

Moderators and predictors of outcomes in telephone delivered compared to face-to-face cognitive behaviour therapy for pediatric obsessive-compulsive disorder: Preliminary evidence from a non-inferiority RCT

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ABSTRACT

This study provides a preliminary exploration of factors which differentially predict treatment response to telephone delivered cognitive behavioural therapy (TCBT) compared to face-to-face CBT (CBT) in a randomised non-inferiority controlled trial of 72 children (aged 11 to 18 years) with obsessive compulsive disorder (OCD). Potential moderator variables, their interaction with treatment group (CBT, TCBT), and baseline levels of OCD severity were entered into separate regression models where the primary outcome measure was the post-intervention Children's Yale Brown Obsessive Compulsive Scale total score (CYBOCS). Separate regressions were also used to test associations between predictors and outcome controlling for pre-treatment CYBOCS. Only pre-treatment level of parent-rated child peer problems moderated the effects of the two interventions on CYBOCS severity at post-treatment ($\beta = 3.63$; $p = 0.05$; CI = 0.04 to 7.31). Peer problems scores were negatively associated with post-intervention CYBOCS in TCBT ($r = -.42$; $p = 0.02$; CI -0.70 to -0.04) but not in CBT ($r = -0.12$; $p = 0.56$; CI -0.51 to 0.31). After controlling for baseline CYBOCS, only family accommodation rated by mothers predicted poorer outcomes in both groups ($r = .40$; $p < 0.01$; CI = 0.10 to 0.41). While CBT and TCBT may be equally effective for adolescents with OCD, the current results tentatively suggest that higher baseline level of peer problems strengthened the response to therapy for youth receiving TCBT. The result for the predictor analyses reinforce the importance of directly addressing family accommodation during CBT for pediatric OCD regardless of delivery mode. Limitations of the current findings and directions for future work are discussed.

Keywords: adolescent, obsessive compulsive disorder, cognitive behavior therapy, moderators, predictors.

Moderators and predictors of outcomes in telephone delivered compared to face-to-face cognitive behaviour therapy for pediatric obsessive-compulsive disorder: Preliminary findings from a non-inferiority RCT

Pediatric obsessive compulsive disorder (OCD) is a severe, often debilitating mental illness with estimated prevalence rates between 0.5 and 2% [1,2]. The intrusiveness and time-consuming nature of OCD can have a particularly pernicious impact on children and adolescents as they are still forming their self-identity and developing social and educational skills [3,4]. A review of long term outcome studies reported that 41 to 60% of children with OCD continue to have moderate to severe OCD in adulthood [5]. Moreover, earlier age of onset and longer duration of illness are significant risk factors for persistence, highlighting the critical need for the development and dissemination of evidence-based interventions for OCD presenting in children and adolescents [5,6]. Randomised controlled trials have consistently found that cognitive behavioural therapy (CBT) incorporating exposure with response prevention (E/RP) for pediatric OCD is as effective as selective serotonin reuptake inhibitors (SSRIs), and may optimise therapeutic outcomes when combined with SSRIs [7,8]. Because of its lower risk to benefit ratio, practice guidelines recommend CBT alone as the first line intervention for mild to moderate OCD and CBT in combination with medication treatment for more severe/treatment resistant OCD [9,10].

Despite these findings, many children and adolescents with OCD are not able to access CBT because of the restricted availability of appropriately trained clinicians in outer metropolitan and non-urban areas, and the financial costs of access to therapy [11]. Remote delivered CBT programmes for OCD such as telephone, web-camera or internet CBT have been suggested as valid alternatives to face-to-face CBT (CBT) because of their convenience, time and cost-effectiveness, and perceptions of being less stigmatising [12]. Trials involving

such remote interventions for youth with OCD have found significant post-treatment reductions in OCD severity comparable to face-to-face CBT [12,13,14]. A recent randomised control non-inferiority trial which compared telephone delivered CBT (TCBT) and standard face-to-face CBT for children and adolescents with OCD found that both delivery modes produced substantial post-treatment reductions in OCD severity which were sustained over 12 months, and that the benefits of TCBT were not inferior to CBT (non-inferiority margin 5 points on Child Yale Brown Obsessive-Compulsive Scale) [15].

