Examining Cognitive Models of Obsessive Compulsive Disorder in Adolescents

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Abstract. Three influential theoretical models of OCD focus upon the cognitive factors of inflated responsibility (Salkovskis, 1985), thought-action fusion (Rachman, 1993) and meta-cognitive beliefs (Wells and Matthews, 1994). Little is known about the relevance of these models in adolescents or about the nature of any direct or mediating relationships between these variables and OCD symptoms. This was a cross-sectional correlational design with 223 non-clinical adolescents aged 13 to 16 years. All participants completed questionnaires measuring inflated responsibility, thought-action fusion, meta-cognitive beliefs and obsessive-compulsive symptoms. Inflated responsibility, thought-action fusion and meta-cognitive beliefs were significantly associated with higher levels of obsessive-compulsive symptoms. These variables accounted for 35% of the variance in obsessive-compulsive symptoms, with inflated responsibility and meta-cognitive beliefs both emerging as significant independent predictors. Inflated responsibility completely mediated the effect of thought-action fusion and partially mediated the effect of meta-cognitive beliefs. Support for the downward extension of cognitive models to understanding OCD in a younger population was shown. Findings suggest that inflated responsibility and meta-cognitive beliefs may be particularly important cognitive concepts in OCD. Methodological limitations must be borne in mind and future research is needed to replicate and extend findings in clinical samples.

Keywords: Obsessive compulsive disorder, adolescents, cognitive models.

Introduction

The presentation and phenomenology of obsessive compulsive disorder (OCD) in young people are similar to accounts of the disorder amongst adults (March and Leonard, 1996). Far from being rare in children and adolescents, as was once believed, OCD affects approximately 1.5% of children (Karno, Golding, Sorenson and Burman, 1988), is associated with significant functional impairment (Piacentini, Bergman, Keller and McCracken (2003), and is relatively resistant to treatment (Stewart et al., 2004). The similarities between OCD in younger and adult populations is of practical importance because of the potential to apply treatment methods, developed for use with adults, to the treatment of OCD in children.

The treatments of choice for OCD in adults are Selective Serotonin Reuptake Inhibitors (SSRIs) and psychological therapy, especially exposure and response prevention (ERP) (Abramowitz, 1997). ERP involves controlled and repeated exposure to the patient's feared stimuli and prevention of their normal response, i.e. their compulsive behaviour (e.g. washing, checking or other rituals). However, ERP is associated with high drop out and is not acceptable to many patients (Allsopp and Verduyn, 1990). It has been suggested that cognitive methods can be used as an adjunct to ERP both to help patients engage in ERP and as an alternative where ERP is not acceptable (Salkovskis, 1999).

The treatment of OCD in children is also primarily based on SSRIs and ERP (Leonard, 1997), although psychological methods may be preferred by children and their parents who are not prepared to take psychotropic medication for extended periods of time. By extension from the adult research literature, cognitive therapy is a possible development. There is some preliminary clinical evidence from case reports that cognitive elements of therapy for OCD are appropriate for young people and are associated with symptom change (Williams, Salkovskis and Allsopp, 2002).

The starting point of this study is to examine whether cognitive models of OCD, which have been developed for adults, can be used to explain symptoms of OCD amongst adolescents. If these models seem to apply to adolescents, that provides a rationale for the careful application of related treatment methods (i.e. cognitive therapy) to children and adolescents. There are a number of models within the psychological literature that emphasize different cognitive processes in the development and maintenance of OCD. These include inflated responsibility (Salkovskis, 1985), thought action fusion (Rachman, 1993; Shafran and Rachman, 2004) and meta-cognitive beliefs (Wells and Matthews, 1994). Each of these different models starts from the basis that experiencing intrusive thoughts, such as those reported by people with OCD, is normal. Rachman and de Silva (1978) reported that the rate of intrusive thoughts amongst non clinical participants was not significantly different from the rate reported by people with OCD. Thus, it is the appraisal, or inferred meaning of these thoughts, and the distress and attempt to cope that is believed to distinguish between people with OCD and those who do not have OCD.

