

# Influence of apparently negative personality characteristics on the long-term outcome of health anxiety: Secondary analysis of a randomized controlled trial

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## ABSTRACT

**Background** – It is known that personality has an influence on the outcome of mental state disorders, but detailed studies on its long-term impact are few. We examined the influence of personality status on the 8-year outcome of health anxiety and its relationship to the effects of cognitive behaviour therapy in a randomized controlled trial.

**Aims** – This study aims to examine both the usefulness of the diagnosis of personality disorder and an additional measure of pathological dependence, in predicting the outcome of medical patients with health anxiety treated with cognitive behaviour therapy. Because the influence of personality is often shown in the long term, these assessments covered the period of 8 years after randomization. An additional aim is to examine the costs of different levels of personality dysfunction in each treatment group.

**Method** – Personality dysfunction, using both ICD-10 and ICD-11 classifications of severity, was assessed at baseline by interview in a randomized controlled trial. Patients were also assessed for pathological dependence using the Dependent Personality Questionnaire, also scored along a severity dimension. Four hundred forty-four patients from medical clinics with pathological health anxiety were treated with a modified form of cognitive behaviour therapy for health anxiety (CBT-HA) or standard care. Total costs over follow-up were calculated from hospital data and compared by personality group.

**Results** – At baseline, 381 (86%) had some personality dysfunction, mainly at the lower level of personality difficulty (not formally a disorder). One hundred eighty four (41%) had a personality disorder. A similar proportion was found with regard to dependent personality. Using the ICD-10 classification, 153 patients (34.6%) had a personality disorder, with 83 (54.2%) having anxious or dependent personality disorder, 20 (13.1%) having an anankastic disorder, but also with 66 (43.1%) having mixed disorder. During initial treatment, those with personality disorder adhered more closely to CBT-HA, and after 8 years, they had a significantly better outcome than those with personality difficulty and no personality disorder ( $p < 0.002$ ). Similar results were found in those scoring high on the Dependent Personality Questionnaire. All these differences increased over

the follow-up period. Costs were similar in all groups but were somewhat higher in the CBT-HA one; this finding is hypothesised to be due to fuller hospital treatment once health anxiety is discounted.

**Conclusion** – Personality disorder in people with health anxiety, particularly in those who have anxious and dependent traits, reinforces the benefits of cognitive behaviour therapy, particularly in the longer term.

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## Background

There has been considerable dispute about the impact of personality disorder on the outcome of other psychiatric disorders in research studies carried out over the past 30 years. This has been most aired with depression, with some studies suggesting that the presence of personality disorder has no effect on the outcome of depressive disorders<sup>1–3</sup> and others suggesting it has a negative effect.<sup>4–6</sup> The balance of evidence at present, in the largest meta-analysis to date, suggests that a negative effect is the most likely.<sup>6</sup> A similar negative effect has been noted with anxiety.<sup>7</sup> There are also conflicting data of the influence of personality disorder on specific treatments for mood disorders, ranging from no differences to better results with drug or psychological treatment depending on the population chosen.<sup>8–10</sup> There is one small study hinting that Cluster A personality disorder improves outcome in cognitive behaviour therapy for depression.<sup>11</sup>

So it can fairly be said that there is a degree of uncertainty about both the nature of the relationship between personality and affective disorders of all kinds. But the degree of interest in the subject is relevant to practice. Until recently, the clear evidence that a significant minority (if not a majority) of all patients presenting in psychiatric practice have a personality disorder<sup>12,13</sup> has been ignored when selecting treatment. The extra information provided by personality status should help both in selecting treatment and introducing appropriate management for personality dysfunction and for the prime disorder.

In planning a large therapeutic trial of adapted cognitive behaviour therapy for health anxiety (CBT-HA), we therefore felt it appropriate to include personality assessment and clinical ratings. Because little was known about the long-term

outcome of health anxiety, it was judged that protracted follow-up was desirable.

## Method

### Study design

The Cognitive behaviour therapy for Health Anxiety in Medical Patients (CHAMP) study was a pragmatic randomized controlled trial of cognitive behaviour therapy adapted for health anxiety (CBT-HA). Patients seen in medical clinics were randomized to CBT-HA or standard clinic care if they scored at or above a threshold for pathological health anxiety.<sup>14</sup> Full details of the methodology of the trial are given elsewhere.<sup>15,16</sup> In brief, the study recruited patients attending medical out-patient clinics and randomized them either to 5–10 sessions of CBT-HA (from initially naïve but trained therapists) or to standard care in primary and secondary care clinics.<sup>16</sup> The out-patients were attending cardiology, endocrine, gastroenterology, neurology and respiratory medicine clinics in six hospitals in London, Middlesex and North Nottinghamshire. The consenting patients completed the Short Health Anxiety Inventory (SHAI),<sup>14</sup> a self-rated scale of 14 questions with a score range of 0–42. Those that scored 20 or more on the scale (a point shown to discriminate between those who have persistent worries over health and those who show normal variation<sup>14,15</sup>) were invited to take part in the trial, and an information sheet about the study was given. In addition, the initial assessment involved asking key questions from the Structured Clinical Interview for DSM-IV<sup>17</sup> covering the formal diagnosis of hypochondriasis. Patients were included if aged between 16 and 75 years, living in the area covered by the hospital, with sufficient understanding of English to read and complete

study questionnaires and interviews, and who had given written consent for audio-taping of 50% of treatment sessions, and access to their medical records.<sup>15</sup> All those who satisfied the inclusion criteria and hypochondriasis diagnosis were then offered randomization to the trial, and if they agreed, full baseline assessments were completed, and written informed consent obtained.