These results indicate that CBT for OCD in children and youth can be delivered remotely without reducing its efficacy, opening the way to making CBT available in the broadest range of circumstances. While this evidence supports the conclusion of equivalent efficacy of TCBT and CBT at the group level, it is important to acknowledge that the adaptation of CBT for telephone delivery does modify aspects of therapeutic processes such as the therapist's sensitivity to levels of affect which, for certain young people, may diminish or augment their benefits. Identifying pre-treatment characteristics of the child/adolescent, their disorder or environmental context that predict a differential benefit from TCBT or CBT has important implications for treatment assignment and improving the likelihood of therapeutic success [16,17]. Preliminary research on moderators for remotely delivered CBT compared to CBT for adults with social anxiety disorder and depression, for example, has found that higher baseline levels of anxiety or depressive symptoms, and co-morbidity with other emotional disorders, were associated with less favourable outcomes in the remotely delivered CBT group but not in face-to-face CBT [18,19,20]. While some studies of CBT for pediatric OCD suggest that patients with a co-morbid anxiety disorder do better with face-to-face CBT (compared to a waitlist control) than their peers without a co-morbid anxiety disorder [21], as far as we are aware there is no evidence about possible moderators of the relative benefits of CBT versus remotely delivered CBT for pediatric OCD. It is important,

given the rapid advance of technological applications of CBT, to develop an evidence base about factors which may predict a superior benefit from face-to-face or remotely delivered CBT for pediatric OCD, which can assist clinicians in making the best recommendations for their patients as well as focus researchers on areas for which modifications of CBT are required.

The aim of the current study was to examine factors which may moderate the relative efficacy of CBT compared to TCBT for pediatric OCD using data from a randomised controlled non-inferiority trial [15]. In addition to level of co-morbid internalising symptoms (depression and emotional symptoms) which have been shown to moderate remote delivery of CBT efficacy for adult anxiety disorders relative to face-to-face CBT [19, 20], the study explores the demographic, OCD related, other co-occurring problems and family factors which were measured at base-line as moderators of the post-treatment outcome in TCBT relative to CBT. A secondary aim of the study was to identify potential predictors of CBT outcome. Knowledge of factors that are associated with an attenuated treatment response can help identify children and adolescents who may benefit from additional or more intense therapy in order to maximise outcomes [16,17] and also assist researchers in specifying factors worth further examining as effect moderators [16]. In a recent systematic review [22] we reported consistent evidence across multiple trials of CBT in children and adolescents with OCD that age, severity of pre-treatment OCD-related impairment, level of co-existing externalising and internalising symptoms, and family accommodation of OCD symptoms were predictors of poorer response to treatment. In the current study we examine these factors as predictors of post-treatment OCD symptoms for children and adolescents in both the TCBT and CBT groups.

Method

This study presents an analysis of existing data from a randomised non-inferiority trial comparing CBT and TCBT for OCD in child and youth aged 11 to 18 years [15].

Participants

Participants in the trial were recruited through referrals to a specialist OCD clinic between 2008 and 2011 by general practitioners and mental health professionals within the UK National Health Service. The sample consisted of 72 adolescents, between the ages of 11 to 18 years, who met Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition Text Revision (DSM- IV-TR) criteria for a primary diagnosis of OCD, and who had a Children’s Yale-Brown Obsessive Compulsive Scale (CYBOCS) score of 16 or higher (suggestive of moderate to high severity). Primary diagnosis was established an experienced clinical team following a CYBOCS assessment and parent and child completion of the Anxiety Disorders Interview Schedule for Children (ADIS-IV-C/P) (see [15] for full methodological details). Additional inclusion criteria were: a medication free status or having a stable dosage of medication for at least 12 weeks; consenting to random assignment; and parental involvement in the intervention. Individuals with suicidal ideation, severe medical illnesses or neurological impairments, current psychosis or substance abuse or dependence, poor English language comprehension, learning disabilities or pervasive developmental disorders were not included.

Measures

Children’s Yale-Brown Obsessive Compulsive Scale (CYBOCS) [23]. The CYBOCS is a clinician administered instrument that assesses the severity of obsessive and compulsive symptoms over the previous week. The CYBOCS total score has demonstrated robust

psychometric properties with strong internal consistency (Cronbach $\alpha = 0.90$) and a test re-test reliability intra-class coefficient of 0.79 [24]. Internal consistency in this sample was sound ($\alpha = 0.88$).

The Children's Global Assessment Scale (CGAS) [25]. The CGAS is a clinician rated assessment which measures overall adaptiveness and general functioning. Lower scores reflect a greater level of impairment. Interrater reliability correlations range from .59 to .90, with greater consistency between experienced raters [26].

Beck's Depression Inventory-Youth (BDI-Y) [27]. Depression in participants was measured using the 20 item self-report youth version of the BDI. The BDI-Y has high internal consistency (Cronbach $\alpha = .90$) and test re-test reliability coefficients from .74 to .93 [27,28]. Internal consistency in this sample was strong (Cronbach $\alpha = .89$).

The Strengths and Difficulties Questionnaire (SDQ) [29]. The SDQ is a 25 item measure that assesses internalising (emotional) symptoms, conduct problem and interpersonal concerns. It provides an overall problem score as well as scores on 4 problem subscales (conduct symptoms, emotional problems, peer problems, hyperactivity/inattention problems) and a pro-social behaviour subscale. The SDQ's internal consistency Cronbach α has been reported at .73 and mean temporal stability over 4 to 6 months was found to be .62 [30]. The current study uses the parent report version of the SDQ. The internal consistency for this sample ranged from low to excellent, with internal consistencies ranging from $\alpha = .38$ to $\alpha = .91$ (emotional problems $\alpha = .91$; conduct problems $\alpha = .38$; hyperactivity $\alpha = .72$; peer problems $\alpha = .71$; prosocial behaviour $\alpha = .68$; SDQ total difficulties $\alpha = .77$).

The Family Accommodation Scale-Parent Report (FAS-PR) [31]. The FAS-PR is a 13 item measure of familial accommodation of a child's OCD related behaviours over the previous month. The instrument has good internal consistency ($\alpha = .90$) and convergent and

discriminant validity [32]. The report on the FAS-PR from both the mother and father were used. Internal consistency for father FAS ($\alpha = .89$) and mother FAS ($\alpha = .91$) in this sample was excellent.

The Depression Anxiety and Stress Scales (DASS) [33]. Levels of depression, anxiety and stress in parents was measured using the DASS, a 42 item self-report questionnaire that assesses features such as low positive affect, hopelessness, low self-esteem, autonomic arousal and tension [33]. The DASS demonstrates strong reliability (Cronbach = 0.96 for the total score) and good construct validity [34]. Internal consistency for the total DASS score in this sample for father DASS ($\alpha = .92$) and mother DASS ($\alpha = .97$) was excellent.

Procedure

Putative moderator or predictor variables were measured at pre-treatment and prior to randomisation [15] while the post-treatment outcome measure was administered immediately after the intervention. The assessors of outcomes were blind to treatment group and pre-treatment characteristics. The CBT intervention protocols in both conditions were identical apart from the mode of delivery (face-to-face, $n = 36$; telephone, $n = 36$) and consisted of 14 sessions that were completed within 17 weeks. The first two sessions addressed establishment of rapport and psychoeducation; sessions three to twelve were primarily devoted to E/RP using hierarchies and cognitive strategies; the final two sessions focused on relapse prevention. Participants were assigned daily homework E/RP tasks in accordance with their progress on the hierarchies. The length of sessions varied slightly, but were typically 45-60 minutes long, with 35-45 minutes allocated to therapy with the young person and an additional 10-15 minutes to work with parents. The session time with parents provided them an overview of the session, explained homework assignments and their rationale, and gave

them the opportunity to clarify potential doubts. Treatment across both conditions was delivered by clinical psychologists experienced in working with childhood OCD.

Ethics statement

The study was approved by the Joint South London and Maudsley / Institute of Psychiatry Research Ethics Committee (08/H0807/12) and in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Written informed consent was obtained from all parents and participants over 16 years, and informed assent from participants under 16 years after a detailed description of the study had been given. The trial was registered on the International Standard Randomized Controlled Trial Number Register (ISRCTN27070832).

Data analysis

Independent samples t-tests were used to examine pre-intervention between group differences (TCBT v CBT) in the outcome and potential moderator/predictor variables. Little's Missing Completely at Random (MCAR) test confirmed that the data was missing at random [35]. Of the 72 participants, 4 did not complete the post treatment CYBOCS. These cases were excluded from the moderator and predictor analyses. The moderator analyses involved running separate multiple regression models for each potential moderator variable with post-treatment total CYBOCS score as the outcome variable. Separate regression models were used because at this stage in our knowledge, when there is little information about possible effect moderation between different modes of delivery in CBT, it is more important to identify putative moderators rather than control for interrelationships between the variables. Each model entered baseline CYBOCS score, the baseline score of the potential moderator variable, group (CBT, TCBT), and an interaction term (group x moderator) as independent variables in a single block. If the interaction term was significant ($p < 0.05$), a

subsequent simple slope analysis was conducted using split file partial correlations (split by group) controlling for baseline CYBOCS score. The values for potential moderator variables were grand mean centred if they were continuous and dummy coded if they were categorical. Due to the sample size, limited power and lack of *a priori* predictions for most variables, moderator analyses were considered exploratory in nature and type 1 error was set at $\alpha = 0.05$. Values of each estimate, *p* value and 95% confidence intervals are reported.

Associations between each pre-treatment factor and the level of CYBOCS were estimated using Pearson correlations for the total sample. Because of the large number of variables, only those that had first order Pearson correlations with post-intervention CYBOCS scores higher than 0.20 were further analysed as potential predictors in separate regression models. This value was chosen because, given the sample size of 72 and power of .8, only first-order correlation above .20 were likely to be significant ($p < .05$) in partial correlation. This allowed exploration of variables which had a moderate strength of relationship with the outcome while reducing the number of analyses performed. The regression analyses were run with the potential predictor variable in the first block as an independent variable and both the individual potential predictor variable and baseline CYBOCS scores in the second block as independent variables (to identify predictors before and after partialling out the association of baseline CYBOCS to post-treatment score). Most previous paediatric OCD predictor studies have not controlled for baseline OCD severity [16]. Post-treatment CYBOCS scores were collapsed across treatment conditions to examine predictors of treatment response; interaction effect and subsequent simple slopes analysis allowed examination of differential strength of predictions between groups.

Results

Table 1 presents the baseline demographic and clinical characteristics of participants within each of the treatment groups. Of the 72 participants, 68 (94% percent) completed the CYBOCS at the end of the 14 session intervention. The average age at baseline was 14.35 ($SD = 2.12$). The gender split was (female = 45.8%; male = 54.2%). The mean CYBOCS score at baseline was in the moderate to severe range for both groups (CBT $M = 25.03$; $SD = 4.23$; TCBT $M = 25.28$; $SD = 4.05$). The CBT group had significantly higher average baseline scores than the TCBT group on SDQ total score ($p = 0.02$; mean difference = -2.75 ; $CI = -5.07$ to -0.42) and SDQ conduct subscale scores ($p = 0.04$; mean difference = -0.82 ; $CI = -1.62$ to -0.18 ; Table 1). No other between-group differences at baseline were significant. With a non-inferiority margin of 5 points on the CYBOCS, TCBT was judged to be not inferior to CBT on the primary outcome at post-treatment [15], and on the secondary outcome (SDQ; BDI-Y) using a one standard deviation non-inferiority margin [15].

The results of the moderator analyses are summarised in Table 2. Neither the group by BDI-Y interaction nor the group by SDQ emotional problem interaction were significantly associated with post-treatment CYBOCS. All the other candidate variables evaluated except for SDQ peer problems and prosocial behaviours showed very small effects. SDQ peer problems score by group interaction showed a significant association with post-intervention CYBOCS total ($\beta = 3.63$; $p = 0.05$; $CI = 0.04$ to 7.31 ; $r = -0.26$). The simple slopes analysis (Figure 1) showed that SDQ peer problems scores were significantly negatively associated with post-intervention CYBOCS in TCBT ($r = -.42$; $p = 0.02$; $CI -0.70$ to -0.04) but not in CBT ($r = -0.12$; $p = 0.56$; $CI -0.51$ to 0.31). The group by SDQ prosocial behaviour score interaction showed a trend level result ($\beta = 2.02$; $p = 0.06$; $CI = -0.08$ to 4.14 ; $r = -0.17$). Partial correlations (controlling for baseline CYBOCS scores) between prosocial scores and post intervention CYBOCS showed a notable although not significant relationship between

prosocial score and outcome in TCBT ($r = -0.35$; $p = 0.07$; 95% CI -0.66 to 0.05) but not in CBT ($r = 0.001$; $p = 0.97$; CI -0.41 to 0.41).

Pearson correlations identified 9 pre-treatment variables which had correlations with post-intervention CYBOCS scores higher than 0.20 (for both groups of participants combined). The results of the regression analyses for these variables are summarised in Table 3. Age, severity of OCD-related impairment and level of mother-report of family accommodation were associated with poorer post-treatment outcome when baseline CYBOCS was not controlled. Only level of family accommodation reported by the mother independently predicted an attenuated response to CBT once baseline CYBOCS was included in the regression models ($\beta = 0.26$; $p < 0.01$; CI = 0.10 to 0.41; $r = 0.44$; CI 0.03 to 0.50). While higher peer problems also emerged as a significant predictor of an improved outcome ($\beta = -1.70$; $p = 0.03$; CI = -3.29 to 0.11), this effect was only evident in the TCBT group and was attributable to the moderation effect previously described.

Discussion

This is the first study to explore potential moderators of treatment outcome between face-to-face and remotely delivered CBT for pediatric OCD. Using data from a randomised controlled non-inferiority trial that compared face-to-face CBT with telephone CBT [15] for 11 to 18 year olds with OCD, we examined child characteristics, pre-treatment levels of co-occurring psychological symptoms and parental factors as potential effect moderators of the relative benefits of the two modes of delivery of CBT. We found no evidence for the anticipated inferior benefits from telephone CBT compared to face-to-face CBT related to higher levels of co-occurring internalising problems such as depressive symptoms or anxiety found in some adult studies [19,20]. Our results did indicate, however, that higher level of parent-reported peer problems shown by the adolescent at baseline was negatively related to

post-intervention OCD severity scores in the telephone delivered CBT, but was unrelated in face-to-face CBT. There was no evidence that any other pre-treatment variables significantly moderated treatment outcome between the two versions of CBT.

It is not clear what accounts for the moderate relationship between level of peer problems and treatment outcome for youth receiving TCBT, which is not evident when CBT is delivered face-to-face. As the non-inferiority trial included a number of factors to monitor and ensure integrity of the treatment within and across the two modes of delivery, such as using a detailed therapist manual, supervision by experienced therapists, and independent ratings of treatment integrity, it is unlikely to be explained by a different response by therapists in the telephone delivered CBT to youth with peer difficulties. There is some qualitative evidence from a study of adults receiving CBT over the telephone [36] that some participants indicated a preference for remote delivery as they felt better able to develop a closer therapeutic alliance when they were less distracted or pressured by the therapist's physical proximity. The moderating effect of peer problems observed in the current study may be attributable to a similar factor such that youth who have interpersonal difficulties experienced reduced discomfort in telephone CBT, which facilitated their alliance with the therapist and strengthened the response to CBT for these participants.

Another possibility may be that peer problems arise, in part, from social anxiety and that youth with social anxiety symptoms responded positively to the telephone condition. We were unable to examine this as a specific measure of social anxiety was not included, however future research addressing this question would be of benefit. However, there was no difference in therapeutic alliance was observed between conditions and no evidence of a negative association of peer problems to outcome in face-to-face CBT, and The interaction of level of the child or adolescent's prosocial behaviour and treatment had a similar size effect as peer problem, albeit not significant ($p = .06$). This pattern of results for the moderator

analysis suggests that delivery of CBT for OCD in children and youth over the phone may activate some specific interpersonal factors which influences the treatment response. The current findings clearly raise the question of whether the variability in the interpersonal contexts between telephone, and perhaps other remote methods of delivery, and face-to-face delivery needs to be considered further in order to better understand how to provide the best treatment recommendation for individual patients and their families.

The inconsistency between the present results, and data from adult studies which have reported reduced TCBT effectiveness with higher levels of co-morbid internalising problems for adults with social anxiety disorder or depression [18, 19, 20], can be explained by a number of factors. In particular, the adult studies involved one-to-one delivery of CBT while CBT for paediatric OCD in the current study included family involvement. The inclusion of the family may have countered any impact of depressive symptoms on the adolescent's motivation for treatment in telephone CBT. The adult studies recruited participants who had co-morbid anxiety disorders in addition to their primary diagnosis [18,19] while, in the current study, participants had a primary diagnosis of OCD and their internalising symptoms were secondary in nature. In addition, a number of methods were put in place in the current study [15] to ensure a consistent and proper intensity of CBT was provided across the two modes of delivery. Overall, while the current finding is preliminary given the exploratory nature of the study, it suggests that youth with OCD respond equally well to the current best-practice CBT delivered face-to-face or over the telephone, regardless of their level of pre-treatment depressive or anxiety symptoms.

The finding that the level of family accommodation at pre-treatment did not moderate the relative benefits of the two modes of delivery of CBT has important potential implications. It suggests that additional focus on the mother's response to her child's symptoms may be required to enhance CBT effectiveness generally and that this additional

focus may be important for improving CBT efficacy regardless of the mode of delivery. This pattern of results indicates that the ability for CBT, with a parental component, to reduce the symptom levels in pediatric OCD is not related to the initial level of family accommodation. Given the key role of family accommodation in maintaining symptoms, methods aimed at altering the parent's responses to their child's OCD symptoms may be delivered as effectively remotely as it can be in face-to-face treatment.

A secondary aim of the current study was to identify predictors that impacted outcome for both treatment modalities. In general, our findings are consistent with those of other studies of predictors of CBT for pediatric OCD, which indicate that most child factors which predict outcome are associated with initial OCD symptom severity, and this interrelationship explains their association with treatment outcome. For example, studies [37,38] which examined OCD-specific, and general psychological distress concurrently, found that level of general psychological symptom did not predict outcome of CBT after controlling for pre-treatment OCD-specific severity. In the current study, only maternal family accommodation predicted a poorer outcome in both interventions after controlling for baseline OCD severity. Family accommodation has been associated with higher post intervention OCD severity scores in previous research [16,37,39]. Although paternal family accommodation scores were not significantly related to outcome in the current study, fathers can contribute to the maintenance of OCD symptoms not only by providing excessive reassurance or acquiescing to symptoms, but also by adding to a climate of criticism around the display of the compulsions [40,41]. It is important that when family accommodation levels of either parent are moderate to high, that clinicians directly address this throughout the intervention to maximise the chances of a positive outcome.

The current study has a number of strengths and limitations. It shares the strengths of the study from which the data was analysed [15] which include recruitment of a large sample

of help-seeking participants with a clear diagnosis of OCD, inclusion/exclusion criteria that increased the study's generalisability, relatively low attrition rate (6% of the original sample) with dropouts missing at random, manualised evidence-based treatment protocols, high adherence rates in both conditions and the use of psychometrically sound instruments to assess relevant putative predictors and moderators and the outcomes. Because initial symptom severity often confounds the true strength of association between predictors and outcome in treatment studies we present these associations both as first order and partial corrections controlling for initial OCD symptom severity.

The current findings need to be considered, nevertheless, in light of several limitations. While the current sample is large enough to test the non-inferiority and prediction hypotheses, it was not necessarily adequately powered to examine the moderator hypotheses across two conditions. The non-significant results reported for levels of internalising symptoms and family accommodation, therefore, do not provide strong evidence for ruling out these factors from further evaluation as moderators. In addition, because of the small number of participants in each treatment condition, the unpacking of significant interactions results in numbers in the simple slopes analysis which are small, having the effect of wide confidence intervals for the estimate of the strength of association. While significant, we cannot confidently conclude from the current findings that the strength of the relationship between level of peer-problems and OCD symptom outcome has notable clinical importance.

We also acknowledge caveats to our analytic approach. Because evidence of potential moderators of CBT based on mode of delivery is only starting to be gathered in the adult literature and this is the first study to examine between delivery mode moderators in CBT for pediatric OCD, we treated the statistical analyses as exploratory and did not adjust the type 1 error rate or consider the interrelationships between possible moderators in multiple regression. Our view is that at this stage of knowledge it is important to identify all

potential moderators empirically and subsequently test them in properly powered studies. The main finding for peer-problems reported here needs, therefore, to be considered cautiously until it and other factors are followed up in further studies examining moderation. Another caveat to inferences from the findings of the current study is the relevance of the data to the populations which are most likely to access CBT remotely. The sample included mostly Caucasian children and adolescents, aged 11 to 18 years, and participants were randomised rather than preferentially allocated to telephone or face-to-face CBT. While randomisation is necessary for comparing efficacy, it precludes identifying effect moderators which may be associated with the family's preference for one treatment mode of delivery over another when both are available.

In conclusion, the present paper enhances the findings of the original study [15] by showing that for children and adolescents with a primary diagnosis of OCD pre-treatment characteristics associated with co-occurring problems and family characteristics do not differentially predict the efficacy of telephone CBT and face-to-face CBT. Therefore, CBT over the telephone has the potential to address barriers to appropriate, evidence based care for the majority of families. The results also suggest a relationship between CBT outcome for telephone delivery and level of peer problems, such that for children with more peer problems, telephone delivery may optimise treatment outcome. In addition, the results of the predictor analyses emphasised the therapeutic importance of explicitly targeting family accommodation in CBT programs. Further research could address the question of moderators of telephone CBT and face-to-face CBT using a larger sample size. Similarly, studies examining moderators of outcome in other remote CBT delivery modalities (such as CBT via web-cams or internet delivered CBT) would also carry important practical implications. Finally, alternative methods to identify predictors and moderators of treatment outcome for CBT, such as machine learning approaches, may provide additional tools to help identify

groups of young people with OCD who may be more suitable for remote delivery of care than traditional in-office approaches [42].

Conflict of Interest: The authors declare that they have no conflict of interest.

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Table 1 Means (SD) for baseline moderator variables by group (TCBT; CBT); mean difference; significance and 95% CI

Variable	Telephone CBT Mean (SD) N = 36	Face-to-face CBT Mean (SD) N = 36	Coefficient Mean Difference	Significance of Difference (Two Tailed)	95% CI
1. Age in Months	175.75 (25.07)	180.86 (26.95)	-5.11	0.40	-17.34 to 7.12
2. Baseline CYBOCS	25.28(4.05)	25.03(4.23)	0.25	0.79	-1.70 to 2.20
3. Age of Onset in Months	133.22(43.84)	132.29(37.86)	0.93	0.92	-18.77 to 20.64
4. CGAS	50.08(9.03)	49.83(9.13)	0.25	0.90	-4.01 to 4.51
5. BDI-Y	16.11(7.71)	19.54(9.85)	-3.42	0.11	-7.64 to 0.79
6. SDQ-Total	16.07 (3.79)	18.82(4.81)	-2.75	0.02*	-5.07 to -0.428
7. SDQ-Emotional Symptoms	4.82(2.51)	5.71(2.66)	-0.89	0.20	-2.28 to 0.49
8. SDQ-Hyper-activity	4.21(1.72)	4.71(1.69)	-0.50	0.28	-1.41 to 0.41
9. SDQ-Conduct Problems	2.32(0.94)	3.14(1.9)	-0.82	0.04*	-1.62 to -0.18
10. SDQ-Peer Problems	4.71(0.97)	5.25(1.45)	-0.53	0.11	-1.20 to 0.12
11. SDQ-Prosocal Behaviour	7.00(1.80)	7.07(2.41)	-0.07	0.90	-1.21 to 1.07
12. Biological Relative with OCD	3.38 (1.15)	3.41(1.18)	-0.02	0.91	-0.59 to 0.53
13. FAS-Mother Total	19.26(12.21)	18.58(11.91)	0.67	0.82	-5.27 to 6.62
14. FAS-Father Total	11.96(11.43)	9.88(7.74)	2.07	0.48	-3.83 to 7.98
15. DASS Mother Total	20.60(24.21)	15.13(13.73)	5.47	0.25	-4.10 to 15.04
16. DASS Father Total	11.40(11.11)	8.25(6.57)	3.15	0.31	-3.08 to 9.38

Note: CY-BOCS: Children's Yale Brown Obsessive Compulsive Scale; CGAS: Clinical Global Assessment Scale; BDI-Y: Beck Depression Inventory for Youth; DASS: Depression Anxiety Stress Scale; SDQ- Strengths and Difficulties Questionnaire- Parent Report; FAS: Family Accommodation Scale- Parent Report

Table 2 Results of regression for the moderator by group interaction on post-treatment CYBOCS total, for each possible moderator

Possible Moderator	Unstandardized β (Standard Error)	<i>t</i>	<i>p</i> Value	95% Confidence Intervals	Part Correlations
Demographic Variables					
Gender	1.53(3.62)	0.42	0.67	-5.70 to 8.77	0.051
Age at Assessment in Months	0.04(0.07)	0.60	0.54	-0.09 to 0.18	0.072
OCD-Related Variables					
CYBOCS (baseline severity)	-0.40(0.44)	-0.90	0.36	-1.28 to 0.48	-0.110
Age of Onset in Months	0.02(0.04)	0.52	0.59	-0.07 to 0.12	0.066
CGAS	0.28(0.20)	1.42	0.16	-0.11 to 0.69	0.169
Co-morbid Symptoms					
BDI-Y	-0.05(0.21)	0.79	0.79	-0.49 to 0.38	-0.032
SDQ- Total	0.007(0.53)	0.01	0.99	-1.06 to 1.08	0.002
SDQ- Emotional Symptoms	-0.08(0.86)	-1.00	0.92	-1.81 to 1.64	-0.014
SDQ- Hyperactivity	0.06(1.36)	0.04	0.96	-2.66 to 2.79	0.007
SDQ- Conduct Problems	0.16(1.87)	0.08	0.93	-3.61 to 3.93	0.012
SDQ- Peer Problems	3.63(1.83)	1.98	0.05*	0.04 to 7.31	0.255
SDQ- Prosocial Behaviour	2.02(1.05)	1.92	0.06	-0.08 to 4.14	0.254
Family Factors					
Biological Relative with OCD	-1.44(1.64)	-0.87	0.38	-4.74 to 1.85	-0.109
FAS- Mother Total	-0.20(0.14)	-1.39	0.17	-0.50 to 0.09	-0.160
FAS- Father Total	0.08(0.31)	0.26	0.79	-0.55 to 0.72	0.041
DASS Mother Total	-0.11(0.11)	-1.01	0.31	-0.34 to 0.11	-0.127
DASS Father Total	-0.30(0.37)	-0.82	0.41	-1.07 to 0.45	-0.131
Note: * $p < .05$; CY-BOCS: Children's Yale Brown Obsessive Compulsive Scale; CGAS: Clinical Global Assessment Scale; BDI-Y: Beck Depression Inventory for Youth; DASS: Depression Anxiety Stress Scale; SDQ- Strengths and Difficulties Questionnaire- Parent Report; FAS: Family Accommodation Scale-Parent Report					

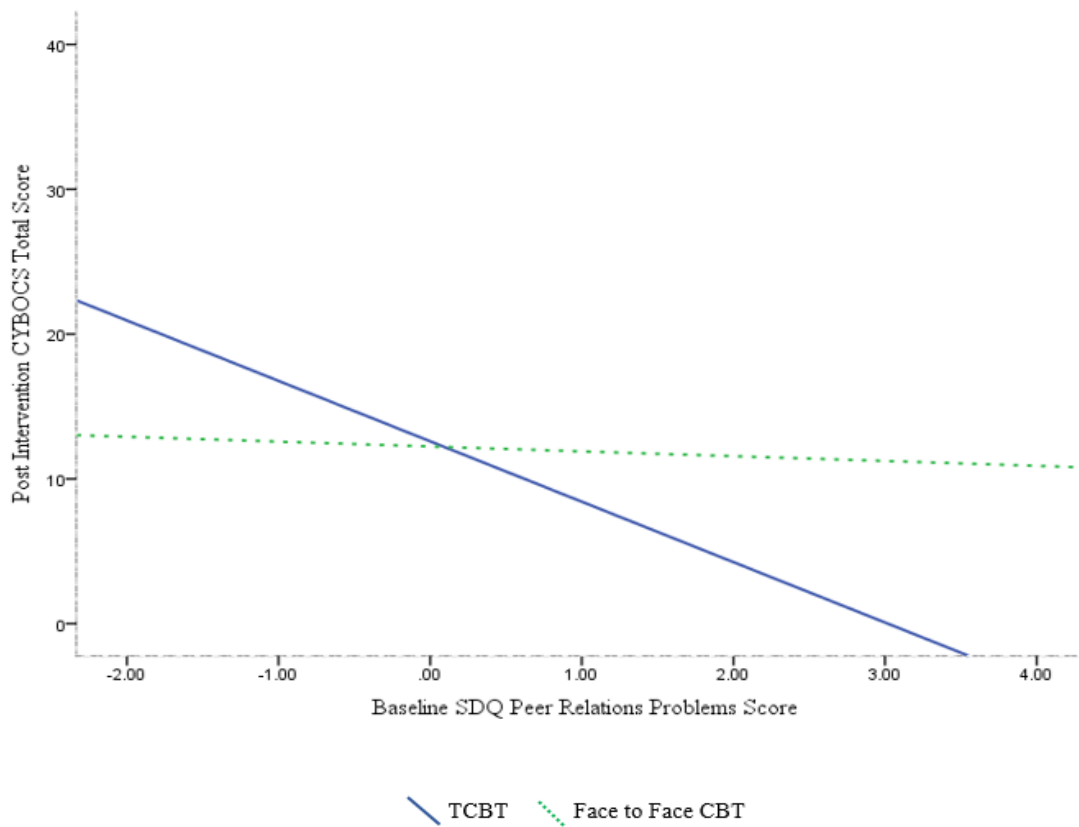


Figure 1 Results of simple slopes analysis showing the association between SDQ Peer Problems Scores and CYBOCS total post treatment for TCBT ($r = -.42$) and CBT ($r = -.12$).

Table 3 Associations between predictors and post-treatment CYBOCS total, with and without control for pre-treatment CYBOCS

Variable	Baseline CYBOCS Control	Unstandardized β (Standard Error)	<i>t</i>	<i>p</i> Value	95% Confidence Intervals	Correlations
Demographic Variables						
Age at Assessment in Months	With	0.06 (0.03)	1.81	0.07	-0.00 to 0.14	0.214
	Without	0.08(0.03)	2.36	0.02*	0.01 to 0.14	0.279
OCD-Related Variables						
CYBOCS (baseline)		0.40(0.22)	1.83	0.07	-0.03 to 0.84	0.220
CGAS	With	-0.17(0.12)	-1.36	0.17	-0.42 to 0.08	-0.162
	Without	-0.22(0.09)	-2.21	0.03*	-0.41 to -0.02	-0.263
Co-morbid Symptoms						
SDQ-Emotional Symptoms	With	0.56(0.39)	1.45	0.15	-0.21 to 1.34	0.194
	Without	0.63(0.39)	1.61	0.11	-0.15 to 1.41	0.218
SDQ-Peer Problems	With	-1.70 (0.79)	-2.14	0.03*	-3.29 to 0.11	-0.281
	Without	-1.48(0.80)	-1.83	0.07	-3.09 to 0.13	-0.247
SDQ-Prosocial Behaviour	With	-0.61(0.49)	-1.23	0.22	-1.61 to 0.38	-0.167
	Without	-0.78(0.48)	-1.62	0.11	-1.75 to 0.18	-0.220
Family Factors						
FAS-Mother Total	With	0.26(0.07)	3.43	0.00**	0.10 to 0.41	0.395
	Without	0.27(0.07)	3.85	0.00**	0.13 to 0.42	0.443
FAS-Father Total	With	0.17(0.11)	1.54	0.13	-0.05 to 0.40	0.232
	Without	0.19(0.11)	1.73	0.09	-0.03 to 0.42	0.262
Note: * $p < .05$ ** $p < .01$. CY-BOCS: Children's Yale Brown Obsessive Compulsive Scale; CGAS: Clinical Global Assessment Scale; BDI-Y: Beck Depression Inventory for Youth; DASS: Depression Anxiety Stress Scale; SDQ-Strengths and Difficulties Questionnaire-Parent Report; FAS: Family Accommodation Scale-Parent Report						