Inflated responsibility

According to Salkovskis (1985), people with OCD interpret their intrusive thoughts about harm coming to themselves or to others, as particularly salient because they assume personal responsibility for any subsequent negative outcome. They feel distressed at the possibility that they may cause harm and therefore try to prevent such events occurring. These attempts

include rituals and neutralizing behaviours observed in OCD and because they are equivalent to safety seeking behaviours (Clarke, 1999) they have the paradoxical effect of maintaining OCD rituals though avoidance.

Empirical support for the role of responsibility in OCD has been provided by experimental studies in which responsibility was manipulated (e.g. Ladouceur et al., 1995, Shafran, 1997). High responsibility conditions were associated with increased hesitation and checking, anxiety and preoccupation with avoiding errors. In questionnaire studies OCD symptoms have also been associated with responsibility beliefs. Salkovskis et al. (2000) found that individuals with OCD had inflated responsibility compared with individuals with other anxiety disorders and a non-clinical group. Smári and Hólmsteinsson (2001) reported that responsibility acted as a mediator between intrusive thoughts and obsessive-compulsive symptoms, consistent with Salkovskis' model (1985).

There is little research that examines inflated responsibility in young people with OCD. Barrett and Healy (2003) found that amongst 7 to 13-year-olds, inflated responsibility interpretations were significantly elevated in children with OCD compared to a non-clinical sample. However, Libby, Reynolds, Derisley and Clark (2004) found that 11 to 18-year-olds with OCD had significantly higher responsibility scores than children with other anxiety disorders and than non-clinical controls, suggesting that responsibility may be more specific to OCD. Also, in a series of six case studies, Williams et al. (2002) found that responsibility cognitions were highly correlated with obsessive-compulsive symptoms. These studies provide preliminary evidence for the role of inflated responsibility in OCD in adolescents, though this area clearly warrants further research.

Thought-action fusion

Rachman (1993) suggested that OCD may be triggered by specific (mis)beliefs about the power and significance of thoughts. He describes the concept of "thought-action fusion" (TAF) as having two components; first, the belief that having an intrusive thought is morally equivalent to carrying out an act (morality TAF) and second, that it will increase the probability of a negative event occurring to yourself or others (likelihood-self/other TAF). Thus, inherent in OCD is a belief that a thought is like an action. Morality and likelihood TAF are not considered to be equivalent, but are highly related and may become intertwined.

There is some evidence for the role of TAF beliefs in OCD. In an experimental study (Rassin, Merckelbach, Muris and Spaan, 1999), experimental participants were told that a bogus device could detect their thoughts of the word "apple" and that thinking of this word would result in an electric shock for another person. Compared to a control group, the experimental group experienced more frequent intrusions, greater discomfort and engaged in neutralizing behaviour, all reminiscent of thinking patterns in OCD. Rachman, Thordarson, Shafran and Woody (1995) found an association between obsessive-compulsive symptoms and TAF beliefs, as rated by self-report measures, in a non-clinical adult sample. In addition, Amir, Freshman, Ramsey, Neary and Brigidi (2001) found that individuals with obsessive-compulsive symptoms gave higher ratings to the likelihood of negative events occurring as a result of their negative thoughts. However, there is some debate about whether TAF is specifically related to OCD or more generally associated with psychopathology and negative affect (Abramowitz, Whiteside, Lynam and Kalsy, 2003; Thordarson and Shafran, 2002. In addition, there is uncertainty about the relationship between TAF and responsibility. Specifically, there is

discussion about whether TAF is a variant of responsibility, if it is associated but distinct from responsibility, or if responsibility is a mediator between TAF and distress (Berle and Starcevic, 2005).

There is currently little research examining relationships between TAF and obsessive-compulsive symptoms in young people. Muris, Meesters, Rassin, Merckelbach and Campbell (2001) found a significant correlation between TAF and obsessive-compulsive symptoms amongst a non-clinical sample aged 13–16 years. Barrett and Healy (2003) found higher ratings of TAF cognitive appraisals in children with OCD compared to non-clinical controls. Also, Libby et al. (2004) found that young people with OCD obtained significantly higher scores on the TAF-likelihood-other scale than anxious and non-clinical adolescents.

Meta-cognitive beliefs

Wells and Matthews (1994; Wells, 2000) proposed that a trigger, usually an intrusion in the form of a thought, doubt, image or emotion, activates beliefs about its meaning and significance. At this level, meta-cognitive beliefs about the danger and significance of thoughts are engaged and can be positive or negative (e.g. "if I perform my rituals, bad things won't happen" and "my rituals are out of control"). Meta-cognitive beliefs incorporate the concept of thought-action fusion (TAF; Rachman, 1993). Beliefs held about rituals and behavioural responses also influence the appraisal that is made of the intrusion. Therefore, beliefs concerning the advantages and dangers of available responses influence both the selection and use of behaviours and the emotional reactions.

Wells (1997; Gwilliam, Wells and Cartwright-Hatton, 2004) proposes that responsibility appraisals emerge from the more central concept of meta-cognitive processing and are "... a peripheral correlate of such meta-cognitions ..." (Gwilliam et al., 2004, p. 139) rather than being the main cognitive distortions in OCD, as suggested by Salkovskis (1985). Some empirical support has been provided for a meta-cognitive model of OCD. For example, Emmelkamp and Aardema (1999) found that meta-cognitive beliefs (including TAF) were related to obsessive-compulsive problems. Also, Wells and Papageorgiou (1998) demonstrated that meta-cognitive beliefs predicted obsessions, independent of general proneness to worry. Janeck, Calamari, Riemann and Heffelfinger (2003) examined the meta-cognitive domain of cognitive self-consciousness (CSC – the tendency to be aware of and monitor thinking), and reported this was significantly correlated with obsessive-compulsive symptoms, with higher scores in OCD patients than anxious clinical controls and a non-clinical control group.

Competing explanatory models

As mentioned above, the importance of appraisals and neutralizing are common to the three models. However, the description of the nature and the content of the appraisals is different across the models. For example, Salkovskis' model (1985) suggests that responsibility appraisals are a central causal agent in the development and maintenance of OCD. He therefore predicts a direct effect of responsibility appraisals on OCD symptoms. Rachman (1993) asserts that responsibility appraisals are made based on an individual's belief that their thoughts can influence or are equivalent to actions. Thus, he implies a mediated model whereby thought action fusion leads to responsibility appraisals and then to OCD symptoms. Finally, Wells and

Matthews (1994) propose that appraisals are made in light of a broader range of dysfunctional beliefs about thought control. Thus, they consider meta-cognitive beliefs as the central causal agent and responsibility appraisals as a mediating variable that arises from more general meta-cognitive beliefs.

There is some evidence that the effect of responsibility appraisals in obsessive compulsive symptoms is secondary to meta-cognitive beliefs. Gwilliam et al. (2004) examined these cognitions in a sample of non-clinical adults and reported that after controlling for meta-cognitions in a partial correlation that the effect of responsibility was removed. However, the use of partial correlations as a test of a mediational relationship is problematic and a regression strategy is generally preferred (Baron and Kenny, 1986; Howell, 2002). More recently, Mather and Cartwright-Hatton (2004) reported a similar finding in a sample of non-clinical adolescents. Using a multiple-regression strategy they reported that the relationship between responsibility attitudes and OCD symptoms was non-significant when depression and meta-cognitions were controlled. The specific test of mediation, however, was not tested leaving the interpretation of the results rather problematic.

The general aim of this study is to clarify the nature of any relationship between inflated responsibility, TAF, and meta-cognitive beliefs and obsessive-compulsive symptoms amongst adolescents and to test the proposed mediating relationships of the different models using a preferred test of mediation (Baron and Kenny, 1986). If these cognitive constructs are related to OCD symptoms (directly or indirectly), this suggests that cognitive interventions may also be appropriate for use with young people. Furthermore, identifying the relative importance of these beliefs to OCD symptoms would help the development of cognitive interventions. Each model proposes a slightly different focus, in terms of treatment aims. Salkovskis (1996) suggests a focus on modifying beliefs and appraisals concerning responsibility. Rachman (1993) proposes consideration and modification of a broader type of appraisal about the power of thoughts, with the aim of constructing a more benign interpretation. By implication, reducing thought action fusion would lead to reduced responsibility appraisals and reduced OCD symptoms. Wells (2000) proposes that an individual's dysfunctional beliefs regarding the power and importance of thoughts are modified, with the aim of a detached acceptance of intrusive thoughts. This implicates a treatment approach such as mindfulness, where individuals are helped to experience thoughts simply as benign events in the mind (Teasdale, 1999). In turn, responsibility appraisals and OCD symptoms would be reduced.

The study described therefore had three research questions: first, what are the relative contributions of inflated responsibility, thought-action fusion and meta-cognitive beliefs in predicting obsessive-compulsive symptoms? Second, do responsibility appraisals play a mediating role in the relationship between thought action fusion and OCD symptoms? Third, do responsibility appraisals play a mediating role in the relationship between meta-cognitive beliefs and OCD symptoms?

Method

Participants

Participants were 223 young people aged 13 to 16 years (99 male, 44%) recruited from three high schools in Norfolk and Suffolk, UK. The response rate was 27%. All participants

were fluent in English. Pupils with special educational needs that might affect their ability to complete the questionnaires were not invited to take part.

Ethical considerations

Ethical approval to conduct the study was obtained from the University of East Anglia Ethics Committee. Participants were informed that their responses would be identified by a numerical code on the computer and that they would not be identified in any subsequent reports. The Data Protection Act (1998) was adhered to and all data collected were stored in a locked filing cabinet.

The information sheet indicated that the participants (and their parent/guardian if they were under 16 years old) would be contacted if their scores on the Leyton Obsessional Inventory-Child Version (LOI-CV; Berg, Whitaker, Davies, Flament and Rapoport, 1988) – a measure of obsessive-compulsive symptoms – suggested any cause for concern. Eight young people scored above the threshold on the LOI. They were contacted by the researcher and two asked for further information and were given information about where to seek help if required.

Measures

Leyton Obsessional Inventory – Child Version. The LOI-CV is a 20-item self-report inventory, adapted from the adult version of the Leyton Obsessional Inventory (Berg, Rapoport and Flament, 1986). It is designed to indicate the range of obsessive-compulsive symptoms and the interference caused by the symptoms. Four subscales have been identified: general, dirt/contamination, numbers-luck and school-related symptoms (Berg et al., 1988). The LOI-CV is not diagnostic but scores of >15 on "number of symptoms (yes/no)" and >25 on "interference" are indicative of obsessive-compulsive psychopathology (Flament et al., 1988). The measure has good internal consistency (Berg et al., 1988), acceptable sensitivity but poor specificity (Flament et al., 1988).

Responsibility Attitudes Questionnaire. The RAS is a 26-item questionnaire that measures general beliefs or assumptions related to inflated responsibility (Salkovskis et al., 2000). The measure has good test-retest reliability ($r = .94$) and high internal consistency (alpha $= .92$) (Salkovskis et al., 2000). Some wording changes have been made to make this questionnaire more suitable for a younger population. There are four changes. In question 2 "see danger coming" replaces "foresee danger". In question 14 "punished" replaces "condemned". In question 17 "unforgivable" replaces "inexcusable" and in question 18 "actions" replaces "intentions" (Libby et al., 2004).

Thought-Action Fusion Questionnaire – Adolescent version. The TAFQ-A consists of 15 brief vignettes, each followed by a statement. The scale has two subscales. The TAFQ-A Morality subscale includes 8 items (e.g. having a thought about stealing is almost as bad as doing it). The TAFQ-A Likelihood subscale includes 7 items (e.g. having a thought about having an accident increases the risk that you will have an accident). Good psychometric properties have been demonstrated for this measure, including reliability coefficients for the TAFQ-A scales of >.90 when used with young people (Libby et al., 2004).

Meta-Cognitions Questionnaire – Adolescent version. The MCQ-A is a 30-item questionnaire designed to measure beliefs about worry and intrusive thoughts (Cartwright-Hatton et al., 2004) adapted from the adult MCQ (Cartwright-Hatton and Wells, 1997). There are five subscales of the MCQ-A which measure: 1) positive beliefs about worry (e.g. "worrying helps me cope"); 2) beliefs about uncontrollability and danger (e.g. "my worrying is bad for me"); 3) cognitive confidence (e.g. "I have little faith in my memory for actions"); 4) beliefs about superstition, punishment and responsibility (e.g. "I should be in control of my thoughts all the time"); and 5) cognitive self-consciousness (e.g. "I think a lot about my thoughts").

The MCQ-A has good internal reliability and test-retest reliability (Cartwright-Hatton et al., 2004).

Procedure

The young people who agreed to take part were invited to attend a session facilitated by the researcher (Schools A and B) or a teacher (School C), to complete the questionnaires. Participants were asked to attempt every item, told that there were no right or wrong answers and to answer the questions based on how they felt. The order of questionnaires in half of the questionnaire packs was reversed, in order to balance out any possible order effects.

Data analytic strategy

Missing data constituted less than 1% of the total number of data points and were dealt with by substitution of the mean subscale score. The internal consistency and distribution of measures was assessed. Transformations of the data were performed where the distribution significantly deviated from normal. Multiple regression analysis was used to examine the relative contributions of MCQ-A, TAFQ-A and RAS, to obsessive compulsive symptoms (research question 1). We used the hierarchical multiple regression procedures of Baron and Kenny (1986) to examine the mediating role of responsibility appraisals in the relationship of obsessive compulsive symptoms and meta-cognitive beliefs (research question 2) and thought action fusion (research question 3).

Results

Because these questionnaires have not been widely used with young people descriptive statistics for each scale and subscale are shown in Table 1. The measures had good internal consistency and there was considerable variability in responses. A number of the variables were not normally distributed and these were transformed in a variety of ways. The LOI-CV symptom scale was normally distributed but the interference scale was positively skewed and was improved using a square root transformation. The responsibility attitude scale (RAS) and the thought action fusion morality sub-scale were normally distributed. Thought action fusion Likelihood and Total scores were positively skewed; the total score was transformed to the square root and the likelihood subscale was transformed to the logarithm. For the meta-cognitions questionnaire the total score, uncontrollability and danger subscale and cognitive self-consciousness subscales were normally distributed. Positive beliefs, cognitive confidence

Table 1. Descriptive statistics for study variables

Measure	α	Range	Median	Mean	*SD*
Leyton Obsessional Inventory – Child version					
Symptom	.83	0–20	9.0	9.70	4.49
Interference	.83	0–39	7.0	9.06	8.35
Responsibility Attitudes Questionnaire					
Total	.93	33–181	109.0	110.60	24.82
Thought action fusion(adolescent version)					
Total	.89	15–48	21.0	22.44	6.89
Morality	.87	8–31	13.0	13.55	4.80
Likelihood	.86	7–22	7.0	8.89	3.18
Meta-cognitions question (adolescent version)					
Total	.91	30–102	52.0	53.87	14.30
Positive beliefs	.84	6–22	9.0	9.83	3.63
Uncontrollability and danger	.83	6–24	11.0	11.58	4.35
Cognitive confidence	.82	6–22	9.0	9.83	3.58
Superstition, punishment, responsibility	.75	6–20	9.0	10.00	3.54
Cognitive self consciousness	.81	6–23	12.0	12.62	4.05

Note: Higher scores on the RAS reflect lower responsibility levels.

and the superstition, punishment and responsibility sub-scales were transformed to the square root.

There were no significant gender differences on any of the measures. There were significant associations with age. Obsessive symptoms and interference, thought action fusion, and meta-cognition were all negatively correlated with age; responsibility was positively correlated with age. Pearson product-moment correlations were used to examine the hypothesis that responsibility, thought-action fusion and meta-cognitive beliefs would be associated with OCD symptoms. Table 2 shows that each of the variables (and their subscales) was significantly correlated with the number of OCD symptoms (LOI symptom) and the degree of interference. Thus higher levels of thought action fusion, meta-cognition, and responsibility attitudes were associated with higher levels of OCD symptoms and greater symptom severity (as indicated by the interference scale) as would be expected from their theoretical origins.

Standard multiple regression was used to determine the relative contributions of thought action fusion, responsibility and meta-cognition to OCD symptoms and severity. Two multivariate outliers were removed, which improved the distribution of the Mahalanobis distance values and had no detrimental effect on the distribution of the individual variables. This left data from 221 young people available for the regression analyses. The dependent variables were all significantly correlated (at $r = .5$ and greater). The tolerance collinarity statistics were calculated for each variable; all values were over 0.50, which confirms that the assumption of multicollinearity was not violated. Finally, analysis of the residuals indicated that scores were approximately normally distributed and thus could be considered linear and to meet the assumptions of homoscedasticity.

The standard multiple regression was conducted with simultaneous entry of the independent variables RAS total score, TAFQ-A total and MCQ-A total to investigate their unique

Table 2. Correlation table of main variables and sub-scales

	Age in months	LOI-CV (yes/no)	LOI-CV (interference)[a]	RAS	TAFQ-A total[a]	TAFQ-A moral	TAFQ-A Likelihood[b]	MCQ-A total	MCQ-A PB[a]	MCQ-A UD	MCQ-A CC[a]	MCQ-A SPR[a]	MCQ-A CSC
Age in months	–	−.19*	−.21*	.25*	−.27*	−.25*	−.15*	−.16*	−.05	−.18*	.03	−.19*	−.19*
LOI-CV (yes/no)		–	.80**	−.58**	.35**	.29**	.32**	.53**	.43**	.50**	.25**	.44**	.37**
LOI-CV (interference)[a]			–	−.56**	.41**	.34**	.38**	.59**	.42**	.56**	.31**	.48**	.42**
RAS				–	−.55**	−.51**	−.42**	−.63**	−.52**	−.54**	−.27**	−.58**	−.47**
TAFQ-A Total[a]					–	.92**	.76**	.59**	.43**	.44**	.23**	.58**	.51**
TAFQ-A Moral						–	.46**	.52**	.37**	.37**	.17*	.50**	.51**
TAFQ-A Likelihood[b]							–	.50**	.36**	.41**	.26**	.51**	.32**
MCQ-A Total								–	.73**	.79**	.60**	.82**	.76**
MCQ-A PB[a]									–	.47**	.27**	.51**	.49**
MCQ-A UD										–	.34**	.59**	.48**
MCQ-A CC[a]											–	.39**	.28**
MCQ-A SPR[a]												–	.58**
MCQ-A CSC													–

Note. 1) N = 223, 2) MCQ-A; PB = Positive Beliefs; UD = Uncontrollability and Danger; CC = Cognitive Confidence; SPR = Superstition, Punishment and Responsibility; CSC = Cognitive Self-Consciousness.
[a]Square root transformation of variable used for normal distribution [b]Logarithm transformation of variable used for normal distribution.
*p < .01 **p < .05.

Table 3. Standard multiple regression of RAS total, TAFQ-A total and MCQ-A total predicting OCD symptoms

Independent variables	R square	Adjusted R square	F change	Sig. F change	Independent contribution		
					β	t	p
RAS total	.35	.34	38.67	.00**	−.38	−5.18	.00**
TAFQ-A total[a]					−.05	−.78	.44
MCQ-A total					.30	4.17	.00**

$N = 221$.
Note. Lower responsibility scores reflect higher levels of inflated responsibility.
[a]Square root transformation of variable used in analysis so normally distributed.
**Significant contribution to the model at $p < .01$ level.

Table 4. Sequential multiple regression demonstrating mediating effect of inflated responsibility on the relationship between thought action fusion and OCD symptoms

		B	SE	Beta	R^2
Step 1	*TAF-A*[a]	.873	.143	.381	.14
Step 2	*TAF-A*[a]	.279	.154	.122	
	RAS	−.029	.004	−.479	.30

$N = 221$.
Note: Lower responsibility scores reflect higher levels of inflated responsibility.
[a]Square root transformation of variable used in analysis so normally distributed.

contribution in predicting scores on the LOI-CV symptom (yes/no) scale. Table 3 shows that 35% of the variance in symptom scores was explained by the three independent variables. Both RAS and MCQ-A made significant independent contributions to the LOI symptom (yes/no) score. Thought action fusion did not make a significant independent contribution to LOI symptom (yes/no) score.

The proposed mediating effect of responsibility appraisals on the relationship between thought action fusion and OCD symptoms, and the relationship between meta-cognitive beliefs and OCD symptoms was tested according to the guidelines offered by Baron and Kenny (1986). They state that four conditions must be met for a variable to be considered a mediator. These are: a) the predictor must be significantly associated with the hypothesized mediator; b) the predictor must be significantly associated with the dependent measure; c) the mediator must be significantly associated with the dependent variable; and d) the impact of the predictor variable on the dependent measure is less after controlling for the mediator.

Table 2 shows that thought-action fusion (the predictor), OCD symptoms (the dependent measure) and responsibility (the mediator) were all significantly inter-correlated, thus meeting conditions 1–3 for the mediating role of responsibility attitudes in the relationship between thought-action fusion and OCD. We examined condition 4 using a sequential multiple regression. TAFQ-A was entered at step 1 and TAFQ-A and RAS at step 2 (see Table 4). There was evidence of a complete mediating effect as TAFQ-A became non-significant at step 2.

Table 5. Sequential multiple regression demonstrating mediating effect of inflated responsibility on the relationship between meta-cognitions and OCD symptoms

		B	SE	Beta	R^2
Step 1	*MCQ*	.063	.006	.569	.32
Step 2	*MCQ*	.042	.008	.376	
	RAS	−.019	.004	−.310	.38

$N = 221$.

Note: Lower responsibility scores reflect higher levels of inflated responsibility.

To examine the mediating effect of RAS in relation to meta-cognition we followed the same procedure. Table 2 shows that MCQ-A (the predictor), OCD (the dependent variable) and RAS (the mediator) are all significantly correlated, thus meeting conditions 1 to 3 for the mediating role of responsibility attitudes in the relationship between meta-cognitions and OCD. In a sequential multiple regression MCQ-A was entered at step 1 and RAS at step 2. There was evidence of a partial mediating effect (see Table 5). The Sobel test demonstrated that this was highly significant, $z = 6.733$, $p < .001$.

Discussion

The results of this study suggest that amongst non-clinical young people aged 13 to 16 years, inflated responsibility and meta-cognitions both make a significant independent contribution to obsessive compulsive symptoms. Furthermore, tests of mediation suggest that the relationship between thought-action fusion and obsessive compulsive symptoms was fully mediated by responsibility attitudes, and that the relationship between meta-cognitions and obsessive compulsive symptoms was partially (and significantly) mediated by responsibility attitudes. Cognitive models of obsessive compulsive disorder appear to be as applicable to young people as they are to adults, and the measures used to assess cognition are appropriate to this age group.