The study was approved by the North Nottingham Ethics Committee (08/H0403/56) before the start of data collection.

#### *Assessments of symptomatology and personality*

The primary outcome measure was the change from baseline score for the SHAI<sup>14</sup> at 1 year after randomization. Secondary measures included generalized anxiety and depression using the Hospital Anxiety and Depression Scale (HADS-A and HADS-D),<sup>18</sup> health-related quality of life using the short Euroqol measure (EQ-5D)<sup>19</sup> and social function using the Social Functioning Questionnaire (SFQ).<sup>20</sup> All measures were recorded at baseline, 6 months, 12 months, 24 months, 5 years and 8 years (with the exception of the HAI which was also recorded at 3 months). Assessments were made completely independently by research assistants. Service use data for the economic evaluation were collected at baseline, 6 months, 12 months, 24 months, 5 years and 8 years follow-up using hospital records only in the latter period.

Personality assessment was carried out by two methods. The first involved the administration of the quick version of the Personality Assessment Schedule (PAS-Q),<sup>21</sup> which records both the severity and the type of personality disorder using a four-point scale. This contains a series of screening questions for each area of personality dysfunction and those that score positive lead to further questions. It takes about 30–45 min to administer. The PAS-Q was scored by a trained research assistant at the last part of the baseline interview, and the assessment forms include both numerical ratings and written comments amplifying each of the sections. During the course of the study, the Working Group for the Reclassification of Personality Disorder in ICD-11 completed its initial

work on a new system of classification based on severity criteria (April 2010).<sup>22</sup> Shortly afterwards, R. S., P. T. and G. L. reclassified the personality status of the patients in the study to convert them to ICD-11 severity equivalents by examining the PAS-Q data and written comments<sup>22</sup> and by interviewing assessors if the data were not clear. For 30 of the assessments, R. S. and P. T. completed independent assessments and achieved a good level of agreement ( $\kappa = 0.85$ ).

The second part of personality assessment was the administration of the Dependent Personality Questionnaire (DPQ).<sup>23</sup> This scale has eight questions, with a range of scores between 0 and 24, has already been shown to be temporally stable and has an accurate measure of personality disorder.<sup>24</sup> It was included as it is generally desirable to have self-report and observer assessments of personality to gain a comprehensive picture.<sup>25</sup> To produce equivalence with the ICD-11 severity classification, a similar severity scale was created with the DPQ scores [0–6, no dependent personality dysfunction, 7–11, dependent personality difficulty, 12–16, mild dependent personality disorder,  $\geq 17$ , moderate (rarely with severe personality disorder)].

#### *Randomization and masking*

Randomization to the two treatment groups was carried out by an independently operated computerized system (Open-CDMS), with a computer-generated random sequence using block randomization with varying block sizes of four and six. The allocation sequence was not available to any member of the research team until databases had been completed and locked.

#### *Statistical analysis*

The calculation of the sample size for the main study has been described previously<sup>15</sup>; it was powered to assess the superiority of CBT-HA over standard care. The current study was a secondary analysis of the outcomes for different levels of severity of personality disturbance, and so no formal sample size calculation was performed.

The primary endpoint (SHAI) was analysed using a mixed model with time, treatment group

and time  $\times$  treatment interaction as fixed effects, baseline measurement as covariate, and patient as random effect by personality severity group in order to test for the first hypothesis, that the CBT-HA would be less effective in participants with a personality disorder. The treatment differences between the four ICD-11 personality and dependent personality groups were calculated at each time point [3 m (SHAI only), 6 months, 1 year, 2 years, 5 years and 8 years]. Other secondary endpoints were analysed in the same way. All analyses were based on the intention-to-treat principle.

### *Economic analysis*

The economic evaluation is described in detail elsewhere.<sup>15</sup> Total costs were calculated by combining the hospital use from electronic records with nationally applicable unit costs.<sup>26–28</sup> Costs were calculated and analysed in UK pound sterling for the financial year 2008–2009 and were discounted in the second and subsequent years at a rate of 3.5% as recommended by the National Institute for Health and Clinical Excellence.<sup>29</sup> Complete case analysis was used for the economic evaluation.<sup>15</sup> The second hypothesis that participants with personality disorder would have increased costs was explored through the examination of differences in costs over the 8-year follow-up period between ICD-11 and dependent personality groups. Analysis was performed using ordinary least squares regression as is appropriate for cost data, with the robustness of the tests confirmed using bias-corrected, non-parametric bootstrapping.<sup>30,31</sup> Differences in all analyses were adjusted for baseline costs and randomized group.

## **Results**

At baseline, 219 patients were randomized to CBT-HA and 225 to standard care; 77% had an established physical diagnosis at baseline. Attrition rates and follow-up using the CONSORT procedure at 5 years have been reported earlier.<sup>32</sup> At 8 years, 308 patients provided data.

### *Personality status*

Using the ICD-10 classification derived from the PAS-Q, 153 patients (34.6%) had a personality disorder, with 83 (54.2%) having anxious or dependent personality disorder, 20 (13.1%) having an anankastic disorder, but a larger proportion, 66 (43.1%) having mixed disorder, mainly of disorders within the original emotionally unstable of ICD-11 in 2011<sup>22</sup> but now called the negative affectivity domain of the new ICD-11 classification.<sup>33</sup> On the severity scale, most people recruited had some personality dysfunction. Only 63 (14.2%) had no personality dysfunction using the ICD-11 classification, but in keeping with other findings,<sup>34</sup> 197 (44.3%) had personality difficulty (a sub-threshold condition not qualifying for disorder). Only three people assessed had severe personality disorder, and so they were included in the moderate group. The distribution of personality groups showed equivalent proportions for the ICD-11 and dependent categories, with greater baseline levels of anxiety and depression and more social dysfunction in the more personality disordered groups (Table 1). There was a gender difference with those with greater dependence being more likely to be female.

