement that it is nevertheless measuring a consistent construct.

Results presented in Table 9 (p.85) indicated that grouping according to the number of separation trauma categories experienced did not prove significant in terms of how participants scored on measures of obsessionality, and therefore supports interpretation of the variables as categorical as opposed to ordinal. *t* test results showed that all variables originated from the same group, showing no significant variations. $\overline{X}_1 = 38.55$; $\overline{X}_3 = 51.41$; $t = -1.12$; $p = .23$; Levene's F (1, 20) = 1.94 with $p = .18$. $\overline{X}_1 = 38.55$; $\overline{X}_2 = 32.18$; $t = 1.19$; $p = .25$; Levene's $F(1, 24) = 1.23$ with $p = .23$. $X_1 = 38.55$; $X_4 = 36.49$; $t = .18$; Levene's $F(1, 20) = 1.94$ with $p = .18$.

Likewise, low mood scores were unaffected by the number of separation trauma incidences; as were separation-distress scores. In none of the analyses did the highest individual separation-distress score occur in the group with the highest number of reported separation trauma incidences; in fact, in analysis for each variable, the highest individual obsessionality, low mood and separation-distress scores occurred in *group* $X_0$ (*no separation experiences*). Therefore the number of experienced incidences of early separation trauma could be said not to affect whether participants scored higher of lower on obsessionality, low mood and separation-distress.

Separation trauma experiences reported in this group were minimal, and chi-square contingency analysis showed that they had no significant effect on the severity of obsessionality, low mood or separation-distress scores in adulthood, for the participants of this sample. This is in keeping with the literature, in that a non-clinical population of scores should be expected to be accompanied by few instances of this particular precursor, which has been shown to have an impact on adult psychopathology. This at first

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seems to contradict the conclusion above, that this sample constitutes a good research analogue for OCD and depression in the clinical population, since it shows the same patterns of significance and is consistent with Studies I and III. However, it should be noted that the occurrence of separation trauma is categorical – it either occurs or it does not, and there is no scaled dimension with incremental increases along which non-pathological merges with pathological levels for this variable. That said, the failure of separation trauma to predict membership in the high obsessionality and high low mood groups is inconsistent with a spectrum conceptualisation of obsessionality and OCD, low mood and depression – but is possibly attributable to the small sample size in Study III. Furthermore, and perhaps more significantly, this sample may be too small to reveal the effects of separation trauma on obsessionality – a more comprehensive sample could be hypothesized to demonstrate the same relationships amongst obsessionality, low mood, separation-distress and separation trauma as are discussed in later chapters with regard to the clinical sample (Study IV, Chapters, 11, 12 and 13).

The degree to which anxiety and depression symptoms occur in non-clinical samples has been the subject of considerable study. Currently, the most appropriate classification of these disorders in non-clinical and clinical populations is increasingly gaining attention. Zinbarg *et al*. (1994) carried out a study of subthreshold anxiety and depressive symptoms. 666 participants were recruited and assigned to one of seven sample groups. The researchers found that the occurrence of subthreshold affective symptoms (i.e. symptoms which did not meet the diagnostic criteria for DSM-II-R diagnosis but which nevertheless caused significant subjective disturbance and functional impairment) were as prevalent in all the groups as were established anxiety and mood disorders. The symptoms were reported to be causing marked distress or functional impairment, but exhibited a non-specific pattern of anxious and depressed symptomatology (Zinbarg *et al*., 1994). Additionally, symptoms were distinguishable from clinical diagnoses of GAD, a major depressive episode, or panic disorder with agoraphobia. Based on their findings, the authors recommended a new diagnostic category called *mixed anxiety-depression*, which provides support for the results presented in this chapter, in that it recognizes the co-occurrence of these kinds of symptoms on a continuous, dimensional spectrum. Other studies have added support to the argument for prevalent, clinically significant subthreshold levels of comorbid anxiety and depressive symptoms (e.g., Stein, Kirk, Prabhu, Grott, & Terepa, 1995; Zinbarg, 1998). Non-specificity of symptom distribution in this sample is supported by findings reported in Table 1, as well as by Tables 3 and 4 in Study II (Chapter 6, pp.62-63), in which large score variability and a lack of interrelation amongst scores on the different assessments was evident.

Another study in the existing empirical literature on subthreshold depression noted that categories used to describe low mood (representative of sub-clinical depression) are diffuse and disorganized (Pincus, Davis, & McQueen, 1999). This is vastly different from the relatively standard and widespread criteria that exist to describe Major Depressive Disorder. The authors suggested that methodological and systematic studies need to be applied to far broader clinical and nosological contexts. The four studies presented in this thesis contribute towards this gap in the literature.

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Therefore separation-distress appears to function consistently in the non-clinical population, since the same findings were repeated in this sample as in the non-clinical sample evaluated in Study I. The questions investigated in the three studies presented so far will be extended to a clinical group in Study III, presented in Chapters 11, 12 and 13.

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**Chapter Eleven Study IV Method**

Study IV. Separation-distress and early separation trauma in clinical OCD and depression

Study IV is the last step in the series of studies presented here. It concludes a comprehensive investigation of the research questions posed in this thesis, concerning the role of separation-distress (PANIC) as a fundamental emotion in OCD. The variables of interest and relationships amongst them will be researched in clinical patients in Study IV, investigating whether separation-distress and separation trauma function as foundational affective disturbances in OCD. The main hypothesis is that PANIC (the basic emotion substrate that manifests as the subjective feeling state of separation-distress; Panksepp, 1998) is an emotion of primary importance in OCD. Parallel to the inclusion of low mood in Studies II and III, patients diagnosed with clinical depression will be included in the Study IV clinical sample. Based on results in Studies II and III, separation-distress appears to be a common affective mechanism of obsessionality and low mood. Considering emerging evidence throughout the first three studies that obsessionality may be continuous with OCD, and low mood with depression, there is therefore reason to hypothesize that separation-distress may constitute a common affective mechanism of OCD and depression, too. If separation-distress underlies depression as well as OCD in this sample, those results will underscore the findings regarding how emotion functions in OCD. Depending on how OCD and depression relate in Study IV, it may be worthwhile to reconsider the way these disorders relate to each other. Rather than being classified separately as an anxiety (OCD) and mood (depression) disorder, it is hypothesized that these disorders may be more accurately conceptualised as belonging along a continuous mood disorder spectrum.

The inclusion of a clinical research group in this study constitutes an important extension of the previous studies. Given the results established so far in this thesis, the comparison of a clinical and control group will allow Study IV to provide validation for the previous three studies. Additionally it will show how the mechanisms of separation-distress and early separation trauma in clinical populations compare to the same variables in non-clinical populations.

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<u>Hypotheses</u>

$H_1$ Separation-distress is an affective mechanism of OCD; therefore scores on measures of separation-distress will be significantly higher in participants diagnosed with clinical OCD than in control participants.

$H_2$ Separation trauma experiences in early childhood will be significantly prevalent in clinical OCD participants, as compared with control participants; i.e. instances of early separation trauma are predictive of OCD diagnosis in adulthood.

$H_3$ Separation-distress is an affective mechanism of depression; therefore scores on measures of separation-distress will be significantly higher in participants diagnosed with clinical depression than in control participants.

H4 Separation trauma experiences in early childhood will be significantly prevalent in clinical depression participants, as compared with control participants; i.e. instances of early separation trauma are predictive of depression diagnosis in adulthood.

$H_5$ OCD and depression are comorbid; therefore OCD patients will score highly on measures of depression.

$H_6$ Scores of separation-distress and incidence of separation trauma are hypothesized to co-vary closely with severity of OCD and depression in the clinical sample.

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Measurement

The same measures used for assessment in Study III were used here, with the single addition of "the most widely-used clinician-administered interview for assessing the severity of OCD" – the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman *et al*., 1989a; 1989b). This was included as a clinical diagnostic evaluation. The Y-BOCS is widely accepted and established as reliable, valid and sensitive to treatment (e.g., Taylor, 1995). Its inclusion will be useful in evaluating the convergence and divergence of the questionnaires used throughout this thesis to assess obsessionality, low mood, OCD, depression and separation-distress.

Measures were chosen after a thorough review of the literature for established evaluations of OCD and depression. Apart from the Y-BOCS, discussed below, they are the same as those discussed in Chapters 2, 5 and 8.

OCD MEASURES

1. *Meta-Cognitions Questionnaire (MCQ)* (Cartwright-Hatton & Wells, 1997; *Appendix A*)

2. *Padua Inventory (PI)* (Sanavio, 1988; *Appendix B*)

3. *The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS)* (Goodman, Price, Rasmussen, Mazure, & Fleishmann, Hill, Heninger, & Charney, 1989a, b; *Appendix C*)

The Y-BOCS is favoured by many clinicians in assessing how severely a patient is afflicted with OCD (Deacon & Abramowitz, 2005). The complete scale is a semi-structured interview, and consists of three

parts. Part I contains definitions and examples of obsessions and compulsions. Part II is a symptom checklist of over 50 common obsessions and compulsions. Part III is the main part of the Y-BOCS; the one which is commonly used in research, and which was administered in this study. It contains ten items, which assess the degree and intensity of five obsession and five compulsion parameters over the last week. These include *time*, *interference*, *distress*, *resistance* and *control*. The items are scored on a 5 point scale, from 0 (none) to 4 (extreme). Importantly, the assessment of severity of the five dimensions for obsessions and compulsions are independent of content and therefore provide a reliable way to compare scores on this scale amongst patients with widely varying symptoms.

Taylor (1995) carried out a full review of self-report inventories, observer-related scales and behavioural methods in the psychometric literature. From a meta-analysis of the observer-related scales, the Y-BOCS was the most reliable and valid scale, with the greatest sensitivity to treatment and range of obsessive-compulsive features. Treatment effect sensitivity was evaluated by behaviour therapy trials (exposure and response prevention) and clomipramine medication. Psychometric investigations suggest that the scale has high interrater reliability (.93), good internal consistency (.69 ≤ □ ≤ .91) and sufficient test-retest reliability (r = .61) over a 2-week interval. Criterion-related and convergent validity were good. Large correlations (r = .51; range of .17 to .77) with other OCD measures were reported for the latter. Discriminant validity is, however, poor, showing high correlations with measures of both depression and general anxiety.

Taylor (1995) also notes that self-report Y-BOCS measures, such as the one used in this study, appear promising. All psychometric properties reported refer to the 10-item Y-BOCS proper. This is the part of the scale used in most published studies. Parts I and II have not been evaluated, and the obsession and compulsion subscales are infrequently reported as separate measures for analysis in the literature (Taylor, 1995). No norms are available for the Y-BOCS, since it was developed with only a clinical population. However, use of this scale to evaluate normal populations is becoming popular (e.g., Rosenfeld *et al*., 1992 in Taylor, 1995).

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Depression MEASURES

1. *Major (ICD-10) Depression Inventory (MDI)* (WHO, 1993; *Appendix D*)

2. *The Positive and Negative Affect Scales (PANAS)* (Watson, Clark, & Tellegen, 1988; *Appendix E*)

SEPARATION-DISTRESS MEASURES

1. *Separation Anxiety Symptom Inventory (SASI)* (Silove *et al*., 1993; *Appendix F*)

2. *Structured Clinical Interview for Separation Anxiety Symptoms (SCI-SAS)* (Cyranowski *et al*., 2002; *Appendix G*)

3. Adult Separation-Anxiety Checklist (ASA-CL27) (Manicavasagar, Silove, Wagner, & Drobny, 2003; *Appendix H*)

4. Affective Neuroscience Personality Scales (ANPS) (Davis, Panksepp, & Normansell, 2003; see *Appendix I*)

The results of these four evaluations will be summed to create a continuous measure of separation-distress (as in Study III). Again, it will be possible and valuable to validate the scales against one another in the context of this thesis, to investigate how consistently they measured the separation anxiety construct.

Sampling

Various strategies were used to recruit a large and heterogeneous group of people with OCD and depression for participation. Apart from giving the study more exposure, using multiple recruitment strategies increased the chances of obtaining a wide cross section of participants. The methodological advantages of this include heterogeneity, validity, and the extent to which results might be generalized.

First, the founder of the *South African Depression & Anxiety Support Group* (SADAG, http://www.anxiety.org.za/) was contacted. This association offers a variety of resources to its visitors, mainly centering on support groups for people with depression and anxiety disorders. It provides information on the disorders, including characteristic symptoms, diagnosis, prognosis, management and treatment options. Help lines are also given. It is considered an important source of help in South Africa for those with depression and anxiety. Therefore it was an ideal gateway to a South African population of adults with OCD and depression.

After explaining the nature and purposes of the study, permission was obtained to place a newsflash on the website homepage. The newsflash included a summary of the research and invited those were interested to participate. The researcher's contact details were provided. Participants established contact via telephone or email, and were sent the collection of questionnaires via email, post or fax. The newsflash content was shown over two periods (October - December 2007 and February 2008 – March 2009). Since the site is a forum for support groups, many participants passed on details of the research to fellow support group members, as well as to friends and family with and without clinical diagnoses. Additionally, a counselling psychologist read the write-up and invited members of the support group she ran to join the study.

As a second method of recruitment, patient database lists were sourced from hospitals and a research facility. The head of the Outpatients Department and of a hospital-based clinic provided the telephone numbers of patients with OCD and/or depression. These patients had been under the care of those

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facilities and had previously participated in research on OCD and depression. They had given their consent to be contacted about future studies. Contact was made by telephone to explain the research and invite them to participate.

Third, an advertisement was placed on the front page of the *Cape Weekend Argus* Classifieds section for two consecutive weekends, giving brief details of the study and inviting those with OCD and/or depression, or those interested in being in the comparison group, to participate.

Fourth, the leader of a former OCD support group assisted in contacting the 21 members and inviting them to take part.

Fifth, a brief article appeared on *Health24.com*, in the Research Hub section. It described the aims of the study and its focus on emotion, and invited participation.

Sixth, a similar blurb was posted on *Gumtree.co.za*, a community-based South African network which includes advertising about courses, events and other social community happenings.

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Data collection

All data was collected via emailed questionnaires, and in some cases questionnaires were faxed and posted. Sometimes data was clarified or more information provided to participants through telephone contact.

All participants were offered general feedback. This consisted of their individual results (means and standard deviations for overall questionnaires and for factor scores) and the clinical and control sample means and standard deviations for questionnaires and factors. Brief explanations of the content and terminology were given, as well as a short, generalised discussion of possible research implications. All data collection and analysis was completed before feedback was sent. Results were presented in a standard format that allowed participants to compare their personal results with both clinical and control group averages on each factor and in general, within the context of the study (*Appendix N* provides an anonymous example of the feedback form). All individual results were kept strictly confidential.

Data capturing and editing

All responses were individually saved in *Excel* format. Using standard *Excel* formulas, the questionnaires self-scored automatically as each participant filled them in. Formulas for addition (overall totals and factor totals), division (average item scores), and reverse scoring (e.g., as described for the ANPS in Chapter 2, p.26), were used. This technique was intended to reduce the human error inevitable in scoring

large amounts of data. Only overall totals and factor scores were manually transferred to *Statistica8* data sheets for analysis.

Data analysis

The statistical software program package, *Statistica8* (StatSoft Power Solutions, 2008), was used to perform all descriptive and inferential analyses. Demographics, overall descriptive statistics and correlations were used to characterize the populations and to form an initial idea of relations amongst variables. Independent *t* tests were used to determine differences between and within the clinical and comparison data for OCD, depression and separation-distress.

*Mediation analysis* will be used to determine whether separation-distress can be said to mediate the relationship between OCD and depression. This will help establish the relationship between the variables; i.e. how they influence one another in this sample. Mediation is a statistical technique to examine "the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" (Baron & Kenny, 1986). Therefore in this case, it was thought that mediation may be able to clarify the way in which OCD and depression co-occur, by examining whether separation-distress influences the way they exert an influence on each other. Mediation models for Study IV will be derived based on the results of analyses defining the occurrence of OCD, depression and separation-distress in the clinical sample.

Tests of indirect effect generally follow the statistical tradition of path analysis, in which a model is hypothesized, and then tested against the data. There are many variations of mediation, differing in assumptions, statistical tests and terminology (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Type I error rates and statistical power vary with the mediation approach used. Low power will fail to detect significant effects, whereas Type I errors involve finding non-existent effects.

Baron and Kenny's (1986) causal steps approach was chosen over Judd & Kenny's (1981b) similar method, since the latter demands complete mediation, whereas the former specifies that the path specifying the relation between independent and dependent variable after being controlled for the effect of the intervening variable (*c'*), need only be significantly lower than before control (*c*) (i.e. $H_0$: $c' = 0$), and not equal to 0 (i.e. $|c'| < |c|$) (MacKinnon *et al*., 2002). MacKinnon *et al*. (2002) argue that "such models are more realistic in most social science research because a single mediator cannot be expected to completely explain the relation between an independent and a dependent variable." This is particularly true of the current thesis, since multiple variables necessarily come to bear on the development and manifestation of both OCD and depression, and there are various possible mechanisms for the relationship between them (Nestadt *et al*., 2001). Baron and Kenny (1986) also note that partial mediation models are more realistic, especially in the setting of social science, since one variable will never account fully for the variation between an independent and dependent variable.

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The fact that this study includes manipulation of both the treatment/independent (OCD) and intervening (separation-distress) variables, implies the possibility for stronger causal inferences (MacKinnon *et al*., 2002).

Based on the literature, the basic normal theory (NT) method is a well-established and widely employed mediation technique, first described by Baron and Kenny (1986) and commented on by various subsequent authors, including, for example, Frazier, Tix, and Barron (2004) (Mallinckrodt, Abraham, Wei, & Russell, 2006). There are various component steps which are considered standard for the NT method, as well as for most other approaches to mediation, and these must be satisfied before mediation analysis and the significance of the indirect effect may be calculated. First, there must be a significant correlation between the independent and dependent variable (Fig.1(a), *Path c*); second, the independent variable must explain a significant proportion of the variation in the mediator (Fig.1(b), *Path a*); third, the mediator must explain a significant amount of the variance in the dependent variable (Fig.1(b), *Path b*); and fourth, the relationship between independent and dependent variable must be significantly decreased by controlling for the variance shared by the mediator and dependent variable.

In Chapter 12, both the raw, unstandardized *B* and the standardized Beta (β) regression coefficients of the paths will be reported, since there is some debate amongst authors as to which should be used. For example, Mallinckrodt, Wei, Abraham, & Russell (2006) present both, whereas Baron and Kenny (1986) propose that in most cases it is best to use the unstandardized regression coefficients (B) rather than correlation coefficients to measure the effect of the independent on the dependent variable. The use of the correlation coefficient has also been suggested (Freedman & Schatzkin, 1992, in McKinnon *et al*., 2002). It has also been argued that the first condition, that of the significant correlation signified in *Path c*, is not a necessary one and that there are situations in which this may not be the case, but where significance of the indirect effect may still hold (e.g., Kenny, Kashy, & Bolger, 1998; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

As an additional and robust test, MacKinnon's Test of Joint Significance (TJS; 2002), first advocated by Cohen and Cohen (1983) will be applied to the mediation models tested here. In a comparison of mediation and intervening variable effect models, MacKinnon, Lockwood, Hoffman, West, and Sheets (2002) showed that the test of joint significance of the two effects of which the intervening variable effect is constituted, exhibits the best relative balance of Type I error and statistical power. This is a straightforward method which has proven superior in minimizing Type I error and maximizing power, and will be reported in Chapter 12 in order to confirm or challenge the observed results. The TJS is a causal steps variant, but only has two necessary conditions: 1. the path from predictor (independent variable) to mediator is statistically significant (i.e. on examination of the regression coefficient estimating Path a) and, 2. the path from mediator to outcome (dependent variable) is similarly statistically significant (i.e. both paths differ significantly from 0; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002 Mensinger, Lynch, TenHave, & McKay, 2007). A significant indirect effect can be concluded

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if both coefficients are statistically significant; i.e. $a \neq 0$ and $b \neq 0$ (Mallinckrodt, Abraham, Wei & Russell, 2006).

*Chi-square contingency tables* will be used to determine whether the experience of separation trauma in early childhood had a significant influence on whether participants fell into the clinical or the control group. This question will be explored for between-group differences overall (whether separation trauma is predictive of later diagnosis with OCD and/or depression), as well as for within-group differences; e.g., does the experience of separation trauma predict OCD more accurately than depression.

Limitations

*Self-report data*. There are well-documented flaws involved in asking people to give an accurate report of their own symptoms and psychological experiences. These include the dangers of response sets, susceptibility to suggestions provided by item phrasing or instructions, and social desirability bias (Mouton, 2001). Furthermore, there is evidence that memory of emotional events is prone to distortion (Roediger & McDermott, 2000; Reisberg & Heuer, 2004). Despite inherent difficulties, self-report evaluation is also the only way to collect purely phenomenological data. Although it is difficult in research to reconcile personal thoughts and feelings with neural physiology, it is precisely the *subjective* perceptions and impressions of participants that are sought in a study of this nature. It is hoped that people will answer honestly because of an interest in gaining insight into their own personalities and natures, as well as a desire to represent themselves accurately. A valuable consideration is that OCD patients, especially, may be expected to answer honestly, given their characteristic tendency towards overelaboration and truthfulness.

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An additional safeguard against self-report vulnerability was the inclusion of the Adult Separation-Anxiety Checklist (ASA-CL27; Manicavasagar, Silove, Wagner, & Drobny, 2003). This survey was developed specifically following an interview-type format, to bridge the gap between the "logistically more exacting" (Manicavasagar, Silove, Wagner, & Drobny, 2003: 151) rigours of an interview and the subjectively more accurate interior experience of adult separation distress. Similarly, during development of the Separation Anxiety Symptom Inventory (SASI; Silove *et al*., 1993), researchers sought to capture what they described as a global phenomenological *gestalt* impression of how adults experienced separation as children, rather than degrading the quality of memories by confining data to the behavioural effects of the experiences. Both questionnaires have good psychometric properties (see Chapter 6) and were chosen for the comprehensive way they address the difficult issue of participant self-report.

*Diagnostic accuracy*. Participants reported their clinical diagnoses for this study. Although all who took part were required to reveal any diagnosis they had received, no independent checks could be made to verify their answers, given concerns over privacy. However, it is unlikely that disorders were inaccurately reported by participants. Those taking part were largely recruited through support groups and the

SADAG website, had been formally diagnosed, and were motivated by a desire to learn more about and contribute towards a better understanding of their disorders.

Six out of the 75 control participants spontaneously reported minor depression, stress and other difficulties in the absence of a formal diagnosis. These participants were retained as controls, to maintain inclusion criteria defined at the outset of the study (i.e. formal clinical diagnosis for the clinical group). It was therefore questionable whether they were most accurately classed as control participants. Additionally, it is possible that people interested in participating in control groups in general, in the absence of rewards other than self-knowledge, may represent a certain sub-population of neurotic, sensitive or highly psychologised persons, in comparison to the broader population.

Recruiting people with specific personality profiles may be unavoidable when relying on the voluntary interest and motivation of people to participate in psychological research. Literature on the subject suggests that volunteers may have specific psychological profiles and personality characteristics (Rosenthal, 1965). For example, in psychological research, self-selection by participants of a psychologically-minded, sensitive or personal information-seeking nature may influence responses to questions. Inclusion in the control group of those reporting minor psychological distress or even, in a few cases, suspected depression, however, will strengthen results. Comparative differences that emerge in spite of these methodological shortfalls will add power, persuasion and generalizability to the findings. To some extent, it may also buffer the effect created by relying on personal self-report diagnoses in the clinical group, by balancing inaccuracies in either group.

*Unreported/undiagnosed presence of psychopathology*. To minimize possible inaccuracies, contact with all participants included requesting the details of their psychiatrist, psychologist or other treatment clinician. This was deemed optional information and, out of respect for patient privacy, was not demanded as a necessary criterion for participation. Concurrent comorbid psychopathologies are difficult to exclude; although it should be noted that in all studies, undiagnosed comorbid pathologies may be present, causing possible confounding effects.

*Psychopharmacotherapeutic effects*. A number of the participants (N = 5) mentioned spontaneously in their communication during the course of the research that, had they taken part in the research a year before, for example, their answers would probably have been very different. It is important to consider that others may have had the same thought, but left it unmentioned. This may affect the overall results. However, since in the few reported cases the patients' predictions were that their scores would have been far worse (i.e. higher) on most of the questionnaires, the difference would be in favour of the research hypotheses - i.e. the scores recorded for these participants will be a more conservative estimate of the extent of their symptoms, thus strengthening the conclusions of the study, as discussed above.

Ethical considerations

This research study was carried out in accordance with the Ethical Code for Professional Conduct specified by the Professional Board for the Psychology Health Professions Council of South Africa (http://www.uct.ac.za/depts/psychology/) and the Research Ethics Code in line with UCT policy

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(http://www.uct.ac.za/downloads/uct.ac.za/about/policies/ethicscode.pdf), in order to protect potentially vulnerable groups during psychological research. Signed consent, which included an explanation of the nature and purposes of the study – as well as an emphasis on the participant's right to withdraw at any time during the research process – was obtained from both clinical and control group participants prior to data collection. In the case of faxed or posted questionnaires, printed copies of the Information and Consent sheets were included for signature by participants. At all times while dealing with clinical participants especially, it was kept in mind that these individuals were to be treated with careful consideration, and care was taken not to impose any undue stress on them.

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**Chapter Twelve Study IV Results**

Below, the results for Study IV are presented, in which comparisons were made between the performance of participants diagnosed with clinical OCD and depression, and a matched non-clinical control group, in terms of measures of OCD, depression and separation-distress, as well as other basic emotions. Inclusion criteria for membership in the clinical group were a diagnosis of either OCD or depression, or a comorbid diagnosis of both. Exclusion criteria were any other psychiatric disorders – whether clinically related to OCD or depression, or otherwise. This was adhered to as strictly as possible, but there was some overlap with other disorders, given the nature of comorbidity between, for example, OCD and Panic Disorder. The diagnostic groups are discussed below. Exclusion criteria for the control group were, conversely, clinical diagnosis of any psychiatric disturbance. Four of the 75 participants reported that they experienced some depression, which bothered them, but did not report that this disabled them at the functional level that would lead to clinical diagnosis. The fact that these participants' scores may have elevated overall depression scores slightly was taken into consideration – although the number was small, and not expected to alter the statistical significance of the calculations. This factor could also be advantageous since, if the hypothesized significant relationships are confirmed in spite of potentially raised non-clinical scores on depression measures, the distinction between groups would be strengthened.

In discussions below, unless it was noted that raw scores were used for a particular analysis, all total raw results were converted to a score out of 100, and rounded to three decimal points (at the last stage of analysis only). The purpose of this was to have comparable results for analysis, which would have consistent meaning throughout discussions. This particular method of standardization was chosen so that scores were readily interpretable as percentages of participants' total possible results on all measures. For all hypothesis-testing, the level of significance was first set at $p < .01$, as the greatest concern was committing Type I errors – i.e. rejecting the null hypothesis when it was true and therefore finding non-significant results (Howell, 2002). When results were non-significant, tests were conducted at the level of $p < .05$ level, which is regarded as conventional (Crawford & Howell, 1998), and these results were reported too.

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*Table 1*

*Participant Demographics*

| Variables | Clinical group (N = 84) | Control group (N = 75) | *t* | *p* | F |
|---|---|---|---|---|---|
| Age in years | 34.123(8.520) | 32.680(10.847) | .928 | .355 | 1.621 *(p = .035)* |
| Education (number of years) | 13.549(1.679) | 14.483(1.811) | 1.859 | .065 | 1.163 *(p = .505)* |
| | | | $\lambda^2$ | Critical $\lambda^2$ *(df=1)* | *p* |
| Sex *(proportion females)* | 59(71.084) | 57(76.000) | .498 | 3.84 | .05 |
| Occupation *(proportion skilled)* | 24(28.571) | 27(36.000) | .905 | 3.84 | .05 |
| Psychiatric treatment* | 63(75.000) | 3(4.000%) | 83.746 | 7.88 | .005 |
| Psychopharmacological treatment** | 63(75.000) | 4(5.333) | 96.510 | 7.88 | .005 |
| Separation trauma*** | 33(46.429) | 16(21.333) | 6.251 | 3.84 | .05 |
| Did not meet exclusion criteria | 24 | 4 | | | |

**For the variables psychiatric/psychological treatment, psychopharmacological treatment, and separation trauma, the number of participants who reported experience of these was given, as well as the corresponding percentage in brackets*

***Psychopharmacological treatment included medication prescribed for clinical psychological and psychiatric disorders, e.g., benzodiazepines (anti-anxiety medication, or tranquilizers) & antidepressants, such as SSRIs (selective serotonin reuptake inhibitors).*

Participants in the two groups were well matched on age ($t$ = .928; $p$ = .355) and years of education ($t$ = 1.859; $p$ = .065), and showed no significant differences in their relative distribution into male/female gender groups ($\lambda^2$ = .498;$\lambda^2_{.05}(1)$ = 3.84) and skilled/unskilled occupations (($\lambda^2$ = .905;$\lambda^2_{.05}(1)$ = 3.84). There were, however, vastly significant differences between the groups in terms of psychiatric and psychopharmacological treatment: as expected, distribution of participants into clinical and control groups was highly contingent on their reported use of psychotropic medication ($\lambda^2$ = 96.51;$\lambda^2_{.005}(1)$ =



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7.88), as well as contingent on being currently under the care of or having previously had psychiatric or psychological treatment/therapy ($\lambda^2 = 83.75; \lambda^2_{.005}(1) = 7.88$). Separation trauma experiences also proved influential in the distribution into clinical *versus* control groups; this variable is discussed in detail later in the chapter (see p.131). Thus clinical and control participants differed predictably on medication, therapeutic treatment and separation trauma experiences, but were otherwise well matched.

As mentioned above, four control participants reported levels of depression that were sub-clinical but high enough for them to consider it an important enough to mention within the context of the study. Regarding the comorbidity of unrelated diagnoses in the clinical group, the divisions were as follows: depression with comorbid anxiety (N = l0), depression with PTSD (N = 1), depression with psychosis (N = 1), depression with comorbid Bipolar Disorder (N = 10), OCD with comorbid Bipolar Disorder (N =1), OCD with Body Dysmorphic Disorder (BDD) (N =1),

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Analysis of main relationships

Below, the analyses involving clinical *vs*. control groups constituted independent samples, whereas those looking at potential differences between depression, OCD or separation-distress scores within a group (e.g., clinical OCD *vs*. depression) were classed and treated as related samples, since in this case they involved repeated measures on the same sample of subjects (Howell, 2002).

*Table 2*

*Differences amongst the three main variable groups (variables were treated as independent samples)*

| Groups for comparison *(Clinical vs. Control)* | *t* | *df* | $t_{sep.var.est}$* | *(df)* | F | Levene F(1,156) |
|---|---|---|---|---|---|---|
| OCD | 9.234** | 156 | 9.401** | *(146.406)* | 2.087** | 14.922** |
| Depression | 9.728** | 156 | 9.766** | *(155.899)* | 1.166 | .222 |
| Separation-distress | 11.400** | 156 | 11.809** | *(113.320)* | 5.484** | 46.364** |

| | OCD | | Depression | | Separation-distress | |
|---|---|---|---|---|---|---|
| | Clinical | Control | Clinical | Control | Clinical | Control |
| Means | 53.285 | 32.808 | 60.821 | 31.794 | 53.209 | 25.801 |
| Std.dev | 16.041 | 11.104 | 19.394 | 17.964 | 19.289 | 8.237 |
| Valid N | 83 | 75 | 83 | 75 | 83 | 75 |

Adjusted for violation of homogeneity of variance***

| | *t* | *df* | $t_{sep.var.est}$* | *(df)* | F | Levene F(1,156) |
|---|---|---|---|---|---|---|
| OCD | 9.074** | 148 | 9.064 | *(131.930)* | 2.072** | 13.340** |
| Separation-distress | 11.393** | 148 | 11.393 | *(99.877)* | 5.539** | 45.427** |

| | OCD | | Separation-distress | |
|---|---|---|---|---|
| | Clinical | Control | Clinical | Control |
| Means | 53.201 | 32.808 | 53.508 | 25.801 |
| Std.dev | 15.985 | 11.104 | 19.284 | 8.237 |
| Valid N | 75 | 75 | 75 | 75 |

**where $t_{sep.var.est}$ stands for the t statistic calculated on the basis of separate variance estimates for each sample group (degrees of freedom relating to this statistic for each test, are given in parentheses)*
***Marked results are significant at the level of p < .01; df = 156*
****equal samples sizes were used in this analysis, which cancels the threat to a robust test of variance, encountered in the case of heterogeneous variances (Howell, 2002)*

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Violation of Assumptions:

Provision was made for the violation of homogeneity of variances, which, it was apparent, held for the variables OCD and separation-distress, as shown by the significant Levene test results in each case. Normality was, however, maintained in these samples (the populations are symmetric, and equally and normally distributed; see *Appendix O* for distribution graphs). Clinical and control depression abide by the assumptions of both normality and homogeneity of variance, and therefore the original statistics pose no potential problems. Sample sizes were adjusted to be equal in order to check that the assumption of homogeneity was not providing inaccurate results for these two tests. It was clear that by adjusting for sample size to counter for potential difficulties raised by violation of homogeneity, both *t* and *F* statistics were only slightly altered, and remained significant at the level of $p < .01$. Means and standard deviations were also only slightly altered.

Clinical and control participants were shown to be from independent groups on measures of OCD ($t = 9.064$; $p < .01$), as well as on depression ($t = 9.728$; $p < .01$) and separation-distress ($t = 11.393$; $p < .01$).

Next, correlations amongst both clinical and control representations of main variables were carried out to gauge how closely they were interrelated; the results are shown below.

*Table 3*

*Correlations amongst clinical and control OCD, depression and separation-distress*

| Variable | OCD | Depression | S-D* | Control OCD | Control Depression | Control S-D |
|---|---|---|---|---|---|---|
| OCD | 1.000 | .694** | .625** | .066 | -.089 | .161 |
| Depression | .694** | 1.000 | .618** | .028 | -.057 | -.016 |
| S-D | .625** | .618** | 1.000 | -.104 | -.212 | -.142 |
| Control OCD | .066 | .028 | -.104 | 1.000 | .700** | .695** |
| Control Depr. | -.089 | -.057 | -.212 | .700** | 1.000 | .782** |
| Control S-D | .068 | -.016 | -.142 | .695** | .782** | 1.000 |

**In this table, separation-distress was abbreviated to S-D*
***Marked results are significant at the level of p < .01*

The above two tables indicated that clinical and control groups differed significantly on all three of the main research variables, with clinical participants exhibiting significantly higher scores on measures of OCD, depression and separation-distress. Large attendant *t*-values indicated a robust effect; the two groups differed by over nine standard deviations on each test of independence of variables. The three clinical factors correlated highly.

Similarly, control expressions of the variables also correlated highly within the control sample. Non-significant, weak correlations between clinical and control variables were found between the two groups. Measures of clinical and control depression were inversely correlated, as were scores on clinical and control separation-distress, clinical and control depression, clinical depression and control separation-distress, clinical separation-distress and control OCD, clinical separation-distress and control depression, and clinical OCD and control depression.

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*Table 4*

*Dependent t tests for comparisons within clinical and control groups*

| Variables for comparison | r(X,Y) | Diff. | Std.dev. of the diff. | *df* | *t* |
|---|---|---|---|---|---|
| OCD *vs.* S-D* *(Clinical)* | .645** | .076 | 15.177 | 82 | .964 |
| OCD *vs.* MDD *(Clinical)* | .712** | 7.536 | 13.832 | 82 | 4.964** |
| MDD *vs.* S-D | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| *(Clinical)* | .620** | 7.612 | 16.832 | 82 | 4.120** |
| OCD *vs*. S-D *(Control)* | .690** | 7.007 | 8.002 | 74 | 7.584** |
| OCD *vs.* MDD *(Control)* | .700** | 1.014 | 12.913 | 74 | 1.680 *(p = .499)* |
| MDD *vs*. S-D *(Control)* | .780** | 5.993 | 12.619 | 74 | 4.113** |

** Separation-distress was abbreviated to S-D and depression to MDD (Major Depressive Disorder)*
***p < .01*

Dependent or *related t* tests, which are applied to groups which share a large correlation (Howell, 2002), revealed that OCD and separation-distress showed no significant difference in scores, within the clinical group. However, clinical depression was higher than clinical OCD (Diff = 13.832; $t = 4.964$; $p < .01$) and higher than clinical separation-distress (Diff = 16.832; $t = 4.120$; $p < .01$). In the control group, only OCD and depression scores were not significantly different. Differences between control OCD and separation-distress were observed (control participants scored higher on OCD than on separation-distress (Diff = 7.007; $t = 7.584$, $p < .01$) and between separation-distress and depression (scores were higher on measures of depression; $t = 4.113$, $p < .01$).

Considering the question of clinical diagnoses raised above, clinical participants were divided into four groups based on their primary diagnoses – OCD, depression, comorbid (those with both OCD and depression), and a group in which depression was the primary diagnosis but whose participants reported one or more comorbid diagnoses that were not related to the study (i.e. a diagnosis other than OCD). Analysis of the group with exclusively OCD diagnoses revealed no differences between depression and OCD scores (Diff(std.dev) = .973(11.410), $t = .330$, $p = .746$), nor between separation-distress and depression scores (Diff(std.dev) = 4.374, $t = 18.463$, $p = .374$). Further calculations of the differences between these mutually exclusive clinical groups are given later in the chapter (p.148).

Below are detailed analyses of the differences between clinical and control variables and factors.

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*Table 5*

*Pooled variance, effect size, confidence intervals for difference between means* and squared point biserial correlations (Clinical* vs. *Control Groups)*

| | $s_p^2$ | $s_p$ | $t^{**}$ | $r_{pb}^2$ | $r_{pb}$ | g | $\mu_1 - \mu_2$ | $CI_{0.95}$* |
|---|---|---|---|---|---|---|---|---|
| OCD | 193.750 | 13.919 | 9.234 | .353 | .594 | 1.471 | 20.477 | $16.13 \leq \mu_1 - \mu_2 \leq 24.82$ |
| Depression | 350.790 | 18.729 | 9.728 | .378 | .614 | 1.550 | 29.028 | $23.18 \leq \mu_1 - \mu_2 \leq 34.88$ |
| Separation-distress | 227.747 | 15.091 | 11.400 | .454 | .674 | 1.816 | 27.408 | $22.70 \leq \mu_1 - \mu_2 \leq 32.12$ |
| MCQ Total | 1060.166 | 32.560 | 8.376 | .312 | .558 | 1.339 | 43.606 | $33.40 \leq \mu_1 - \mu_2 \leq 53.81$ |
| MCQ 1 | 127.749 | 11.303 | 5.138 | .146 | .381 | 0.821 | 9.284 | $5.74 \leq \mu_1 - \mu_2 \leq 12.83$ |
| MCQ2 | 125.678 | 11.211 | 8.522 | .319 | .565 | 1.362 | 15.274 | $11.71 \leq \mu_1 - \mu_2 \leq 18.79$ |
| MCQ3 | 52.756 | 7.263 | 7.110 | .256 | .500 | 1.137 | 8.256 | $5.98 \leq \mu_1 - \mu_2 \leq 10.53$ |
| MCQ4 | 58.640 | 7.658 | 7.154 | .248 | .498 | 1.144 | 8.759 | $6.36 \leq \mu_1 - \mu_2 \leq 11.16$ |
| MCQ5 | 20.333 | 4.509 | 2.819 | .049 | .221 | 0.451 | 2.032 | $0.62 \leq \mu_1 - \mu_2 \leq 3.45$ |
| PI Total | 1914.122 | 43.75 | 7.566 | .270 | .519 | 1.210 | 52.923 | $39.21 \leq \mu_1 - \mu_2 \leq 66.63$ |
| PI1 | 250.623 | 15.831 | 7.534 | .268 | .518 | 1.205 | 19.069 | $14.11 \leq \mu_1 - \mu_2 \leq 24.03$ |
| PI2 | 93.434 | 9.666 | 4.574 | .120 | .345 | 0.731 | 7.069 | $4.040 \leq \mu_1 - \mu_2 \leq 10.10$ |
| PI3 | 61.774 | 7.860 | 5.657 | .171 | .413 | 0.904 | 7.108 | $4.65 \leq \mu_1 - \mu_2 \leq 9.57$ |
| PI4 | 36.478 | 6.040 | 5.838 | .180 | .425 | 0.934 | 5.644 | $3.75 \leq \mu_1 - \mu_2 \leq 7.54$ |
| Y-BOCS | 73.210 | 8.556 | 8.811 | .334 | .578 | 1.409 | 12.053 | $9.37 \leq \mu_1 - \mu_2 \leq 14.73$ |
| Y-BOCS Obsessions | 22.622 | 4.756 | 8.142 | .198 | .445 | 1.302 | 6.191305 | $4.70 \leq \mu_1 - \mu_2 \leq 7.68$ |
| Y-BOCS Compulsions | 21.447 | 4.631 | 7.933 | .289 | .537 | 1.268 | 5.874 | $4.42 \leq \mu_1 - \mu_2 \leq 7.33$ |
| MDI | 149.664 | 12.234 | 9.254 | .354 | .595 | 1.474 | 18.036 | $14.22 \leq \mu_1 - \mu_2 \leq 21.86$ |
| PANAS | 110.788 | 10.526 | 3.252 | .064 | .253 | 0.520 | 5.472 | $2.165 \leq \mu_1 - \mu_2 \leq 8.78$ |
| PA | 67.744 | 8.231 | -6.042 | .191 | .437 | 0.966 | 7.951 | $-10.53 \leq \mu_1 - \mu_2 \leq 5.37$ |
| NA | 90.685 | 9.523 | 8.816 | .334 | .578 | 1.409 | 13.422 | $10.44 \leq \mu_1 - \mu_2 \leq 16.41$ |
| SASI | 115.410 | 10.743 | 5.582 | .167 | .409 | 0.892 | 9.588 | $6.22 \leq \mu_1 - \mu_2 \leq 12.95$ |
| SCI-SAS | 60.256 | 7.762 | 6.739 | .227 | .108 | 1.077 | 8.363 | $5.93 \leq \mu_1 - \mu_2 \leq 10.80$ |
| SCI-SAS Childhood | 19.612 | 4.429 | 5.494 | .163 | .404 | 0.878 | 3.890 | $2.50 \leq \mu_1 - \mu_2 \leq 5.28$ |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SCI-SAS | | | | | | | | |
| Adulthood | 17.517 | 4.185 | 6.685 | .224 | .473 | 1.069 | 4.473 | $3.16 \leq \mu_1 - \mu_2 \leq 5.78$ |
| ASA-CL27 | 338.599 | 18.401 | 7.086 | .245 | .495 | 1.133 | 20.846 | $15.08 \leq \mu_1 - \mu_2 \leq 26.61$ |
| ANPS***: | | | | | | | | |
| SEEK | 27.900 | 5.282 | -3.490 | .073 | .270 | 0.558 | 2.948 | $-4.60 \leq \mu_1 - \mu_2 \leq -1.29$ |
| FEAR | 40.428 | 6.358 | 6.247 | .201 | .449 | 0.999 | 6.351 | $4.36 \leq \mu_1 - \mu_2 \leq 8.34$ |
| CARE | 34.782 | 5.898 | -1.405 | .013 | .112 | 0.225 | 1.325 | $-3.17 \leq \mu_1 - \mu_2 \leq .52$ |
| ANGER | 47.687 | 6.906 | 4.233 | .104 | .322 | 0.677 | 4.674 | $2.51 \leq \mu_1 - \mu_2 \leq 6.84$ |
| PLAY | 31.849 | 5.643 | -7.934 | .289 | .537 | 1.269 | 7.159 | $-8.93 \leq \mu_1 - \mu_2 \leq 5.39$ |
| SADNESS | 29.195 | 5.403 | 5.557 | .166 | .408 | 0.888 | 4.800 | $3.12 \leq \mu_1 - \mu_2 \leq 6.49$ |
| SPIRITUAL-ITY | 61.923 | 7.869 | -1.132 | .008 | .091 | 0.181 | 1.424 | $-3.89 \leq \mu_1 - \mu_2 \leq 1.04$ |

*Where $s_p^2 = (N-1)s_1^2 + (N_2-1)s_2^2/N_1 + N_2 - 2$;*
*$t = Mean_1 - Mean_2/\sqrt{s_p 2/N_1 + s_p^2/N_2}$;*
*$rpb^2$ (squared point biserial correlation) $= t^2/t^2 + df$;*
*$g = Mean_1 - Mean_2/s_p$ (Hedge's g is a measure of effect size which is calculated in the same way as Cohen's d, but which refers to sample rather than population parameters*
*the confidence interval (CI) was set at 95% and represents the limits between which the true difference between population means is enclosed (see *given by* $\mu_1 - \mu_2$ ); $CI_{0.95} = (Mean_1 - Mean_2) \pm t_{0.025} s_{Mean1 - Mean2}$
***all results were significant at the level of $p < .01$, except MCQ5 & PANAS, which were significant at the $p < .05$ level; df =155*
****statistics were not reported for ANPS Total since this would be meaningless – the scale is scored according to subsets of factors which provide meaningful information;*
*Raw scores were used to calculate these results, except for the OCD, depression and separation-distress results, for which percentage scores were retained in order to compare with calculations throughout these findings*

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From examination of the table above, it was evident that there were large differences on all variables of interest between the clinical and control groups, reflected by large *t* statistics throughout analyses. Effect sizes were generally small, which is not unexpected in samples of this size. On examination of the largest effect sizes in consideration with *t* and point-biserial squared statistics (which provide a measure of the proportion of variance between the groups accounted for by a factor), the factors which appeared to demonstrate the greatest differences between groups were separation-distress, total PI, MCQ2, Y-BOCS Obsessions and Compulsions, MDI and negative affect.

95% confidence limits were reported on the difference in severity of, for example, OCD scores between clinical and non-clinical groups. Confidence intervals reported were relatively narrow, and enclosed the differences between means closely.

Bootstrapping is a statistical technique developed to counteract the disadvantages of conventional confidence interval calculations. It involves the random replacement (the general standard is 1000 replacements; Efron & Tibshirani, 2003 in Mallinckrodt & Wei, 2005) of values in the sample from the theoretical population – repeating some of the sample parameter values and leaving others out altogether, to create the closest representation of an accurate population sample.

*Table 6*

*Bootstrap confidence intervals**

| Variable | Bootstrapping Correlation | Lower CL | Upper CL | *SE* | Bootstrapping Mean | Lower CL | Upper CL | *SE* Bootstrap distr. |
|---|---|---|---|---|---|---|---|---|
| Clinical *vs* Control OCD | | | | | 41.583 | 38.216 | 45.070 | |
| Clinical OCD *vs* Clinical S-D** | .658 | .512 | .787 | .073 | 51.972 | 48.266 | 55.599 | 1.876 |
| Clinical *vs* Control Depression | | | | | 45.96 | 41.209 | 50.888 | 2.370 |

**CL = Confidence Limit; Confidence Interval's were set at 95%; Number of repetitions = 1 000*
**where S-D stands for separation-distress*

This confirmed that differences between variable means were substantial, and were enclosed by narrow confidence intervals.

Next, the differences between clinical and control scores on all OCD factors were compared, in order to see which factors represented the greatest divergence between the two groups.

*Table 7*

*Independent t test results for clinical vs control groups on all 11 OCD factors, four depression factors, and five separation-distress factors*

| Variable | $\overline{X}_1$(*std.dev*) | $\overline{X}_2$(*std.dev*) | *t*** | $t_{sep.var.est.}(df)$** |
|---|---|---|---|---|
| MCQ 1 | 52.726(17.930) | 40.596(12.778) | 4.859** | 4.450**(149.889) |
| MCQ 2 | 76.804(20.458) | 53.146(17.106) | 7.858** | 7.937**(156.350) |
| MCQ 3 | 61.488(21.701) | 41.033(15.401) | 6.779** | 6.908**(149.640) |

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| | | | | |
|---|---|---|---|---|
| MCQ 4 | 62.248(18.278) | 45.538(12.686) | 6.620** | 6.753**(148.305) |
| MCQ 5 | 67.687(18.074) | 60.429(17.014) | 2.599* | 2.607*(156.550) |
| | | | | |
| PI 1 | 45.028(27.249) | 17.294(18.283) | 7.443** | 7.606**(146.129) |
| PI 2 | 34.416(26.052) | 18.515(16.447) | 4.539** | 4.651**(141.920) |
| PI 3 | 37.054(28.559) | 15.083(19.253) | 5.618** | 5.740**(146.442) |
| PI 4 | 29.549(27.014) | 9.619(13.010) | 5.814** | 6.024**(122.454) |
| | | | | |
| Y-BOCS Obsessions | 45.471(27.764) | 14.867(18.744) | 8.048** | 8.222**(146.537) |
| Y-BOCS Compulsions | 41.905(28.005) | 12.867(16.423) | 7.853** | 8.075**(136.532) |
| | | | | |
| NA | 65.167(21.221) | 38.587(18.253) | 8.417** | 8.489**(156.792) |
| MDI | 56.546(21.400) | 26.133(19.321) | 9.339** | 9.388**(156.000) |
| | | | | |
| SASI | 49.505(26.859) | 27.222(19.908) | 5.694** | 5.776**(150.969) |
| SCI-SAS Childhood | 48.720(3.644) | 24.083(19.783) | 5.591** | 5.728**(135.862) |
| SCI-SAS Adulthood | 50.678(30.133) | 22.417(20.833) | 6.787** | 6.910**(146.327) |
| ASA-CL27 | 43.403(26.095) | 16.793(17.460) | 7.185** | 7.313**(146.819) |
| ANPS SADNESS | 72.375(9.541) | 62.804(11.706) | 5.439** | 5.373**(139.956) |

*df = 156; $\bar{X}_1$ = mean score*
***All results significant at the level of p (2-sided) < .01 (apart from the difference between clinical and control results on MCQ5 – these were significant at the level of *p < .05);*
*Percentage scores were used to calculate these differences*

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First, as a comparison with results in Studies II and III, the percentage severity reported for each factor was examined. Results for Study III were significantly higher than the previous two (Clinical *vs*. Study II: $t = 4.656$, $p < .01$; Clinical *vs*. Study III: $t = 4.064$, $p < .01$). However, in accordance with the previous two studies, the symptom with the lowest reported severity in the clinical group, at 29.55% was *Urges and worries of losing control over motor behaviours*, whilst 34.42% severity was reported for *Becoming contaminated*, 37.05% for *Checking behaviours*, and 45.03% for *Impaired control over mental abilities*; whereas higher scores for symptoms severity were obtained for MCQ factors, with 52.73% for *Positive beliefs about worry*, 61.49% for *Lack of cognitive confidence*, 62.25% for themes of *Superstition, punishment and responsibility*, 67.69% for *Cognitive self-consciousness*, and 76.80% for *Uncontrollability and danger*. Study III included the additional assessment of the Y-BOCS, for which clinical participants reported 41.91% severity on compulsions and 45.47% on obsessions.

Control participants showed a similar pattern, with a few notable differences. The least severe factor was also *Urges and worries of losing control over motor behaviours* (9.62%), but the highest for the PI factors was *Becoming contaminated* (18.52%) and not *Impaired control over mental abilities*, as in all other groups; whereas amongst MCQ factors, *Positive beliefs about worry* (40.60%) was similarly the least severe, but *Cognitive self-consciousness* (60.43) was the most highly endorsed factor. Y-BOCS Obsessions (14.87%) were also slightly (but not significantly) more severe than Compulsions (12.87%) in the control sample. As mentioned above, control scores on all factors were significantly lower than clinical scores.

In terms of depression, results showed an endorsement of the symptoms at the level of 56.55% for items of the Major Depression Inventory, and of 65.17% on the Negative Affect scale. Similarly in the control group, a severity score of 26.13% was obtained for items on the MDI, and of 38.59% for items on the NA. The pattern of results for both OCD and depression symptoms in the clinical and control groups was therefore consistent with those reported in Studies II and III. The results obtained for each factor in Study IV were significantly higher than in Study II, but showed a similar pattern of distribution.
Separation-distress factor analyses showed that the least severe symptom cluster in the clinical group was represented at 42.40% by ASA-CL27, followed by SCI-SAS Childhood (48.72%), the SASI (49.51%), SCI-SAS Adulthood (50.68%). ANPS SADNESS was the most severe (72.38%). The lowest and highest scoring factors were the same as in Study III, with some variation in the factor order in between. The control group in this study was similar, with ASA-CL27 again the least severe (16.79%), followed by SCI-SAS Adulthood, SCI-SAS Childhood, the SASI and finally SADNESS again as the highest (62.80%).

It was clear from Table 19 that the largest differences between clinical and control participants were in terms of their performances on the Y-BOCS Obsessions ($t$ = 8.05) and Compulsions ($t$ = 7.85), NA ($t$ = 8.42) and MDI ($t$ = 8.97) scales.

Based on this finding, a new total score for OCD was calculated (by averaging the MCQ2 (*Uncontrollability and danger*), PI1 (*Impaired control over mental abilities*), Y-BOCS Obsessions and Y-BOCS Compulsions factor scores), as well as for depression (by averaging scores on the NA (*Negative Affect scale*) and the MDI (*Major Depression Inventory*)). By correlating the four separation-distress scales with these new overall OCD and depression scores, it was determined that in the Clinical group, the ASA-CL27 and the ANPS showed the strongest correlations with OCD (r = 0.63; r = 0.52) and depression (r = 0.63; r = 0.61); therefore these subscales were used to calculate an average separation-distress score. In the Control group, OCD was most strongly correlated with the ASA-CL27 (r = 0.64) and the SCI-SAS (r = 0.55), whereas depression was most strongly correlated with the ASA-CL27 (r = 0.69) and the ANPS SADNESS subscale (r = 0.69); and thus these three measures were used to represent an average separation-distress score.

The purpose of these calculations was to determine, by looking at the most highly related scores, whether the results concerning the roles of separation-distress and fear anxiety (assessed by the four separation-distress scales and FEAR ANPS subscale, respectively) in OCD and depression were supported – i.e. that

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both were importantly implicated, but that FEAR yielded higher scores in these samples. Such results were reported for Study III, and similar results for Study IV are discussed below.

*t* tests were performed to determine the differences between the two independent samples in terms of these new variables. Further standard differences are also presented. $\overline{X}_1$ denotes the first group listed in the left hand column; $\overline{X}_2$ the second.

*Table 8*

*Investigation of differences between separation-distress and FEAR scores compared with OCD and depression, based on factors showing the greatest sample differences*

| Groups | $\overline{X}_1$(Std.dev) | $\overline{X}_2$(Std.dev) | *t* | $t_{sep.var.est}$ | F |
|---|---|---|---|---|---|
| Clinical/ Control OCD | 52.303(21.539) | 23.810(13.026) | 9.945** | 10.212** | 2.734** |
| Clinical/ Control depression | 86.214(28.873) | 51.449(24.337) | 8.156** | 8.235** | 1.408 |
| Clinical/ Control FEAR | 78.378(11.356) | 66.143(13.677) | 6.139** | 6.081** | 1.451 |
| Clinical/ Control Separation-distress | 56.993(16.775) | 34.545(13.346) | 9.263** | 9.382** | 1.580* |
| Clinical FEAR/ Separation-distress | 78.378(11.356) | 56.993(16.775) | 9.635** | 9.657** | 2.182** |
| Control FEAR/ Separation-distress | 66.143(13.677) | 34.545(13.346) | 14.320** | 14.320** | 1.050 |

**marked statistics significant at the level of p < .01*

Even though the factors that showed the greatest differences between clinical and control groups were used as the basis for these calculations, the finding remained that clinical results for fear anxiety as measured by the FEAR ANPS scale were higher than those for separation-distress as represented by the ASA-CL27 and SADNESS ANPS scales. This relationship was evident in both clinical and control groups.

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Separation-distress in exclusive clinical groups

It was important to evaluate whether there were significant differences between people diagnosed only with OCD, only with depression, and those with a comorbid diagnosis. For this purpose, the clinical group was broken down into four categories (the extra category is explained below), and *t* tests were applied to determine whether the variables were independent in this regard.

The clinical group was divided into four categories in order to probe the relationships amongst variables given participants' primary diagnoses. The groups were categorized as follows: participants diagnosed only with OCD, those only with depression, those with a diagnosis of comorbid OCD and depression, and those with an unrelated diagnosis additional to clinical depression (e.g., Body Dysmorphic Disorder, social anxiety disorders, phobias or Bipolar Disorder I/II, discussed above under participant exclusion criteria). One purpose of this categorical division was to analyze whether there were differences between the relative importance of FEAR as opposed to separation-distress, amongst the clinical groups, since previous analyses showed that the two emotions both appear significantly implicated in OCD and depression, and part of the research question was to determine whether separation-distress could be more strongly indicative of the disorders than FEAR. Results for each group in terms of their performance on these factors are presented below. Dependent *t* tests were performed since in each case, two sets of scores within the same group of participants were being tested – samples that are related in this way should be analyzed dependently (Howell, 2002).

*Table 9*

*t values for differences between dependent clinical variables in groups with different primary diagnoses*

| | Groups *(t values*)* | | | |
|---|---|---|---|---|
| Variables for comparison | OCD | Depression | Comorbid Group | Depression+* |
| FEAR/Separation-distress | 6.792** | 8.939** | 3.402** | 5.421** |
| FEAR/ SASI | 5.909** | 7.708** | 2.860** | 4.364** |
| FEAR/SCI-SAS | 5.407** | 6.026** | 3.250** | 4.108** |
| FEAR/ASA-CL27 | 5.794** | 8.312** | 4.145** | 6.355** |
| FEAR/SADNESS | 3.786** | 2.363 | 1.851 *(p = .074)* | 2.974** |
| FEAR/OCD | 7.303** | 12.376** | 4.246** | 8.387** |

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| | | | | |
|---|---|---|---|---|
| FEAR/MCQ2 | .422 *(p = .680)* | 12.755** | 6.922** | 11.721** |
| FEAR/MCQ2+PI | 3.301** | 16.686** | 5.872** | 10.028** |
| OCD/Separation-distress | .711 *(p = .489)* | .071 *(p = .944)* | .008 *(p = .994)* | 1.525 *(p = .134)* |
| MCQ2/Separation-distress | 5.727** | .592 *(p = .559)* | 1.416 *(p = .167)* | 1.559 *(p = .126)* |
| MCQ2+PI/Separation-distress | 2.540 *(p = .024)* | -2.921** | 1.119 *(p = .272)* | 2.481 *(p = .017)* |
| MCQ2/SADNESS | 1.153 *(p = .268)* | -9.640** | 5.238** | 10.855** |
| FEAR/Depression | 5.141** | 5.293** | 2.113* | 1.928 *(p = .060)* |
| Depression/Separation-distress | .917 *(p = .374)* | 2.584 *(p = .015)* | .949 *(p = .350)* | 3.547** |

Mean*(std.dev)*

| | | | | |
|---|---|---|---|---|
| OCD | 50.135(18.300) | 42.876(18.295) | 55.112(16.804) | 48.806(16.481) |
| Depression | 57.733(24.138) | 64.571(23.181) | 63.000(24.254) | 74.250(13.794) |
| Separation-distress | 49.142(19.851) | 51.066(19.180) | 55.058(23.082) | 56.812(19.742) |
| SASI | 41.333(26.967) | 45.283(24.887) | 54.722(29.154) | 54.444(28.132) |
| SCI-SAS | 43.124(28.573) | 45.759(28.782) | 51.758(28.979) | 54.005(30.583) |
| ASA-CL27 | 40.153(28.532) | 41.667(24.836) | 44.444(29.222) | 44.393(26.587) |
| ANPS SADNESS | 72.024(10.184) | 71.556(11.714) | 69.308(12.220) | 74.405(5.614) |
| ANPS FEAR | 79.524(9.870) | 75.893(13.376) | 77.455(12.675) | 80.655(8.631) |

**The group labelled* Depression+ *refers to all participants who reported diagnoses additional to depression (these included GAD, Bipolar I/II, social anxiety disorder, Body Dysmorphic Disorder (BDM), psychosis, acute anxiety, Attention Deficit Disorder (ADD), Posttraumatic Stress Disorder (PTSD), agoraphobia, bulimia,*

**t values are reported, with marked results significant at the level of **p < .01; for non-significant results, the* p *value is given in brackets*

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Several points were apparent from this analysis. In all four groups, FEAR scores were significantly higher than overall separation-distress scores, except for on the SADNESS subscale. In the depression and comorbid groups, FEAR and SADNESS ANPS subscales yielded comparable results. In the OCD group, FEAR was significantly higher than SADNESS, but not by a large amount ($\mu_1 - \mu_2 = 7.5$; $t = 3.786$, $p < .01$). Similarly, in the Depression+ group, which included participants with other diagnoses (unrelated to this study) in addition to depression, SADNESS was significantly lower than FEAR, although not by a large amount ($\mu_1 - \mu_2 = 6.250$; $t = 3.572$, $p < .01$).

In all four groups, OCD and separation-distress showed a close association (most strongly in the comorbid group; r = .802, $p = .01$), and were therefore drawn from the same population of scores. In the OCD and comorbid groups, separation-distress and depression were also shown to belong to the same population.

Amongst MCQ factors, MCQ factor 2, *uncontrollability and danger*, revealed the greatest difference in scores between clinical and control groups ($t = 7.858$, $p < .01$, and with the highest correlation to overall OCD score of all OCD factors, at r = .388; replicating results in Study I), as did PI factor 1, *impaired control over mental abilities* amongst PI factors ($t = 7.634$, $p < .01$, $r(X_{PI\ 1} Y_{OCD\ Overall}) = .904$; also reliably reproducing findings in Study I). When the combined average of these two factors was used to represent OCD, FEAR was higher than OCD in the OCD group ($t = 2.455$, $p < .01$), although separation-distress and OCD were shown to be from the same sample ($t = 1.830$, $p = .078$). Similarly, in the Depression, Comorbid and Depression+ groups, FEAR was shown to be higher than OCD, showing the largest effect in the Depression+ group ($t = 10.028$, $p = .01$. In these analyses, FEAR was highest in the Depression+ group ($\mu_{FEAR} = 80.655$, $\mu_{MCQ+PI} = 43.182$; $t = 10.028$, $p < .01$), followed in magnitude by scores in the OCD ($\mu = 79.524$), comorbid ($\mu = 77.455$), and depression ($\mu = 75.893$) groups, respectively.

When MCQ2 alone was used as an indicator of OCD, separation-distress and OCD were shown to belong to the same population in all groups except the OCD group, in which MCQ2 yielded significantly higher scores than the four separation-distress scales ($t = 3.639$, $p < .01$).

The relationships between Overall OCD and the various MCQ factors were, in descending order of correlative strength, MCQ2 *Uncontrollability and danger* (r = .388), MCQ3 *Lack of cognitive confidence* (r = .348), MCQ4 *Themes of superstition, punishment and responsibility* (r = .324), MCQ1 *Positive beliefs about worry* (r = .197) and MCQ5 *Cognitive self-consciousness* (r = .185). Correlations between Overall OCD and PI factors were: PI1 *Impaired control over mental abilities* (r = .904), PI3 *Checking behaviours* (r = .739), PI2 *Becoming contaminated* (r = .680), and PI4 *Urges and worries of losing control over motor behaviours* (r = .604). This was the same pattern of results indicated in Study I, except that MCQ4, 1 and 3 were ranked in that order between the strongest and most weakly correlating factors (MCQ1 and 5) in Study I.

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Relationships between OCD, depression and ANPS factors

To gain an initial impression of which subscales were implicated in OCD and depression, correlations amongst individual subscale scores and overall scores for OCD and depression were carried out.

*Table 10*

*Correlations between clinical OCD, depression and the ANPS subscales*

| Variable | OCD | Depression | SEEK | FEAR | CARE | ANGER | PLAY | SADNESS | SPIRITUALITY |
|---|---|---|---|---|---|---|---|---|---|
| OCD | 1.000 | .711** | -.090 | .641** | .052 | .028* | -.048 | .481** | -.077 |
| Depression | .711** | 1.000 | -.083 | .529** | .071 | .376** | -.066 | .547** | -.025 |
| SEEK | -.090 | -.083 | 1.000 | -.191 | .238* | -.086 | .386** | -.091 | 466** |
| FEAR | .641** | .529** | -.191 | 1.000 | .184 | .228* | -.161 | .631** | -.165 |
| CARE | .052 | .071 | .238* | .184 | 1.000 | -.055 | .416** | .234* | .417** |
| ANGER | .278** | .376** | -.086 | .228* | -.055 | 1.000 | -.002 | .160 | -.042 |
| PLAY | -.048 | -.066 | .386** | -.161 | .416** | -.002 | 1.000 | -.111 | .443** |
| SADNESS | .481** | .547** | -.091 | .631** | .234* | .160 | -.111 | 1.000 | -.038 |
| SPIRITUALITY | -.077 | -.025 | .466** | -.165 | .417** | -.042 | .443** | -.038 | 1.000 |
| Means | 53.285 | 60.821 | 66.889 | 78.378 | 72.827 | 74.634 | 59.875 | 72.375 | 72.469 |
| Std.dev. | 16.041 | 19.394 | 10.316 | 11.356 | 11.809 | 13.089 | 10.878 | 9.541 | 16.304 |

**Factor names are highlighted where these significant results had a direct bearing on the study questions*
**Marked correlations significant at the level of *p < .05 and **p < .01*

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It was evident from these results that OCD and depression in the clinical sample, aside from being highly correlated with each other (r = 0.71), were also strongly related to several of the ANPS factors. In descending order of rank, OCD was significantly correlated with FEAR (r = 0.64), SADNESS (r = 0.48) and ANGER (r = .28). Depression was also significantly but slightly less strongly correlated with FEAR (r = 0.53), and more strongly with ANGER (r = 0.38) and SADNESS (r = 0.55).

*Table 11*

*OCD and depression correlated with ANPS basic emotion subscales in the control sample.*

| Variable | OCD | Depression | SEEK | FEAR | CARE | ANGER | PLAY | SADNESS | SPIRITUALITY |
|---|---|---|---|---|---|---|---|---|---|
| OCD | 1.000 | .700** | .199 | .663** | .301** | .570** | -.014 | .562** | .238* |
| Depression | .700** | 1.000 | .042 | .634** | .231* | .560** | -.160 | .668** | .183 |
| SEEK | .199 | .042 | 1.000 | .272* | .554** | .241* | .802** | .295* | .575** |
| FEAR | .663** | .634** | .272* | 1.000 | .497** | .707** | .120 | .765** | .295* |
| CARE | .301** | .231* | .554** | .497** | 1.000 | .387** | .488** | .533** | .430** |
| ANGER | .570** | .560** | .241* | .707** | .387** | 1.000 | .120 | .716** | .286* |
| PLAY | -.014 | -.160 | .802** | .120 | .488** | .120 | 1.000 | .214 | .357** |
| SADNESS | .562** | .668** | .295* | .765** | .533** | .716** | .214 | 1.000 | .357** |
| SPIRITUALITY | .238* | .183 | .575** | .295* | .430** | .286* | .357** | .357** | 1.000 |
| Means | 32.808 | 31.794 | 71.190 | 66.143 | 74.190 | 65.405 | 71.690 | 62.952 | 75.417 |
| Standard dev. | 11.104 | 17.964 | 11.740 | 13.677 | 12.376 | 13.684 | 12.329 | 12.183 | 18.609 |

**Where significant results had a bearing on the study questions (i.e. correlations between factors that do not also correlate with OCD are not marked), corresponding factor names were highlighted in red*
**Marked correlations significant at the level of p < .05; **p < .01*

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The same pattern of results was apparent in the control group, whereby emotions significantly related to sub-clinical OCD were FEAR (r = 0.59), SADNESS (r = 0.48) and ANGER (r = 0.50). Interestingly, SADNESS showed the same strength of correlation in both the clinical and control sample. FEAR was marginally lower, and ANGER slightly higher.

Analysis of ANPS factors

Analyses were carried out to determine whether the clinical and control groups were independent in terms of the measures obtained for the seven subscales of the ANPS.

*Table12*

*Clinical vs Control performance on ANPS factors*

| Factor | Clinical Mean*(std.dev)* | Control Mean*(std.dev)* | *t* | $t_{sep.var.est.}$ | Levene(1,*df*) | *p*Lev. |
|---|---|---|---|---|---|---|
| SEEK | 66.093(12.586) | 71.190(11.740) | 2.631** | 2.642** | 0.596 | 0.441 |
| SADNESS | 71.494(12.490) | 62.952(12.183) | 4.331** | 4.336** | 0.296 | 0.587 |

| | | | | | |
|---|---|---|---|---|---|
| FEAR | 77.594(14.034) | 66.143(13.677) | 5.198** | 5.205** | 0.005 | 0.943 |
| ANGER | 73.846(15.520) | 65.405(13.684) | 3.601** | 3.621** | 0.859 | 0.355 |
| CARE | 71.386(14.390) | 74.190(12.376) | 1.310 | 1.321 | 2.051 | 0.154 |
| PLAY | 59.277(12.746) | 71.690(12.329) | 6.191** | 6.201** | 1.153 | 0.285 |
| SPIRITUALITY | 72.586(18.006) | 75.417(18.609) | 0.968 | 0.967 | 0.004 | 0.949 |

***p < 0.01*

Therefore participants in the clinical group scored significantly higher on SADNESS, FEAR and ANGER subscales, and significantly lower on SEEK and PLAY. Although control participants scored higher on the CARE and SPIRITUALITY subscales, the differences were not significant; such differences were due to chance in this sample. It is therefore evident that scores on separation-distress, anxiety, anger, serious-mindedness, and curiosity/goal-directed motivation (as reflected by SADNESS, FEAR, ANGER, PLAY and SEEK ANPS subscales, respectively) are significantly influenced by whether the participant falls into the clinical or control group.

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OCD and depression factors related to separation-distress

Owing to the significant relationships between OCD, depression and separation-distress, analyses were carried out to determine which specific OCD factors showed the strongest relationship with separation-distress, in order better to understand the relationship between the two variables. The table below shows to what extent each of the nine OCD factors were correlated with separation-distress. Both clinical and control scores are represented to demonstrate the contrast between these groups. Clinical results are labelled under *group* as *1* and control results as *2*, for Tables 13 and 14.

*Table 13*

*Separation-distress related to individual OCD factors in clinical and control groups*

| Factor | **Group** | **r(X,Y)** | **$r^2$** | ***T*** | **p** | **Mean** | | **Std. Dev** | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | OCD factor | Sep.Distress | OCD factor | Sep.Distress |
| MCQ 1 | 1 | .125 | .016 | 1.137 | .259 | 52.505 | 53.209 | 17.923 | 19.289 |
| | 2 | .471** | .221 | 4.556** | <.01 | 40.596 | 53.209 | 12.778 | 19.289 |
| MCQ 2 | 1 | .109 | .012 | .985 | .328 | 76.763 | 53.209 | 20.461 | 19.289 |
| | 2 | .636** | .404 | 7.037 | <.01 | 53.146 | 53.209 | 17.106 | 19.289 |
| MCQ 3 | 1 | .142 | .020 | 1.291 | .200 | 61.687 | 53.209 | 21.756 | 19.289 |
| | 2 | .580** | .337 | 6.087** | <.01 | 41.033 | 53.209 | 15.401 | 19.289 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MCQ 4 | 1 | .204 | .042 | 1.877 | .064 | 62.326 | 53.209 | 18.375 | 19.289 |
| | 2 | .521** | .271 | 5.215** | <.01 | 45.538 | 53.209 | 12.686 | 19.289 |
| MCQ 5 | 1 | .062 | .004 | .557 | 0.579 | 67.427 | 53.209 | 18.025 | 19.289 |
| | 2 | .221 | .049 | 1.936 | .057 | 60.429 | 53.209 | 17.014 | 19.289 |
| PI 1 | 1 | .563** | .317 | 6.135** | <.01 | 45.471 | 53.209 | 26.955 | 19.289 |
| | 2 | .680** | 462 | 7.913** | <.01 | 17.294 | 53.209 | 18.283 | 19.289 |
| PI 2 | 1 | .401** | .161 | 3.939** | <.01 | 34.830 | 53.209 | 25.930 | 19.289 |
| | 2 | .248 | .061 | 2.187 | .032 | 18.515 | 53.209 | 16.447 | 19.289 |
| PI 3 | 1 | .433** | .188 | 4.323** | <.01 | 37.500 | 53.209 | 28.437 | 19.289 |
| | 2 | .382** | .146 | 3.530** | <.01 | 15.083 | 53.209 | 19.253 | 19.289 |
| PI 4 | 1 | .591** | 0.350 | 6.601** | <.01 | 29.905 | 53.209 | 26.979 | 19.289 |
| | 2 | .473** | .224 | 4.588** | <.01 | 9.619 | 53.209 | 13.010 | 19.289 |
| Y-BOCS Obsessions | 1 | .482** | .232 | 4.948** | <.01 | 46.024 | 53.209 | 27.472 | 19.289 |
| | 2 | .371** | .137 | 3.410** | <.01 | 14.867 | 53.209 | 18.744 | 19.289 |
| Y-BOCS Compulsions | 1 | .453** | .205 | 4.574** | <.01 | 42.410 | 53.209 | 27.788 | 19.289 |
| | 2 | .341** | .116 | 3.099** | <.01 | 12.867 | 53.209 | 16.423 | 19.289 |

*Relationships between MCQ, PI and Y-BOCS factors, and separation-distress (percentage scores)*
***Marked results significant at p < 0.01; N = 84 (casewise deletion of missing data)*

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Results presented in Table 13 above show that MCQ factors correlated more highly with separation-distress levels in the control than in the clinical sample. Except for PI factor 1, however, all PI and Y-BOCS OCD factors were more strongly correlated with separation-distress in the clinical sample. All significant results were significant at the $p$ <.01 level; no further factors were significant at $p$ < .05. The magnitude of the $t$ statistics that accompanied the highest correlations confirmed that these factors were the most highly related to separation-distress: In the control sample, MCQ2 ($t$ = 7.037), PI1 ($t$ = 7.913); and in the clinical sample, the PI4 ($t$ = 6.601), Y-BOCS Obsessions ($t$ = 4.948) and Y-BOCS Compulsions ($t$ = 4.574).

The same analysis was carried out for depression factors, to obtain a more accurate impression of its relationship with separation-distress. Positive Affect (PA) was also included in this analysis to look at its relationship to the variable of interest, as a comparison to NA.

*Table 14*

*Separation-distress related to various depression factors in clinical and control groups*

| Factor | Group | r(X,Y) | $r^2$ | *t* | *p* | Mean | | Std.Dev | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Depression factor | Sep. Distress | Depression factor | Sep. Distress |
| MDI 1st 3 items | 1 | .484** | .234 | 4.973** | <.01 | 67.229 | 53.209 | 21.770 | 19.289 |
| | 2 | .661** | .437 | 7.532** | <.01 | 33.422 | 53.209 | 22.421 | 19.289 |
| MDI last 7 items | 1 | .546** | .298 | 5.866** | <.01 | 62.306 | 53.209 | 23.643 | 19.289 |
| | 2 | .742** | .551 | 9.466** | <.01 | 28.533 | 53.209 | 21.625 | 19.289 |
| PA | 1 | -.125 | .016 | -1.137 | .259 | 47.398 | 53.209 | 17.024 | 19.289 |
| | 2 | -.295* | .087* | -2.636* | .010 | 62.453 | 53.209 | 17.316 | 19.289 |
| NA | 1 | .586** | .343 | 6.504** | <.01 | 65.952 | 53.209 | 20.085 | 19.289 |
| | 2 | .735** | .540 | 9.252** | <.01 | 38.587 | 53.209 | 18.253 | 19.289 |

*Relationships between MDI and PANAS factors, and separation-distress*
**Marked results significant at the level of p < 0.05; **p < 01*
*N = 84 (casewise deletion of missing data)*

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An analysis of the correlation between control positive affect (PA) and *control* separation, r = -.295, *t* = -2.636, *p* < .05, indicated a substantially larger inverse (and significant) relationship between control depression than that between clinical depression and positive affect (r = -.125, *t* = -1.137).

Again, it was evident that the control group showed stronger relationships between the factors measuring OCD and depression, and those evaluating separation-distress. All variables were, however, significantly related to one another and to separation-distress.

Scores on the ANPS SADNESS subscale were compared for independence amongst the four clinical groups, in order to gain an impression of whether the quality of separation-distress may be different in OCD and depression.

*Table 15*

*Independence of ANPS SADNESS scores in the exclusive categorical clinical groups*

| Groups | Mean$_1$ *(Std.dev)* | Mean$_2$ *(Std.dev)* | *t* | *p* | *df* | F | *p* |
|---|---|---|---|---|---|---|---|
| OCD *vs*. Depression | 72.024 *(10.184)* | 71.556 *(11.714)* | .130 | .897 | 41 | 1.323 | .593 |
| OCD *vs*. Comorbid | 72.024 *(10.184)* | 69.308 *(12.220)* | .670 | .508 | 29 | 1.440 | .501 |
| OCD *vs*. Depression+ | 72.024 *(10.184)* | 74.405 *(5.614)* | .943 | .352 | 37 | 3.291 | .011 |
| Depression *vs*. Comorbid | 71.556 *(11.714)* | 69.308 *(12.220)* | .603 | .550 | 42 | 1.088 | .820 |
| Depression *vs*. Depression+ | 71.556 *(11.714)* | 74.405 *(5.170)* | 1.088 | .282 | 50 | 4.354** | <.01 |
| Comorbid *vs*. Depression+ | 69.308 *(12.220)* | 74.405 *(5.614)* | 1.788 | .082 | 38 | 4.738 | <.01 |

**percentage scores are given in this table*
***p < .01*

Above are the results from the analysis of differences amongst SADNESS scores between the four clinical groups. They indicated that ANPS SADNESS scores were highest in the depression+ group, followed by the OCD, depression and comorbid groups, in that order. However, none of the tests were significant. Therefore, whether participants were diagnosed primarily with OCD, depression, both (a comorbid diagnosis of OCD and depression), or depression with a comorbid diagnosis unrelated to this study, this had no discernable effect on their scores on the SADNESS subscale of the ANPS. This subscale is considered a strong indicator of the PANIC emotion substrate and, therefore, of separation-distress.

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Separation-distress scale validation study

An additional aim of this study was to examine the four separation-distress scales for their psychometric properties, including convergent and discriminant validity, as well as internal consistency, with the intention of contributing to the growing literature on the reliability and validity of separation-distress measures. Information on the psychometrics of separation-distress evaluations would be very useful,

particularly since research into the systematic assessment of separation-distress is in its early phases (e.g., Silove *et al*., 1995).

Construct Validity:

The purpose of determining construct validity in psychometrics is to evaluate whether a measurement instrument is assessing the theoretical psychological construct was intended to represent. This presents a problem in that clearly the construct must be defined as represented by *some* measure first, against which subsequent scales may be compared. Construct validity is therefore usually established deductively, by defining a "universe of items and sampling systematically within this universe to establish the test" (Cooper, Lawrence, & Pervin, 1998, p.136). It must be shown that the items being used are a "sample of the universe" of items which is being systematically researched. The concept of this type of validity is based upon showing that a common factor underlies different reported manifestations or measurements. As discussed in methodology sections considering the selection of measurement tools, there is theoretical foundation for haven chosen the four scales, SASI, SCI-SAS, ASA-CL27 and ANPS SADNESS as measures of separation-distress. The scale validity study addressed whether these could be said to represent the same underlying construct.

Convergent Validity

Basic correlations were calculated to obtain data on how closely separation-distress measures were related in both clinical and control samples.

*Table 16*

*Correlation results for convergence of separation-distress scales in the clinical sample.*

| Measures | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS | SCI-SAS Childhood | SCI-SAS Adulthood |
|---|---|---|---|---|---|---|
| SASI | 1.000 | 0.816* | 0.663* | 0.383* | 0.822* | 0.666* |
| SCI-SAS | 0.816* | 1.000 | 0.766* | 0.336* | 0.924* | 0.907* |
| SCI-SAS Childhood | 0.822* | 0.924* | 0.671* | 0.254 | 1.000 | 0.676* |
| SCI-SAS Adulthood | 0.666* | 0.907* | 0.735* | 0.366* | 0.676* | 1.000 |
| ASA-CL27 | 0.663* | 0.766* | 1.000 | 0.404* | 0.671* | 0.735* |
| ANPS SADNESS | 0.383* | 0.336* | 0.404* | 1.000 | 0.254* | 0.366* |
| **Mean | 22.277 | 15.904 | 35.157 | 40.524 | 7.795 | 8.108 |
| *(std.dev)* | *(12.086)* | *(9.278)* | *(21.137)* | *(5.*311) | *(5.312)* | *(4.821)* |
| Percentage Mean | 49.505 | 49.699 | 43.403 | 72.375 | 48.720 | 50.678 |
| *(std.dev)* | *(26.859)* | *(28.995)* | *(26.095)* | *(9.541)* | *(33.198)* | *(30.133)* |

** p < 0.01; N = 84 (casewise deletion of missing data)*

***Means and standard deviations given for both raw and percentage scores*

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These results showed that all four measures were significantly correlated at the level of $p < .01$, and were moderate to high, which gave a good indication that they were measuring a common underlying construct/factor. It was, however, clear that the ANPS SADNESS subscale was related the least strongly to each other scale. Whilst it retained its commonality owing to the high level of significance, it was also noted that this scale departed slightly from the psychological quality represented by this selection of measures. The slight divergence of this scale in comparison to the others has already been noted in previous sections on, for example, division of the clinical group into primary diagnostic divisions.

*Correlations with other variables – clinical Sample*

To further investigate convergent validity, correlations with other, theoretically related variables, as described in Chapter Six, were carried out.

*Table 17*

*Correlation results for convergence of separation-distress scales in the control sample*

| Measures | OCD | Depression | Negative Affect (NA) | Mean*(std.dev)* |
|---|---|---|---|---|
| SASI | 0.442* | 0.457* | 0.456* | |
| SCI-SAS | 0.498* | 0.461* | 0.445* | |
| SCI-SAS Childhood | 0.433** | 0.388** | 0.378** | |
| SCI-SAS Adulthood | 0.480** | 0.459** | 0.440** | |
| ASA-CL27 | 0.666* | 0.612* | 0.547* | |
| ANPS SADNESS | 0.481** | 0.547* | 0.555* | |
| OCD | 1.000 | 0.711* | 0.665* | 53.285*(16.041)* |
| Depression | 0.711** | 1.000 | 0.913* | 60.821*(19.394)* |
| NA | 0.665** | 0.913* | 1.000 | 65.571*(20.266)* |

**marked correlations were significant at the level of p < .05, **p < .01;*
*N = 82 (casewise deletion of missing data)*

All correlations were significant. ANPS SADNESS again demonstrated a slight divergence in that it shared stronger correlations with OCD, depression and negative affect than with the other scales; whereas those scales showed the reverse pattern, correlating more strongly with each other. However, all results were significant, and the other three scales shared moderately high correlations (at the level of $p < .05$) with OCD, depression and negative affect.

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*Table 18*

*Correlation results for convergence of separation-distress scales in the control sample*

| Measures | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS |
|---|---|---|---|---|
| SASI | 1.000 | 0.644* | 0.611* | 0.387* |
| SCI-SAS | 0.644* | 1.000 | 0.696* | 0.452* |
| ASA-CL27 | 0.611* | 0.696* | 1.000 | 0.417* |
| ANPS SADNESS | 0.387* | 0.452* | 0.417* | 1.000 |
| Means(%) | 12.689(27.822) | 7.541(23.250) | 14.311(17.432) | 35.730(62.952) |
| Std.dev(%) | 8.998(20.124) | 5.589(17.560) | 14.734(18.182) | 5.470(12.183) |

** p < .01; N = 73 (casewise deletion of missing data)*

The same trend was observed in the control group, in which correlations were lower overall, although still significant at the $p < .01$ level.

*Table 19*

*Correlations between separation-distress in the control sample, and other variables*

| Measures | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS | OCD | Depression | NA |
|---|---|---|---|---|---|---|---|
| SASI | 1.000 | 0.653** | 0.616** | 0.402** | 0.556** | 0.621** | 0.616** |
| SCI-SAS | 0.653** | 1.000 | 0.700** | 0.449** | 0.603** | 0.640** | 0.560** |
| ASA-CL27 | 0.617** | 0.700** | 1.000 | 0.398** | 0.654** | 0.690** | 0.629** |
| ANPS SADNESS | 0.402** | 0.449** | 0.398** | 1.000 | 0.572** | 0.668** | 0.620** |
| OCD | 0.556** | 0.603** | 0.654** | 0.562** | 1.000 | 0.700** | 0.665** |
| Depression | 0.621** | 0.640** | 0.690** | 0.668** | 0.700** | 1.000 | 0.941** |
| NA | 0.616** | 0.555** | 0.629** | 0.620** | 0.665 | 0.941** | 1.000 |

***p < .01; N = 74 (casewise deletion of missing data)*

In an analysis of other related variables in the control sample, all four scales were correlated at the level of $p < .01$, with one another, and with OCD, depression and separation-distress.

Discriminant validity

Based on the negative correlations between ANPS SADNESS and various other factors throughout analyses, the relationships of the four separation-distress scales with these factors were examined in

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order to gain an impression of discriminant validity. Based on the observations mentioned, as well as on established literature, measures of separation-distress were expected to differ significantly from those of seeking, play and spirituality.

*Table 20*

*Discriminant validity in the clinical sample*

| Measure | SEEK | PLAY | SPIRITUALITY | PA | NA |
|---|---|---|---|---|---|
| SASI | 0.135 | 0.236* | 0.181 | 0.048 | 0.488** |
| SCI-SAS | 0.190 | 0.175 | 0.162 | -0.012 | 0.478** |
| ASA-CL27 | 0.072 | 0.174 | 0.061 | -0.087 | 0.571** |
| ANPS SADNESS | 0.314** | 0.260* | 0.264* | -0.010 | 0.621** |
| SEEK | 1.000 | 0.573** | 0.616** | 0.562** | 0.127 |
| PLAY | 0.573** | 1.000 | 0.570** | 0.471** | 0.139 |
| SPIRITUALITY | 0.616** | 0.570** | 1.000 | 0.441** | 0.147 |
| PA | 0.562** | 0.471** | 0.441** | 1.000 | -0.126 |
| NA | 0.127 | 0.139 | 0.147 | -0.126 | 1.000 |
| Means(%) | 37.458(66.137) | 33.530(59.277) | 5.265(72.586) | 23.699(46.488) | 32.976(65.293) |
| Std.dev(%) | 5.777(12.725) | 6.091(12.746) | 7.826(18.006) | 8.512(17.713) | 10.043(21.429) |

*Marked correlations significant at the level of *p < 0.05, **p < .01; N = 82*

Factors regarded as belonging theoretically to the "positive" spectrum of affect and therefore expected to show weak or inverted relationships with separation-distress measures, were analyzed for discriminant validity. Once again, negative affect was included in the table above, as a result against which to contrast the other constructs. The positive factors showed no relationship with most of the separation-distress scales. SEEK and SADNESS were correlated at the $p < .01$ level (r = .314), PLAY revealed mild correlations with the SASI and SADNESS at a significance level of $p < .05$. The correlation between SPIRITUALITY and SADNESS was r = .264, $p < .01$. ANPS SADNESS, however, was positively and significantly correlated with SEEK, PLAY, SPIRITUALITY and PA.

It was also important to note the relationships amongst overall separation-distress scores across the three sample groups, as well as amongst overall FEAR scores.

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Reliability

It was possible to investigate reliability to a small extent, by comparing results on the four separation-distress measures obtained in Studies III and in the control group of Study IV. Performance on the same measures was tested in different but comparable samples; i.e. both samples consisted of non-clinical participants. In Table 21 below, '*Group 1'* refers to Study II and the control group from Study IV as *'Group 2'*.

*Table 21*

*Reliability of separation-distress evaluations over Studies III and IV*

| Scale | Group | Mean*(std.dev)* | Valid N | Cronbach α | Inter-item corr. | Corr. 1st & 2nd half of scale | Split-half reliability |
|---|---|---|---|---|---|---|---|
| SASI | 1 | 14.285*(9798)* | 49 | .905 | .402 | .837 | .912 |
| | 2 | 12.722*(8.992)* | 72 | .896 | .380 | .861 | .925 |
| SCI-SAS | 1 | 8.122*(6.966)* | 49 | .898 | .369 | .715 | .834 |
| | 2 | 7.569*(5.689)* | 72 | .856 | .283 | .520 | .684 |
| ASA-CL27 | 1 | 18.531*(17.017)* | 49 | .955 | .453 | .908 | .952 |
| | 2 | 14.528*(14.905)* | 72 | .955 | .454 | .889 | .941 |
| ANPS SADNESS | 1 | 34.519*(3.994)* | 54 | .301 | .034 | .383 | .554 |
| | 2 | 35.750*(5.443)* | 73 | .732 | .168 | .622 | .770 |

*Comparison of separation-distress results between Studies III and IV*

These results were indicative of comparable performances between the two groups on all four measures used to evaluate separation-distress. High Cronbach alpha, 1st/2nd half scale correlation and split-half reliability coefficients were evident for all scales, except for the ANPS SADNESS subscale (in both groups). Control group ANPS SADNESS coefficients were, however, higher than those for the non-clinical group, although still noticeably lower than coefficients for the other three measures. Inter-item correlation was markedly lower for all four measures, and especially so in both SADNESS subscales.

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*Table 22*

*Correlations between fear anxiety and separation-distress in Studies III and IV*

| Sample | NC* FEAR | Control FEAR | Clinical FEAR | NC S-D | Control S-D | Clinical S-D |
|---|---|---|---|---|---|---|
| NC FEAR | 1.000 | .062 | .153 | .535** | .093 | .093 |
| Control FEAR | .062 | 1.000 | .159 | -.025 | .761 | .012 |
| Clinical FEAR | .153 | .159 | .1.000 | .026 | .258 | .552** |
| NC S-D | .535** | -.025 | .026 | 1.000 | .060 | -.087 |
| Control S-D | .093 | .761** | .258 | .060 | 1.000 | -.038 |
| Clinical S-D | .093 | .012 | .552** | -.087 | -.038 | 1.000 |
| Means | 69.279 | 67.097 | 76.819 | 35.955 | 26.073 | 50.831 |
| *Std.dev* | 14.727 | 14.472 | 11.173 | 12.827 | 8.369 | 18.916 |

**where NC stands for non-clinical (the Study III sample was a non-clinical one, as opposed to the clinical group in Study IV) and S-D for separation-distress*

***p < .01*

It was evident from results presented in Table 22 above that FEAR results in the non-clinical Study III sample group were only significantly related to separation-distress in the same group. Likewise, FEAR scores in the Study IV control group were only significantly related to separation-distress scores in the same group. And finally, FEAR results in the Study IV clinical group were only significantly related to separation-distress scores in the same group. There were no significant interrelations across or between groups.

*Table 23*

*Discriminant validity in the control sample*

| Measure | SEEK | PLAY | SPIRITUALITY | PA | NA |
|---|---|---|---|---|---|
| SASI | 0.025 | -0.116 | 0.213 | -0.265 | 0.616** |
| SCI-SAS | 0.050 | -0.113 | 0.151 | -0.356** | 0.560** |
| ASA-CL27 | 0.036 | -0.230 | 0.121 | -0.259 | 0.629** |
| ANPS SADNESS | 0.295 | 0.214 | 0.357** | -0.117 | 0.620** |
| SEEK | 1.000 | 0.802** | 0.575** | 0.546** | 0.071 |
| PLAY | 0.802** | 1.000 | 0.357** | 0.590** | -0.149 |
| SPIRITUALITY | 0.575** | 0.357** | 1.000 | 0.289 | 0.216 |
| PA | 0.546** | 0.590** | 0.289 | 1.000 | -0.217 |

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| | | | | | |
|---|---|---|---|---|---|
| NA | 0.071 | -0.149 | 0.216 | -0.217 | 1.000 |
| Means(%) | 40.405(71.190) | 40.689(71.690) | 36.689(75.417) | 31.649(62.453) | 19.554(38.587) |
| Std.dev(%) | 4.664(11.740) | 5.093(12.329) | 7.917(18.609) | 7.903(17.316) | 8.904(18.253) |

*Marked correlations significant at the level of *p < 0.05, **p < .01; N = 73*

In the control sample, SPIRITUALITY was significantly related to SADNESS (r = .357, $p < .01$). The PA and SCI-SAS showed a significantly negative correlation, indicating that increases in one are predictive of decreases in the other.

Internal Consistency

As described in Study II, internal consistency was investigated in order to determine the degree of consistency in item results within each separation-distress measure.

Calculations were done for both clinical and control groups. Given the significant differences already shown between the two groups, if both yielded high internal consistency, this would provide further evidence both for their independence as groups and for the reliability of the separation-distress scales.

*Table 24*

*Split-half reliability and Inter-item correlation* in the clinical group*

| Variable | Split-half reliability (Cronbach α) | Standardized (Cronbach α) | Inter-item correlation | Corr. 1st & 2nd half | Attenuation corrected | Split-half | Guttman split-half |
|---|---|---|---|---|---|---|---|
| *Clinical* | | | | | | | |
| SASI | .926 | .926 | .466 | .874 | - | .933 | .932 |
| SCI-SAS | .929 | .930 | .465 | .638 | .708 | .779 | .778 |
| ASA-CL27 | .956 | .956 | .460 | .838 | .909 | .912 | .912 |
| ANPS SADNESS | .663 | .676 | .133 | .510 | - | .676 | .671 |

| | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS |
|---|---|---|---|---|
| Means | 22.608 | 15.782 | 35.722 | 40.438 |
| Std.dev | 12.043 | 9.179 | 21.269 | 5.355 |

*see Appendix P for details of inter-item correlations with the deletion of each successive variable*

Exceptionally high results were obtained for all separation-distress measurement scales.

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*Table 25*

*Split-half reliability and Inter-item correlation** in the control group*

| Variable | Split-half reliability (Cronbach α) | Standardized (Cronbach α) | Inter-item correlation | Corr. 1st & 2nd half | Attenuation corrected | Split-half | Guttman split-half |
|---|---|---|---|---|---|---|---|
| *Control* | | | | | | | |
| SASI | .896 | .897 | .380 | .861 | - | .925 | .924 |
| SCI-SAS | .856 | .860 | .283 | .520 | .653 | .684 | .623 |
| ASA-CL27 | .955 | .955 | .454 | .889 | .971 | .941 | .939 |
| ANPS SADNESS | .734 | .732 | .168 | .622 | - | .767 | .749 |

| | SASI | SCI-SAS | ASA-CL27 | ANPS SADNESS |
|---|---|---|---|---|
| Means | 12.722 | 7.569 | 14.528 | 35.750 |
| Std.dev | 8.992 | 5.689 | 14.905 | 5.443 |

***see Appendix P for details of inter-item correlations with the deletion of each successive variable*

High internal consistency was also obtained in the control group.

Early separation trauma

*Number of incidences*. As in Study III, separation trauma experiences were first analysed to determine whether the number of separation trauma incidences participants had experienced significantly influenced whether they fell into the clinical or control group. The clinical group was divided into seven separate groups, based on the number of timeframes participants reported having experienced separation trauma. These included: $X_0$ (those who experienced no separation), $X_1$ (separation in one of the specified timeframes), $X_2$ (separation in two timeframes), $X_3$ (separation in three timeframes), $X_4$ (separation in four timeframes), $X_7$ (separation in seven timeframes), and $X_9$ (separation in nine timeframes). Each pair was analysed for independence of variables. *t* test results showed that all variables originated from the same group.

*Chi-square contingency table analysis.* The central research question was whether the presence or absence of separation trauma in early childhood influenced the development of psychological disturbances in adult life; in this case, on their development of OCD, depression and an above average tendency towards separation-distress. Chi-square contingency table analysis was carried out for two classification variables at a time. Presented in the table below are a series of 2 x 2 contingency table analyses, which addressed the hypotheses listed below. In statistical analytic terms, the purpose of these analyses was to determine whether the distribution of OCD, depression and separation-distress scores into clinical and control groups was contingent on separation trauma.

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1. $H_0$: OCD and depression diagnoses were independent of early separation trauma experiences.
   $H_1$: Whether participants fell into the clinical or control group was contingent on the incidence of early separation trauma.
2. $H_0$ : OCD diagnoses were independent of early separation trauma experiences.
   $H_1$ : Whether participants fell into the clinical OCD group was contingent on the incidence of early separation trauma.
3. As in 2, but for depression.
4. $H_0$ : Distribution into the upper or lower scoring halves of clinical OCD scores was independent of separation trauma experiences
   $H_1$ : Distribution into the upper or lower scoring halves of clinical OCD scores was contingent on separation trauma experiences
5. As in 4, but for clinical depression scores
6. As in 5, but for control OCD scores
7. As in 6, but for control depression scores
8. $H_0$: The distribution of scores into clinical, control and non-clinical groups was independent of the number of separation trauma incidences reported
   $H_1$: The distribution of scores into clinical, control and non-clinical groups was contingent on the number of occurrences of early separation trauma
9. $H_0$: The distribution of scores into clinical control and non-clinical groups was independent of separation trauma experiences
   $H_1$: The distribution of scores in clinical, control and non-clinical groups was contingent on separation trauma experiences

Contingency tables with nine or fewer cells are considered small, and all expected frequencies in these tables should be at least 5 in total (Howell, 1989: 291). The calculations carried out on these data satisfy those conditions (see *Appendix Q* for details of observed and expected frequencies).

*Table 26*

*Chi-square results for clinical and control group analysis*

| $\lambda^2$ test*: *Contingencies of The following groupings On ST* | Obtained $\lambda^2$ | Critical $\lambda^2$ | *df*(k-1)** | *p**** |
|---|---|---|---|---|
| 1. Clinical *vs.* Control group (OCD & depression diagnoses) | 6.749 | 6.63 | 1 | .01 |
| 2. Clinical *vs.* Control OCD diagnoses | 2.564 | 5.99 | 2 | .05 |



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| | | | | |
|---|---|---|---|---|
| 3. Clinical *vs*. Control depression diagnoses | 0.200 | 3.84 | 1 | .05 |
| 4. Upper *vs*. lower scoring halves of clinical OCD scores | 0.201 | 3.84 | 1 | .05 |
| 5. Upper *vs*. lower scoring halves of clinical depression scores | 0.200 | 3.84 | 1 | .05 |
| 6. Upper *vs*. lower Scoring halves of Control OCD scores | 3.560 | 3.84 | 1 | .05 |
| 7. Upper *vs*. lower Scoring halves of Control depression scores | 3.600 | 3.84 | 1 | .05 |
| 8. Clinical *vs*. Control *vs*. Non-Clinical *(number of categories)* | 9.410 | 9.49 | 4 | .05 |
| 9. Clinical *vs*. Control *vs*. Non-Clinical *(incidence of separation trauma)* | 7.235 | 5.99 | 2 | .05 |

**where* $\lambda^2 = \Sigma\,(O - E)^2/E$ *{O =Observed frequency; E = Expected frequency}*
***where k = number of categories; for contingency tables with 2 columns and 2 cells, e.g.:*
*df = (k-1)(k-1) = (2-1)(2-1) = 1*
****In this table, values given for p denote the level cross-referenced for and corresponding to the df value*

Although the condition of a minimum of 5 in each expected frequency cell was satisfied, Yates' correction for continuity (Yates, 1934) was applied to the significant results obtained for 2 x 2 contingency tables, in order to confirm their significance should there be any doubt due to the relatively small numbers involved. The correction consists of subtracting the value of 0.5 from each absolute numerator in the $\lambda^2$ equation (given under Table 26 above), before squaring. For the calculations of whether distribution of participants into clinical and control groups was contingent on separation trauma, the obtained $\lambda^2$ value = 6.791, maintaining its significance at $p < 0.01$, $\lambda^2_{.05}(6.63)$. The correction is based on the fact that the theoretical $\lambda^2$ distribution is continuous, whereas the obtained distribution is discrete and fixed –

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therefore the Yates' correction attempts to correct for this discrepancy by an adjustment which allows for an $\lambda^2$ statistic that is close to the true probabilities calculated on the basis of the individual probabilities of all possible tables *with those marginal totals* (the row and column totals)" (Howell, 2002: 152). However, since in reality marginal totals are very rarely fixed (i.e. if the experiment was repeated, the individual cell totals may well change, *but so might the marginal totals*. In this study, the realistic chances of marginal totals remaining fixed is slim, since a different subset of participants would probably yield variable separation trauma results, and therefore it is not very useful to consider the true probability of fixed marginal data (e.g., Overall, 1980).

The contingency analysis for Hypothesis #8, the influence of number of separation trauma categories on grouping into non-clinical, control and clinical samples, is very nearly significant, and would have been so at the level of $p = .100$ ($\lambda^2_{0.10}(4) = 7.78$). However, at the conventional level of significance ($p < .05$) this analysis remains insignificant. The conclusion remains that distribution of scores into clinical, control and non-clinical samples was not contingent on the specific number of timeframes during which participants in *Studies III* and *IV* experienced separation trauma.

As was apparent from the results reported in Table 26, it was necessary to accept all but two of the null hypotheses. First, overall clinical diagnosis (either OCD and/or depression) was contingent on the incidence of early separation trauma ($\lambda^2 = 6.749$; $\lambda^2_{.01}(4) = 6.63$; $p < .01$). Second, the distribution of scores on OCD, depression and separation-distress measures into clinical (Study IV), control (Study IV) and non-clinical (Study III) groups was contingent on the experience of early separation trauma ($\lambda^2 = 7.235$; $\lambda^2_{.05}(2) = 5.99$; $p < .05$). Both contingencies were highly significant.

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*Table 27*

*Descriptive statistics for point-biserial correlation of relationships between clinical variables and separation-trauma*

| Variable | N | Mean | Std.dev | Std.err | Variance | Lower CL | Upper CL |
|---|---|---|---|---|---|---|---|
| No separation trauma* | 107 | 1.000 | 0.000 | 0.000 | 0.000 | - | - |
| OCD score | 107 | 38.498 | 16.763 | 1.621 | 280.996 | 35.285 | 41.711 |
| Depression score | 107 | 41.759 | 22.693 | 2.194 | 514.976 | 37.410 | 46.109 |
| Separation-distress score | 107 | 39.750 | 17.597 | 1.701 | 309.642 | 36.378 | 43.123 |
| Separation trauma | 50 | 2.000 | 0.000 | 0.000 | 0.000 | - | - |
| OCD score | 50 | 46.400 | 16.348 | 2.312 | 267.268 | 41.754 | 51.047 |
| Depression score | 50 | 59.292 | 20.520 | 2.902 | 421.064 | 53.460 | 65.124 |
| Separation-distress score | 50 | 51.862 | 21.289 | 3.012 | 453.225 | 45.812 | 57.912 |

*Table 28*

*Correlational relationships for point-biserial data: Effect of separation trauma on the differences between variable group means*

| Variable | $s_p^2$ | $s_p$ | *t* | $r_{bp}^2$ | $r_{pb}$ | Effect size (Hedge's g) |
|---|---|---|---|---|---|---|
| OCD | 276.656 | 16.633 | 2.773** | 0.047443 | 0.217814 | 0.475113 |
| Depression | 485.288 | 22.029 | 4.646** | 0.122235 | 0.349621 | 0.795881 |
| Separation-distress | 355.033 | 18.842 | 3.752** | 0.083274 | 0.288573 | 0.059006 |

** $r_{pb}^2$ may be calculated for non-numerical data(Howell, 2002, p.297): in this case, and for all calculations involving the non-numerical (nominal) separation-trauma variable, those participants who reported experience of early separation trauma experiences were coded as 2 and those who reported none as 1*
*where $s_p^2 = (N\text{-}1)s_1^2 + (N_2\text{-}1)s_2^2/N_1 + N_2 - 2$;*
*$t = Mean_1 - Mean_2/\sqrt{s_p}2/N_1 + s_p^2/N_2$;*
*$rpb^2 = t^2/t^2 + df$;*
*$g = Mean_1 - Mean_2/s_p^2$*
***$p < .01$*
*$df = 155$*

The use of point-biserial correlation for this analysis is discussed in Chapter 13. The results above show that the point-biserial correlation for clinical and control OCD groups was .047; for clinical and control depression, $r_{pb}^2 = .122$ and for clinical and control separation-distress, $r_{pb}^2 = .083$. These were all related to *t* statistics which were significant at the level of $p < .01$. Effect sized related to differences between the clinical and control groups were small, as seen in Table 28 relevant to each set of calculations.

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Mediation

As outlined in Chapter 11, the specific mediation models to be analysed in this section were based on the results presented so far in this chapter. Mediation is a statistical technique to examine "the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" (Baron & Kenny, 1986). This method is distinct from *moderation*, in which the relationship between an independent and dependent variable changes as a function of the level of a third variable (the moderator) (Howell, 2002).

The general mediating relationship is represented graphically below:

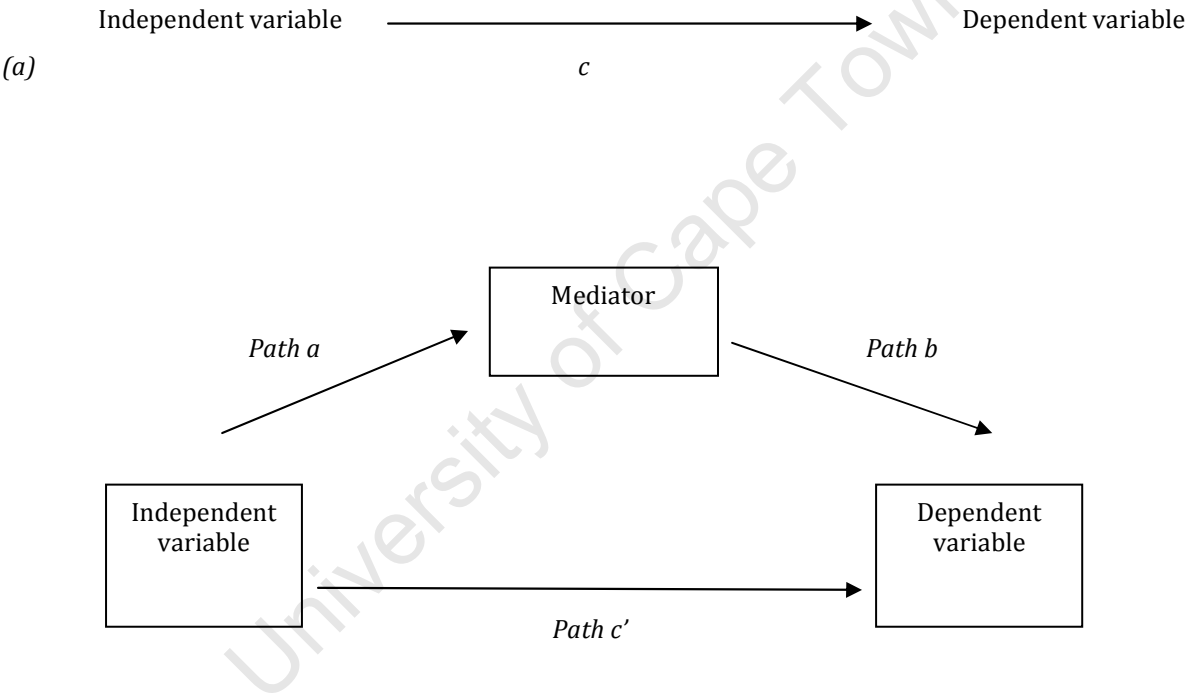


*Fig.1. Illustration of (a) a direct effect and (b) its corresponding mediating model; also denoting the conditions to be met before proceeding with analysis, based upon Baron & Kenny's (1986) original suggestions*

Two models were hypothesized and tested for suitability. In each, a different variable was chosen as the mediator. Model A positioned separation-distress as the intervening variable between the independent variable OCD and the dependent variable depression. This would provide a test of whether separation-distress significantly influenced the effect that OCD exerts on depression.

Model B positioned depression as the intervening variable between the independent variable separation-distress and the dependent variable OCD. This was based on the hypothesis that when depression is

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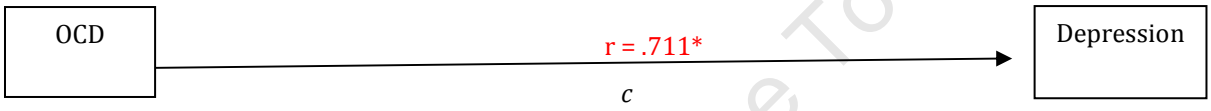
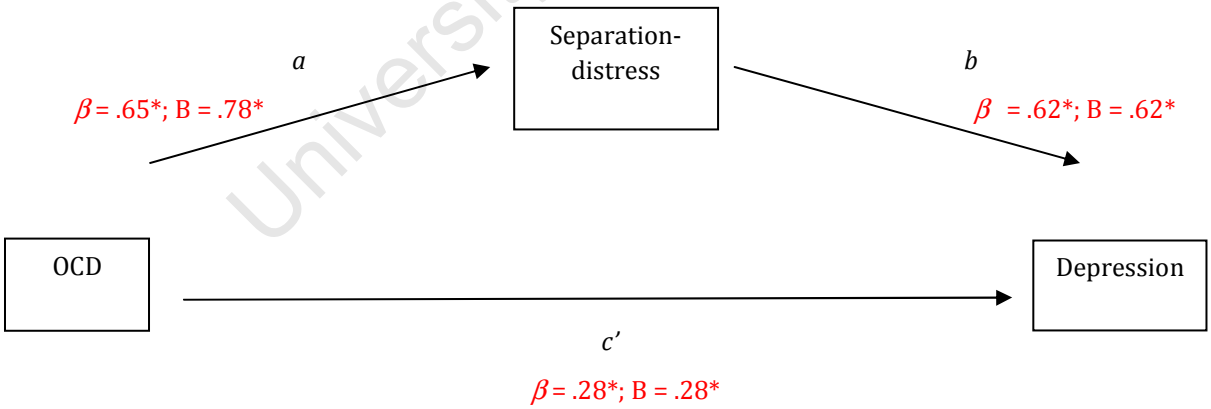
added as a comorbid disorder, separation-distress has an even greater influential effect on OCD than when a direct path from separation-distress to OCD is analysed.

MODEL A

Based on the results above indicating comorbidity of OCD and depression in the clinical sample, the first model focused on whether separation-distress significantly influenced the effect of OCD on depression. The direct path was analysed (*Path c*; the direct effect of OCD on depression), followed by analysis of the change in this relationship with the addition of separation-distress as a mediating variable (*Path c'*; the indirect effect of OCD on depression, adjusted for the effect of separation-distress).




(a) Direct effect model for OCD and depression. Correlation (*r*) is given. N = 82; **p < .01*




(b) Mediation model, with separation-distress as a mediator between OCD and depression. Standardized (*β*) and unstandardized (B) path coefficients are shown. N = 82, **p < .01*

*Fig.2. MODEL A*

The initial conditions of Baron and Kenny (1986) were tested by looking at the simple correlations amongst the variables.

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***Correlations***

Pearson Correlation Coefficients

| | OCD | Separation-distress | Depression |
|---|---|---|---|
| OCD | 1.000 | 0.645** | 0.711** |
| Separation-distress | 0.645** | 1.000 | 0.621** |
| Depression | 0.711** | 0.621** | 1.000 |
| **Mean** | 53.285 | 53.209 | 60.821 |
| **Std.Dev.** | 16.041 | 19.289 | 19.394 |

**Correlation was significant at the 0.01 level (2-tailed)

Values corresponding to *Paths a*, *b* and *c* in *Fig.2(a)* and *(b)* above are presented below. Both the raw, unstandardized *B* and the standardized Beta (β) regression coefficients of the paths were reported, since there is some debate amongst authors on the topic as to which should be used.

Unstandardized regression coefficients were chosen for these analyses, although all possible coefficient choices (standardized, unstandardized and correlation; as discussed in Chapter 11) were significant for models A and B (see pp.136, 137), and thus conditions of significance are satisfied, whichever is used.

*Table 29*

*Conditions for mediation – MODEL A*

| **Mediators** | ***Path a**** | ***Path b***** | ***Path c***** | ***Path c'*** | **Z statistic****** | ***p*** |
|---|---|---|---|---|---|---|
| Separation-distress | .65(.78) | .62(.62) | .71(.86) | .28(.28) | 5.24 | .05 |

*For *Path a (from independent variable to mediator), Path b (from mediator to dependent variable),*
****Path c (direct effect) and Path c' (indirect effect), Beta (β) is given, followed by B (the raw, unstandardized regression coefficient) in brackets*
*****see p.140, 143*

As discussed in Chapter 11, authors have also argued that the first condition, that of the significant correlation signified in *Path c*, is not necessary and that there are situations in which this may not be the case, but where significance of the indirect effect may still hold (e.g., Kenny, Kashy, & Bolger, 1998; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). However, all four conditions are met in the models presented below.

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After establishing that these conditions were met, regression analyses were carried out to determine whether the path between OCD and depression was substantially and significantly reduced by the addition of separation-distress as a mediating variable. The results of the regression analyses are presented in the table below.

*Table 30*

*Regression summary – MODEL A*

| | Regression Summary for Dependent Variable: Clinical Overall Depression (New Overall Scores) R= .74193579 $R^2$= .55046872 Adjusted $R^2$= .53923043 F(2,80)=48.982 p<.00000 Std.Error of estimate: 13.165 | | | | | | |
|---|---|---|---|---|---|---|---|
| *Model* | *Unstandardized coefficients* | | *Standardized coefficients* | | t | *Sig.* | *Semi-Partial Correlation* |
| | *B* | *Std.Error of B* | *Beta* | *St.Error of Beta* | | | |
| (1) | | | | | | | |
| (Constant) | 15.046 | 5.257 | | | 2.862 | 0.0053 | |
| OCD | 0.859 | 0.095 | 0.711 | 0.078 | 9.089 | 0.0001 | 0.711 |
| (2) | | | | | | | |
| (Constant) | 11.706 | 5.175 | | | 2.262 | 0.0264 | |
| OCD | 0.641 | 0.119 | 0.530 | 0.098 | 5.409 | 0.0001 | 0.405 |
| Separation-distress | 0.281 | 0.099 | 0.279 | 0.098 | 2.848 | 0.009 | 0.213 |

a. Dependent variable: Depression.

When OCD was used as the sole predictor of depression, the path was clearly significant ($t$ = 9.089, $p$ < .01). When separation-distress was added to OCD, the path from OCD to depression was still significant, although it became less important ($t$ = 5.409, $p$ = 0.01). It was therefore important to consider further whether separation-distress was serving a mediating role between OCD and depression. The direct path was reduced ($t$ = 5.409 < $t$ = 9.089), though it remains significant.

Baron and Kenny (1986) and Sobel (1982) provided statistical techniques to determine whether the complete mediating path from independent variable to mediator to dependent variable is significant. For this calculation, the regression coefficients and their related standard errors for the two paths in the mediating chain are needed. Since mediation was established, the magnitude of the indirect effect could now be calculated. This was done by calculating the value of *Paths a* and *b* and dividing by the standard

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error of their cross-product[1], yielding a *Z* statistic (Baron & Kenny, 1986; Sobel 1982). The Z statistic is evaluated for significance against standard normal distribution probabilities (Kenny *et al*., 1998; Frazier *et al*., 2004 in Mallinckrodt, Abraham, Wei, & Russell, 2006).

Sobel (1982, in Howell, 2002) states that this ratio is asymptotically normally distributed, which, for a large sample (such as this), would lead to the rejection of the null hypothesis at $\alpha = 0.05$, when the ratio (Z statistic) exceeds ±1.96. It would presumably have a *t* distribution of N – 3 for small samples. In this case, the path is clearly significant, as would be expected from the previous results. Therefore, it can be concluded that there is convincing evidence of a strong mediating pathway from OCD through separation-distress to depression.

MODEL B

The second model hypothesized OCD as the mediating variable. From the four preceding studies, it has become apparent that separation-distress is an important emotion in OCD (as well as in depression). The theoretical framework of this thesis proposed that separation- distress is an emotion that significantly influences the development of OCD (as well of depression). Therefore it was reasonable to ask whether OCD is the variable through which separation-distress acts to influence depression. Results are presented below. The hypothesis is that OCD is the variable through which separation-distress operates to influence depression.

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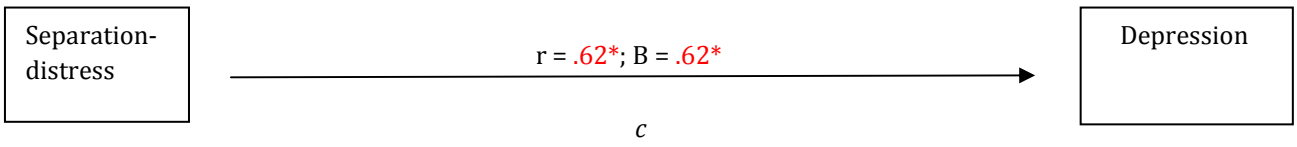
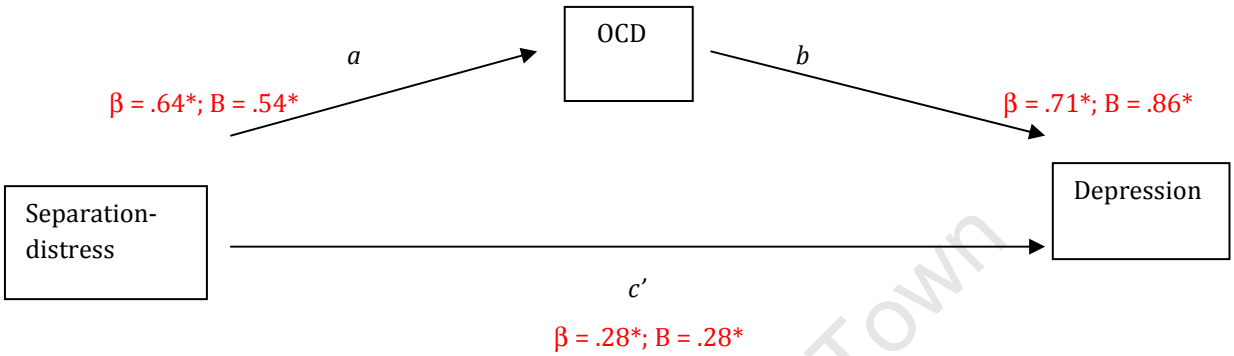
[1] $s_{\beta a \beta b}$ (the standard error of the indirect effect) = $\sqrt{\beta_a^2 s_b^2 + \beta_b^2 s_a^2 - s_{\beta a}^2 \beta_b^2}$ *(Baron & Kenny, 1986), "where a and b are the unstandardized, raw regression coefficients derived from the multiple regression analysis and* $s_a$ *and* $s_b$ *are their corresponding errors" (Mallinckrodt et al., 2006). Sobel (1982) advocated use of the same equation, without the subtraction of the multiplied product of the error terms, since this is typically very small. Therefore the two formulas yield roughly equivalent results (MacKinnon* et al*., 2002).*




(a) Direct effect model for separation-distress and OCD




(b) Mediation model, with depression as a mediator between separation-distress and OCD. Standardized path coefficients are shown. N = 82, *$p < .01$

*Fig.3. MODEL B*

The initial conditions of Baron and Kenny (1986) were tested by looking at the simple correlations amongst the variables, shown below:

***Correlations***

Pearson Correlation

| | Separation-distress | OCD | Depression |
|---|---|---|---|
| Separation-distress | 1.000 | 0.645** | 0.621** |
| OCD | 0.645** | 1.000 | 0.711** |
| Depression | 0.621** | 0.711** | 1.000 |
| **Mean** | 53.209 | 53.285 | 60.821 |
| **Std.Dev.** | 19.289 | 16.041 | 19.394 |

**Correlation was significant at the 0.01 level (2-tailed)

These relationships satisfied Baron and Kenny's (1986) basic prerequisites.

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*Table 31*

*Conditions for mediation – MODEL B*

| **Mediators** | ***Path a**** | ***Path b***** | ***Path c***** | ***Path c'*** | **Z statistic******** | ***p*** |
|---|---|---|---|---|---|---|
| OCD | .64(.54) | .71(.86) | .62(.62) | .28(.28) | 5.82 | .05 |

*For *Path a (from independent variable to mediator), Path b (from mediator to dependent variable), ***Path c (direct effect) and Path c' (indirect effect), Beta (β) is given, followed by B (the raw, unstandardized regression coefficient) in brackets*
*********see p.140, 143*

Once these conditions were established, both separation-distress and OCD were used as predictors of depression.

*Table 32*

*Regression summary – MODEL B*

| | Regression Summary for Dependent Variable: Clinical Overall Depression (New Overall Scores) R= .74193579 $R^2$= .55046872 Adjusted $R^2$= .53923043 F(2,80)=48.982 p<.01 Std.Error of estimate: 13.165 | | | | | | |
|---|---|---|---|---|---|---|---|
| Model | Unstandardized coefficients | | Standardized coefficients | | t | Sig. | Semi-Partial Correlation |
| | B | Std.Error | Beta | Std.Error of Beta | | | |
| (1) | | | | | | | |
| (Constant) | 27.579 | 4.951 | | | 5.571 | 0.001 | |
| Separation-distress | 0.625 | 0.088 | 0.621 | 0.087 | 7.137 | 0.001 | 0.621 |
| (2) | | | | | | | |
| (Constant) | 11.06 | 5.175 | | | 2.262 | 0.026 | |
| Separation-distress | 0.281 | 0.099 | 0.279 | 0.098 | 2.848 | 0.005 | 0.213 |
| OCD | 0.641 | 0.119 | 0.530 | 0.098 | 5.409 | 0.000 | 0.405 |

a. Dependent variable: Depression.

When OCD was added as a predictor variable to separation-distress, which clearly significantly predicted depression when used alone ($t$ = 7.137, $p$ < 0.01), separation-distress is still a significant predictor, but the direct path between separation-distress and depression *has* become less important ($t$ = 2.848, $p$ < 0.01).Therefore, the complete mediating path from the independent variable (separation-distress) to the mediator (OCD) to the dependent variable (depression), was evaluated for significance.

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*Table 33*

*Analysis of Magnitude and Statistical Significance of Indirect Effects*

| Independent variable | Mediator variable | Dependent variable | β (standardized path coefficient & product) | Mean Indirect effect (*ab*) | $SE_{ab}$* | *Z*** | 95% CI** |
|---|---|---|---|---|---|---|---|
| Indirect effects hypothesized to be statistically significant | | | | | | | |
| OCD | → Separation distress | → Depression | (.775) X (.625) | .4844 | .092 | 5.244 | .465 ≤ μ ≤ .504 |
| Separation distress | → OCD | → Depression | (.536) X (.859) | .4604 | .079 | 5.816 | .443 ≤ μ ≤ .477 |
| Separation distress | → Depression | → OCD | (.625) X (.588) | .3675 | .0655 | 5.608 | .354 ≤ μ ≤ .381 |

*where $s_{\beta a \beta b} = \sqrt{\beta_a^2 s_b^2 + \beta_b^2 s_a^2 - s_a^2 s_b^2}$

** *The Z statistic is judged against tables of the normal distribution and therefore is significant at the level of $\alpha = .05$ when $Z > \pm 1.96$*

***CI = confidence interval for mean indirect effect (this 95% CI excludes zero and therefore is significant at $p < .05$)

The *Z* statistics for Models A and B, as well as the extra model included in Table 33, are all significantly larger than 1.96, and therefore the indirect mediating effects were highly significant.

The Test of Joint Significance (TJS; Cohen & Cohen, 1983; Kenny *et al.*, 1988 in Mallinckrodt, Abraham, Wei & Russell, 2006)

The Test of Joint Significance (TJS) was applied to both Model A and B, in order to provide a further statistical evaluation of the goodness-of-fit of these models. As discussed in detail in the previous chapter (Chapter 11, p.99), the TJS is well respected as the most robust mediation technique (MacKinnon *et al.*, 2002), with the greatest potential for maximising power and minimising *Type I* error. Therefore it was considered a good technique with which to confirm the findings so far for the mediation models.

Below are the raw regression coefficients and their significance levels for Models A and B.

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*Table 34*

*Statistical results for the Test of Joint Significance*

| Model | *Path a** | *p* | *Path b*** | *p* |
|---|---|---|---|---|
| A | .788(.658) | < .01 | .625(.621) | < .01 |
| B | .550(.658) | < .01 | .861(.716) | < .01 |

*Conditions for the Test of Joint Significance*
**path coefficients are given as B (the raw regression coefficient), with Beta (β) given in brackets*

The unstandardized, raw regression coefficients for *Paths a* (B = 0.78, *p* < .01) and *b* (B = 0.62, *p* < .01) in Model A were significant, and therefore it can be concluded that separation-distress had a significant indirect effect on the relationship between OCD and depression. For Model B, the regression coefficients for *Paths a* (B = 0.55, p < 0.01) and *b* (B = 0.86, p < 0.01) in this model were significant, and therefore it can be concluded that OCD has a significant indirect effect on the relationship between separation-distress and depression. This conclusion can be made with a large degree of certainty, based on the reliable method used here.

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**Chapter Thirteen Study IV Discussion**

As described in Chapter 11, Study IV is the culmination of a series of studies designed to investigate the role of separation-distress and separation trauma in obsessionality and OCD, low mood and depression. The principle feature of Study IV is its inclusion of patients with clinical diagnoses. Chapters 12 and 13 outlined how a large clinical (N = 84) and well matched control (N = 75) sample were investigated in order to determine whether patients with OCD have a heightened vulnerability to separation-distress, as well as whether the clinical sample demonstrated a disproportionate incidence of separation trauma experiences in early childhood.

Analysis of main relationships

Differences on *t* tests of independence established that clinical and control groups produced significantly different results on measures of OCD, depression and separation-distress. As expected, participants diagnosed with clinical OCD scored substantially higher than controls ($t = 9.074$; $p < .01$). This confirmed that the two populations of participants were unrelated on measures of OCD used here. A difference of over 9 standards deviations is very large for the difference between two groups when measured with any standardised test (Binder, 2009), and the fact that this result is an average of multiple measures strengthens the distinction. The *F* statistic accompanying this analysis ($F = 2.072$; $p < .01$) also demonstrated that there was a substantial difference between means, and is a good indicator that the null hypothesis can accurately be rejected (see Chapter 6, pp.63-64).

Similarly, the two groups exhibited a significant difference on measures of depression ($t = 9.766$; $p < .01$), confirming that clinically depressed participants scored far higher than controls on measures of depression.

The difference was largest between clinical and control scores of separation-distress: on average, participants with clinical OCD and/or depression scored over 11 standard deviations higher than control group participants ($t = 11.393$; $p < .01$). Moreover, an *F* statistic of 5.539 showed that the population means were the most substantially different for this analysis, out of the three variables compared. The fact that the groups were more strongly distinguishable by scores on separation-distress than on clinical OCD and depression provides excellent support for the hypothesis that separation-distress (and, therefore, the emotion PANIC) is a strong constituent of the disorders. Separation-distress is as valid as a distinguishing feature of both OCD and depression as are specific measures of the disorders themselves, if not more so.

Clinical OCD, depression and separation-distress all demonstrated high correlations with one another, especially given the consideration that they represent psychiatric disorders that are influenced by a vast number of variables. Given their complexity, the correlation coefficients between OCD, depression and separation-distress in this study (all just slightly below .700) therefore represent an extremely large

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amount of covariability. Separation-distress is also a complex psychological construct, and is arguably influenced by many internal and external factors. Correlations reported amongst the clinical variables in this study can therefore be interpreted as an indication of robust relationships.

Since control scores were significantly lower on all measures, it was expected that scores obtained by control group participants on measures of OCD, depression and separation-distress would also correlate highly. This was confirmed by analyses showing that correlation coefficients ranged from .695 to .792 ($p < .01$) for measures of OCD, depression and separation-distress in the control group. Weak, non-significant correlations were found between clinical and control variables (with correlations ranging between -.212 and .068). Measures of clinical and control depression were inversely correlated, as were scores on clinical and control separation-distress, clinical and control depression, clinical depression and control separation-distress, clinical separation-distress and control OCD, clinical separation-distress and control depression, and clinical OCD and control depression. The inverse relationships indicated that for an increase in one of the variables, there was a correlated decrease in the other – again, a reflection and confirmation of the groups' independence. These findings further support the independence of the two groups.

Dependent *t* tests were carried out to determine whether there were any significant differences within the clinical and control groups. Dependent or *related t* tests are performed when a comparison of scores on different measures by the *same* participants is needed. Therefore the groups for comparison will correlate highly (Howell, 2002), indicating that their scores are representative of the same population. These analyses showed that in the clinical group, OCD and separation-distress showed no significant score differences. However, clinical depression was higher than clinical OCD (*difference* = 13.832; $t = 4.964$; $p < .01$). Depression was also higher than clinical separation-distress (*difference* = 16.832; $t = 4.120$; $p < .01$). These results indicated that, on average, clinical participants scored substantially higher on measures of depression than on measures of OCD. There are several possible explanations for this observation. The first and most persuasive is the preponderance of participants with primary diagnoses of depression, as noted in Chapter 12. This result also emerged in the analysis of exclusive clinical groups, discussed later in this chapter (see p.148).

Another possibility is that depression was genuinely more severe or prevalent than OCD in this clinical sample, which raises the question of whether this would be repeated with other, matched clinical samples. The higher scores could also be an artefact of the tests: participants may have been more inclined to identify with the items included in the depression measures than the more specific, clinical indicators of OCD. As discussed in Method sections throughout the thesis, as well as in the Results and Discussion for Study III (Chapters 9 and 10), the evaluations chosen to measure depression in these studies may be applied equally well to non-clinical populations in order to measure low mood. The Meta-Cognitions Questionnaire (MCQ) was included as a more general measure for OCD, which would apply equally well to obsessionality in the non-clinical population. However, it is possible that the specificity of

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items in the Padua Inventory (PI) and Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) shifted the balance of items so that depression items were more readily affirmed than OCD items, overall.

In terms of dependent differences within the control group, only OCD and depression scores were not significantly different. Differences between control OCD and separation-distress were observed (control participants scored higher on OCD than on separation-distress (*difference* = 7.007; $t = 7.584$, $p < .01$) and between separation-distress and depression (scores were higher on measures of depression; $t = 4.113$, $p < .01$). Nevertheless, scores on measures of OCD and depression were low in the control population. Control scores were all significantly lower than clinical scores, as discussed above at the beginning of the chapter. Therefore the fact that control OCD and depression scores were higher than control separation-distress scores is interpreted as a reflection of the inclusion of measures developed with both clinical and non-clinical sample groups (i.e. the MCQ, MDI and PANAS). These assessments were thus well equipped to detect everyday non-clinical levels of worry and low mood.

There were large differences on all variables of interest between the clinical and control groups, reflected by *t* statistics of significant magnitude throughout analyses. As shown in Chapter 12 (Table 5, pp.109-110), the largest effect sizes (and *t* and point-biserial squared statistics (which provide a measure of the proportion of variance between the groups accounted for by a factor), were obtained for differences between groups in terms of separation-distress, total Meta-Cognition Questionnaire (MCQ) scores, MCQ2 *Uncontrollability and danger* ($t = 8.522$; $p < .01$), Y-BOCS Obsessions ($t = 8.811$; $p < .01$), Y-BOCS Compulsions ($t = 7.933$; $p < .01$), the Major Depression Inventory (MDI; $t = 9.254$) and Negative Affect (NA; $t = 8.816$). This means that the most robust differences between groups were in terms of these factors, which is consistent with findings discussed throughout the rest of this chapter. Clinical participants scored higher and were most notably different on both dimensions of the Y-BOCS, the PI as a whole, the MDI, NA portion of the Positive and Negative Affect Scale (PANAS), and, very importantly, on Factor 2 of the MCQ, which assesses negative, obsessive thoughts related to uncontrollability and danger. The significance of the MCQ2 has been noted throughout this thesis. It appears that the balance of clinical and non-clinical questionnaires was well suited to detecting sample differences in OCD and depression. The NA and MDI were developed for use with non-clinical as well as clinical populations, and therefore highly significant differences on these measures – as well as on the MCQ2 *Uncontrollability and danger* ($t = 7.86$) and the PI1 *Impaired control over mental abilities* ($t = 7.44$) – indicate important differences between the groups. It seems that this constellation of factors may offer the best indication of how to distinguish those who are clinically depressed and who suffer from OCD, from their controls.

Confidence limits at the conventional level of 95%[1] were reported here, for the difference in severity between clinical and control scores on all variables and items. All confidence intervals were relatively narrow, and enclosed the differences between means closely. The reported differences between clinical

[1] *The general expression for calculation of a 95% confidence interval is as follows:* $CI_{0.95} = (Mean_1 - Mean_2) \pm t_{0.025} SMean_1 - Mean_2$; *since* $t_{0.05/2} = t_{0.025}$

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and control means may therefore be interpreted as considerably accurate. Bootstrap confidence intervals confirmed these findings – by a statistical technique of performing replacements for all possible means in the population samples, robust confidence intervals were obtained. All confidence levels reported are therefore considered an accurate reflection of population means.

Separation-distress in exclusive clinical groups

It was important to evaluate whether there were significant differences between people diagnosed only with OCD, only with depression, and those with a comorbid diagnosis. For this purpose, the clinical group was broken down into four categories (the extra category is explained below), and *t* tests were applied to determine whether the variables were independent in this regard.

The clinical group was divided into four categories in order to probe the relationships amongst variables given participants' primary diagnoses. The groups were categorized as follows: participants diagnosed only with OCD, those only with depression, those with a diagnosis of comorbid OCD and depression, and those with an unrelated diagnosis additional to clinical depression (e.g., Body Dysmorphic Disorder, social anxiety disorders, phobias or Bipolar Disorder I/II, discussed in Chapter 12, p.105, under participant exclusion criteria). One purpose of this categorical division was to analyze whether there were differences between the relative importance of FEAR as opposed to separation-distress, amongst the clinical groups, since previous analyses showed that the two emotions both appear to be significantly implicated in OCD and depression. The central research question was whether separation-distress is a critical emotion in OCD. Fear anxiety is known to be implicated in the disorder, but its established precedence as the central emotion in OCD is challenged in this thesis. Results for each group in terms of their performance on these factors were presented in Table 9 (p.115-116). Dependent *t* tests were performed: in each case, two sets of scores within the same group of participants were tested; samples related in this way should be analysed dependently (Howell, 2002).

Amongst the Meta-Cognitions Questionnaire (MCQ) factors, MCQ factor 2 *Uncontrollability and danger*, revealed the greatest difference in scores between clinical and control groups ($t = 7.858$, $p < .01$). It also shared the highest correlation out of all the individual OCD factors with overall OCD score ($r = .388$). This replicated the results in Study I. Similarly, amongst Padua Inventory (PI) factors, clinical and control participants showed the greatest score differences on PI factor 1 *Impaired control over mental abilities* amongst PI factors ($t = 7.634$, $p < .01$), as well as correlating most the most highly of all the factors with the overall PI score ($r = .904$). This result also contributed to the reliability across studies, by replicating the findings of Study I.

Given these findings, it appeared worthwhile to combine the average scores for *uncontrollability and danger* and *impaired control over mental abilities*, and use this new score to represent OCD. The purpose of this technique was to determine whether conceptualising OCD in terms of its most representative factors (in this sample) made a difference to any of the analyses performed.

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First, the new OCD score was used in analyses of the role of fear anxiety (evaluated by the FEAR subscale on the Affective Neuroscience Personality Scales; Davis, Panksepp, & Normansell, 2003) in clinical OCD and depression, in comparison to separation-distress. Using the combined and highly representative new OCD score, fear anxiety was still higher than scores on measures of OCD in the OCD group ($t$ = 2.455, $p$ < .01); whilst separation-distress and OCD were shown to be from the same sample ($t$ = 1.830, $p$ = .078). Similarly, in the Depression, Comorbid and Depression+ groups, scores of fear anxiety were higher than OCD. The largest difference was observed for the Depression+ group ($t$ = 10.028, $p$ = .01). The finding that fear anxiety scores were very high in clinical OCD was not unexpected given the established literature and subjective accounts of patients, in which fear anxiety features heavily. The concurrent prevalence of fear anxiety in the Comorbid, Depression, and Depression+ groups is evidence in favour of the comorbidity and the emotional similarity between OCD and depression.

This thesis posed the question of whether the basic emotion substrate, PANIC, and its associated feeling state, separation-distress, can be considered a fundamental affective mechanism of OCD. However, the intention was not to suggest that it operates to the exclusion of other emotions, including fear anxiety. It seems clear that both are integral to the disorder. It was not possible to determine in this thesis whether separation-distress may play more of a generative role in OCD, and whether fear anxiety constitutes a secondary disturbance of the disorder. It remains reasonable to expect, however, that fear anxiety should be highly implicated in OCD. In the analyses of the separate primary diagnostic groups, fear anxiety was highest in the Depression+ group ($\mu_{FEAR}$ = 80.655; and differed from the combined MCQ+PI score by over 10 standard deviations: $t$ = 10.028, $p$ < .01), followed in magnitude by scores in the OCD ($\mu_{FEAR}$ = 79.524; $t$ = 3.301, $p$ < .01), comorbid ($\mu_{FEAR}$ = 77.455; $t$ = 5.872, $p$ < .01), and depression ($\mu_{FEAR}$ = 75.893; $t$ = 16.686, $p$ < .01) groups, respectively. The high fear anxiety scores in the clinical population provide further support for the significance of the high separation-distress scores. As mentioned in Study I, Chapter 4 (p.49), the new results regarding separation-distress are strengthened and confirmed by the established significance of fear anxiety results in the same set of data.

When MCQ Factor 2 *Uncontrollability and danger* alone was used as an indicator of OCD, separation-distress and OCD were once again shown to belong to the same population in all groups except in the group composed exclusively of OCD patients. In the OCD group, *uncontrollability and danger* yielded significantly higher scores than the four separation-distress scales ($t$ = 3.639, $p$ < .01). This suggests that, as would be expected, the most highly representative OCD factor in this sample is concentrated in the purely OCD sample to the extent of a significantly higher score than separation-distress. Since separation-distress and OCD (as an overall score) still originated from the same population, this finding underscores the importance of *Uncontrollability and danger* as an interpretive and representative factor for OCD in general, which could be focused on in future research. The significance of this single factor has been seen in all four studies presented in this thesis.

The relationships between overall OCD and the various Meta-Cognitions Questionnaire factors were, in descending order of correlative strength, MCQ2 *Uncontrollability and danger* (r = .388), MCQ3 *Lack of*



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*cognitive confidence* (r = .348), MCQ4 *Themes of superstition, punishment and responsibility* (r = .324), MCQ1 *Positive beliefs about worry* (r = .197) and MCQ5 *Cognitive self-consciousness* (r = .185). Correlations between Overall OCD and PI factors were: PI1 *Impaired control over mental abilities* (r = .904), PI3 *Checking behaviours* (r = .739), PI2 *Becoming contaminated* (r = .680), and PI4 *Urges and worries of losing control over motor behaviours* (r = .604). This was the same pattern of results indicated in Study I, except that the MCQ4, 1 and 3 were ranked in that order between the strongest and most weakly correlating factors (MCQ1 and 5) in Study I. Therefore, a strong case is made for the relative strength of each of these factors in their ability to assess OCD accurately in clinical and non-clinical populations. This ranking order should be noted for its consistent ability to distinguish the more representative from the less representative subtypes or factors of OCD.

Relationships between OCD, depression and various emotions

It was evident from these results that OCD and depression in the clinical sample, aside from being highly correlated with each other (r = 0.71), were also strongly related to several emotions, as evaluated by the Affective Neuroscience Personality Scale (ANPS; Davis, Panksepp, & Normansell, 2003). In descending order of rank, OCD was significantly correlated with FEAR (r = 0.641), SADNESS (r = 0.481) and ANGER (r = .278). Depression was also significantly but slightly less strongly correlated with FEAR (r = 0.529), and more strongly with ANGER (r = 0.376) and SADNESS (r = 0.547) in the clinical group.

The same pattern of correlational results was apparent in the control group, whereby emotions significantly related to measures of OCD were FEAR (r = 0.663), SADNESS (r = 0.562) and ANGER (r = 0.570). In the control group, depression and FEAR (r = .634) were significantly related at the significance level of $p < .01$; with SADNESS (r = .668), and with ANGER (r = .560). Interestingly, in all cases for measures of both OCD and depression, correlations were higher for these emotions in the control than in the clinical group. Since it has already been shown that control scores were lower than clinical scores on all measures, this indicates that the low scores on all the control factors are more closely related than the same scores, at a far higher level, in the clinical sample. For example, control participants scored low on measures of both OCD and ANGER, and the scores overlapped to the extent of having 57% of their variability in common. Clinical participants scored far higher on both of these measures. However, the relationship between them was weaker, although still significant (27.8%). This is probably accounted for by the extremely high scores obtained by participants in the clinical group on OCD and depression.

Independent *t* test results amongst clinical and control factors confirmed that clinical participants scored higher on separation-distress, fear anxiety and anger (evaluated by PANIC, FEAR and ANGER subscales), and showed significantly lower activation of the emotion that engenders curiosity/goal-directed behaviour, as well as of playfulness (evaluated by the SEEK and PLAY emotion substrates, respectively). These results indicated that OCD and depression in the clinical population functioned similarly to obsessionality and low mood in the non-clinical samples. Furthermore, the constellation of emotions

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related to these disorders was expected, based on substantial literatures that describe affective characteristics of anger, sadness, fear and anxiety in both OCD and depression (this has been discussed in Chapters 4 and 10).

OCD and depression factors related to separation-distress

Some interesting results were evident in Table 13 (p.120-121). Meta-Cognitions Questionnaire (MCQ) factors correlated more highly with separation-distress levels in the control group than in the clinical population, indicating that this questionnaire was perhaps better suited to gauging non-clinical or sub-clinical levels of OCD, and corroborating results reported earlier, throughout this and preceding chapters. Except for the Padua Inventory (PI) Factor 1, however, all PI and Y-BOCS OCD factors were more strongly correlated with separation-distress in the clinical sample. This showed that PI and Y-BOCS evaluations more accurately predict levels of separation-distress in the clinical sample, whereas MCQ factors and PI 1 more accurately predicted separation-distress results in control participants. This may partially explain why stronger relationships (i.e. on a par with FEAR scores) were not found between clinical participants and OCD – since OCD was found to correlate most strongly with MCQ2 and PI 1, both of which are better linked to non-clinical separation-distress. All significant results were significant at the $p$ <.01 level; no further factors were significant at $p$ < .05. The magnitude of the $t$ statistics that accompanied the highest correlations confirmed that these factors were the most highly related to separation-distress: In the control sample, MCQ2 ($t$ = 7.037), PI1 ($t$ = 7.913); and in the clinical sample, the PI4 ($t$ = 6.601), Y-BOCS Obsessions ($t$ = 4.948) and Y-BOCS Compulsions ($t$ = 4.574).

The same analysis was carried out for depression factors, to obtain a more accurate impression of its relationship with separation-distress. Positive Affect (PA) was also included in this analysis to look at its relationship to the variable of interest, as a comparison to NA. Again, it was evident that the control group showed stronger relationships between the factors measuring OCD and depression, and those evaluating their tendencies towards separation-distress. All variables were, however, significantly related to one another, and the stronger relationships in the clinical group therefore indicate that these evaluations are well suited to detect sub-clinical indicators of depression, OCD (as evidenced by Table 14 and the discussion above) and separation-distress. It does not detract from the significant relationships observed in the clinical group, especially since overall scores on OCD for clinical participants (with the inclusion of the MCQ factors) were still significantly associated with separation-distress. Expectations regarding which relationships would be significant were therefore maintained, as was the consistency of measures across clinical and control samples, based on their development in which a balance of clinical and non-clinical participants were used, as discussed in the Method sections.

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Independence of ANPS SADNESS scores in the exclusive categorical clinical groups

Scores on the ANPS SADNESS subscale were compared for independence amongst the four clinical groups, in order to gain an impression of whether the quality of separation-distress may be different in OCD and depression. This was considered a important question, since the rationale for this thesis was based upon the possibility that separation-distress (a form of *panic* anxiety distinct from *fear* anxiety) may constitute an important emotion in OCD. As discussed previously, the findings that depression overlaps with OCD on a basic emotion substrate level underscore the importance of positive findings for separation-distress (as well as separation trauma) in OCD. Since depression is consistently comorbid with OCD, the finding that anxiety of a separation-distress quality is consistently implicated in both disorders makes a strong case for the role that this emotion plays in the affective nature of OCD.

Scores on the ANPS SADNESS subscale were compared for independence amongst the four separate clinical groups described above (OCD, Comorbid, Depression, and Depression+). As presented in Chapter 12 (p.117), results indicated that ANPS SADNESS scores were highest in the Depression+ group, followed by the OCD, Depression and Comorbid groups, in that order. However, none of the tests were significant and therefore the clinical groups into which participants fell were not dissociable on the basis of SADNESS scores. Therefore, whether participants were diagnosed primarily with OCD, depression, both (a comorbid diagnosis of OCD and depression), or depression with a comorbid diagnosis unrelated to this study, this had no discernable effect on their scores on the SADNESS subscale of the ANPS. This subscale is considered a strong indicator of the PANIC emotion substrate and, therefore, of separation-distress. This is a critical finding, in that it shows that all four of the primary clinical groups are comparable in terms of the one crucial variable, separation-distress. All clinical participants were comparable on this measure, which underscores the interpretation that patients with OCD and depression are united by this central variable. It is a finding that confirms and strengthens the importance of PANIC/separation-distress in the two disorders.

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Separation-distress scale validation study

As described in previous chapters, an additional aim of this thesis was to validate the separation-distress scales against one another, as well as to compare performances on the scales across studies, where possible, in order to determine reliability. Construct validity was assessed in order to determined whether the measures were evaluating the underlying psychological construct they claimed to; i.e. separation-distress.

All correlations were significant. As noted in Study III, ANPS SADNESS again demonstrated a slight divergence in that it shared stronger correlations with OCD, depression and negative affect than with the other separation-distress scales; whereas those scales showed the reverse pattern, correlating more strongly with each other. However, all results were significant, and the other three separation-distress

evaluations shared moderately high correlations (at the level of $p < .05$) with OCD, depression and negative affect. This provided further evidence that the scales chosen to represent separation-distress were indeed measuring the same construct in both the Study III and IV samples.

The same trend was observed in the control group, in which correlations were lower overall, although still significant at the $p < .01$ level. This was encouraging in confirming the convergent validity of the scales, since it appeared that the significantly lower levels of separation-distress in the control sample were being systematically assessed by the scales, and provided the same overall pattern. In an analysis of other related variables in the control sample, all four scales were correlated at the level of $p < .01$, with one another, and with OCD, depression and separation-distress. This indicated that the scores came from the same, non-clinical sample and confirmed convergent validity based on theoretical links amongst the measurements.

Differences in SADNESS scores may be taken to suggest that the evaluation of a specific conceptualization of separation-distress is needed in OCD and depression, one which is well represented by this subscale and thus by its corresponding emotion substrate, PANIC. However, the results still confirm the hypotheses throughout the thesis: results from Study I were supported (i.e., separation-distress is implicated in obsessionality and low mood), in which SADNESS was used as the measure of separation-distress. In Studies III and IV, the SADNESS subscale also showed significant relationships with obsessionality, low mood, OCD, depression and the rest of the separation-distress scales. Thus although $ANPS_{SADNESS}$ diverged slightly from the other separation-distress assessments, there is evidence that a broad range of separation anxiety indicators are importantly involved in OCD and depression. The divergence of the SADNESS subscale may indicate that the specific involvement of the PANIC substrate is involved, and that this requires more particular evaluations than are provided by more general separation-distress scales.

Factors regarded as belonging theoretically to the "positive" spectrum of affect and therefore expected to show weak or inverted relationships with separation-distress measures, were analyzed for discriminant validity. Once again, negative affect was included, as a result against which to contrast the other constructs. The positive factors showed no relationship with most of the separation-distress scales. Unexpected findings were that SEEK and SADNESS were correlated at the $p < .01$ level ($r = .314$), PLAY revealed mild correlations with the SASI and SADNESS at a significance level of $p < .05$. A perhaps surprising but less incongruous result was the correlation of SPIRITUALITY and SADNESS ($r = .264$, $p < .01$); this, however, was not one of the emotional subscales of interest, and could arguably be interpreted as a reasonable result, given the gravity and seriousmindedness that can accompany spirituality. However, given its strong correlations with SEEK, PLAY and PA, this seems an unlikely profile, and the finding remains an interesting one in its own right. The positive factors are highly correlated with each other, underscoring the existence of discriminant validity in this sample.

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In a correlative analysis of separation-distress and fear anxiety (as evaluated by the FEAR ANPS subscale) results across Studies III and IV, it emerged that separation-distress and fear anxiety were only significantly related within groups. That is, FEAR results in the non-clinical Study III sample group were only significantly related to separation-distress in the same group. Likewise, FEAR scores in the Study IV control group were only significantly related to separation-distress scores in the same group. And finally, FEAR results in the Study IV clinical group were only significantly related to separation-distress scores in the same group. There were no significant interrelations across or between groups.

These results provided further evidence of discriminant validity, in that non-clinical and control FEAR as well as non-clinical and control separation-distress demonstrated very weak (and in the case of separation-distress, even negative) correlations and confirmed that participants across the three groups conformed to expected performance levels on the two variables, in this regard. However, evidence for convergence is not confirmed here – one would expect comparable levels of FEAR in the non-clinical and control groups, since these both constitute undiagnosed samples; and the same would be expected for separation-distress. However, very weak correlations are noted amongst those variables. Convergence is paradoxically supported by the relatively strong relationships between non-clinical FEAR and separation-distress ($r = .535$; $p < .01$), control FEAR and separation-distress ($r = .761$; $p < .01$), and clinical FEAR and separation-distress ($r = .552$; $p < .01$) – indicating that these pairs of variables are significantly related in the anticipated way.

The control sample showed no unexpected results, and replicated the finding that SPIRITUALITY was significantly related to SADNESS ($r = .357$, $p < .01$). The PA and SCI-SAS showed a significantly negative correlation, indicating that increases in one are predictive of decreases in the other. Overall, the theoretical distinction between separation-distress and other, unrelated constructs was confirmed by this analysis.

Exceptionally high Cronbach coefficient alphas, inter-item correlation coefficients, correlations between the first and second halves of the scales, and split-half reliability, were obtained for all separation-distress measurement scales. Therefore excellent internal consistency was demonstrated and it was confirmed that items within each measurement were evaluating common constructs.

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Early separation trauma

*Number of incidences*. As in Study III, separation trauma experiences were first analysed to determine whether the number of separation trauma incidences significantly influenced whether participants fell into the clinical or control group. The clinical group was divided into seven separate groups, based on the number of timeframes participants reported having experienced separation trauma. These included: $X_0$ (those who experienced no separation), $X_1$ (separation in one of the specified timeframes), $X_2$ (separation in two timeframes), $X_3$ (separation in three timeframes), $X_4$ (separation in four timeframes), $X_7$

(separation in seven timeframes), and $X_9$ (separation in nine timeframes). Each pair was analysed for independence of variables. *t* test results showed that all variables originated from the same group. Variations in the number of separation trauma timeframes experienced by clinical participants therefore were not significant in terms of how participants scored on measures of OCD and depression.

*Correlational relationships for point-biserial data*. Point-biserial correlation is used when one variable is dichotomous, roughly continuous and normally distributed (Howell, 2002). In this case, separation trauma represented the dichotomous (yes/no) variable, whilst clinical and control OCD, depression and separation-distress scores represented the dependent variable, in each analysis. Combining the scores like this is defensible on the grounds that, when examined as a group (N = 157), OCD, separation-distress and depression, when each is combined as a distribution of both clinical and control scores, appear to be continuous and normally distributed (see *Fig.1, 2 & 3; Appendix O, pp.192-194*) – which is as expected given the continuity of results observed so far. The reason for using a modified version of the normal Pearson correlation coefficient (in this case, the point-biserial correlation coefficient), is in order to compensate for the fact that there is no way to determine whether a dichotomous variable is continuous or normally distributed – assumptions upon which the Pearson correlation is based (Howell, 2001).

The results above can be interpreted to mean that 4.727% of the variability in OCD scores is associated with differences between occurrence and non-occurrence of separation trauma; 12.234% of the variability in depression scores is attributable to incidence of separation trauma; and 8.326% of the variability in separation-distress scores is associated with whether or not separation trauma was experienced. These should be interpreted as fairly large contributions if one considers the multitude of variables that influence the psychological constructs of OCD, depression separation-distress.

Although the effect sizes reported above were low, the results were nevertheless in the expected direction and significant. It is also important that the *t* values were significant at the level of $p < .01$, indicating that there were realistic differences in OCD, depression and separation-distress scores between those who reported separation trauma and those who did not. Small effect sizes are often accounted for by relatively small samples, and the findings of this research should be replicated and advanced in further studies in order to confirm and further address the meaning of these significant relationships. The findings are, however, strengthened by the chi-square contingency analyses reported above, in which a strongly contingent relationship was found between early separation trauma and adult incidence of clinical versus control group identity (in terms of OCD and depression) ($\lambda^2 = 6.744$, p = .01; $\lambda^2_{.01}(1) = 6.63$).

*Chi-square contingency analysis*. The statistical test of Chi-square contingency analysis was performed to determine whether separation trauma in early childhood influenced the differences between group means for OCD, depression and separation-distress. The contingency analysis for Hypothesis #8, the influence of number of separation trauma categories on grouping into non-clinical, control and clinical

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samples, was very nearly significant, and would have been so at the level of $p < .10$ ($\lambda^2_{0.10}(4) = 7.78$). However, at the conventional level of significance ($p < .05$), this analysis remains insignificant. The conclusion remains that distribution of scores into clinical, control and non-clinical samples was not contingent on the specific number of timeframes during which participants in Studies III and IV experienced separation trauma.

As was apparent from the results reported in Table 26, it was necessary to accept all but two of the null hypotheses. However, the two rejected hypotheses prove very important in terms of the research questions. First, overall clinical diagnosis (either OCD and/or depression) was highly contingent on the incidence of early separation trauma ($\lambda^2 = 6.749$; $\lambda^2_{.01}(4) = 6.63$; $p < .01$). Second, the distribution of scores on OCD, depression and separation-distress measures into clinical (Study IV), control (Study IV) and non-clinical (Study III) groups was contingent on the experience of early separation trauma ($\lambda^2 = 7.235$; $\lambda^2_{.05}(2) = 5.99$; $p < .05$). Both contingencies were highly significant. Therefore, it is possible to conclude that people who experience separation trauma during critical early childhood periods are more likely to fall into a clinical diagnostic group in adulthood, with a diagnosis of OCD, depression, or both disorders.

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Mediation

As is evident from preceding results and discussions, separation-distress as a feeling state (and its underlying basic emotion substrate, PANIC; Panksepp, 1998) appear to be importantly implicated in the fundamental affective dynamics of OCD. It is difficult to judge from correlational and *t* test results of independent sample differences, *how* this variable could be operating in the population. Therefore the technique of mediation was chosen as a way to determine how separation-distress might function with regard to the relationship between OCD and depression, through the generation and testing of a causal mediation model. Structural equation modelling techniques such as path analysis were considered for analysis, but could not be completed without larger sample sizes, and therefore mediation was chosen as the technique of choice for smaller groups (Mallinckrodt, Abraham, Wei, & Russell, 2006). As discussed in Chapter 11, a large variety of mediation techniques exist, with authors suggesting certain methods over others in specific empirical contexts and according to one's ultimate goals. Two mediating models were hypothesized for the interaction between OCD, depression and separation-distress; the rationale and statistical calculations for each are presented below.

The Normal Theory (NT) approach and the Test of Joint Significance (TJS; MacKinnon *et al*., 2002) were applied to two models in Chapter 12, in order to provide another statistical evaluation of the goodness-of-fit of these two theoretical proposals for how the variables interrelate. Based on the results above indicating comorbidity of OCD and depression in the clinical sample, the first model focused on whether separation-distress significantly influenced the effect of OCD on depression.

The second model hypothesized OCD as the mediating variable. From the four preceding studies, it has become apparent that separation-distress is an important emotion in OCD (as well as in depression). The theoretical framework of this thesis proposed that separation-distress is an emotion that significantly influences the development of OCD (as well of depression). Therefore it was reasonable to ask whether OCD is the variable through which separation-distress acts to influence depression. The hypothesis is that OCD is the variable through which separation-distress operates to influence depression. Results for both models yielded a significant *Z* statistic and therefore both models hold as potential theories of the relationships amongst OCD, depression and separation-distress.

In order to confirm these findings, the TJS was applied. The unstandardized, raw regression coefficients for *Paths a* (B = 0.78, $p < .01$) and *b* (B = 0.62, $p < .01$) in Model A were significant, and therefore it can be concluded that separation-distress had a significant indirect effect on the relationship between OCD and depression. This is a very important finding, since in reviews of mediation techniques, the TJS emerges as the most robust, reliable and conclusive (MacKinnon *et al*., 2002). Therefore for Model A, the TJS both confirms and strengthens findings from the Normal Theory (NT) approach. The inclusion of separation-distress as a mediator significantly increases the effect that OCD has on depression.

For Model B, it may be argued that a better conceptualisation would have been to place depression as the mediating variable, since separation-distress is thought to lead to OCD. However, it was because OCD was the main variable of concern in this thesis that it was used as a mediator here. Given the results presented so far in this thesis, it is believed to influence depression. In fact the literature suggests that OCD usually precedes depression, a fact which has been accounted for by the functional life impairment that OCD causes. Here, a different explanation is being offered; i.e., that separation-distress plays an important role in generating OCD, and that the combined effects of these predispose one to depression.

The significance of Models A and B make a good case for this argument. In Model B, separation-distress has a strong direct effect on the development of depression (consistent with the literature), but this effect is reduced and supplanted by a highly significant indirect effect, once OCD is added to separation-distress as a predictor variable. This fits both with the comorbidity data, and with results reported throughout the four studies, which suggest that separation-distress plays a pivotal role in OCD. Here it appears that this emotion (PANIC/separation-distress) may provide an influential foundation for both. The relationships amongst OCD, depression and separation-distress were therefore further strengthened by findings from MODEL A that the effect of OCD on depression was substantially and significantly strengthened when separation-distress was added as a predictor variable.

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**Chapter Fourteen Concluding Discussion**

The purpose of this thesis was to determine whether separation-distress – the conscious feeling state associated with the basic emotion substrate, PANIC (Panksepp, 1998) – is a significant constituent of OCD. This was hypothesized due to the convergence of evidence regarding ACC activity in cognitive conflict-monitoring as well as in the mediation of PANIC, and the hypermetabolism of the ACC in patients with OCD. Establishing that separation-distress/PANIC is an important emotion in OCD would be valuable, since this is a counterintuitive notion and therefore may lead to new ways of conceptualising and subsequently treating the disorder. The hypothesis was approached by investigating whether separation-distress was higher in non-clinical participants who scored at the high end of the obsessionality spectrum than those at the low end, and whether separation-distress was also higher in clinical OCD than in control participants. The potential influence of separation trauma on high obsessionality and OCD scores was also investigated, in order to distinguish its effects from that of separation-distress. A further aspect of the thesis was the investigation of whether separation-distress was also implicated in high scores on low mood, as well as in clinical depression. Inclusion of this variable was based on several factors: 1. the consistent yet unaccounted for comorbidity of OCD and depression (see Chapter 1), 2. cognitive and neuroimaging similarities between the two disorders (Chapter 5), and 3. the evidence that separation trauma is influential in the development of adult psychopathology, especially depression (Chapter 1). The questions were investigated systematically over a series of four studies, which were designed to address several related hypotheses to arrive at the eventual conclusion. Robust, reliable and repeated results were found to confirm the hypothesis: those who score high on measures of obsessionality and low mood, as well as those with clinical OCD and depression diagnoses, exhibit significantly higher scores on measures of separation-distress. Therefore they are inclined towards a heightened activation of the PANIC system. Furthermore, separation trauma in early childhood is highly predictive of whether participants will be diagnosed with OCD and/or depression in adult life.

The four studies presented in this thesis provide new evidence regarding the role of a specific basic emotion – PANIC/separation-distress – in the trait of obsessionality, as well as in the psychiatric disorder of OCD. The findings that OCD is characterised by a *panic* type of anxiety were strengthened by evidence that separation-distress is also important as an underlying affective mechanism in clinical depression. Abnormal activation of the same emotion substrate was observed in the two disorders, as well as in participants who scored towards the high end of both obsessionality and low mood in the normal population. Therefore OCD and depression were found to relate in a way that has not previously been recognized, providing a plausible mechanism for the comorbidity of the disorders. They also appear to function as continuous variables. Rather than existing as categorical disorders, it may be better to conceptualise both OCD and depression as spectrum disorders. Such a conceptualisation would class obsessionality and low mood (as investigated in Studies I, II and III) as falling closer towards the low end of the spectrum (normality), whereas OCD and depression would fall towards the high end of the spectrum (pathology). The severity of symptoms, their variety and the impairment they cause to functioning, would increase further up the spectrum. In this case, incremental changes in emotion,

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cognition and behaviour would mark the gradual change from sub-clinical to clinical manifestations of the disorders; rather than the presence or absence of specific diagnostic criteria.

There are various viewpoints in the literature regarding the potential qualitative and quantitative differences between clinical and non-clinical variants of OCD and depression (e.g., Barlow, 2004; Mataix-Cols & van den Heuvel, 2006). The question of whether separation-distress and separation trauma follow similar or different courses in clinical and non-clinical populations provides another way to investigate the issue. Overall, and as discussed, it appears that separation-distress functions consistently in its relationship with obsessionality, low mood, OCD and depression. In conclusion, it is plausible that PANIC/separation-distress may function as an affective mechanism of OCD and depression, and therefore that OCD may be better categorised along a mood disorder spectrum.

Given the findings relating the comorbidity of OCD and depression to separation-distress throughout the four studies, it is possible to suggest a possible reclassification of obsessionality, low mood, OCD and depression as conceptualised long a spectrum of *mood* disorders, and founded in a fundamental disturbance of PANIC/separation-distress. This proposal is also strongly supported by the mediation results reported in Chapter 12 and discussed in Chapter 13. Since the most significant *Z* statistic was for Model B ($5.816 > \pm 1.96$; $p < .01$), namely that OCD is the variable through which separation-distress acts to influence depression, it holds that this model has the most theoretical strength to account for how OCD, depression and separation-distress interrelate statistically. Separation-distress as a variable has a strong direct effect on the development of depression: as evidenced throughout the analyses in this thesis, as well as established empirical evidence, and confirmed by the mediation model (B). With the addition of OCD as a mediating variable, however, the effect of separation-distress *through* OCD to depression is much stronger, reducing the direct effect at the expense of the indirect, mediating effect. Since the indirect path does prove significant, this is a good indication that Model B provides an accurate approximation of the way the variables function in the population. Both mediation models were significant by the standards of the test of joint significance, which is recognised as the most robust and reliable of the variety of available mediation techniques (MacKinnon *et al*., 2002). The analyses provide strong evidence that the variables interrelate in this way. The conclusion is that separation-distress influences depression through the significant effect it has on OCD.

A very important implication of the primary role of PANIC/separation-distress in both OCD and depression, is that there has until now been no satisfactory explanatory mechanism for the high comorbidity of these disorders, and they appear to be opposed in many ways. Depression was a secondary topic in the thesis, but was important in its ability to underscore findings relating separation-distress to OCD. Literature on the prevalence of separation trauma in the early histories of individual's with psychopathologies in adulthood, specifically in affective pathologies, suggested depression as a variable that fitted well within the context of the thesis. Depression has long been associated with separation and loss. Furthermore, the high comorbidity between depression and OCD throughout the empirical literature, suggests that separation-distress may be fundamental to both disorders. These lines

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of converging evidence further support studies into the importance of the panic/separation variant of anxiety in OCD. It is important to emphasize that this emotion was by no means an obvious candidate for an affective mechanism of OCD. It is in fact counterintuitive, since a focus on separation, sadness, loss and anxiety characterised by panic have never formed the focus for OCD.

A highly significant finding, reported in Chapter 12 and discussed in Chapter 13, concerned the separate clinical groups constituting the clinical sample (Study IV). The clinical sample (N = 84) was divided into groups according to the primary diagnosis received by each participant. There were four groups: those who had a primary diagnosis of OCD, those with Major Depressive Disorder, those with a comorbid diagnosis of both OCD and depression, and those with a primary diagnosis of depression and a comorbid diagnosis not directly related to the thesis. It was considered important to determine the extent to which these groups represented a unified population, in terms of the central variable in the thesis, separation-distress. Scores on the Affective Neuroscience Personality Scale, SADNESS, which was constructed to reflect the PANIC emotion substrate (Davis, Panksepp, & Normansell, 2003) were considered the best measures of whether the clinical participants were comparable on separation-distress, given the neuropsychological framework of the thesis. The four groups were analysed accordingly, and the results indicated that the groups could not be distinguished on the basis of these scores. This is a critical finding, in that it provides strong evidence for the fact that patients with primary diagnoses of OCD, depression or a comorbid diagnosis of both, score at comparable levels on a robust measure of PANIC/separation-distress. Furthermore, their scores are significantly higher than those of control group participants, confirming that all clinical participants showed a consistently increased activation of the PANIC emotion substrate. Ultimately, separation-distress as reflected by the SADNESS subscale provides a reliable and consistent way to distinguish between patients diagnosed with OCD, depression, or both disorders – and control participants.

Fear anxiety, which has been traditionally considered the central affect in OCD, was related to separation-distress throughout this thesis. Importantly, fear anxiety (as evaluated in these studies by the FEAR subscale of the ANPS) was significantly implicated in groups that scored highly on obsessionality (in Studies I, III) as well as in the clinical OCD group (Study IV). Its consistent significance across all groups, and its close relationship with separation-distress (and especially with the SADNESS subscale), provide strong support for the findings regarding separation-distress in the same samples. Fear anxiety has been established as a prominent emotion in OCD, and the fact that it related highly to separation-distress in all the relevant groups, confirms the positive findings for separation-distress. Furthermore, fear anxiety was as highly implicated in participants diagnosed with depression as those with OCD.

A less important contribution made by this thesis was its investigation of the psychometric properties of four evaluative measures of separation-distress: the Separation Anxiety Symptom Inventory (SASI), the Structured Clinical Interview for Separation Anxiety Symptoms (SCI-SAS), the Adult Separation Anxiety Checklist of 27 Items (ASA-CL27), and the SADNESS subscale of the Affective Neuroscience Personality Scales (ANPS). The validity of these evaluations was thoroughly investigated, and as far as possible

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reliability was assessed, too. Little empirical research has been reported on the psychometric properties of these separation-distress questionnaires. It was therefore valuable to include the validation study in this thesis.

Results showed that the SASI, SCI-SAS and ASA-CL27 converged highly on measures of separation-distress. Correlations amongst these scales were extremely high, as were correlations amongst them and other, theoretically related variables. Discriminant validity was also confirmed by non-significant, and often negative, correlations with variables representing unrelated psychological constructs. These three assessments also demonstrated very high internal consistency statistics, indicating that they consistently and reliably measured the same underlying construct.

The ANPS demonstrated lower internal consistency statistics; although the results were still statistically significant. It was weakly, though also significantly, correlated with the other scales. Perhaps most intriguingly, it did not diverge from the positive factors, as did the other three separation-distress scales. Whilst only the SASI was the only other factor significantly related to a positive construct (PLAY; $r = .236$, $p < .01$), the ANPS SADNESS, was positively and significantly correlated with SEEK, PLAY, SPIRITUALITY and PA: factors which would not necessarily be associated with separation-distress. This was a further indication that the SADNESS subscale consists of items that seem to evaluate separation-distress slightly differently from the items on the other three separation-distress scales.

The influence of separation trauma experiences in early childhood was also examined in this thesis. This was in order to distinguish separation trauma from separation-distress in their roles in obsessionality, low mood, OCD and depression. Separation trauma referred in this thesis to physical separation from one's primary caregiver (usually one's mother) during critical periods of time, based on attachment research. Although early separation trauma has long been recognised as an important variable in the development of depression in later life, it has not previously been linked to OCD, or to the affective mechanism of PANIC/separation-distress. Therefore this thesis contributed towards the literature on separation trauma in the following ways. First, findings in Study IV re-confirmed the influence that separation trauma has on the development of depression in adult life. Second, it was found that not only does separation trauma increase one's vulnerability to clinical depression, but also to the development of clinical OCD. Third, given the comorbidity of obsessionality and low mood, and of OCD and depression in Studies II, III and IV in this thesis, as well as in the literature in general, separation trauma appears to exert a common significant influence on both. Fourth, given the consistency of separation-distress in the clinical sample (as discussed above with regard to SADNESS subscale analyses), the findings for separation trauma further support the implication of separation and panic in OCD.

Chi-square contingency analyses reported for Study III (Chapter 9) indicated that high scores on measures of obsessionality and low mood were not contingent on separation trauma in the Study III sample. This is inconsistent with the robust findings in Study IV. It also does not fit with the spectrum

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conceptualisation of obsessionality and OCD, low mood and depression which is otherwise supported by the thesis. The finding is, however, quite likely attributable to the small sample size in Study III.

In conclusion, this thesis presents new evidence that separation-distress, which is the conscious feeling associated with the basic emotion substrate, PANIC, is an important emotion in OCD. This has implications for the way in which the disorder is conceptualised. The findings enable a shift away from a purely cognitive perspective on the disorder, and direct attention to the primacy of emotion in OCD. Furthermore, evidence regarding the similar functioning of separation-distress in depression strengthens and confirms the implication of separation-distress in OCD. These findings suggest an explanation for the consistently high comorbidity of OCD and depression. It is concluded that separation-distress is a central affective mechanism of OCD.

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APPENDICES
QUESTIONNAIRES

***Appendix A***
Meta-Cognitions Questionnaire (MCQ)

Instructions:

This questionnaire is concerned with beliefs people have about their thinking. Listed below are a number of beliefs that people have expressed. Please read each item and indicate how much you generally agree with it by circling the appropriate number. Please respond to all of the items, there are no right or wrong answers.

1 = Do not agree  2 = Agree slightly  3 = Agree moderately  4 = Agree very much

1. Worrying helps me to avoid problems in the future.
2. Worrying is dangerous for me.
3. I have difficulty knowing if I have actually done something, or just imagined it.
4. I think a lot about my thoughts.
5. I could make myself sick with worrying.
6. I am aware of the way my mind works when I am thinking about a problem.
7. If I did not control a worrying thought, and then it happened, it would be my fault.
8. If I let my worrying thoughts get out of control, they will end up controlling me.
9. I need to worry in order to remain organized.
10. I have little confidence in my memory for words and names.
11. My worrying thoughts persist, no matter how I try to stop them.
12. Worrying helps me to get things sorted out in my mind.
13. I cannot ignore my worrying thoughts.
14. I monitor my thoughts.
15. I should be in control of my thoughts all the time.
16. My memory can mislead me at times.
17. I will be punished for not controlling certain thoughts.
18. My worrying could make me go mad.
19. If I do not control my worrying thoughts, they could come true.
20. I rarely question my thoughts.
21. Worrying puts my body under a lot of stress.
22. Worrying helps me to avoid disastrous situations.
23. I am constantly aware of my thinking.
24. I have a poor memory.
25. I pay close attention to the way my mind works.
26. People who do not worry have no depth.
27. Worrying helps me cope.
28. I imagine having not done things, and then doubt my memory for doing them.
29. Not being able to control my thoughts is a sign of weakness.
30. If I did not worry, I would make more mistakes.
31. I find it difficult to control my thoughts.
32. Worrying is a sign of a good person.
33. Worrying thoughts enter my head against my will.
34. If I could not control my thoughts I would go crazy.
35. I will lose out in life if I do not worry.
36. When I start worrying, I cannot stop.
37. Some thoughts will always need to be controlled.

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38. I need to worry in order to get things done.
39. I could be punished for not having certain thoughts.
40. My thoughts interfere with my concentration.
41. I it alright to let my thoughts roam free.
42. I worry about my thoughts.
43. I am easily distracted.
44. My worrying thoughts are not productive.
45. Worrying can stop me from seeing a situation clearly.
46. Worrying helps me to solve problems.
47. I have little confidence in my memory for places.
48. My worrying thoughts are uncontrollable.
49. It is bad to think certain thoughts.
50. If I do not control my thoughts, I may end up embarrassing myself.
51. I do not trust my memory.
52. I do my clearest thinking when I am worrying.
53. My worrying thoughts appear automatically.
54. I would be selfish if I never worried.
55. If I could not control my thoughts, I would not be able to function.
56. I need to worry in order to work well.
57. I have little confidence in my memory for actions.
58. I have difficulty keeping my mind focused on one thing for a long time.
59. If a bad thing happens which I have not worried about, I feel responsible.
60. It would not be normal if I did not worry.
61. I constantly examine my thoughts.*
62. If I stopped worrying, I would become glib, arrogant, and offensive.
63. Worrying helps me to plan the future more effectively.
64. I would be a stronger person if I could worry less.
65. It would stupid and complacent not to worry.

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**Item #61 was mistakenly excluded from the online questionnaire, & therefore could be included in neither the calculations for the total nor for Factor 5; however, the effect is, at least, consistent~ meaning a decrease of 0-4 for every person's total, as well as for each person's score on Factor 5)*

***Appendix B***
The Padua Inventory (PI)

Instructions:

The following statements refer to thoughts and behaviours which may occur to everyone in everyday life. For each statement, choose the reply that best seems to fit you and the degree of disturbance which such thoughts or behaviours may create. Rate your replies as follows:

0 = Not at all 1 = A little 2 = Quite a lot 3 = A lot4 = Very much

1. I feel my hands are dirty when I touch money.
2. I think even slight contact with bodily secretion (perspiration, saliva, urine, etc.) may contaminate my clothes or somehow harm me.
3. I find it difficult to touch an object when I know it has been touched by strangers or by certain people.
4. I find it difficult to touch garbage or dirty things.
5. I avoid using public toilets because I am afraid of disease and contamination.
6. I avoid using public telephones because I am afraid of contagion and disease.
7. I wash my hands more often and longer than necessary.
8. I sometimes have to wash or clean myself simply because I think I may be dirty or 'contaminated'.
9. If I touch something I think is 'contaminated', I immediately have to wash or clean myself.
10. If an animal touches me, I feel dirty and immediately have to wash myself or change my clothing.
11. When doubts or worries come into my mind, I cannot rest until I have talked them over with a reassuring person.
12. When I talk, I tend to repeat the same things and the same sentences several times.
13. I tend to ask people to repeat the same things to me several times consecutively, even though I did understand what they said the first time.
14. I feel obliged to follow a particular order in dressing, undressing and washing myself.
15. Before going to sleep, I have to do certain things in a certain order.
16. Before going to bed, I have to hang up or fold my clothes in a special way.
17. I feel I have to repeat certain numbers for no reason.
18. I have to do things several times before I think they are properly done.
19. I tend to keep on checking things more often than necessary.
20. I check and recheck gas and water taps and light switches after turning them off.
21. I return home to check doors, windows, drawers, etc., to make sure they are properly shut.
22. I keep on checking forms, documents, cheques, etc., in detail, to make sure I have filled them in correctly.
23. I keep on going back to see that matches, cigarettes, etc., are properly extinguished.
24. When I handle money I count and recount it several times.
25. I check letters carefully many times before posting them.
26. I find it difficult to take decisions, even about unimportant matters.
27. Sometimes I am not sure I have done things which in fact I know I have done.
28. I have the impression that I will never be able to explain things clearly, especially when talking about important matters that involve me.
29. After doing something carefully, I still have the impression I have either done it badly or not finished it.
30. I am sometimes late because I keep on doing certain things more often than necessary.
31. I invent doubts and problems about most of the things I do.
32. When I start thinking of certain things, I become obsessed with them.
33. Unpleasant thoughts come into my mind against my will and I cannot get rid of them.
34. Obscene or dirty words come into my mind and I cannot get rid of them.
35. My brain constantly goes its own way and I find it difficult to attend to what is happening around me.
36. I imagine catastrophic consequences as a result of absent-mindedness or minor errors which I make.
37. I think or worry at length about having hurt someone without knowing it.
38. When I think about a disaster, I think it is somehow my fault.
39. I sometimes worry at length for no reason that I have hurt myself or have some disease.
40. I sometimes start counting objects for no reason.
41. I feel I have to remember completely unimportant numbers.

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42. When I read I have the impression I have missed something important and must go back and reread the passage at least two or three times.
43. I worry about remembering completely unimportant things and make an effort not to forget them.
44. When a thought or doubt comes into my mind, I have to examine it from all points of view and cannot stop until I have done so.
45. In certain situations I am afraid of losing my self-control and doing embarrassing things.
46. When I look down from a bridge or a very high window, I feel an impulse to throw myself into space.
47. When I see a train approaching I sometimes think I could throw myself under the wheels.
48. At certain moments, I am tempted to tear off my clothes in public.
49. While driving I sometimes feel an impulse to drive the car into someone or something.
50. Seeing weapons excites me and makes me think violent thoughts.
51. I get upset and worried at the sight of knives, daggers and other pointed objects.
52. I sometimes feel something inside me which makes me do things which are really senseless and which I do not want to do.
53. I sometimes feel the need to break or damage things for no reason.
54. I sometimes have an impulse to steal other people's belongings, even if they are of no use to me.
55. I am sometimes almost irresistibly tempted to steal something from the supermarket.
56. I sometimes have an impulse to hurt defenceless children or animals.
57. I feel I have to make special gestures or walk in a certain way.
58. In certain situations I feel an impulse to eat too much, even if I am then ill.
59. When I hear about a suicide or a crime, I am upset for a long time and find it difficult to stop worrying about it.
60. I invent useless worries about germs and diseases.

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***Appendix C***

The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS)

*Note*: Scores should reflect the composite effect of all the patient's obsessive compulsive symptoms. Rate the average occurrence of each item during the prior week up to and including the time of interview.

Obsession Rating Scale (circle appropriate score)

| Item | Range of Severity | | | | |
|---|---|---|---|---|---|
| 1. Time Spent on Obsessions | 0 hr/day | 0–1 hr/day | 1–3 hr/day | 3–8 hr/day | > 8 hr/day |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 2. Interference From Obsessions | None | Mild | Definite but manageable | Substantial impairment | Incapacitating |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 3. Distress From Obsessions | None | Little | Moderate but manageable | Severe | Near constant, disabling |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 4. Resistance to Obsessions | Always resists | Much resistance | Some resistance | Often yields | Completely yields |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 5. Control Over Obsessions | Complete control | Much control | Some control | Little control | No control |
| Score: | 0 | 1 | 2 | 3 | 4 |

Obsession subtotal (add items 1-5) _____

Compulsion Rating Scale (circle appropriate score)

| Item | Range of Severity | | | | |
|---|---|---|---|---|---|
| 6. Time Spent on Compulsions | 0 hr/day | 0–1 hr/day | 1–3 hr/day | 3–8 hr/day | > 8 hr/day |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 7. Interference From Compulsions | None | Mild | Definite but manageable | Substantial impairment | Incapacitating |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 8. Distress From Compulsions | None | Mild | Moderate but manageable | Severe | Near constant, disabling |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 9. Resistance to Compulsions | Always resists | Much resistance | Some resistance | Often yields | Completely yields |
| Score: | 0 | 1 | 2 | 3 | 4 |
| 10. Control Over Compulsions | Complete control | Much control | Some control | Little control | No control |
| Score: | 0 | 1 | 2 | 3 | 4 |

Compulsion subtotal (add items 6–10) _____

Y-BOCS total (add items 1–10) ☐

Total Y-BOCS score range of severity for patients who have both obsessions and compulsions:

0–7 Subclinical 8–15 Mild 16–23 Moderate 24–31 Severe 32–40 Extreme

COMMENTS: _____

_____

_____

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***Appendix D***
The Positive and Negative Affect Scales (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent [INSERT APPROPRIATE TIME INSTRUCTIONS HERE*]. Use the following scale to record your answers.

1 = Very slightly or not at all  2 = A little  3 = Moderately  4 = Quite a bit  5 = Extremely

| | |
|---|---|
| _____ interested | _____ irritable |
| _____ distressed | _____ alert |
| _____ excited | _____ ashamed |
| _____ upset | _____ inspired |
| _____ strong | _____ nervous |
| _____ guilty | _____ determined |
| _____ scared | _____ attentive |
| _____ hostile | _____ jittery |
| _____ enthusiastic | _____ active |
| _____ proud | _____ afraid |

*The PANAS can be used with the following time instructions:

| | |
|---|---|
| *Moment* | you feel this way right now, that is, at the present moment |
| *Today* | you have felt this way today |
| *Past few days* | you have felt this way during the past few days |
| *Week* | you have felt this way during the past week |
| *Past few weeks* | you have felt this way during the past few weeks |
| *Year* | you have felt this way during the past year |
| *General* | you generally feel this way, that is, how you feel on the average |

The *General* time scale was used in this study.

***Appendix E***
Major (ICD-10) Depression Inventory (MDI)

Instructions: The following questions ask about how you have been feeling over the last two weeks. Please indicate which is closest to how you have been feeling, using the following scale:

0 = At no time  1 = Some of the time  2 = Slightly less than half of the time  3 = Slightly more than half of the time  4 = Most of the time  5 = All of the time

How much of the time...

1. Have you felt low in spirits or sad?
2. Have you lost interest in your daily activities?
3. Have you felt lacking in energy and strength?
4. Have you felt less self-confident?
5. Have you had a bad conscience or feelings of guilt?
6. Have you felt that life wasn't worth living?
7. Have you had difficulty in concentrating, e.g., when reading the newspaper or watching television?
8a. Have you felt very restless?
8b. Have you felt subdued or slowed down?
9. Have you had trouble sleeping at night?
10a. Have you suffered from reduced appetite?
10b. Have you suffered from increased appetite?

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***Appendix F***
Separation Anxiety Symptom Inventory (SASI)

0 = I never had this feeling 1 = This feeling occurred occasionally 2 = This feeling occurred fairly often 3 = This feeling occurred very often

1. I did not want to go to school
2. I feared that one of my parents might come to harm when I was away from home
3. I did not want to be left alone at home
4. I had physical symptoms like stomach aches, nausea and headaches, before going to school
5. I had fears that accidents might happen to members of my family when I was not with them
6. I was afraid of getting lost when I was in strange places
7. I imagined that monsters or animals might attack me when I was alone at night
8. I was very afraid of strangers when I was on my own
9. I had nightmares about violence towards me or my family
10. I was very unhappy if I was separated from my family
11. I was afraid of being harmed or kidnapped when I was alone
12. I daydreamed about being with my family when I was away from home
13. I was afraid to go to sleep alone
14. I was very tense before going to school
15. I was afraid of the dark

***Appendix G***
Structured Clinical Interview for Separation Anxiety Symptoms (SCI-SAS)

Instructions: These are questions about feelings you may have had as a child. How did you feel as a child when you had to be away from your mother or from home? If you were cared for and felt closest to someone other than your mother, relate the questions below to this person. Answer according to this scale:

0 = Not at all 1 = Sometimes 2 = Often

*Childhood separation anxiety*
1. Did you ever feel very upset or sad if you were separated from your mother? For example, when she went out or went on a trip, did you cry, beg her to stay, have a temper tantrum, try to stop her from leaving, try to follow her? When you were away from home or from your mother did you feel very sad or upset like you didn't care about anything? Did you want to come home early? Did you often call your mother?

2. Did you worry that something bad might happened to your mother and you might lose her? (For example, did you worry a lot if she had an illness or worry that she would be hurt in an accident or some other bad thing would happen?) Did you ever worry that your mother would go away and never come back? Did you ever worry that she would die?

3. Did you ever worry that something bad would happen to you that would separate you from your mother (like getting lost, being kidnapped, having an accident, or even being killed)?
4. Did you have trouble going to school because of fear of leaving home, or just wanting to be at home? Did you ever refuse to go to school so you could stay home to be with your mother? Did your parents ever have to make you go to school? Did someone from home have to stay with you while you went to school?

5. Was it very difficult for you to be alone, even alone in a room by yourself? Did you ever follow your mother or other people around at home so you wouldn't need to be alone? Did your mother ever complain because you were too "clingy"?

6. Did you ever feel like you didn't want to go to sleep without your mother near, or like you didn't want to sleep away from home? Did you ever wake up in the middle of the night and go to sleep near your mother or go to check to see if she was okay?

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7. Did you ever have repeated nightmares about bad things happening that would separate you from your family or your mother (including things like fire, murder or other catastrophes)?

8. Did you ever feel physically ill when you had to go to school (for example, have a headache or stomach ache or feel sick to your stomach)? Would you feel better if you stayed home? Did you feel physically ill if you were away from home or away from your mother for other reasons? Would you feel better at home?

*Adult separation anxiety*
1. Did you ever feel you were overly dependent on a family member, spouse or another person, or did you cling to them because of fear of losing them? Did you ever feel very upset or sad because you had to be away from this person, or away from home? For example, did you cry, beg him/her to stay home, get angry or jealous, try to stop him/her from leaving, or try to follow him/her? When you were away from home or from this person, did you ever feel very sad or upset, or like you didn't care about anything? Did you want to come home early? Did you often call this person to have some contact?

2. Did you ever worry that something bad would happen to this person and you might lose him/her? For example, did you worry a lot if you quarrelled, if he/she had an illness, that he/she would be hurt in an accident or injured in some other way? Did you ever worry a lot that he/she would leave you or would die?

3. Did you ever worry that something bad would happen to you and separate you from this person (like getting lost, being kidnapped, having an accident or being killed)?

4. Did you have trouble going out because of fear of leaving home or just wanting to be at home? Did you ever stop going out so you could stay home? Did you need to have someone else do out-of-the-house chores? Did someone need to be with you when you went out?

5. Was it ever very difficult for you to be alone, even in a room by yourself? Did you ever follow anyone around, so you wouldn't need to be alone? Did anyone ever complain because you were too "clingy", "dependent", or because you were "suffocating" him or her?

6. Did you ever feel like you didn't want to go to sleep without a loved one near, or like you didn't want to sleep away from home? Did you ever wake up in the middle of the night and check to see if he/she was okay?

7. Did you ever have repeated nightmares about things happening that would separate you from your family or from other important persons (including things like fire, murder or other catastrophes)?
8. Did you ever feel physically ill when you had to go out (for example, have a headache or stomach ache or feel sick to your stomach, or have other physical symptoms)? Would you feel better if you stayed home?

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***Appendix H***
Adult Separation Anxiety Self-Report Checklist (ASA-CL27)

Instructions: Rate your answers according to the following scale:

0 = This has never happened  1 = This happens occasionally  2 = This happens fairly often
3 = This happens very often

1. Feel more secure at home with close attachments.
2. Experience difficulty in staying away from home for several hours.
3. Carry around something in purse or wallet for security or comfort.
4. Experience extreme stress when leaving home to go on long trip.
5. Suffer from nightmares or dreams about separation from close attachments.
6. Experience extreme stress before leaving someone close before going away on a long trip.
7. Become very upset when usual routine is disrupted.
8. Worry about the intensity of relationships with close attachments.
9. Experience physical symptoms before leaving to go to work or other regular activities.

10. Talk a lot in order to keep close attachments around.
11. Concerned where close attachments are going when separated from them.
12. Experience difficulty in sleeping alone at night.
13. Better able to sleep if can hear the voices of close attachments or voices on the television or radio.
14. Become very distressed when thinking about being away from close attachments.
15. Suffer from nightmares or dreams about separation from home.
16. Worry about close attachments coming to serious harm.
17. Become very upset with change to usual daily routine if it interferes with contact to close attachments.
18. Worry a lot about close attachments leaving.
19. Sleep better if the lights are on in the house or bedroom.
20. Try to avoid being at home alone when close attachments are out.
21. Suffer from panic attacks when thinking about leaving close attachments or about them leaving.
22. Anxiety about not speaking to close attachments on the telephone regularly.
23. Afraid of not being able to cope if close attachments left.
24. Suffer from panic attacks when separated from close attachments.
25. Worry about possible events that may cause separation from close attachments.
26. Close attachments have mentioned that you talk a lot.
27. Worry that relationships are so close it may cause other problems.

***Appendix I***

Affective Neuroscience Personality Scales (ANPS)

Instructions: Use the following scale to indicate to what extent you agree with the following statements:

1 = Strongly Agree  2 = Agree  3 = Disagree  4 = Strongly Disagree

1. Almost any little problem or puzzle stimulates my interest.
2. People who know me well would say I am an anxious person.
3. I often feel a strong need to take care of others.
4. When I am frustrated I usually get angry.
5. I am a person who is easily amused and laughs a lot.
6. I often feel sad.
7. Feeling a oneness with all of creation helps give more meaning to my life.
8. I make an effort to remain aware of my feelings and emotions.
9. I do not get much pleasure out of looking forward to special events.
10. I do not often struggle over making decisions.
11. I think it's ridiculous the way some people carry on around baby animals.
12. If I am blocked from getting what I want, I usually just accept it.
13. My friends would probably describe me as being too serious.
14. I seem to be affected less by personal rejection than most people.
15. The meaning in my life does not come from feeling connected to other living beings.
16. I will gossip a little at times.
17. I really enjoy looking forward to new experiences.
18. I often think of what I should have done after the opportunity has passed.
19. I like taking care of children.
20. My friends would probably describe me as hot-headed.
21. I am known as one who keeps work fun.
22. I often have the feeling that I want to cry.
23. I am often spiritually touched by the beauty of creation.
24. When listening to music, I sometimes become so absorbed in the music that I lose track of everything else going on around me.
25. I like to set very practical goals rather than grandiose plans.
26. I would not describe myself as a worrier.
27. Caring for a sick person would be a burden for me.
28. I cannot remember a time when I became so angry that I wanted to break something.
29. I generally would not enjoy vigorous games which required physical effort.

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30. I seem to be less sad than most other people.
31. I rarely rely on spiritual inspiration to help me meet important challenges.
32. I always tell the truth.
33. Seeking the answer is as enjoyable as finding the solution.
34. I am frequently more tense inside than others realize.
35. I love being around baby animals.
36. When I get angry, I often feel like swearing.
37. I usually think about good times and have happy thoughts.
38. I often feel lonely.
39. For me, experiencing a connection to all of life is an important source of inspiration.
40. I like to take pleasure in small things, such as the colours in soap bubbles.
41. I often feel little eagerness or anticipation when thinking about my goals.
42. I have very few fears in my life.
43. I do not especially enjoy being around children.
44. When I am frustrated, I rarely become angry.
45. I dislike humour that gets really silly.
46. I am very attached to my family.
47. For me, spirituality is not a primary source of inner peace and harmony.
48. Sometimes I feel like swearing.
49. I enjoy anticipating and working towards a goal almost as much as achieving it.
50. I sometimes cannot stop worrying about my problems.
51. I often feel soft-hearted towards stray animals.
52. When someone makes me angry, I tend to remain fired up for a long time.
53. People who know me would say I am a very fun-loving person.
54. I often think about people I have loved who are no longer with me.
55. Contemplating spiritual issues often fills me with a sense of intense awe and possibility.
56. I have never attempted to express myself by writing poetry.
57. I am usually not interested in solving problems and puzzles just for the sake of solving them.
58. My friends would say that I am courageous and that it takes a lot to frighten me.
59. I would generally consider pets in my home to be more trouble than they are worth.
60. People who know me well would say I almost never become angry.
61. I do not particularly enjoy kidding around and exchanging "wisecracks".
62. It does not particularly sadden me when friends or family members are disapproving of me.
63. My sense of significance and purpose in life do not come from my spiritual beliefs.
64. I have never "played sick" to get out of something.
65. My curiosity sometimes drives me to do things that others might consider a waste of time.
66. I often worry about the future.
67. I feel sorry for the homeless.
68. I tend to get irritated if someone tries to stop me from doing what I want to do.
69. I feel happiness most of the time.
70. I tend to think about losing loved ones often.
71. Feeling a connection with the rest of humanity motivates me to make more ethical choices.
72. I am not typically impressed by poetic language or fancy speech.
73. I rarely feel the need just to get out and explore things.
74. There are very few things that make me anxious.
75. I do not like to feel "needed" by other people.
76. I rarely get angry enough to want to hit someone.
77. I do not tend to see the humour in things many people consider funny.
78. Moving away from my friends would not upset me.
79. The goals I set for myself are not influenced by my spirituality.
80. There have been times in my life when I have been afraid of the dark.
81. Whenever I am in a new place, I always like to explore the area and get a better feel for my surroundings.
82. I often worry about whether I am making the correct decision.
83. I frequently do little things for others that make them feel good.

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84. When things do not work out the way I want, I sometimes feel like kicking or hitting something.
85. I enjoy all kinds of games, including those with physical contact.
86. I frequently feel distressed when I cannot be with my friends.
87. Spiritual inspiration helps me transcend my limitations.
88. While watching a movie or the like, I may become so involved it is as if I am actually part of it.
89. I am not the kind of person that likes probing and investigating problems.
90. I rarely worry about my future.
91. I do not especially want people to be emotionally close to me.
92. I hardly ever become so angry at someone that I feel like yelling at them.
93. I enjoy playing games less when it is just for fun and there is no clear winner.
94. I rarely think about people or relationships I have lost.
95. The suggestion to "Treat other people as you want to be treated" does not arouse strong feelings in me.
96. I have never intentionally told a lie.
97. I often feel like I could accomplish almost anything.
98. I often feel nervous and have difficulty relaxing.
99. I am a person who strongly feels the pain of other people's losses.
100. Sometimes little quirky things people do really get on my nerves.
101. I see life as being full of opportunities to have fun.
102. I am a person who feels sorrow and the pain of loss strongly.
103. I sometimes feel "chills" or "goosebumps" when listening to music.
104. It often seems that life has no meaning.
105. I am not an extremely inquisitive person.
106. I almost never lose sleep worrying about things.
107. I am not particularly affectionate.
108. When people irritate me, I rarely feel the urge to say nasty things to them.
109. Playing games with other people is not especially enjoyable for me.
110. I am almost always happy to interact with other people.

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***Appendix J***

Early Separation Trauma Scale

*{References to time periods}*

Following are 9 specific age periods; please mark Yes or No for each listed time span, according to whether or not you were separated from your mother (or whoever was your primary caregiver) during those times:

1. 0 – 6 months (under the age of 3 years)
2. 0 – 12 months (under the age of 3 years)
3. 0 – 18 months (under the age of 3 years)
4. 0 – 6 months (under the age of 6 years)
5. 0 – 12 months) (under the age of 6 years)
6. 0 – 18 months (under the age of 6 years)
7. 0 – 6 months (under the age of 12 years)
8. 0 – 12 months (under the age of 12 years)
9. 0 – 18 months (under the age of 12 years)

***Appendix K***

*www.guineapig.co.za*


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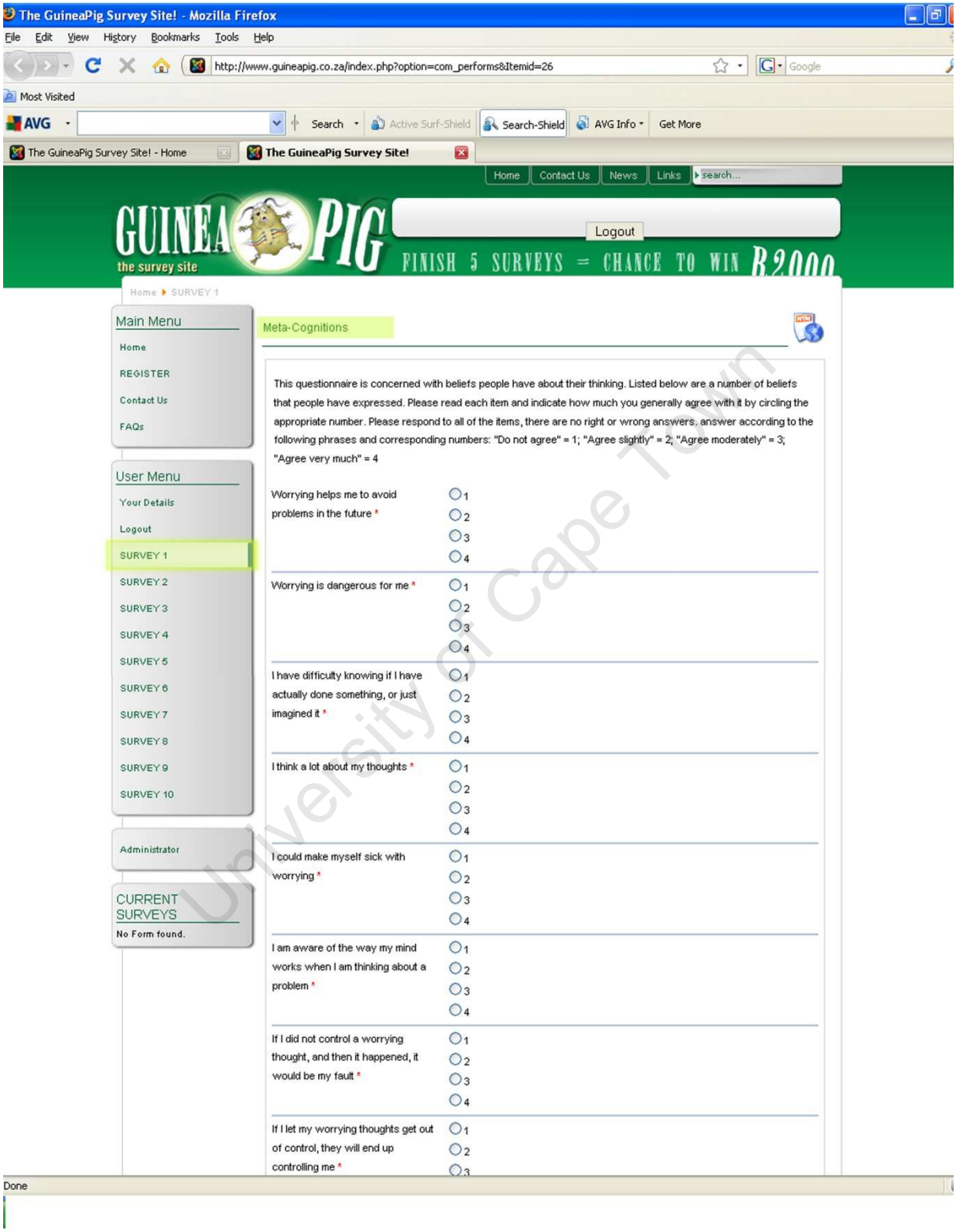


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***Appendix L***
Security measures for online questionnaire anonymity

1) The website will not be listed on search engines
The HTAccess file has been edited to deny robots/spiders and any indexing from ALL search engines.
No keywords or meta-tags have been included in any of the pages
No external marketing of the site will be implemented
Only registered users will have access to forms, and those users are screened.

2) Coding & Security

- The survey forms are not created using standard HTML but are dynamically generated through a secured database using PhP
- The MySQL server is heavily protected by the ISP as part of it's services to clients
- The tables on the database used for the forms have security where only the PhP Admin can view / modify. I am the only one with that access
- Core files with security (level3 - highest)
- Server CMOD / File permissions are set to strict - i.e., code 715/655 where required
- All registered users are tracked and IP addresses are recorded
- Modified HTAccess / PhP for high security (Please see end of mail for example code and measures implemented

3) Other forms of plagiarism / other issues

- Users who try to "SAVE" the page will only see 'jumbled' PhP code
- I could add a JavaScript to stop people from right-clicking to copy and paste text, however this is not foolproof since users could take a screenshot of the page and use an OCR scan to convert it to text. Users could also disable java scripts on the page and copy and paste to their hearts content
- Using 128bit Encryption would be overkill, and does not stop anyone from copying and pasting text from a web page. I have tested this thoroughly using my own Internet Banking (In fact I don't download my statements, I copy and paste statements directly into MSWord)
- Ultimately - the surveys aren't very big; participants could write them down and have them typed up
- The only people with access to the surveys will be students from one institution (UCT), who have to provide a student number during the registration process on the site. These students will not be interested in copying a survey, only in the incentive to take part in the survey
- No other persons in professional fields besides myself and Michelle will have access to any of the information on the site.

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***Appendix M***
Information and Consent

PARTICIPANT INFORMATION

Name:

Age:

Sex:

Occupation:

Education:

Diagnosis/diagnoses:

Contact telephone numbers:

Psychiatrist (including contact details) - Optional information

Under the age of 3 years:
0-6months
0-12months
0-18months

Under the age of 6 years:
0-6months
0-12months
0-18 months

Under the age of 12 years:
0-6months
0-12months
0-18months

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PARTICIPANT CONSENT

Thank you sincerely for consenting to participate in my research study.
As part of my PhD degree in Neuropsychology at the University of Cape Town (UCT), I need to ask people who have been clinically diagnosed with Obsessive-Compulsive Disorder (OCD) and/or depression/Major Depressive Disorder (MDD) to fill in a collection of questionnaires. The purpose of the study is to look at specific emotions in the two disorders from a neuropsychological perspective. Specifically, it is to see whether common basic emotions could potentially be importantly involved in OCD (as well as depression).
I hope may offer a new way of understanding these two extremely complicated disorders; and the ways in which they develop and are maintained. Please read through and sign the informed consent section below and then to fill in the questionnaires that follow. Thanks for your time and effort; I hope my research will help to understand and treat OCD and depression.

Consent form

1. I agree to take part in the research study outlined above, to form part of Michelle Jackson's PhD degree in Neuropsychology, to answer all the questions fully, honestly and to the best of my ability and memory.

2. I understand that I am within my rights under the Ethical Code of Professional Conduct laid out by the Professional Board for Psychology (Health Professions Council of South Africa) to withdraw my participation at any time, without having to justify my decision to the researcher.

3. I understand that all information provided by me via my questionnaire responses, as well as any correspondence between myself and the researcher, will remain confidential and will only be used for the purposes of the study. Although questionnaire scores and other data provided by myself may be used in the study, my identity will never be revealed or linked to my individual responses in any way.

4. In the event that the research study is published in either a local or international peer-reviewed scientific journal, the same conditions pertaining to the writing up of the thesis (in 3. above) will apply and my anonymity will be maintained.

5. I agree to complete these questionnaires in full and to return them via email to the researcher.

I understand the above conditions, agree, and give my informed consent (please delete the response that does not apply to you):
YES/NO

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***Appendix N***
Study IV Feedback Form (anonymous)

Name: X
Study: Clinical
Group: Clinical

Introduction

Debate continues surrounding the best way to approach thought (cognition), emotion (affect), their co-evolution, their subjectively experienced distinctiveness and their ultimate mutual dependence in the brain. Affective neuroscience is the relatively new scientific field of examining emotion from a neurobiological and neuropsychological perspective. It is used in this thesis to investigate specific emotions in Obsessive-Compulsive Disorder (OCD), and to look at closely related implications for depression.

OCD is a clinical psychological disorder characterized by intrusive, recurrent and unwanted thoughts (obsessions) and/or repetitive behaviours and mental acts (compulsions) that one feels driven to perform in the hope of relieving the obsessions. OCD has a lifetime prevalence of 2 to 3% in the population (Robins et al., 1984 in Maltby et al., 2005). Depression is a clinical mood disorder diagnosed when an abnormal depressed mood persists for most of the day, nearly every day, for at least two weeks, and is accompanied by loss of all interest and pleasure, fatigue, self-reproach, poor concentration, morbid thoughts of death, and disturbances in sleep, weight, appetite and activity (DSM-IV-TR, 2000). Lifetime prevalence rates for depression are estimated at up to 17.1% (Blazer, Kessler, McGonagle, & Swartz, 1994). Both OCD and depression cause major impairment to normal functioning (DSM-IV-TR, 2000). In many ways, the disorders seem to be polar opposites: OCD is a pathology of overactivity, which focuses on future events, and is actively resisted; whilst depressive rumination typically focuses on past events, and is not forcefully resisted. This thesis will look at how emotion functions in both disorders.

Method

Participants with clinical diagnoses of OCD, depression and related spectrum disorders were recruited to a clinical group; a control group was also recruited, who were "matched" on factors such as age, sex, education and occupation in order to provide a suitable "control" with which to make accurate comparisons to the clinical findings. Again, evaluations in terms of OCD, depression and separation-distress were performed, and the results were subjected to statistical calculations, chosen with care to address the specific research questions.

Results

The table below provides a summary of the demographics (participant characteristics) of the study in which you took part.

| Variables | Your demographics | Average demographics | |
|---|---|---|---|
| | | Control | Clinical |
| Age | 45 | 32.88 | 34.12(8.52) |
| Sex | Female | 78.87 | 72.29 |
| Education (# of years) | 12 | 14.11 | 13.57(1.69) |
| Occupation (skilled vs unskilled) | Unskilled | 38.03 | 27.71 |
| Psychiatric treatment | Yes | 4.23 | 68.67 |
| Psychopharmacological treatment* | Yes | 5.63 | 73.49 |
| Separation trauma | 0-6 months (under 12 yrs) | 19.72 | 40.96 |

*Table 1: Demographics (Occupation is given as a value of % of skilled workers; psychiatric or psychological and psychopharmacological treatment, as well as incidences of early separation trauma, are reflected by the % of people in each group who met these criteria; and sex is marked as the % of females each group)*

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**this refers to medication prescribed for clinical psychological and psychiatric disorders, e.g., benzodiazepines (anti-anxiety medication, or tranquilizers) & antidepressants, such as SSRIs (selective serotonin reuptake inhibitors)*

Below are your personal questionnaire result scores the standardized norms from this specific research population (Control N* = 71; Clinical N = 83). For tables 2, 3 and 4, clinical results (i.e. the focus of the study) are highlighted in red.

| Questionnaires | Total possible score | Personal score | Population norms (this study)*** | |
|---|---|---|---|---|
| | | | Control | Clinical |
| MCQ** | 256 | 154 | 122.42 | 167.13 |
| PI | 240 | 31 | 34.92 | 86.63 |
| Y-BOCS | 40 | 12 | 5.86 | 17.67 |
| MDI | 50 | 30 | 15.86 | 33.93 |
| PANAS | 100 | 69 | 51.51 | 56.67 |
| SASI | 45 | 26 | 12.44 | 22.23 |
| SCI-SAS | 32 | 19 | 7.49 | 15.90 |
| ASA-CL27 | 81 | 25 | 14.51 | 35.16 |
| ANPS | 440 | 252 | 267.93 | 263.92 |

*Table 2: Individual scores compared to norms*
**N = the total number of participants included in the research sample (after casewise deletion of missing data)*
***Questionnaire abbreviations: MCQ = Meta-Cognitions Questionnaire; PI = Padua Inventory; Y-BOCS = Yale-Brown Obsessive-Compulsive Survey; MDI = Major Depression Inventory; PANAS = Positive & Negative Affect Scale; SASI = Separation Anxiety Symptom Inventory; SCI-SAS = Structured Clinical Interview for Separation Anxiety Symptoms; ASA-CL27 = Adult Separation Anxiety Checklist; ANPS = Affective Neuroscience Personality Scales*
****Population norms refer to the average scores of the people who make up a research group; therefore this forms a particular estimate using the most representative group of people possible under study conditions, but by no means can be generalized with certainty to every other group, or to every individual.*
*Standardized population norms therefore refer to the average scores for everyone who took part in this study*

Descriptive and inferential analyses were carried out on the data sets. Descriptive statistical analysis refers to averages (means), standard deviations (SD; how greatly each score diverges from the average) and correlational calculations (how scores change together, without confirming specifics such as cause, effect or degree). Inferential analysis is more complex, testing the effect specific factors and groups have on one another, and how changes in the scores of one factor or variable are accounted for - and to what kind of degree - by changes in another. Only descriptive statistics relating to your own scores are reported here.

Below are your personal scores for the individual assessment factors within each questionnaire (the SASI and SCI-SAS have been omitted from this table, as they are constituted only by a total score, given above). The total possible score for each factor is given in brackets after the factor name, e.g., the highest obtainable score on MCQ1 = 76. SDs are given in brackets next to the means.

| Questionnaires | Factors | Personal score | Population mean/average | |
|---|---|---|---|---|
| | | | Control | Clinical |
| MCQ | MCQ 1(76) | 44 | 32.00(9.20) | 40.55(12.97) |
| | MCQ2 (64) | 43 | 34.35(10.43) | 49.75(11.99) |
| | MCQ3 (40) | 15 | 16.18(5.43) | 24.89(8.29) |
| | MCQ4 (52) | 31 | 23.75(5.80) | 32.76(8.86) |
| | MCQ5 (24) | 21 | 17.04(4.28) | 19.18(4.64) |
| PI | PI1 (68) | 10 | 12.07(12.67) | 30.99(18.33) |
| | PI2(44) | 3 | 7.97(7.23) | 15.33(11.41) |
| | PI3 (32) | 2 | 5.04(6.26) | 12.00(9.10) |
| | PI4 (28) | 4 | 2.70(3.73) | 8.37(7.55) |
| Y-BOCS | Obsessions (20) | 0 | 3.14(3.78) | 9.20(5.49) |

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| | | | | |
|---|---|---|---|---|
| | Compulsions (20) | 12 | 2.72(3.32) | 8.48(5.56) |
| MDI | 1st 3 items* (15) | 9 | 5.08(3.39) | 10.08(3.27) |
| | 1st 7 items (35) | 21 | 10.03(7.63) | 21.81(8.27) |
| PANAS | Positive Affect (50) | 32 | 32.00(7.80) | 23.70(8.51) |
| | Negative Affect (50) | 37 | 19.51(8.84) | 32.98(10.04) |
| SCI-SAS | Childhood (16) | 10 | 3.80(3.12) | 7.80(5.31) |
| | Adult (16) | 9 | 3.69(3.38) | 8.10(4.82) |
| ANPS | SEEK (56) | 42 | 40.72(4.48) | 37.46(5.78) |
| | FEAR (56) | 44 | 37.63(6.47) | 43.89(6.36) |
| | CARE (56) | 39 | 42.15(5.05) | 40.78(6.61) |
| | ANGER (56) | 40 | 36.85(6.19) | 41.80(7.33) |
| | PLAY (56) | 36 | 40.83(5.14) | 33.53(6.09) |
| | SADNESS (56) | 43 | 35.59(5.54) | 40.53(5.34) |
| | SPIRITUALITY (48) | 40 | 36.69(7.90) | 35.27(7.83) |

*Table 3: Factor scores: see descriptive meanings of MCQ & PI factors below.*

{*the way item scores cluster in this evaluation are utilised to determine the characteristics of a clinical diagnosis of MDD; which is not represented by your scores on this test, anyway}

MCQ1 – Positive beliefs about worry
MCQ2 – Uncontrollability & danger
MCQ3 – Cognitive confidence
MCQ4 – Themes of superstition, punishment & responsibility
MCQ5 – Cognitive self-consciousness

PI1 – Impaired control over mental activities
PI2 – Becoming contaminated
PI3 – Checking behaviours
PI4 – Urges & worries of losing control over motor behaviours

The scores below have been standardized to form a percentage of the total possible score.

| Variables | Your score | Control score | Clinical score |
|---|---|---|---|
| OCD | 36.48 | 30.22 (10.56) | 50.49 (16.11) |
| Depression | 60.91 | 32.15 (17.84) | 60.82 (19.39) |
| Separation-distress | 52.8 | 32.72 (13.72) | 53.21 (19.29) |

*Table 4: Descriptive statistics: Overall OCD, MDD & separation-distress scores*

Minimum & maximum scores for each variable were as follows.

| | Control | | Clinical | |
|---|---|---|---|---|
| OCD | 12.59 | 65.37 | 19.45 | 83.89 |
| Depression | 10.91 | 78.18 | 10.00 | 95.45 |
| Separation-distress | 14.49 | 92.53 | 17.29 | 95.79 |

*Table 5: Minimums & Maximums for overall scores on OCD, depression & separation-distress*

NOTE
It is very important to realise that responses to the questions asked in these surveys are not diagnostic, and that they have simply been used as a way to gather information on people's tendencies towards various types of mental

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states. If you have high scores on one or more of the variables do not take this as a diagnosis – the terms OCD and depression were used in a specific context, for the purposes of simplification and to make it possible to approach the research questions in an accessible, statistically relevant way. They do not refer in this context to the actual clinical disorders; only to approximations towards them on certain variables. The questionnaires you have answered could never alone constitute a diagnosis, in any way, and are research-oriented (i.e. they do not emerge from within a therapeutic psychological framework).

Discussion

The results given here are almost exclusively only in terms of your individual test performances. None of the overall data analyses for specific research questions have been provided, since they are still in the preliminary stages.

The implications of this study include possible reappraisal of mood and anxiety disorder conceptualisation, contribution towards understanding the emotional bases of OCD and MDD, and adding to the understanding, management and treatment of the disorders. This research also contributes towards the affective neuroscience research paradigm, by investigating the role of emotion in what has traditionally been considered a disorder of purely cognitive origin.

Thank you so much for helping me with my PhD. I couldn't have finished it without the help I had from everyone who took part.

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***Appendix O***

Normal distribution plots and descriptive statistics for OCD, separation-distress and depression as continuous variables (Point-biserial data calculations; Study IV, Chp.12, p.134)

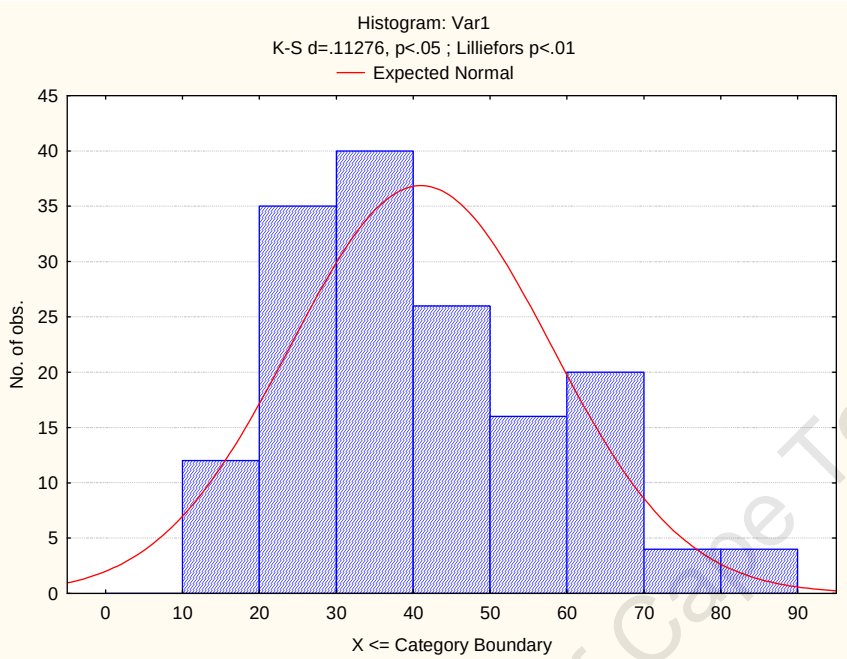


*Fig.1 Normal probability plot for OCD as a continuous variable (clinical and control scores combined; N = 157)*

| Variable | N | Mean*(std.dev)* | $CI_{0.95}$ | Median | Min. | Max. | Variance | *SE* |
|---|---|---|---|---|---|---|---|---|
| OCD | 157 | 41.015*(16.986)* | 38.337 ≤ μ ≤ 43.692 | 37.040 | 12.590 | 83.890 | 288.524 | 1.356 |

*Table 1 Descriptive statistics for distribution of OCD scores across clinical and control groups*

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Depression

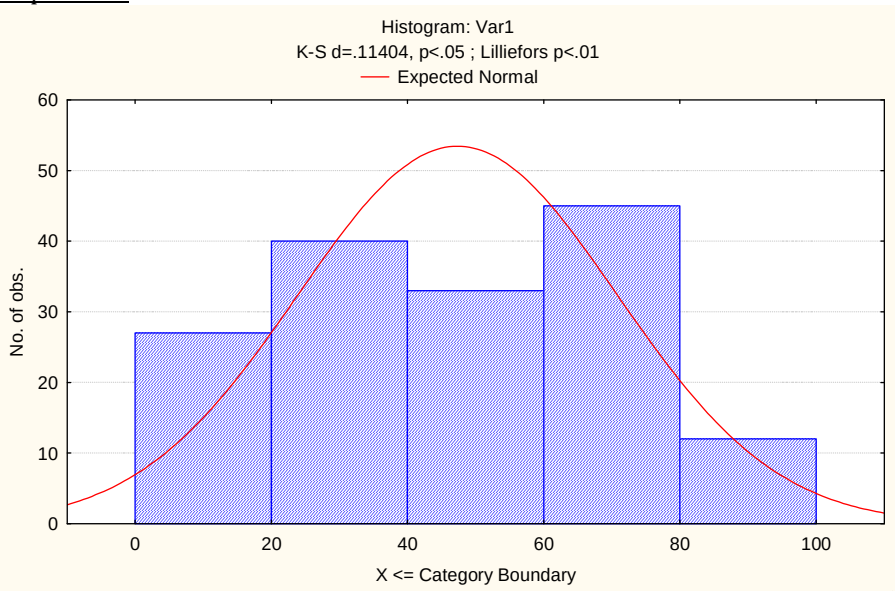


*Fig.2*

| Variable | N | Mean*(std.dev)* | $CI_{0.95}$ | Median | Min. | Max. | Variance | *SE* |
|---|---|---|---|---|---|---|---|---|
| Depression | 157 | 47.343*(23.438)* | 43.648 ≤ μ ≤ 51.038 | 47.270 | 10.000 | 95.450 | 549.324 | 1.871 |

*Table 2 Descriptive statistics for distribution of depression scores across clinical and control groups*

Separation-distress

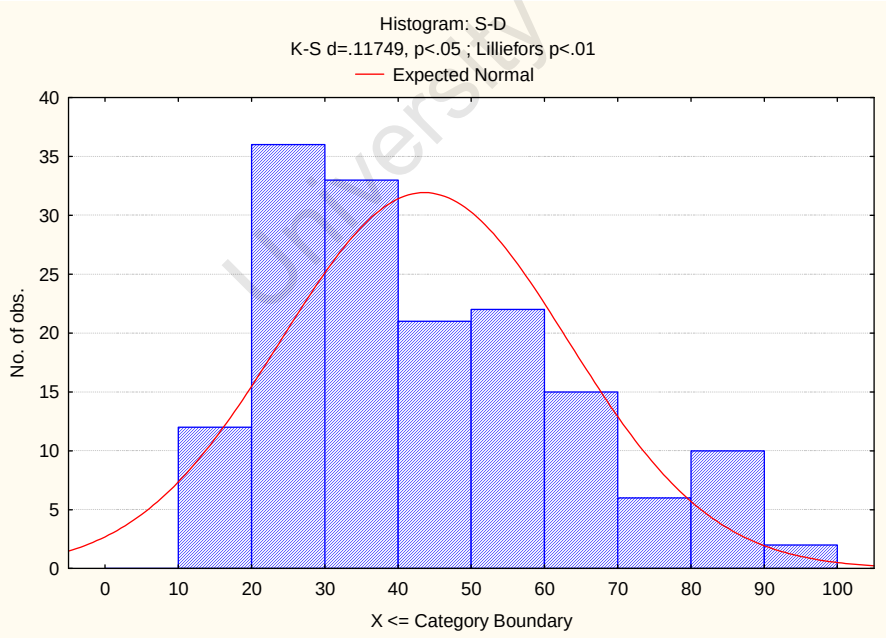


*Fig.3*

| Variable | N | Mean*(std.dev)* | $CI_{0.95}$ | Median | Min. | Max. | Variance | *SE* |
|---|---|---|---|---|---|---|---|---|
| Separation-distress | 157 | 43.607*(19.616)* | 40.515 ≤ μ ≤ 46.700 | 39.250 | 14.490 | 95.790 | 384.801 | |

*Table 3 Descriptive statistics for distribution of separation-distress scores across clinical and control groups*

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***Appendix P***

Inter-item correlations for scale validation studies (detailed results tables)

*Non-clinical results*

SASI

| Variable | Summary for scale: Mean=14.2857; Std. Dev.=9.79796 Valid N:49 **Cronbach alpha:** .905005; **Standardized alpha:** .905192 **Average inter-item corr.:** .401804 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| SASI 1 | 12.592 | 88.037 | 9.383 | 0.314 | 0.908 |
| SASI 2 | 13.245 | 84.144 | 9.173 | 0.468 | 0.904 |
| SASI 3 | 13.469 | 80.372 | 8.965 | 0.758 | 0.893 |
| SASI 4 | 13.510 | 80.454 | 8.970 | 0.619 | 0.898 |
| SASI 5 | 13.327 | 82.873 | 9.103 | 0.580 | 0.899 |
| SASI 6 | 13.306 | 82.131 | 9.063 | 0.668 | 0.896 |
| SASI 7 | 13.184 | 83.089 | 9.115 | 0.512 | 0.902 |
| SASI 8 | 13.265 | 81.705 | 9.039 | 0.643 | 0.897 |
| SASI 9 | 13.327 | 84.179 | 9.175 | 0.516 | 0.902 |
| SASI 10 | 13.469 | 82.535 | 9.085 | 0.622 | 0.898 |
| SASI 11 | 13.469 | 82.698 | 9.094 | 0.611 | 0.898 |
| SASI 12 | 13.857 | 86.612 | 9.307 | 0.468 | 0.903 |
| SASI 13 | 13.612 | 79.748 | 8.930 | 0.804 | 0.891 |
| SASI 14 | 13.490 | 80.087 | 8.949 | 0.619 | 0.898 |
| SASI 15 | 12.878 | 78.475 | 8.859 | 0.693 | 0.895 |

*Summary for Scale: Non-clinical SASI Inter-item Correlation and values with deletion of successive variables.*

SCI-SAS

| Variable | Summary for scale: Mean=8.12245; Std. Dev.=6.96609 Valid N:49 **Cronbach alpha:** .898443; **Standardized alpha:** .899849 **Average inter-item corr.:** .369196 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| SCI-SAS 1 | 7.388 | 41.176 | 6.417 | 0.602 | 0.891 |
| SCI-SAS 2 | 7.265 | 40.848 | 6.391 | 0.633 | 0.890 |
| SCI-SAS 3 | 7.469 | 40.616 | 6.373 | 0.672 | 0.888 |
| SCI-SAS 4 | 7.816 | 41.864 | 6.470 | 0.668 | 0.889 |
| SCI-SAS 5 | 7.878 | 42.842 | 6.545 | 0.604 | 0.892 |
| SCI-SAS 6 | 7.653 | 41.492 | 6.441 | 0.613 | 0.891 |
| SCI-SAS 7 | 7.551 | 42.370 | 6.509 | 0.572 | 0.892 |
| SCI-SAS 8 | 7.714 | 40.735 | 6.382 | 0.648 | 0.889 |
| SCI-SAS 9 | 7.653 | 42.145 | 6.492 | 0.511 | 0.894 |
| SCI-SAS 10 | 7.204 | 40.734 | 6.382 | 0.624 | 0.890 |
| SCI-SAS 11 | 7.490 | 42.413 | 6.513 | 0.491 | 0.895 |
| SCI-SAS 12 | 7.918 | 44.483 | 6.670 | 0.474 | 0.900 |
| SCI-SAS 13 | 7.837 | 43.402 | 6.588 | 0.506 | 0.894 |
| SCI-SAS 14 | 7.673 | 42.628 | 6.529 | 0.508 | 0.894 |
| SCI-SAS 15 | 7.592 | 43.670 | 6.608 | 0.345 | 0901 |
| SCI-SAS 16 | 7.735 | 41.583 | 6.448 | 0.611 | 0.891 |

*Summary for Scale: Non-clinical SCI-SAS Inter-item Correlation and values with deletion of successive variables.*

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ASA-CL27

| Variable | Summary for scale: Mean=18.5306; Std. Dev.=17.0173 Valid N:49<br>**Cronbach alpha:** .954999; **Standardized alpha:** .953574<br>**Average inter-item corr.:** .452578 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| ASA-CL27 1 | 17.245 | 275.940 | 16.611 | 0.264 | 0.957 |
| ASA-CL27 2 | 18.286 | 277.429 | 16.656 | 0.381 | 0.955 |
| ASA-CL27 3 | 18.020 | 268.877 | 16.397 | 0.484 | 0.954 |
| ASA-CL27 4 | 18.020 | 268.265 | 16.379 | 0.597 | 0.954 |
| ASA-CL27 5 | 18.143 | 272.082 | 16.495 | 0.536 | 0.954 |
| ASA-CL27 6 | 17.735 | 261.868 | 16.182 | 0.738 | 0.953 |
| ASA-CL27 7 | 17.531 | 264.494 | 16.263 | 0.553 | 0.954 |
| ASA-CL27 8 | 17.245 | 259.001 | 16.094 | 0.712 | 0.953 |
| ASA-CL27 9 | 17.939 | 261.853 | 16.182 | 0.701 | 0.953 |
| ASA-CL27 10 | 17.673 | 258.628 | 16.082 | 0.756 | 0.952 |
| ASA-CL27 11 | 17.653 | 256.145 | 16.005 | 0.792 | 0.952 |
| ASA-CL27 12 | 18.082 | 266.442 | 16.323 | 0.607 | 0.954 |
| ASA-CL27 13 | 18.041 | 264.243 | 16.256 | 0.615 | 0.954 |
| ASA-CL27 14 | 17.939 | 258.139 | 16.067 | 0.792 | 0.952 |
| ASA-CL27 15 | 18.347 | 279.614 | 16.722 | 0.302 | 0.956 |
| ASA-CL27 16 | 17.388 | 262.156 | 16.191 | 0.627 | 0.954 |
| ASA-CL27 17 | 17.918 | 261.953 | 16.185 | 0.718 | 0.953 |
| ASA-CL27 18 | 17.673 | 257.608 | 16.050 | 0.756 | 0.952 |
| ASA-CL27 19 | 17.918 | 263.259 | 16.225 | 0.581 | 0.954 |
| ASA-CL27 20 | 17.959 | 260.651 | 16.145 | 0.723 | 0.953 |
| ASA-CL27 21 | 18.163 | 260.422 | 16.138 | 0.776 | 0.952 |
| ASA-CL27 22 | 17.918 | 260.810 | 16.150 | 0.704 | 0.953 |
| ASA-CL27 23 | 17.796 | 256.693 | 16.022 | 0.806 | 0.952 |
| ASA-CL27 24 | 18.184 | 262.640 | 16.206 | 0.764 | 0.952 |
| ASA-CL27 25 | 17.633 | 255.253 | 15.977 | 0.827 | 0.951 |
| ASA-CL27 26 | 17.653 | 266.227 | 16.316 | 0.462 | 0.956 |
| ASA-CL27 27 | 17.694 | 254.049 | 15.939 | 0.800 | 0.952 |

*Summary for Scale: Non-clinical ASA-CL27 Inter-item Correlation and values with deletion of successive variables.*

ANPS SADNESS

| Variable | Summary for scale: Mean=34.5185; Std. Dev.=3.99406 Valid N:54<br>**Cronbach alpha:** .300744; **Standardized alpha:** .296607<br>**Average inter-item corr.:** .034429 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| ANPS ITEM 6 | 32.185 | 13.262 | 3.642 | 0.200 | 0.240 |
| ANPS ITEM 14 | 31.593 | 14.464 | 3.803 | 0.056 | 0.299 |
| ANPS ITEM 22 | 32.037 | 12.850 | 3.585 | 0.265 | 0.212 |
| ANPS ITEM 30 | 31.778 | 17.173 | 4.144 | -0.313 | 0.421 |
| ANPS ITEM 38 | 32.333 | 14.111 | 3.756 | 0.107 | 0.280 |
| ANPS ITEM 46 | 32.352 | 14.710 | 3.835 | 0.004 | 0.320 |
| ANPS ITEM 54 | 32.389 | 12.978 | 3.603 | 0.286 | 0.210 |
| ANPS ITEM 62 | 31.463 | 14.360 | 3.789 | 0.117 | 0.278 |
| ANPS ITEM 70 | 32.185 | 12.743 | 3.570 | 0.354 | 0.187 |
| ANPS ITEM 78 | 31.537 | 13.767 | 3.710 | 0.156 | 0.261 |
| ANPS ITEM 86 | 31.963 | 15.073 | 3.882 | -0.017 | 0.322 |
| ANPS ITEM 94 | 31.722 | 15.090 | 3.885 | -0.049 | 0.341 |
| ANPS ITEM 102 | 32.630 | 13.641 | 3.693 | 0.194 | 0.248 |
| ANPS ITEM 110 | 32.574 | 14.948 | 3.866 | 0.010 | 0.312 |

*Summary for Scale: Non-clinical ANPS SADNESS Inter-item Correlation and values with deletion of successive variables.*

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*Clinical results*

SASI

| Variable | Summary for scale: Mean = 22.6076; Std. Dev. = 12.0431; Valid N: 79<br>**Cronbach alpha**: .925545; **Standardized alpha**: .925710<br>**Average inter-item correlation**: .465739<br>Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Squared Multiple R | Alpha if deleted |
|---|---|---|---|---|---|---|
| SASI 1 | 20.86 | 131.12 | 11.45 | 0.41 | 0.60 | 0.928 |
| SASI 2 | 21.33 | 126.30 | 11.24 | 0.61 | 0.66 | 0.922 |
| SASI 3 | 21.13 | 123.43 | 11.11 | 0.71 | 0.67 | 0.919 |
| SASI 4 | 21.38 | 125.53 | 11.20 | 0.65 | 0.56 | 0.920 |
| SASI 5 | 21.01 | 125.25 | 11.19 | 0.69 | 0.61 | 0.919 |
| SASI 6 | 20.96 | 125.20 | 11.19 | 0.69 | 0.59 | 0.919 |
| SASI 7 | 20.95 | 127.52 | 11.29 | 0.61 | 0.47 | 0.922 |
| SASI 8 | 20.97 | 124.33 | 11.15 | 0.69 | 0.69 | 0.919 |
| SASI 9 | 21.04 | 126.49 | 11.25 | 0.59 | 0.61 | 0.922 |
| SASI 10 | 21.16 | 123.20 | 11.10 | 0.74 | 0.77 | 0.918 |
| SASI 11 | 21.25 | 122.06 | 11.05 | 0.74 | 0.72 | 0.918 |
| SASI 12 | 21.42 | 125.94 | 11.22 | 0.66 | 0.77 | 0.920 |
| SASI 13 | 21.06 | 123.25 | 11.10 | 0.70 | 0.70 | 0.919 |
| SASI 14 | 21.08 | 124.68 | 11.17 | 0.64 | 0.72 | 0.921 |
| SASI 15 | 20.90 | 126.83 | 11.26 | 0.58 | 0.62 | 0.923 |

*Summary for Scale: Clinical SASI Inter-item Correlation and values with deletion of successive variables.*

SCI-SAS

| Variable | Summary for scale: Mean=15.7821; Std. Dev.=9.17881 Valid N: 78<br>Cronbach alpha**: .929337**; **Standardized alpha: .929698**<br>**Average inter-item corr.:** .464579<br>Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
|---|---|---|---|---|---|
| SCI-SAS 1 | 14.77 | 72.84 | 8.53 | 0.69 | 0.92 |
| SCI-SAS 2 | 14.51 | 73.61 | 8.58 | 0.65 | 0.92 |
| SCI-SAS 3 | 14.85 | 72.72 | 8.53 | 0.71 | 0.92 |
| SCI-SAS 4 | 14.91 | 72.29 | 8.50 | 7.00 | 0.92 |
| SCI-SAS 5 | 15.08 | 72.97 | 8.54 | 0.73 | 0.92 |
| SCI-SAS 6 | 14.77 | 73.25 | 8.56 | 0.65 | 0.92 |
| SCI-SAS 7 | 14.83 | 73.06 | 8.55 | 0.68 | 0.92 |
| SCI-SAS 8 | 14.95 | 73.05 | 8.55 | 0.70 | 0.92 |
| SCI-SAS 9 | 14.63 | 73.80 | 8.59 | 0.61 | 0.93 |
| SCI-SAS 10 | 14.41 | 73.45 | 8.57 | 0.68 | 0.92 |
| SCI-SAS 11 | 14.69 | 72.85 | 8.54 | 0.69 | 0.92 |
| SCI-SAS 12 | 14.59 | 76.06 | 8.72 | 0.45 | 0.93 |
| SCI-SAS 13 | 15.23 | 74.82 | 8.65 | 0.60 | 0.93 |
| SCI-SAS 14 | 14.77 | 73.38 | 8.57 | 0.62 | 0.93 |
| SCI-SAS 15 | 14.83 | 71.68 | 8.47 | 0.71 | 0.92 |
| SCI-SAS 16 | 14.91 | 75.26 | 8.68 | 0.49 | 0.93 |

*Summary for Scale: Clinical SCI-SAS Inter-item Correlation and values with deletion of successive variables.*

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ASA-CL27

| Variable | Summary for scale: Mean=35.7215; Std. Dev.=21.2693 Valid N:79<br>**Cronbach alpha:** .956092; **Standardized alpha:** .956214<br>**Average inter-item corr.:** .460137 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| ASA-CL27 1 | 33.77 | 433.06 | 20.81 | 0.30 | 0.96 |
| ASA-CL27 2 | 34.53 | 418.10 | 20.45 | 0.65 | 0.95 |
| ASA-CL27 3 | 34.51 | 417.44 | 20.43 | 0.45 | 0.96 |
| ASA-CL27 4 | 34.29 | 414.56 | 20.36 | 0.61 | 0.95 |
| ASA-CL27 5 | 34.59 | 408.49 | 20.21 | 0.76 | 0.95 |
| ASA-CL27 6 | 34.34 | 409.31 | 20.23 | 0.74 | 0.95 |
| ASA-CL27 7 | 34.01 | 427.35 | 20.67 | 0.45 | 0.96 |
| ASA-CL27 8 | 33.92 | 420.40 | 20.50 | 0.58 | 0.96 |
| ASA-CL27 9 | 34.54 | 418.07 | 20.45 | 0.60 | 0.95 |
| ASA-CL27 10 | 34.47 | 412.63 | 20.31 | 0.70 | 0.95 |
| ASA-CL27 11 | 34.27 | 415.11 | 20.37 | 0.68 | 0.95 |
| ASA-CL27 12 | 34.56 | 412.30 | 20.31 | 0.69 | 0.95 |
| ASA-CL27 13 | 34.58 | 419.08 | 20.47 | 0.55 | 0.96 |
| ASA-CL27 14 | 34.42 | 407.38 | 20.18 | 0.84 | 0.95 |
| ASA-CL27 15 | 34.71 | 409.30 | 20.23 | 0.75 | 0.95 |
| ASA-CL27 16 | 33.85 | 418.69 | 20.46 | 0.64 | 0.95 |
| ASA-CL27 17 | 34.30 | 415.65 | 20.39 | 0.69 | 0.95 |
| ASA-CL27 18 | 34.18 | 405.31 | 20.12 | 0.84 | 0.95 |
| ASA-CL27 19 | 34.95 | 422.63 | 20.56 | 0.52 | 0.96 |
| ASA-CL27 20 | 34.84 | 417.02 | 20.42 | 0.63 | 0.95 |
| ASA-CL27 21 | 34.54 | 405.34 | 20.13 | 0.81 | 0.95 |
| ASA-CL27 22 | 34.41 | 414.77 | 20.37 | 0.66 | 0.95 |
| ASA-CL27 23 | 34.06 | 409.33 | 20.23 | 0.75 | 0.95 |
| ASA-CL27 24 | 34.77 | 408.73 | 20.22 | 0.77 | 0.95 |
| ASA-CL27 25 | 34.14 | 408.73 | 20.22 | 0.80 | 0.95 |
| ASA-CL27 26 | 34.71 | 418.66 | 20.46 | 0.54 | 0.96 |
| ASA-CL27 27 | 34.49 | 414.40 | 20.36 | 0.65 | 0.95 |

*Summary for Scale: Clinical ASA-CL27 Inter-item Correlation and values with deletion of successive variables.*

ANPS SADNESS

| Variable | Summary for scale: Mean=40.4375; Std. Dev.=5.35533 Valid N:80<br>**Cronbach alpha:** .663295; **Standardized alpha:** .675726<br>**Average inter-item corr.:** .132690 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| ANPS ITEM 6 | 37.10 | 23.89 | 4.89 | 0.48 | 0.62 |
| ANPS ITEM 14 | 37.25 | 23.99 | 4.90 | 0.38 | 0.63 |
| ANPS ITEM 22 | 37.43 | 23.92 | 4.89 | 0.44 | 0.62 |
| ANPS ITEM 30 | 37.34 | 23.40 | 4.84 | 0.45 | 0.62 |
| ANPS ITEM 38 | 37.40 | 23.07 | 4.80 | 0.46 | 0.62 |
| ANPS ITEM 46 | 38.58 | 29.29 | 5.41 | -0.18 | 0.72 |
| ANPS ITEM 54 | 37.21 | 25.12 | 5.01 | 0.33 | 0.64 |
| ANPS ITEM 62 | 37.38 | 23.01 | 4.80 | 0.44 | 0.62 |
| ANPS ITEM 70 | 37.65 | 26.28 | 5.13 | 0.11 | 0.67 |
| ANPS ITEM 78 | 38.00 | 26.90 | 5.19 | 0.07 | 0.68 |
| ANPS ITEM 86 | 38.28 | 25.37 | 5.04 | 0.26 | 0.65 |
| ANPS ITEM 94 | 37.33 | 24.67 | 4.97 | 0.39 | 0.63 |
| ANPS ITEM 102 | 36.83 | 25.24 | 5.02 | 0.41 | 0.63 |
| ANPS ITEM 110 | 37.94 | 26.58 | 5.16 | 0.12 | 0.67 |

*Summary for Scale: Clinical ANPS SADNESS Inter-item Correlation and values with deletion of successive variables.*

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*Control results*

SASI

| Variable | Summary for scale: Mean=12.7222; Std. Dev.=8.99174 Valid N:72<br>**Cronbach alpha:** .895790; **Standardized alpha:** .896543<br>**Average inter-item corr.:** .380082<br>Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
|---|---|---|---|---|---|
| SASI 1 | 11.40 | 72.99 | 8.54 | 0.38 | 0.90 |
| SASI 2 | 12.11 | 70.52 | 8.40 | 0.53 | 0.89 |
| SASI 3 | 11.92 | 67.88 | 8.24 | 0.77 | 0.88 |
| SASI 4 | 12.01 | 69.82 | 8.36 | 0.55 | 0.89 |
| SASI 5 | 11.92 | 70.16 | 8.38 | 0.58 | 0.89 |
| SASI 6 | 11.85 | 69.02 | 8.31 | 0.66 | 0.89 |
| SASI 7 | 11.89 | 71.32 | 8.45 | 0.47 | 0.89 |
| SASI 8 | 11.78 | 69.81 | 8.36 | 0.63 | 0.89 |
| SASI 9 | 12.00 | 71.14 | 8.43 | 0.56 | 0.89 |
| SASI 10 | 11.69 | 68.82 | 8.30 | 0.62 | 0.89 |
| SASI 11 | 11.93 | 67.65 | 8.22 | 0.64 | 0.89 |
| SASI 12 | 12.03 | 71.39 | 8.45 | 0.52 | 0.89 |
| SASI 13 | 11.99 | 70.51 | 8.40 | 0.54 | 0.89 |
| SASI 14 | 11.93 | 69.23 | 8.32 | 0.57 | 0.89 |
| SASI 15 | 11.67 | 69.28 | 8.32 | 0.55 | 0.89 |

*Summary for Scale: Control SASI Inter-item Correlation and values with deletion of successive variables.*

SCI-SAS

| Variable | Summary for scale: Mean=7.56944; Std. Dev.=5.68870 Valid N:72<br>**Cronbach alpha:** .855508; **Standardized alpha:** .859583<br>**Average inter-item corr.:** .283346<br>Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
|---|---|---|---|---|---|
| SCI-SAS 1 | 6.88 | 27.55 | 5.25 | 0.51 | 0.846 |
| SCI-SAS 2 | 6.78 | 27.73 | 5.27 | 0.43 | 0.851 |
| SCI-SAS 3 | 7.00 | 27.64 | 5.26 | 0.51 | 0.846 |
| SCI-SAS 4 | 7.21 | 28.58 | 5.35 | 0.48 | 0.847 |
| SCI-SAS 5 | 7.35 | 30.62 | 5.53 | 0.22 | 0.857 |
| SCI-SAS 6 | 7.15 | 28.80 | 5.37 | 0.43 | 0.850 |
| SCI-SAS 7 | 7.22 | 28.56 | 5.34 | 0.54 | 0.845 |
| SCI-SAS 8 | 71.0 | 28.64 | 5.35 | 0.38 | 0.853 |
| SCI-SAS 9 | 6.81 | 27.38 | 5.23 | 0.49 | 0.848 |
| SCI-SAS 10 | 6.65 | 26.73 | 5.17 | 0.59 | 0.841 |
| SCI-SAS 11 | 6.94 | 26.66 | 5.16 | 0.64 | 0.838 |
| SCI-SAS 12 | 7.33 | 29.06 | 5.39 | 0.50 | 0.847 |
| SCI-SAS 13 | 7.42 | 29.83 | 5.46 | 0.50 | 0.849 |
| SCI-SAS 14 | 7.18 | 28.68 | 5.35 | 0.44 | 0.849 |
| SCI-SAS 15 | 7.24 | 28.10 | 5.30 | 0.57 | 0.843 |
| SCI-SAS 16 | 7.29 | 28.54 | 5.34 | 0.54 | 0.845 |

*Summary for Scale: Control SCI-SAS Inter-item Correlation and values with deletion of successive variables.*

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ASA-CL27

| Variable | Summary for scale: Mean=14.5278; Std. Dev.=14.9053 Valid N:72<br>**Cronbach alpha:** .954584; **Standardized alpha:** .954920<br>**Average inter-item corr.:** .454259 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| ASA-CL27 1 | 13.181 | 203.204 | 14.254 | 0.538 | 0.954 |
| ASA-CL27 2 | 14.222 | 208.340 | 14.434 | 0.562 | 0.954 |
| ASA-CL27 3 | 14.194 | 208.684 | 14.446 | 0.457 | 0.955 |
| ASA-CL27 4 | 14.181 | 205.092 | 14.321 | 0.663 | 0.953 |
| ASA-CL27 5 | 14.181 | 206.009 | 14.353 | 0.656 | 0.953 |
| ASA-CL27 6 | 13.903 | 198.671 | 14.095 | 0.783 | 0.952 |
| ASA-CL27 7 | 13.806 | 201.879 | 14.208 | 0.653 | 0.953 |
| ASA-CL27 8 | 13.764 | 199.542 | 14.126 | 0.683 | 0.953 |
| ASA-CL27 9 | 14.292 | 209.401 | 14.471 | 0.601 | 0.954 |
| ASA-CL27 10 | 14.069 | 199.751 | 14.134 | 0.760 | 0.952 |
| ASA-CL27 11 | 13.903 | 204.171 | 14.289 | 0.618 | 0.953 |
| ASA-CL27 12 | 13.931 | 198.342 | 14.083 | 0.752 | 0.952 |
| ASA-CL27 13 | 14.125 | 207.332 | 14.399 | 0.487 | 0.954 |
| ASA-CL27 14 | 13.972 | 196.110 | 14.004 | 0.868 | 0.951 |
| ASA-CL27 15 | 14.333 | 208.389 | 14.436 | 0.698 | 0.953 |
| ASA-CL27 16 | 13.403 | 202.685 | 14.237 | 0.623 | 0.953 |
| ASA-CL27 17 | 13.931 | 204.481 | 14.300 | 0.601 | 0.953 |
| ASA-CL27 18 | 13.819 | 199.342 | 14.119 | 0.728 | 0.952 |
| ASA-CL27 19 | 14.391 | 216.940 | 14.729 | 0.113 | 0.957 |
| ASA-CL27 20 | 14.125 | 204.554 | 14.302 | 0.723 | 0.952 |
| ASA-CL27 21 | 14.222 | 205.173 | 14.324 | 0.690 | 0.953 |
| ASA-CL27 22 | 14.014 | 202.542 | 14.232 | 0.734 | 0.952 |
| ASA-CL27 23 | 13.806 | 198.657 | 14.095 | 0.772 | 0.952 |
| ASA-CL27 24 | 14.292 | 203.929 | 14.280 | 0.737 | 0.952 |
| ASA-CL27 25 | 13.722 | 196.173 | 14.006 | 0.799 | 0.951 |
| ASA-CL27 26 | 13.861 | 202.286 | 14.223 | 0.555 | 0.954 |
| ASA-CL27 27 | 14.153 | 203.074 | 14.250 | 0.653 | 0.953 |

*Summary for Scale: Control ASA-CL27 Inter-item Correlation and values with deletion of successive variables.*

ANPS SADNESS

| Variable | Summary for scale: Mean=35.7500; Std. Dev.=5.44305 Valid N:72<br>**Cronbach alpha: .733635**; **Standardized alpha:** .731724<br>**Average inter-item corr.:** .167939 | | | | |
|---|---|---|---|---|---|
| | Mean if deleted | Var. if deleted | Std. Dev. if deleted | Item-Total Correlation | Alpha if deleted |
| ANPS ITEM 6 | 33.431 | 23.995 | 4.898 | 0.557 | 0.694 |
| ANPS ITEM 14 | 32.951 | 25.259 | 5.026 | 0.386 | 0.714 |
| ANPS ITEM 22 | 33.417 | 23.854 | 4.884 | 0.446 | 0.706 |
| ANPS ITEM 30 | 33.278 | 25.923 | 5.091 | 0.361 | 0.717 |
| ANPS ITEM 38 | 33.208 | 23.720 | 4.870 | 0.550 | 0.693 |
| ANPS ITEM 46 | 33.958 | 27.901 | 5.282 | 0.071 | 0.749 |
| ANPS ITEM 54 | 32.778 | 24.812 | 4.981 | 0.447 | 0.707 |
| ANPS ITEM 62 | 32.736 | 26.166 | 5.115 | 0.290 | 0.725 |
| ANPS ITEM 70 | 33.139 | 25.286 | 5.029 | 0.341 | 0.720 |
| ANPS ITEM 78 | 33.069 | 27.926 | 5.284 | 0.068 | 0.749 |
| ANPS ITEM 86 | 33.472 | 27.138 | 5.209 | 0.222 | 0.731 |
| ANPS ITEM 94 | 32.806 | 25.601 | 5.060 | 0.381 | 0.715 |
| ANPS ITEM 102 | 32.667 | 25.194 | 5.019 | 0.500 | 0.704 |
| ANPS ITEM 110 | 33.861 | 27.120 | 5.208 | 0.232 | 0.730 |

*Summary for Scale: Control ANPS SADNESS Inter-item Correlation and values with deletion of successive variables.*

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***Appendix Q***
Observed and expected Chi-square contingency tables

Study III
Chi-square contingency table analysis (two classification variables):

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 4 | 20 | 24 |
| NO | 7 | 18 | 25 |
| Column totals | 11 | 38 | 49 |

Observed frequencies for incidences of separation trauma in obsessionality

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 5.39 | 18.61 | 24 |
| NO | 5.61 | 19.39 | 25 |
| Column totals | 11 | 38 | 49 |

Expected frequencies for incidences of separation trauma in obsessionality

$\lambda^2 = 0.903$; $\alpha = 0.05$; $df = 1$
$\lambda^2_{.05}(1) = 3.84$

Therefore obtained < critical; accept $H_0$: Differences in the incidence of separation trauma in high and low obsessionality participants were due to chance.

Next, the same analytic approach was taken for high and low scores on measures of low mood.

| **Separation trauma** | **Depression** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 8 | 16 | 24 |
| NO | 3 | 22 | 25 |
| Column totals | 11 | 38 | 49 |

Observed frequencies for incidences of separation trauma in low mood

| **Separation trauma** | **Depression** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 5.39 | 18.61 | 24 |
| NO | 5.61 | 19.39 | 25 |
| Column totals | 11 | 38 | 49 |

Expected frequencies for incidences of separation trauma in low mood

$\lambda^2 = .903$ and at = 0.05, $df = 1$ and $\lambda^2_{.05}(1) = 3.84$

| **Separation trauma incidence** | **Falls into high separation-distress group** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| OCD | 4 | 20 | 24 |
| non OCD | 1 | 23 | 24 |
| | 5 | 43 | 48 |

Observed frequencies for incidences of separation trauma in obsessionality and low mood upper and lower scoring halves of the non-clinical sample (frequency columns were based on how many of those with separation trauma experiences fell into the top half of separation-distress scores for that sample.

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For top and bottom group according to obsessionality

| **Separation trauma incidence** | **Falls into high separation-distress group** | | **Row totals** |
|---|---|---|---|
| | YES | NO | |
| YES | 2.5 | 21.5 | **24** |
| NO | 2.5 | 21.5 | **24** |
| | **5** | **43** | **48** |

Expected frequencies for incidences of separation trauma in OCD upper and lower scoring halves of the non-clinical sample

$\lambda^2$ = 2.009, $\alpha$ = 0.05; *k* = (2-1)(2-1) =1
$\lambda^2_{.05}(1)$ = 3.84

Therefore, the observed value is greater than the critical value, and thus the $H_0$ is rejected: the division of Study III participants into high and low obsessionality and low mood groups reveals that separation trauma experiences in early childhood influences the extent of separation-distress tendencies in adulthood.

For top and bottom group according to low mood

| **Separation trauma incidence** | **Falls into high separation-distress group** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 6 | 18 | 24 |
| NO | 3 | 21 | 24 |
| Column totals | 9 | 39 | 48 |

Observed frequencies for incidences of separation trauma in low mood in high and low scoring groups for low mood

| **Separation trauma incidence** | **Falls into high separation-distress group** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| MDD | 4.5 | 19.5 | 24 |
| non MDD | 4.5 | 19.5 | 24 |
| Column totals | 9 | 39 | 48 |

Expected frequencies for incidences of separation trauma in high and low obsessionality groups

$\lambda^2$ = 1.231, $\alpha$ = 0.05, *k* = (2-1)(2-1) = 1
$\lambda^2_{.05}(1)$ = 3.84

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Study IV

| **Early separation trauma** | **Clinical group** | **Control group** | Row totals |
|---|---|---|---|
| YES | 34 | 16 | 50 |
| NO | 49 | 58 | 107 |
| Column Totals | 83 | 74 | 157 |

Observed frequencies of separation trauma in clinical and control groups

| **Early separation trauma** | **Clinical group** | **Control group** | Row totals |
|---|---|---|---|
| YES | 26.433312 | 23.566878 | 50 |
| NO | 56.566878 | 50.433121 | 107 |
| Column Totals | 83 | 74 | 157 |

Expected frequencies of separation trauma in clinical and control groups

$$\lambda^2 = \sum \frac{(O - E)^2}{E} = 6.74$$

For a significance level of $\alpha < .01$ and $k = (4-1)(2-1) = 3 \times 1 = 2$
$\lambda^2_{.05}(3) = 7.82$

Therefore the obtained value (6.74) was greater than the critical value (6.63) of $\lambda^2$ at a significance level of .01. It was thus possible to reject the $H_0$ conclude that the distribution of OCD and depression scores into clinical and control groups was contingent on the incidence of separation trauma.

| **Early separation trauma** | **Falls into high separation-distress group** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| OCD | 18 | 16 | 34 |
| non OCD (control) | 13 | 3 | 16 |
| Depression | 18 | 16 | 34 |
| non depression (control) | 12 | 4 | 16 |
| Column totals | 61 | 39 | 100 |

Observed frequencies for incidences of separation trauma in OCD and depression clinical and control samples (frequency columns were based on how many of those with separation trauma experiences fell into the top half of separation-distress scores for that sample.

| **Separation trauma incidence** | **Falls into high separation-distress group** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| OCD | 20.74 | 13.26 | 34 |
| non OCD (control) | 9.76 | 6.24 | 16 |
| Depression | 20.74 | 13.26 | 34 |
| non depression (control) | 9.76 | 6.24 | 16 |
| Column totals | 61 | 39 | 100 |

Expected frequencies for incidences of separation trauma in OCD and depression clinical and control samples.

$$\lambda^2 = \sum \frac{(O - E)^2}{E} = 5.93$$

$5.93 < 7.82$ and therefore, $H_0$ was accepted: Separation-distress scores in the clinical and control OCD and depression groups are independent of incidences of separation trauma. Incidences were, however, dominant in the upper half of separation-distress scores.

*Clinical OCD*

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 16 | 18 | 34 |
| NO | 25 | 23 | 48 |
| Column totals | 41 | 41 | 82 |

Observed frequencies for incidences of separation trauma in clinical OCD

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 17 | 17 | 34 |
| NO | 24 | 24 | 48 |
| Column totals | 41 | 41 | 82 |

Expected frequencies for incidences of separation trauma in clinical OCD

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$\lambda^2$ = 0.201; k = (2-1)(2-1) = 1
Therefore $\lambda^2_{.05}(1) = 3.84$

Thus whether participants experienced separation trauma during early childhood had no effect on whether they fell into the upper or lower half of OCD scores.

*Clinical depression*

| **Separation trauma** | **Depression** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 18 | 16 | 34 |
| NO | 23 | 25 | 48 |
| Column totals | 41 | 41 | 82 |

Observed frequencies for incidences of separation trauma in clinical depression

| **Separation trauma** | **Depression** | | Row Totals |
|---|---|---|---|
| | YES | NO | |
| YES | 17 | 17 | 34 |
| NO | 24 | 24 | 48 |
| Column totals | 41 | 41 | 82 |

Expected frequencies for incidences of separation trauma in clinical depression

Similarly, whether participants experienced separation trauma during early childhood had no effect on whether they fell into the upper or lower half of clinical depression scores:

$\lambda^2 = 0.20$; $\alpha = 0.05$; k = 1
$\lambda^2_{.05}(1) = 3.84$

*Control depression*

| **Separation trauma** | **Depression** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 12 | 4 | 16 |
| NO | 28 | 30 | 58 |
| Column totals | 40 | 34 | 74 |

Observed frequencies for incidences of separation trauma in control depression

| **Separation trauma** | **Depression** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 8.65 | 7.35 | 16 |
| NO | 31.35 | 26.65 | 58 |
| Column totals | 40 | 34 | 74 |

Expected frequencies for incidences of separation trauma in control depression

$\lambda^2 = 3.60$; $\alpha = 0.05$; k = 1
$\lambda^2_{.05}(1) = 3.84$

Therefore separation trauma had no influence on whether control depression scores fell into the high- or low-scoring division of the sample.

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | CLINICAL | CONTROL | |
| YES | 34 | 16 | 50 |
| NO | 49 | 25 | 25 |
| Column totals | 83 | 41 | 124 |

Observed frequencies for separation trauma in clinical and control OCD groups

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| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | CLINICAL | CONTROL | |
| YES | 33.47 | 16.53 | 50 |
| NO | 49.53 | 24.47 | 74 |
| Column totals | 83 | 41 | 124 |

Expected frequencies for separation trauma in clinical and control OCD groups

$\lambda^2 = 0.04$; $\alpha = 0.05$; $k = 1$

$\lambda^2_{.05}(1) = 3.84$

Differences in the incidence of separation trauma in OCD as opposed to the clinical group were due to chance.

*Control OCD*

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 11 | 5 | 16 |
| NO | 24 | 33 | 57 |
| Column totals | 35 | 38 | 73 |

Observed frequencies for incidences of separation trauma in control OCD

| **Separation trauma** | **OCD** | | Row totals |
|---|---|---|---|
| | YES | NO | |
| YES | 7.67 | 8.33 | 16 |
| NO | 27.33 | 29.67 | 57 |
| Column totals | 35 | 38 | 73 |

Expected frequencies for incidences of separation trauma in control OCD

$\lambda^2 = 3.56$, $\alpha = 0.05$, $df = 1$

$\lambda^2_{.05}(1) = 3.84$

Differences in the incidence of separation trauma in upper and lower scoring control group participants were due to chance.

*Contingency of Clinical, Control and Non-clinical sample grouping on separation trauma*

| **Group** | **Experience of separation trauma** | | | Row totals |
|---|---|---|---|---|
| | None | 1-2 categories | 3+ categories | |
| Clinical | 49 | 25 | 9 | 83 |
| Control | 58 | 10 | 6 | 74 |
| Non-clinical | 38 | 7 | 4 | 49 |
| Column totals | 145 | 42 | 19 | 206 |

Observed frequencies for incidences of separation trauma in specified category groups; all study samples

| **Group** | **Experience of separation trauma** | | | Row totals |
|---|---|---|---|---|
| | None | 1-2 categories | 3+ categories | |
| Clinical | 58.422 | 16.922 | 7.655 | 83 |
| Control | 52.087 | 15.087 | 6.825 | 74 |
| Non-clinical | 34.490 | 9.990 | 4.519 | 49 |
| Column totals | 145 | 42 | 19 | 206 |

Expected frequencies for incidences of separation trauma in specified category groups; all study samples

$\lambda^2 = 9.410$, $\alpha = 0.05$, $df = (k - 1)(k - 1) = (3-1)(3-1) = 4$

$\lambda^2_{.05}(4) = 9.49$

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*Table 36*
*Calculation of point-biserial correlation of relationships between clinical variables and separation-trauma – sample of how data was structured for analysis*

| No separation trauma | OCD score | | MDD*score | S-D score | Separation trauma | OCD score | | MDD score | S-D score |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 68.15 | 60.91 | 36.91 | 2 | | 68.15 | 74.55 | 85.98 | |
| 1 | 37.78 | 66.36 | 44.86 | 2 | | 32.96 | 72.73 | 49.53 | |
| 1 | 65.15 | 50.00 | 58.41 | 2 | | 67.59 | 73.64 | 86.92 | |
| 1 | 53.26 | 69.09 | 51.40 | 2 | | 46.47 | 53.64 | 49.53 | |
| 1 | | | | | 2 | | | | |
| 1 | | | | | 2 | | | | |
| 1 | | | | | 2 | | | | |
| 1 | | | | | 2 | | | | |

**where MDD stands for Major Depressive Disorder and S-D for separation-distress*

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***Appendix R***
Declaration

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