Wells has suggested that responsibility appraisals are a peripheral correlate of meta-cognition rather than a central feature of OCD as proposed by Salkovskis (1985, Salkovskis et al., 1995). Some previous research has supported this (Gwilliam et al., 2004, Mather and Cartwright-Hatton, 2004). However, using a stronger test of mediation, the current study found that although responsibility attitudes partially mediated the relationship between meta-cognitions and obsessive compulsive symptoms, responsibility attitudes remained a significant predictor of obsessive compulsive symptoms in line with the model proposed by Salkovskis (1985).

The results are also consistent with Wells' model, which places thought-action fusion within the more general category of meta-cognition. Although thought-action fusion was significantly correlated with OCD symptoms and severity, the strength of this association was lesser than the other two variables and thought action fusion did not make an independent contribution to OCD symptoms or severity over and above the variance attributed to responsibility and meta-cognition. However, there is some overlap in item content between the RAS and the TAF-Q, which may reflect conceptual overlap and help explain the lack of an independent relationship between thought-action fusion and obsessive compulsive symptoms.

These data contribute to a very small body of evidence on a) the relationships of different cognitive processes to obsessive compulsive symptoms, and b) the application of cognitive models to the understanding, and potentially, the treatment of OCD in young people. A number of methodological issues make the evidence preliminary and are shared by this study and others. The use of a non-clinical sample does mean that generalizing to a clinical population is problematic but allows studies to have adequate power to test relationships between variables. Similarly, the use of cross-sectional designs means that inferences of causal relationships are speculative; it is as possible that cognitive process change *after* or *because of* obsessive compulsive concerns and behaviours, rather than playing an aetiological role in OCD. The assumption that there is a causal relationship between cognitive processes and the development of obsessive compulsive symptoms is best tested in longitudinal observational studies (which are highly expensive and rarely conducted) or tightly controlled experiments in which participants' cognitions are manipulated and the effect of this on obsessive compulsive symptoms is observed. Finally, the variables examined, though significant, leave much of the variance in symptoms unexplained and thus are clearly only a partial explanation of OCD related symptoms in young people.

There is a discrepancy between the results of this study and those of Mather and Cartwright-Hatton (2004) who reported that responsibility attitudes did not make a significant independent contribution to obsessive compulsive symptoms. The two studies recruited very similar participants and used the same measures of responsibility and meta-cognitions in a similar, cross sectional design. Levels of obsessive compulsive symptoms, responsibility attitudes and meta-cognitions were also similar, as were associations between the variables. One possibly important difference between the two studies is that Mather and Cartwright-Hatton controlled for depression before examining the impact of meta-cognitions and responsibility attitudes. In the final regression model, depression and meta-cognition, but not responsibility attitudes, were significant predictors of obsessive compulsive symptoms. However, although depression and responsibility attitudes were significantly correlated, this accounted for only about 25% of the shared variance. Clearly the role of mood, as well as of cognition, should be examined in future studies that attempt to unpick and clarify different predictors of obsessive compulsive symptoms.

This study adds to a small but growing literature on the application of cognitive models OCD to young people. Although scant, there is a consistency in the results of these studies that demonstrate considerable overlaps in the presentation and cognitive correlates of OCD in young people and adults. This implies that clinical interventions based on cognitive models of OCD are likely to be applicable to young people. The efficacy of cognitive therapy for OCD or "cognitively enhanced" ERP has yet to be firmly demonstrated but is appealing to many clinicians because of the many practical difficulties in engaging and keeping people in traditional ERP programmes.

The research agenda is currently wide open. Further experimental studies demonstrating the causal role of cognition (especially meta-cognition) in the formation of obsessive compulsive features or symptoms would be compelling. Extending the cross-sectional studies to samples of clinically referred young people and adults would be of benefit, as would tightly controlled single case experiments that demonstrated temporal relationships between changing cognitive processes and changes in obsessive compulsive symptoms. The role of mood in the relationship between cognitive processes and obsessive compulsive symptoms may be important, and the

extent to which these cognitive processes are unique to obsessive compulsive disorder or are features of all anxiety disorders is yet to be determined.

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