There were no differences in total costs at baseline.

### *Treatment differences by personality status*

The 8-year outcome data separated by personality status showed clear separation in both ICD-11 and dependent groups ( $n = 308$ ). Contrary to our initial hypotheses,<sup>15</sup> the results showed that patients with general personality dysfunction and dependent disorder had significantly better outcomes than those with personality difficulty and no personality dysfunction. This was shown universally in terms of the primary outcome, change in HAI score (Figures 1 and 2), generalized anxiety (HADS-A), depression (HADS-D) and social function (SFQ), with the most significant differences found in people with the most severe personality disorders and greater dependent personalities (Tables 2 and 3). For almost all these measures, the group that showed the least group differences was the one with no personality

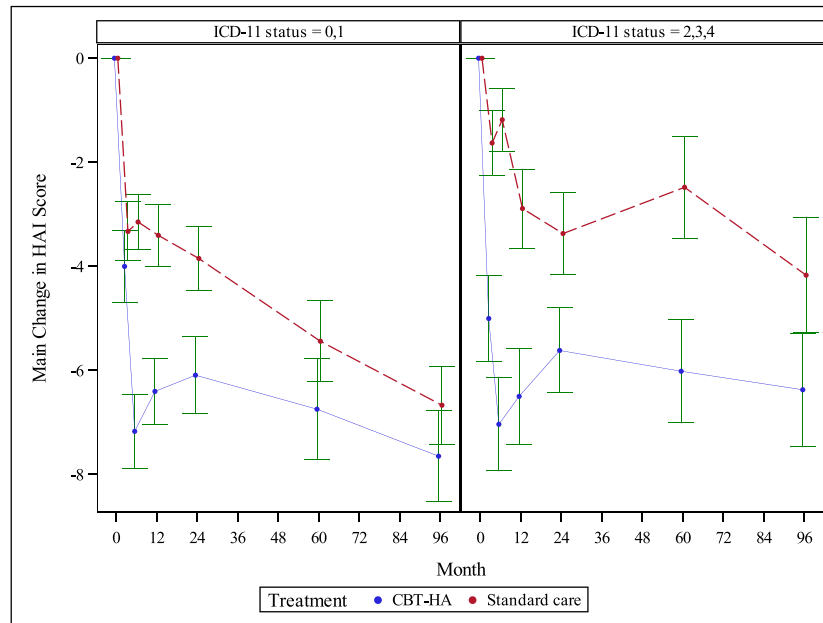
Table 1: Distribution of patients at baseline separated by personality levels and dependent personality groupings

		Classification by ICD-11 severity levels						
Variable	Statistics	No personality disorder (N = 63)	Difficulty (N = 197)	Mild personality disorder (N = 142)	Moderate personality disorder (N = 42)	p-value		
Age (year)	Mean (SD)	48.65 (14.78)	49.54 (13.56)	47.54 (13.65)	47.94 (11.33)	0.5922		
Gender	Female	29 (46.0%)	109 (55.3%)	76 (53.5%)	22 (52.4%)	0.6423		
	Male	34 (54.0%)	88 (44.7%)	66 (46.5%)	20 (47.6%)			
Treatment	CBT-HA	29 (46.0%)	100 (50.8%)	68 (47.9%)	22 (52.4%)	0.8708		
	Standard care	34 (54.0%)	97 (49.2%)	74 (52.1%)	20 (47.6%)			
HAI score	Mean (SD)	24.00 (3.25)	24.78 (4.50)	25.18 (4.30)	26.93 (4.93)	0.0064		
HADS-A score	Mean (SD)	10.14 (3.59)	12.10 (3.69)	13.35 (3.61)	14.02 (3.63)	<0.0001		
HADS-D score	Mean (SD)	6.65 (3.73)	8.21 (4.08)	10.05 (4.37)	12.36 (4.68)	<0.0001		
SFQ score	Mean (SD)	5.85 (3.40)	8.42 (3.98)	11.15 (4.40)	12.36 (3.88)	<0.0001		
Classification by dependent personality dysfunction levels								
Variable	Statistics	DPQ (0-6) (N = 76)	DPQ (7-11) (N = 186)	DPQ (12-16) (N = 141)	DPQ (≥17) (N = 41)	p-value		
Age (year)	Mean (SD)	50.64 (13.03)	49.88 (13.61)	46.48 (12.89)	46.56 (15.62)	0.0507		
	Female	29 (38.2%)	100 (53.8%)	85 (60.3%)	22 (53.7%)	0.0206		
Gender	Male	47 (61.8%)	86 (46.2%)	56 (39.7%)	19 (46.3%)			
	CBT-HA	47 (61.8%)	86 (46.2%)	65 (46.1%)	21 (51.2%)	0.1059		
Treatment	Standard care	29 (38.2%)	100 (53.8%)	76 (53.9%)	20 (48.8%)			
	Mean (SD)	24.31 (4.18)	24.85 (4.38)	25.29 (4.50)	25.95 (4.14)	0.1957		
SHAI score	Mean (SD)	10.46 (3.53)	11.97 (3.81)	13.45 (3.62)	14.41 (2.86)	<.0001		
HADS-A score	Mean (SD)	7.70 (4.55)	8.46 (4.44)	9.42 (3.71)	12.12 (5.22)	<.0001		
HADS-D score	Mean (SD)	8.28 (4.41)	8.70 (4.35)	9.65 (4.09)	12.88 (4.91)	<.0001		

HADS-A = Anxiety section of Hospital Anxiety and Depression Scale; HADS-D = Depression section of Hospital Anxiety and Depression Scale; SFQ = Social Functioning Questionnaire; SHAI = Short Health Anxiety Inventory.

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**Figure 1:** Mean change in short health anxiety inventory (HAI) score in patients with no personality disorder (ICD-11 levels 0 and 1) and personality disorder (levels 2–4) over 8 years [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

dysfunction and that showing the largest differences was the most personality disordered group. The findings showed that over 8 years, all groups improved with the exception of that with more severe personality disorders in standard care (Figure 2, Tables 2 and 3), and it was this failure to improve that created the larger differences at 8 years (Table 3).

Total hospital costs over 8-year follow-up by randomized group and personality score are detailed in Table 4. Costs were generally higher in the CBT group but broadly similar across personality groups, but the largest differences were shown in the more severe personality disordered patients, with CBT-HA showing greater costs. Regression analysis suggested that the differences in cost between personality groups were not significant.

#### *Number of treatment sessions*

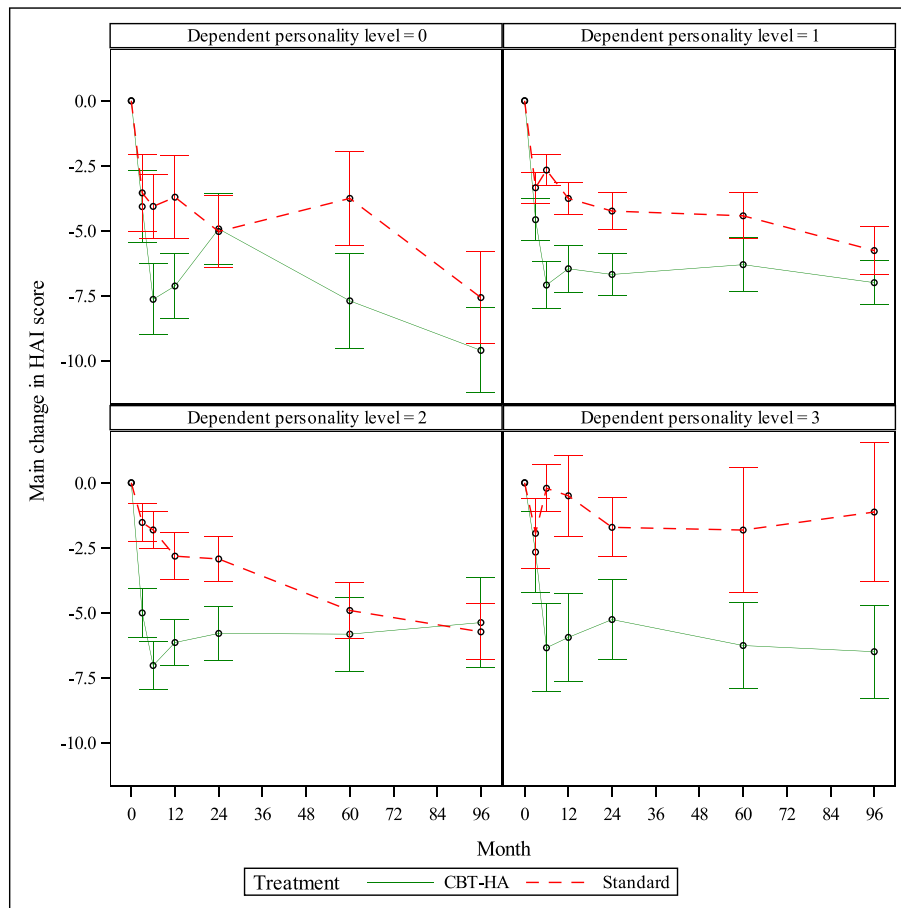
In both ICD-11 and dependent personality groups, the patients with the most severe personality disturbance received more sessions of treatment than others (Table 5). As the trial allowed flexibility in the number of sessions, with the

expectation that six would normally be the maximum, this variation was unexpected.

## Discussion

The challenging finding of this study was that both the hypotheses concerning personality status were contradicted. People with no personality dysfunction did not benefit from health anxiety adapted cognitive behaviour therapy (CBT-HA) in the early stages of the study and at no point were their symptoms and functioning superior to standard care. By contrast, all those with some personality dysfunction showed selective benefit from CBT-HA at some point during the follow-up period, with the maximum being shown at 8 years in the most disordered group.

The statistics here are robust, with good concordance between self-rated and observer assessments, and it is difficult to find an alternative explanation that could explain the results. All data were collected by research workers who had no knowledge of baseline personality status, and bias in assessment can be discounted.



**Figure 2:** Mean changes in HAI score in patients separated by scores on the dependent personality questionnaire (DPQ) over 8 years. Level 0 = 0–6, Level 1 = 7–11, Level 2 = 12–16, Level 3 =  $\geq 17$  [Colour figure can be viewed at [wileyonlinelibrary.com](#)]

The screening threshold for health anxiety was a score of 20 points on the Short Health Anxiety Inventory (HAI), and it could be argued that this was too low. This score equates to around 62 on the long version of the HAI, and a score of 67 on the long HAI has been found to be a good cut-off point for discriminating between normal and pathological anxiety.<sup>35</sup> But it is also fair to add that the SHAI was a screening instrument only and that many patients with high scores did not enter the trial, including a proportion who did not have DSM-IV hypochondriacal disorder.<sup>16</sup>

If we assume that the results reflect some advantage of personality dysfunction when receiving CBT-HA, it is worth examining how this could have come about. Certainly, the old standard requirement in for many former mental health trials—patients with personality disorder will be

excluded—would not have been appropriate here. It is also important to note that the more severely personality disordered patients treated with CBT-HA did not achieve a higher level of overall improvement than other groups; the difference in outcome was a consequence of poor outcome in this group in standard care.

The greater number of sessions in the personality disordered patients is relevant here. The flexibility allowed in the trial allowed extra sessions to be given, and it is likely that this extra input, combined with lower levels of drop-out, had an impact on outcome. It is also possible that CBT-HA was treating personality disturbance and health anxiety, as Hedman *et al.*<sup>36</sup> have claimed. It has long been known that personality disturbance is common in hypochondriasis, and a case has been made for the identification of a

Table 2: Summary results from mixed model analysis of changes from baseline in the CBT-HA group compared to standard care in participants separated by ICD-11 personality status

Outcome	Comparison	Dependent personality dysfunction			Moderate/severe personality disorder (N = 42)
		No personality dysfunction (N = 63)	Personality difficulty (N = 197)	Mild personality disorder (N = 142)	
SHAI score	CBT-HA vs. SC at 3 months	-0.85 (-4.93, 3.24)	-1.04 (-3.07, 0.99)	-3.21 (-5.64, -0.78)**	-1.41 (-5.72, 2.90)
	CBT-HA vs. SC at 6 months	-3.86 (-7.93, 0.22)	-4.33 (-6.41, -2.25)***	-5.19 (-7.65, -2.72)***	-6.49 (-10.79, -2.19)**
	CBT-HA vs. SC at 12 months	-2.82 (-7.04, 1.39)	-2.36 (-4.44, -0.28)*	-3.33 (-5.81, -0.85)**	-4.85 (-9.35, -0.35)*
	CBT-HA vs. SC at 24 months	0.45 (-3.84, 4.74)	-2.06 (-4.18, 0.07)	-3.22 (-5.70, -0.73)*	-1.76 (-6.29, 2.78)
	CBT-HA vs. SC at 5 years	-4.52 (-9.07, 0.02)	-1.33 (-3.55, 0.89)	-1.62 (-4.35, 1.12)	-4.05 (-8.77, 0.67)
	CBT-HA vs. SC at 8 years	-2.27 (-7.03, 2.49)	-0.76 (-3.05, 1.53)	-0.97 (-3.91, 1.97)	-5.09 (-10.20, 0.02)
	CBT-HA vs. SC at all times	-2.31 (-5.48, 0.85)	-1.98 (-3.56, -0.40)*	-2.92 (-4.86, -0.98)**	-3.94 (-7.53, -0.36)*
	CBT-HA vs. SC at 6 months	-1.69 (-3.86, 0.48)	-1.23 (-2.56, 0.11)	-1.05 (-2.49, 0.38)	-2.40 (-5.12, 0.33)
HADS-A score	CBT-HA vs. SC at 12 months	-0.79 (-3.08, 1.50)	-0.56 (-1.89, 0.78)	-1.16 (-2.61, 0.30)	-2.93 (-5.86, -0.01)*
	CBT-HA vs. SC at 24 months	-0.78 (-3.10, 1.54)	-0.86 (-2.23, 0.52)	-1.07 (-2.53, 0.38)	-1.91 (-4.86, 1.05)
	CBT-HA vs. SC at 5 years	-0.71 (-3.20, 1.78)	-0.70 (-2.14, 0.74)	-0.89 (-2.52, 0.74)	-1.53 (-4.66, 1.59)
	CBT-HA vs. SC at 8 years	0.42 (-2.22, 3.06)	-0.65 (-2.15, 0.84)	-0.10 (-1.86, 1.67)	-2.07 (-5.54, 1.39)
	CBT-HA vs. SC at all times	-0.71 (-2.29, 0.87)	-0.80 (-1.76, 0.16)	-0.85 (-1.96, 0.26)	-2.17 (-4.27, -0.07)*
	CBT-HA vs. SC at 6 months	-0.44 (-2.72, 1.84)	-0.42 (-1.75, 0.91)	-1.35 (-2.81, 0.12)	-1.45 (-4.07, 1.17)
	CBT-HA vs. SC at 12 months	-0.08 (-2.49, 2.33)	-0.38 (-1.71, 0.94)	-1.24 (-2.73, 0.24)	-2.18 (-5.02, 0.66)
	CBT-HA vs. SC at 24 months	2.16 (-0.28, 4.59)**	-0.66 (-2.04, 0.71)	-1.80 (-3.29, -0.31)*	-1.51 (-4.38, 1.36)
HADS-D score	CBT-HA vs. SC at 5 years	-3.92 (-6.54, -1.31)**	-0.83 (-2.27, 0.61)	-0.81 (-2.49, 0.86)	-1.49 (-4.56, 1.59)
	CBT-HA vs. SC at 8 years	-2.42 (-5.19, 0.34)	-1.42 (-2.91, 0.08)	-0.87 (-2.70, 0.95)	-1.63 (-5.13, 1.86)
	CBT-HA vs. SC at all times	-0.94 (-2.64, 0.75)	-0.74 (-1.67, 0.19)	-1.21 (-2.32, -0.11)*	-1.65 (-3.33, 0.02)
	CBT-HA vs. SC at 6 months	-0.12 (-1.60, 1.36)	0.25 (-0.67, 1.18)	-0.08 (-1.07, 0.90)	-0.85 (-2.54, 0.85)
	CBT-HA vs. SC at 12 months	-0.27 (-1.84, 1.30)	0.29 (-0.64, 1.21)	0.16 (-0.84, 1.16)	-0.99 (-2.83, 0.84)
	CBT-HA vs. SC at 24 months	-0.44 (-2.02, 1.15)	-0.05 (-1.00, 0.91)	0.05 (-0.95, 1.06)	-0.77 (-2.62, 1.09)
	CBT-HA vs. SC at 5 years	0.47 (-1.26, 2.21)	-0.09 (-1.12, 0.94)	-0.10 (-1.28, 1.09)	-0.56 (-2.60, 1.48)*
	CBT-HA vs. SC at 8 years	0.04 (-1.79, 1.87)	-0.75 (-1.83, 0.32)	-0.55 (-1.88, 0.77)	-2.56 (-4.93, -0.19)*
CBT-HA vs. SC at all times	-0.06 (-1.10, 0.97)	-0.07 (-0.66, 0.52)	-0.10 (-0.75, 0.54)	-1.14 (-2.28, -0.01)*	
SFQ score	CBT-HA vs. SC at 5 years	-0.94 (-2.64, 0.75)	-0.74 (-1.67, 0.19)	-1.21 (-2.32, -0.11)*	-1.65 (-3.33, 0.02)
	CBT-HA vs. SC at 6 months	-0.12 (-1.60, 1.36)	0.25 (-0.67, 1.18)	-0.08 (-1.07, 0.90)	-0.85 (-2.54, 0.85)
	CBT-HA vs. SC at 12 months	-0.27 (-1.84, 1.30)	0.29 (-0.64, 1.21)	0.16 (-0.84, 1.16)	-0.99 (-2.83, 0.84)
	CBT-HA vs. SC at 24 months	-0.44 (-2.02, 1.15)	-0.05 (-1.00, 0.91)	0.05 (-0.95, 1.06)	-0.77 (-2.62, 1.09)
	CBT-HA vs. SC at 5 years	0.47 (-1.26, 2.21)	-0.09 (-1.12, 0.94)	-0.10 (-1.28, 1.09)	-0.56 (-2.60, 1.48)*
	CBT-HA vs. SC at 8 years	0.04 (-1.79, 1.87)	-0.75 (-1.83, 0.32)	-0.55 (-1.88, 0.77)	-2.56 (-4.93, -0.19)*
	CBT-HA vs. SC at all times	-0.06 (-1.10, 0.97)	-0.07 (-0.66, 0.52)	-0.10 (-0.75, 0.54)	-1.14 (-2.28, -0.01)*

All minus scores indicate greater improvement in CBT-HA group. At 3 months, only the SHAI was administered.

CBT-HA = Cognitive behaviour therapy for Health Anxiety; HADS-A and HADS-D = Hospital Anxiety and Depression Scale, Anxiety and Depression sections; SC = Standard Care; SFQ = Social Functioning Questionnaire; SHAI = Short Health Anxiety Inventory.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .



Table 3: Results from mixed model analysis of changes from baseline in the CBT-HA group compared to standard care in participants separated by dependence status (using the Dependent Personality Questionnaire)

Outcome	Comparison	ICD-11 personality status		
		No dependent personality (score ≤6) (N = 76)	Dependent personality difficulty (score 7–11) (N = 186)	Mild dependent personality (score 11–16) (N = 141)
SHAI score	CBT-HA vs. SC at 3 months	-0.85 (-4.93, 3.24)	-1.04 (-3.07, 0.99)	-3.21 (-5.64, -0.78)**
	CBT-HA vs. SC at 6 months	-3.86 (-7.93, 0.22)	-4.33 (-6.41, -2.25)***	-5.19 (-7.65, -2.72)***
	CBT-HA vs. SC at 12 months	-2.82 (-7.04, 1.39)	-2.36 (-4.44, -0.28)*	-3.33 (-5.81, -0.85)**
	CBT-HA vs. SC at 24 months	0.45 (-3.84, 4.74)	-2.06 (-4.18, 0.07)	-3.22 (-5.70, -0.73)*
	CBT-HA vs. SC at 5 years	-4.52 (-9.07, 0.02)	-1.33 (-3.55, 0.89)	-1.62 (-4.35, 1.12)
	CBT-HA vs. SC at 8 years	-2.27 (-7.03, 2.49)	-0.76 (-3.05, 1.53)	-0.97 (-3.91, 1.97)
	CBT-HA vs. SC at all times	-2.31 (-5.48, 0.85)	-1.98 (-3.56, -0.40)*	-2.92 (-4.86, -0.98)**
	CBT-HA vs. SC at 6 months	-1.69 (-3.86, 0.48)	-1.23 (-2.56, 0.11)	-1.05 (-2.49, 0.38)
	CBT-HA vs. SC at 12 months	-0.79 (-3.08, 1.50)	-0.56 (-1.89, 0.78)	-1.16 (-2.61, 0.30)
	CBT-HA vs. SC at 24 months	-0.78 (-3.10, 1.54)	-0.86 (-2.23, 0.52)	-1.07 (-2.53, 0.38)
HADS-A score	CBT-HA vs. SC at 5 years	-0.71 (-3.20, 1.78)	-0.70 (-2.14, 0.74)	-0.89 (-2.52, 0.74)
	CBT-HA vs. SC at 8 years	0.42 (-2.22, 3.06)	-0.65 (-2.15, 0.84)	-0.10 (-1.86, 1.67)
	CBT-HA vs. SC at all times	-0.71 (-2.29, 0.87)	-0.80 (-1.76, 0.16)	-0.85 (-1.96, 0.26)
	CBT-HA vs. SC at 6 months	-0.44 (-2.72, 1.84)	-0.42 (-1.75, 0.91)	-1.35 (-2.81, 0.12)
	CBT-HA vs. SC at 12 months	-0.08 (-2.49, 2.33)	-0.38 (-1.71, 0.94)	-1.24 (-2.73, 0.24)
	CBT-HA vs. SC at 24 months	2.16 (-0.28, 4.59)	-0.66 (-2.04, 0.71)	-1.80 (-3.29, -0.31)*
	CBT-HA vs. SC at 5 years	-3.92 (-6.54, -1.31)**	-0.83 (-2.27, 0.61)	-0.81 (-2.49, 0.86)
	CBT-HA vs. SC at 8 years	-2.42 (-5.19, 0.34)	-1.42 (-2.91, 0.08)	-0.87 (-2.70, 0.95)
	CBT-HA vs. SC at all times	-0.94 (-2.64, 0.75)	-0.74 (-1.67, 0.19)	-1.21 (-2.32, -0.11)*
	CBT-HA vs. SC at 6 months	-0.12 (-1.60, 1.36)	0.25 (-0.67, 1.18)	-0.08 (-1.07, 0.90)
SFQ score	CBT-HA vs. SC at 12 months	-0.27 (-1.84, 1.30)	0.29 (-0.64, 1.21)	0.16 (-0.84, 1.16)
	CBT-HA vs. SC at 24 months	-0.44 (-2.02, 1.15)	-0.05 (-1.00, 0.91)	0.05 (-0.95, 1.06)
	CBT-HA vs. SC at 5 years	0.47 (-1.26, 2.21)	-0.09 (-1.12, 0.94)	-0.10 (-1.28, 1.09)
	CBT-HA vs. SC at 8 years	0.04 (-1.79, 1.87)	-0.75 (-1.83, 0.32)	-0.55 (-1.88, 0.77)
	CBT-HA vs. SC at all times	-0.06 (-1.10, 0.97)	-0.07 (-0.66, 0.52)	-0.10 (-0.75, 0.54)
	CBT-HA vs. SC at 3 months	-1.41 (-5.72, 2.90)	-1.41 (-5.72, 2.90)	-1.41 (-5.72, 2.90)
	CBT-HA vs. SC at 6 months	-6.49 (-10.79, -2.19)**	-6.49 (-10.79, -2.19)**	-6.49 (-10.79, -2.19)**
	CBT-HA vs. SC at 12 months	-4.85 (-9.35, -0.35)*	-4.85 (-9.35, -0.35)*	-4.85 (-9.35, -0.35)*
	CBT-HA vs. SC at 24 months	-1.76 (-6.29, 2.78)	-1.76 (-6.29, 2.78)	-1.76 (-6.29, 2.78)
	CBT-HA vs. SC at 5 years	-4.05 (-8.77, 0.67)	-4.05 (-8.77, 0.67)	-4.05 (-8.77, 0.67)
CBT-HA vs. SC at 8 years	-5.09 (-10.20, 0.02)	-5.09 (-10.20, 0.02)	-5.09 (-10.20, 0.02)	
CBT-HA vs. SC at all times	-3.94 (-7.53, -0.36)*	-3.94 (-7.53, -0.36)*	-3.94 (-7.53, -0.36)*	
CBT-HA vs. SC at 6 months	-2.40 (-5.12, 0.33)	-2.40 (-5.12, 0.33)	-2.40 (-5.12, 0.33)	
CBT-HA vs. SC at 12 months	-2.93 (-5.86, -0.01)*	-2.93 (-5.86, -0.01)*	-2.93 (-5.86, -0.01)*	
CBT-HA vs. SC at 24 months	-1.91 (-4.86, 1.05)	-1.91 (-4.86, 1.05)	-1.91 (-4.86, 1.05)	
CBT-HA vs. SC at 5 years	-1.53 (-4.66, 1.59)	-1.53 (-4.66, 1.59)	-1.53 (-4.66, 1.59)	
CBT-HA vs. SC at 8 years	-2.07 (-5.54, 1.39)	-2.07 (-5.54, 1.39)	-2.07 (-5.54, 1.39)	
CBT-HA vs. SC at all times	-2.17 (-4.27, -0.07)*	-2.17 (-4.27, -0.07)*	-2.17 (-4.27, -0.07)*	
CBT-HA vs. SC at 6 months	-1.45 (-4.07, 1.17)	-1.45 (-4.07, 1.17)	-1.45 (-4.07, 1.17)	
CBT-HA vs. SC at 12 months	-2.18 (-5.02, 0.66)	-2.18 (-5.02, 0.66)	-2.18 (-5.02, 0.66)	
CBT-HA vs. SC at 24 months	-1.51 (-4.38, 1.36)	-1.51 (-4.38, 1.36)	-1.51 (-4.38, 1.36)	
CBT-HA vs. SC at 5 years	-1.49 (-4.56, 1.59)	-1.49 (-4.56, 1.59)	-1.49 (-4.56, 1.59)	
CBT-HA vs. SC at 8 years	-1.63 (-5.13, 1.86)	-1.63 (-5.13, 1.86)	-1.63 (-5.13, 1.86)	
CBT-HA vs. SC at all times	-1.65 (-3.33, 0.02)	-1.65 (-3.33, 0.02)	-1.65 (-3.33, 0.02)	
CBT-HA vs. SC at 6 months	-0.85 (-2.54, 0.85)	-0.85 (-2.54, 0.85)	-0.85 (-2.54, 0.85)	
CBT-HA vs. SC at 12 months	-0.99 (-2.83, 0.84)	-0.99 (-2.83, 0.84)	-0.99 (-2.83, 0.84)	
CBT-HA vs. SC at 24 months	-0.77 (-2.62, 1.09)	-0.77 (-2.62, 1.09)	-0.77 (-2.62, 1.09)	
CBT-HA vs. SC at 5 years	-0.56 (-2.60, 1.48)	-0.56 (-2.60, 1.48)	-0.56 (-2.60, 1.48)	
CBT-HA vs. SC at 8 years	-2.56 (-4.93, -0.19)*	-2.56 (-4.93, -0.19)*	-2.56 (-4.93, -0.19)*	
CBT-HA vs. SC at all times	-1.14 (-2.28, -0.01)*	-1.14 (-2.28, -0.01)*	-1.14 (-2.28, -0.01)*	

All minus scores indicate greater improvement in CBT-HA group.

A = CBT-HA; ACBT-HA = Cognitive Behaviour Therapy for Health Anxiety; B = standard care; HADS-A and HADS-D = Hospital Anxiety and Depression Scale, Anxiety and Depression sections; SC = standard care; SFQ = Social Functioning Questionnaire; SHAI = Short Health Anxiety Inventory.

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .

Table 4: Hospital costs over 8-year follow-up by randomized group and ICD-11 and dependent personality status (DPQ score)

Personality status	N	CBT-HA mean (SD)
ICD-11: No personality dysfunction	61	6 162.73 (6 739.89)
ICD-11: Personality difficulty	179	6 101.23 (7 953.29)
ICD-11: Mild personality disorder	136	6 919.85 (8 360.14)
ICD-11: Moderate and severe personality disorder	35	5 946.13 (7 521.01)
DPQ (score 0–6): No dependent dysfunction	70	6 587.35 (7 988.58)
DPQ (score 7–11): Dependent personality difficulty	174	6 314.46 (6 820.97)
DPQ (score 12–17): Mild dependent personality	131	5 177.19 (8 037.74)
DPQ (score $\geq 17$ ): Moderate dependent personality	36	9 613.63 (10 140.38)

These data do not include the patients who died during the course of the study.

Table 5: Sessions of cognitive therapy for health anxiety (CBT-HA) given in personality groups separated by ICD-11 and dependent personality levels

Statistic	ICD-11 personality levels				Significance of differences (p)
	No personality dysfunction	Personality difficulty	Mild personality disorder	Moderate and severe personality disorder	
n	29	100	68	22	0.26
Mean	5.28	5.94	5.85	7.55	
SD	3.55	3.66	4.8	4.8	
Dependent personality levels (from Dependent Personality Questionnaire)					
Statistic	No dependence (0–6)	Dependent personality difficulty (7–11)	Mild dependent personality (12–16)	Moderate or severe personality difficulty (≥17)	Significance of differences (p)
n	47	86	65	21	0.0046
Mean	5.40	5.28	6.49	8.62	
SD	4.17	3.79	3.86	5.39	

The dependence scores in brackets indicate the baseline DPQ score groupings.

separate condition, hypochondriacal personality disorder, and a condition with a relatively poor outcome.<sup>37,38</sup>

As cognitive therapy is quite capable of embracing personality disturbance effectively,<sup>39</sup> it is also quite possible that CBT-HA includes a personality disorder relieving component, particularly as the features of hypochondriacal personality disorder are so clearly linked to health anxiety symptoms. However, a study of CBT in panic disorder showed no such benefit in those with similar personality disturbance as in the CHAMP study.<sup>40</sup>

### *Economic aspects*

The cost data do not show any savings for CBT-HA, and indeed, the total costs are higher in all those treated. This contradicts our earlier hypotheses about cost savings and also those reported in all previous studies of psychological treatments for health anxiety.<sup>24,41–43</sup> The explanation for this almost certainly lies in the high level of medical co-morbidity of the participants in the study and in the absence of primary care costs, as this is where health anxiety becomes most expensive. This was not the case in other samples. For example, in a study using very similar methodology to the CHAMP study, and yielding very similar results in terms of clinical benefit, there was a net monetary benefit of £3 164 per patient in the treatment arm of the study, with total costs of £2 197 being 48% more than standard care.<sup>43</sup> The mean cost of in-patient care in this study was £22 in the CBT-HA group, a tiny fraction of the numbers reported in this paper, in which most of the patients had medical co-morbidity.

Nonetheless, we still have a set of differences in favour of standard care in the CHAMP study at 8 years (Table 5) that needs explaining. Although these are not significant, it is fair to add that very large samples indeed are needed to show significance in cost-effectiveness studies, so here, it is justified to comment. Possible explanations include possible unreliability of hospital data and intensity of health anxiety not being related to costs.<sup>44</sup>

A more plausible explanation is that improvement in health anxiety allows medical staff to

make a better evaluation of medical symptoms. Thus, those who have recovered from health anxiety are treated more appropriately and more relevant medical illness identified. In the CHAMP study, there was no difference in the mortality of patients in each treatment group overall, but those in standard care had great mortality in the early years of the study.<sup>16</sup> These data support this hypothesis, but it has to be a speculative one.

### *Implications*

What clinical and theoretical messages can we conclude from these findings? In clinical practice, a strong case can be made for physicians and their colleagues in general hospitals to be more aware of health anxiety in their practice,<sup>45</sup> but can we add personality to health anxiety as well? Probably not, but the good physician, with sensitive tentacles, will be able to pick up important aspects of personality from a clinical examination. In some centres, particularly those treating cancer, screening instruments are used for depression and been found to be of value. But this is partly because undetected depression is still eminently treatable, personality disorder less so.

But we cannot ignore the tangled web that personality weaves around health anxiety. