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The impact of telephone-delivered cognitive behaviour therapy and befriending on mood disorders in people with chronic obstructive pulmonary disease: A randomized controlled trial

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Objectives

The main objectives of this pragmatic randomized controlled trial (RCT) were to investigate the impact of cognitive behaviour therapy (CBT) and an active social control (befriending) on depression and anxiety symptoms in people with chronic obstructive pulmonary disease (COPD).

Methods

Eligible participants were randomly allocated to receive eight weekly telephone interventions of CBT (n=54) or befriending (n=56). Repeated measures ANOVA was used to assess changes in scores and Cohen's d was used to assess effect sizes.

Results

Significant improvement was observed in anxiety symptoms for the befriending group from baseline (T1) to post-intervention assessment (T2) and to 8-week follow-up assessment (T3), with a small to medium effect size (Cohen's d=0.3). Significant improvement was noted in depression symptoms from T1 to T2 for both groups but only the CBT group had a significant difference at T3, with a small to medium effect size (Cohen's d=0.4). For secondary outcomes there was a significant change in COPD symptoms from T1 to T2 for the befriending group; however, at T3 this change was no longer significant. Finally, there was a significant change in general self-efficacy for both groups between T1 and T2, and T1 and T3.

Conclusion

CBT reduced depression symptoms but not anxiety. Befriending reduced depression symptoms in the short-term and anxiety symptoms in both the short and long term. Further research is needed to demonstrate non-inferiority of telephone delivery compared with other

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formats, and to understand the impact of befriending which has the potential to be a cost effective support for people with COPD.

Introduction

Chronic obstructive pulmonary disease (COPD) is a chronic lung disease characterised by airflow obstruction and dyspnoea which progressively limits activities of daily living with a resultant deterioration in quality of life (Ambrosino & Goldstein, 2007; Norwood & Balkissoon, 2005). Depression and anxiety are significant comorbidities that, if left untreated, can lead to increased mortality risk, reduced engagement with management plans, impaired health-related quality of life, slower recovery from exacerbations, and increased health care utilisation and costs (Fritzsche, Clamor, & von Leupoldt, 2011; Lamers et al., 2010; Maurer et al., 2008; Panagioti, Scott, Blakemore, & Coventry, 2014).

While failures of health professionals and systems to address mood disorders in COPD patients lead to poorer outcomes for patients, physical mobility restrictions and issues with transport have also been reported as factors preventing people from participating in intervention trials and psychotherapy that could alleviate their symptoms (Elzen, Slaets, Snijders, & Steverink, 2008; Hynninen, Bjerke, Pallesen, Bakke, & Nordhus, 2010; D. C. Mohr et al., 2006). It has been reported that approximately 75% of depressed primary care patients report barriers that make it difficult for them to attend regular psychotherapy sessions (D.C. Mohr et al., 2012). Practical barriers included lack of accessible services, time constraints, transportation services and cost (D. C. Mohr et al., 2006; D.C. Mohr et al., 2012). Telephone-administered cognitive behaviour therapy (CBT) would allow people to receive counselling therapy in their own home. It also has lower attrition rates compared to face-to-face CBT (D.C. Mohr et al., 2012) and has been found to be as effective in reducing depression and anxiety as face-to-face CBT in populations without COPD (Hammond et al., 2012; D.C. Mohr et al., 2012).

There have been a number of reviews of the effectiveness of CBT for alleviating anxiety and depression associated with COPD all calling for further studies (Coventry & Gellatly, 2008; Smith, Sonogo, Ketcheson & Larson, 2014). Smith et al (2014) reported a small decrease in anxiety and depression symptoms associated with CBT delivered face to face either

individually or in groups. Heslop, Newton, Baker, Burns, Carrick-Sen & De Soyza (2013) reported a protocol for a study, again providing face to face interventions and Panagioti, Scott, Blakemore & Coventry (2014) reviewed the evidence for management of depression and anxiety in people with COPD while calling for more research on novel approaches. Given that there is evidence for treatment efficacy in the case of CBT, the present study used befriending as a comparison that also provided an active social control (Barton, 2015). Befriending, a non-directive emotional social support provided by volunteers, has been found to effect a small but significant reduction in depression symptoms in carers, those with a chronic illness, and the socially isolated (Mead, Lester, Chew-Graham, Gask, & Bower, 2010). Telephone befriending helps recipients gain confidence, re-engage with the community and become socially active again (Cattan, Kime, & Bagnall, 2011). It could be that these benefits act to alleviate depression symptoms yet no trial has been conducted to investigate whether befriending would be appropriate or effective for those with COPD.

The aim of this trial was to evaluate the efficacy of both telephone-administered CBT and befriending, on outcomes for clients with diagnosed COPD who had at least mild levels of depression and/or anxiety. Befriending provided an active social control comparison to control for factors of time and therapeutic alliance but recent evidence has suggested that befriending could be considered an active intervention, albeit without the theoretical or conceptual basis available for CBT (Balaam, 2015). Any attention control in a psychotherapy comparison may be active to some extent. A recent study found that psychoeducation which is commonly used as a control condition also improved depression and anxiety (Donker, Griffiths, Cuijpers & Christensen, 2009). An interesting question then becomes, does CBT with its extra training and resources required, provide additional positive outcomes? The objectives of this study were to: (1) investigate changes to levels of depression and anxiety in participants before and after the telephone interventions and at follow-up; (2) investigate changes to secondary outcome measures such as self-efficacy and COPD symptom severity; and (3) evaluate participants' level of satisfaction with the intervention they received. Use of a comparison trial design had been recommended by CBT researchers to evaluate whether CBT was suitable for all populations when compared to potentially lower cost alternatives such as befriending (Andrews, 2001; Butler, Chapman, Forman, & Beck, 2006). It was hypothesised that CBT would be superior to befriending in changing depression and anxiety levels, lead to greater self-efficacy and more satisfaction with the intervention.

Methods

The study was a pragmatic randomized controlled trial. It included a telephone screen using the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS) and the PHQ-9 for identifying eligible participants, followed by a baseline assessment for assessing enrolled participants' health and well-being. At baseline participants completed the PHQ-9, Beck Anxiety Inventory, COPD Assessment Test and General Self-Efficacy Scale as well as questionnaires measuring demographic and other health-related information such as FEV1 measures. More details about the study methodology are provided elsewhere (xxxx).

Following the baseline assessment, participants were randomly allocated to the intervention (CBT) plus treatment as usual or the active social control (befriending) plus treatment as usual group at 1:1 ratio. Both groups received an initial session with the therapist or befriender to build rapport, followed by eight weekly telephone calls of either CBT or befriending. The initial session was either conducted face-to-face or over the telephone, depending on the location of the participant and their distance from the therapist or befriender. A follow-up assessment was then undertaken and a second follow-up eight weeks later (see Figure 1).

Researchers undertaking the baseline and follow-up assessments, and the data analysis were blind to group allocation. Due to the nature of the intervention and control conditions, the therapists and volunteers delivering the interventions and the participants were not able to be blind to the conditions.

Participants were recruited between January 2012 and December 2014 from outpatient clinics of respiratory departments of four tertiary hospitals in xxxx and Pulmonary Rehabilitation Programs across the xxxx metropolitan area. In addition, the study was advertised in the xxxx newsletters and on their website. Eligible participants were people with COPD who: 1) were 45 years or older; 2) lived in the community; 3) had a telephone number and could hear over the phone; 4) understood and spoke English; 5) if on psychotropic medication, had been on a stable dose for at least 3 months; and 6) scored 8 or more on the Hospital Anxiety and Depression Scale (HADS) or 10 or more on the Patient Health Questionnaire-9 (PHQ-9). Diagnosis of COPD was confirmed by the participants' respiratory physician wherever possible. However if this was not possible (due to self-referral from responding to advertisements in the Australian Lung Foundation newsletters or website), likely diagnosis was assumed from the combination of self-report, the COPD Assessment Test (CAT) result and lung function test results (FEV1 levels).

The randomization schedule was created by the trial statistician (who was not directly involved in the study) using computer-generated randomized permuted blocks with varied block sizes (n= 4, 6 or 8). A computer-generated random sequence only available to the trial statistician was used to produce randomized allocation slips.

Telephone-administered CBT and befriending procedures

Details about the development of the therapist and befriending manuals and the procedures of the therapists and befrienders conducting those sessions are reported in the study's protocol paper (xxxx).

The telephone-administered CBT intervention consisted of an initial introductory session followed by sessions that included behavioural strategies such as behavioural activation, activity scheduling, relaxation training, exposure hierarchies and social skills training, as well as cognitive strategies such as cognitive restructuring, structured problem solving and behavioural experiments. The therapists conducting these sessions with each participant were registered or provisionally registered psychologists experienced in the delivery of telephone CBT. A manual had been developed to introduce the sessions and provide guidance for the conduct of the sessions (available from the authors) and an introductory training session and ongoing supervision was provided for quality monitoring (see xxxx for further details).

In comparison, the eight befriending sessions plus an initial session focused on neutral, everyday topics and events; however, they did not involve discussion of symptoms or difficulties in client's lives, problem-solving strategies, or exploration of emotions. The befrienders undertaking these sessions with each participant were volunteers who had been provided with training, a manual (available from the authors) and ongoing supervision for quality monitoring.

Outcome measures

There were two primary outcome measures in this study: first, the Patient Health Questionnaire 9 (PHQ-9) was used to assess the level of depression (Kroenke, Spitzer & Willians, 2001); second, the Beck Anxiety Inventory (BAI) was used to assess clinical anxiety (Kabacoff, Segal, Hersen & Van Hasselt, 1997). Clinically significant depression was defined as a PHQ-9 score of 10 or higher with higher scores reflecting more severe depression. Clinically significant anxiety was defined as a BAI score of 8 or higher with higher scores reflecting more severe anxiety.

The secondary outcomes measures were the COPD Assessment Test (CAT; Jones, 2009) and the General Self-Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995). The CAT was used to measure the health impact of COPD on participants. Higher scores reflected a greater impact of the disease with changes of two points or more reflecting a clinically significant change. The GSES was used to identify any impact of the intervention on an individual's belief in one's own competence to cope with challenging and stressful situations. Higher scores reflected greater perceived self-efficacy.

In addition, participant satisfaction and acceptability of the telephone-administered intervention were used to measure participant response. The Client Satisfaction Questionnaire (CSQ-8; Larsen, Attkisson, Hargreaves & Nguyen, 1979) was used to assess participant satisfaction, with higher scores indicating greater participant satisfaction with the intervention. The Working Alliance Inventory (WAI)-S was used to measure the strength of the therapeutic alliance, with higher scores representing a more positive rating of the working alliance (Horwath & Greenberg, 1989).

Finally, demography, smoking status, health rating and COPD specific variables (date of diagnosis, COPD severity, use of oxygen, participation in pulmonary rehabilitation program), and exercise participation were assessed from participant self-report. We did not ask participants specifically whether they preferred telephone or face to face delivery although we did ask if they were satisfied with the intervention.

Details about the choice of the measures above as well as their reliability and/or validity are provided elsewhere (xxxx).

Sample size calculation

Based upon published effect sizes of the impact of CBT on depression for those with COPD (& Gellatly, 2008), it was expected that there would be standardized mean effect size difference between CBT and usual care of 0.5 to 0.6 (calculated using the METAN procedure from Stata 11 using published effect sizes for depression and anxiety). The sample size was estimated based on the smallest expected effect size of 0.5 and largest dropout rate of 10%, using Cohen's power table for effect size. (Cohen 1988, pg. 55).

Based on 80% power, two-sided alpha of 0.05 and an estimated withdrawal rate of 5-10%, it was estimated that 70 patients per group would need to be recruited to ensure sufficient power.

Data analysis

Statistical analyses

The data analysis was performed based on an intention-to-treat (ITT) design with the last observation carried forward (LOCF) for all missing responses. The differences between subjects completing the study and those dropping out were assessed prior to any imputations and the main data analysis to determine whether the drop out was at random. The LOCF is a conservative approach as it assumes that there was no impact of intervention. Prior to imputation we did assess whether the data were missing at random to illuminate any systematic bias. In addition we performed sensitivity analysis (results not shown) and estimated effect sizes were similar to those estimated based on LOCF imputation.

All continuous variables were assessed for normality prior to data analysis. Repeated measures ANOVA was used to assess changes in scores. The effect sizes were assessed using Cohen's *d* with 95% confidence intervals and were calculated using 'esize' command in Stata 13 (StataCorp, 2013) followed by bootstrapping with 500 replications. Student t-tests were used to detect any differences in CSQ-8 and WAI-S scales between the groups at the post-treatment assessment (T2). $P < 0.05$ was considered statistically significant.

Integrity analyses

For quality monitoring, a random selection of phone conversations was monitored by each clinical supervisor. The quality monitoring for the befriending conversations checked randomly whether symptoms, difficulties or problem solving was appearing in the conversation for each befriender. A random sample of telephone calls was reviewed by an independent reviewer who was trained and experienced in reviewing CBT treatment for fidelity. Fidelity was rated using the Cognitive Therapy Rating Scale (Young & Beck, 1980b), which has been widely used to assess therapist competency and treatment adherence in the administration of CBT (Vallis, 1986). A high score indicated greater therapist competency and adherence to CBT principles. The scale contains 11 items, including six general therapeutic skills (agenda, feedback, understanding, interpersonal effectiveness, collaboration, and pacing and efficient use of time) and five key CBT strategies and techniques (guided discovery, focusing on key conditions or behaviours, strategy for change, application of cognitive-behavioural techniques, and homework). Each item is rated on a Likert scale, ranging from 0 to 6 (Young & Beck, 1980a). A computer generated random number sequence was used to select telephone calls for review with a final review conducted

to ensure at least one call for each therapist or befriender was included in the integrity review. The initial introductory call or home visit and the final calls in both the groups were excluded from the review, as these would not be generally representative of whether either protocol had been applied.

Ethics approvals for the trial were obtained from xxxx, xxxx, xxxx, xxxx, xxxx, and xxxx. The trial was registered with the xxxx trial register (xxxx).

Results

The study attracted 340 referrals, of which 120 (35%) were eligible to participate with ten participants withdrawing prior to randomisation. One hundred and ten participants were randomized to either the CBT intervention ($n = 54$) or to the active social control (befriending) group ($n = 56$). Ninety-five participants (86%) completed the trial and 92 (84%) provided data at the second follow-up. Fifteen participants did not complete the trial with the major reasons for withdrawal being ill-health or deceased (6 participants) and the intervention not appropriate to their needs (6 participants). Two participants expressed suicidal thoughts during the trial and were referred to their health practitioners while proceeding with the trial. Participant flow throughout the trial is described in Figure 1.

Participants characteristics

As shown in Table 1, participants were predominately female with an average age of 68 years. Approximately 20% were smokers and the majority had a government pension or entitlement as their main source of income. Most had attended pulmonary rehabilitation, 22% had used oxygen and over half classified their health as poor to very poor. With the exception of personal help, there were no significant differences between the two study arms in any of the socio-demographic or clinical variables. Nor were any significant differences identified between those participants who completed the study and those who were lost to follow-up. Regarding the level of anxiety and depression, 60% of the participants had moderate to severe depression, 69% had moderate to severe anxiety, and 47% had moderate to severe anxiety and depression. Mean raw FEV1 levels for those participants willing to undertake spirometry were 1.11 (min 0.43, max 2.25, $n = 64$) at baseline.

Primary, secondary and satisfaction outcomes

The groups were well matched as the baseline (see table 1) and no other confounders were identified during univariate analysis. Mean values and standard deviations for all outcome

measures at baseline (T1), post-treatment (T2) and follow-up (T3) are presented in Table 2 along with within and between group effect sizes reported as Cohen's *d*. The within group effect sizes are changes between T1 and T3, and the between group effect sizes are changes between the two groups at T3.

On the study's primary outcomes measures significant improvement was noted in depression symptoms (PHQ-9) from T1 to T2 for both groups but only the CBT group had a significant difference at followup T3, with the difference in depression in the CBT group equating to a small to medium effect size (Cohen's *d* = 0.4). Significant improvement was observed in anxiety symptoms (BAI) for the befriending group from T1 to T2 and to T3 but not in the CBT group, with the difference in anxiety in the befriending group equating to a small to medium effect (Cohen's *d* = 0.3) (Cohen, 1988). There was no significant difference in the changes in BAI and PHQ-9 between the two groups. No significant interaction effects were found for any of the primary outcomes measures and the demographic variables.

In the secondary outcome measures, there was no significant change in COPD symptoms at followup (T3). There was a significant change in COPD symptoms (CAT) from T1 to T2 for the befriending group but not for the CBT group; however, at T3 this change was no longer significant in the befriending group. There was a significant change in general self-efficacy (GSES) for both groups at followup (between T1 and T3) and post intervention (between T1 and T2). The overall effect was a small to medium change for both the CBT and befriending groups (Cohen's *d* = 0.3).

On the study's satisfaction measures both groups were mostly satisfied with the treatment received (CSQ-8) but participants in the CBT group were significantly more satisfied ($M = 27.2$, $SD = 5.5$) than those in the befriending group ($M = 24.4$, $SD = 5.8$) ($p = 0.020$). The strength of the therapeutic alliance (WAI-S) was also significantly different across the two groups. Participants in the CBT group reported a stronger working alliance with their telephone support person ($M = 67.5$, $SD = 8.9$) compared to those in the befriending group ($M = 49.4$, $SD = 18.6$, $p < 0.001$). There was a large effect reported between the two groups in the three subscales in the WAI-S with a significant difference in the therapeutic bond (Cohen's *d* = 0.7) and agreement on the tasks of therapy (Cohen's *d* = 0.7) and a very large difference on the goals of therapy (Cohen's *d* = 1.4), with participants in the CBT group rating the therapeutic bond, and agreement on tasks and goals of therapy with the therapist much higher than those in the befriending group.

Integrity outcomes

Fifty random telephone calls were selected for independent review with 25 calls for each group (CBT and befriending). However, four calls for the befriending group were excluded for review because the reviewer could not hear the participants from the recordings. T-tests showed a significant difference in the mean score on the Cognitive Therapy Rating Scale between the cognitive behaviour therapists and befrienders ($n=25$, $mean=42.5$, $SD=6.5$ vs. $n=21$, $mean=13.5$, $SD=2.8$; $P=.000$).

Discussion

In answer to the primary research question of whether depression and anxiety can be relieved by telephone delivered CBT or befriending, the results of this study demonstrated that telephone delivery of both cognitive behaviour therapy and an active social control, befriending, could reduce anxiety and depression symptoms in people with COPD. However each intervention acted on anxiety and depression differently: while the befriending reduced depression symptoms in the short-term and anxiety symptoms in both the short and long term, the CBT intervention reduced depression symptoms but not anxiety. CBT participants were more satisfied with the intervention received than the befriending participants.

In our study befriending produced surprisingly significant reductions in anxiety symptoms. In their meta-analytical review of befriending interventions in various populations Mead and colleagues (2010) identified a small short-term effect on depression symptoms, which is also consistent with the finding of this study. However previous studies with carers and those recently bereaved did not find befriending or social support reduced anxiety symptoms as this study found (Charlesworth et al., 2008; Onrust, Smit, Willemse, van den Bout, & Cuijpers, 2008). It may be that for those with COPD social support works differently than in other populations. For example, DiNicola and colleagues (2013) found that in those with COPD receiving instrumental support reduced anxiety while unsympathetic and insensitive support, and perceived failure to provide help increased anxiety. It may be that those in the befriending group perceived the regular calls as practical and helpful and this in turn may have reduced anxiety. Topics discussed were generally tailored to the interests of the participant and included innocuous topics such as gardening, television programs or hobbies. A recent case report described the impact of befriending on an individual with severe depression and anxiety (xxxx). Further research is required to identify exactly whether

perceptions such as these do actually contribute to the reduction in anxiety or whether another mechanism is responsible.

This is the first study to directly evaluate the impacts of a standalone CBT intervention delivered over the telephone. While results for the CBT intervention in this study were lower than in a recent group intervention (Cohen's d range 0.9 to 1.4) (Hynninen et al., 2010), they were similar to another group CBT based program which also found a small but significant reduction in depression but not anxiety symptoms ($r = 0.2$) (Howard, Dupont, Haselden, Lynch, & Wills, 2010). Our results are similar to a recent meta-analysis of the impact of CBT programs on depression and anxiety (Panagioti, Scott, Blakemore & Coventry, 2014) although sub-analyses of the impact of CBT in that review included multi-component as well as CBT interventions. Our results were also similar to an earlier CBT group program that also found small but significant reductions in both anxiety and depression but interestingly found CBT was not more effective than the control groups which provided COPD education, similar to pulmonary rehabilitation (Kunik et al., 2008). There were a number of differences between this study and the Hynninen study, which may account for the lower than expected result in the current study. The study populations did differ. In the Hynninen study participants were on average eight years younger and research has found CBT may have reduced effectiveness in older adults (Gould, Coulson, & Howard, 2012); however no impact of age was identified in this study. Furthermore in the Hynninen study participants were excluded if they were accessing any form of comprehensive psychosocial intervention including pulmonary rehabilitation which was not the case in the current study. In fact over 70% of this study's participants had attended or were currently attending pulmonary rehabilitation programs and 19% were currently receiving other psychological or psychiatric services. So it may be that this study was constrained in isolating an independent effect for CBT by **not controlling** for these potentially confounding variables. Dosage and the treatment modality likewise may have impacted the results. This study reported an average of five hours of clinician time per participant compared to eight and fourteen hours offered in the group programs (Howard et al., 2010; Hynninen et al., 2010). Additionally while the telephone mode may overcome the limitations of accessing treatment for those who find travel difficult the group modality itself may be beneficial. Studies with other stigmatised mental conditions have suggested group treatment can provide a unique effect on a participant's mental health. For example attending the group could alleviate social isolation and reduce shame, which in turn may reduce depression (Schmalisch, Bratiotis, & Muroff,

2010). Future studies could consider directly comparing telephone to a group CBT program to identify whether the processes and dynamics available in a group program are also beneficial for those with COPD. Overall this study suggests that CBT can have an independent effect on depression and possibly anxiety symptoms in those with COPD; however, more studies are required to continue to confirm and refine these preliminary findings.

Self-efficacy is considered essential for self-management of COPD. Without behaviour modification, such as abstaining from smoking and increasing exercise to improve lung capacity, COPD will limit both life expectancy and quality of life (Bourbeau, Nault, & Dang-Tan, 2004). In this study both the CBT and the befriending improved self-efficacy however the change was small. It may be that a longer follow-up period is required to observe improvement in COPD symptoms and also quality of life, but the current instruments used to assess COPD symptoms and quality of life may not be sufficiently sensitive to detect behavioural changes (Monninkhof et al., 2004). Overall participants indicated they were satisfied with the intervention they received, with those who received the CBT intervention being more satisfied. The high satisfaction in the CBT treatment was consistent with the results achieved in the Hynninen et al. (2010) study which used the same measure.

Limitations

Recruitment of participants was below the anticipated number and the sample size aimed for was not able to be achieved within the time frame of the study. It was not clear why more participants did not take up the opportunity, especially given that the drop out rate for the study was low among those who did commence participating. A recent study by Marshall, Stenton, Carrick-Sen et al (2016) indicated that anxiety and depression were not a barrier to enrolment in a study of COPD. A revised power analysis was undertaken which indicated that the final sample size of 110 still had 74% power to detect the expected effect size.

Restricting follow-up to eight weeks after treatment ended reduced the ability of this study to detect long-term efficacy. Recent studies have shown the impact of CBT can continue well beyond eight weeks and follow-up over a longer time period is warranted if resources were available.

Conclusions

This study indicated that participants improved their depression symptoms as a result of the cognitive behaviour therapy, but improved their anxiety symptoms as a result of the

befriending. Unexpectedly there was no greater improvement in the CBT group than in the befriending group, indicating both to be effective in improving mood symptoms. Future research is needed to understand the impact of befriending as this mode of support has the potential to be very cost effective. However our participants showed higher satisfaction with the cognitive behaviour therapy intervention than with befriending, and self-efficacy improved more with cognitive behaviour therapy than with befriending, suggesting that overall CBT was the better intervention. Clients living in rural or remote areas were very interested in the service and participants with breathing difficulties did not find the telephone calls problematic, so the mode of delivery appears to be viable for these clients. Further research on the non-inferiority of telephone versus face to face delivery of CBT for people with COPD may be of benefit. In future this type of support may be especially effective for those clients where there are few alternatives to face-to-face support or where transport is difficult.

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Table 1. Participant baseline characteristics

Characteristic	CBT N = 54	Befriending N = 56	P value
Age (mean (SD))	68.5 (9.4)	67.0 (9.1)	.38
Gender (female)	64.8%	66.1%	.890
Living status (with others)	63%	52%	.236
Marital status (partnered)	52%	38%	.130
Education level (high school only)	59%	67%	.755
Source of income (pension/government)	76%	80%	.291
Smoking status (current smoker)	20%	23%	.423
Health rating			.788
Good to excellent	15%	14%	
Fair	30%	36%	
Poor to very poor	55%	50%	
COPD severity			.981
Mild	20%	20%	
Moderate	48%	50%	
Severe	32%	30%	
Use oxygen	22%	30%	.305
Household help	74%	71%	.755
Personal help	26%	9%	.023
Get together with friends/family regularly	73%	73%	.957
Exercise regularly	56%	54%	.835
Exercise frequency – 4 days a week or more	39%	29%	.074
Attended PR clinic – currently or in the past	65%	80%	.067
Acute hospital visit in previous 8 weeks	20%	21%	.891
Use psychiatric services	22%	16%	.385
COPD Assessment Test (CAT)	24.0 (6.4)	24.5 (6.0)	.661
Beck Anxiety Inventory (BAI)	20.0 (11.2)	20.9 (10.4)	.654
Patient Health Questionnaire 9 (PHQ-9)	12.6 (6.0)	11.2 (6.8)	.243
General self-efficacy scale (GSES)	28.5 (4.6)	27.0 (5.9)	.168

Note. CBT = Cognitive Behaviour Therapy

Table 2. Outcome data at all assessment points

Measure	Time	CBT N = 54	Befriending N = 56	Between groups
		Mean (SD)	Mean (SD)	Effect size (95% CI)
BAI	T1	20.0 (11.2)	20.9 (10.4)	0.1 (-0.4, 0.3)
	T2	18.4 (11.8)	17.2 (10.0) [#]	
	T3	18.7 (11.9)	18.1 (11.7)**	
PHQ-9	T1	12.6 (6.0)	11.2 (6.8)	-0.03 (-0.4, 0.4)
	T2	9.6 (6.0) [#]	9.5 (7.6)*	
	T3	10.2 (6.5) [#]	10.0 (7.8)	
CAT	T1	24.0 (6.3)	24.5 (6.0)	0.1 (-0.4, 0.3)
	T2	23.1 (6.3)	22.8 (7.3)*	
	T3	23.7 (6.4)	23.4 (6.4)	
GSES	T1	28.5 (4.6)	27.0 (5.9)	-0.2 (-0.6, 0.3)
	T2	30.6 (4.7) [#]	28.4 (6.7)**	
	T3	29.6 (5.5)*	28.7 (5.0)*	
CSQ-8	T2	27.2 (5.5)	24.4 (5.8)	
WAI-S – Total	T2	67.5 (8.9)	49.4 (18.6)	
- Bond		26.0 (2.7)	23.3 (4.8)	-0.7 (-1.1, -0.3)
- Task		16.8 (3.6)	13.5 (5.1)	-0.7 (-1.2, -0.3)
- Goal		25.1 (4.3)	14.4 (9.6)	-1.4 (-1.9, -0.8)

Note. CBT = Cognitive Behaviour Therapy; BAI = Beck Anxiety Inventory; PHQ-9 = Patient Health Questionnaire 9; CAT = COPD Assessment Test; GSES = General Self-efficacy Scale; CSQ=Client Satisfaction Questionnaire; WAI-S= Worker Alliance Inventory; T1: Pre-treatment assessment; T2: Post-treatment assessment; T3: 8-week follow-up.

*Significant change from the baseline, $p < 0.05$; **Significant change from the baseline $p \leq 0.01$;

[#]Significant change from the baseline $p < 0.001$

Figure 1: Flow chart of participants

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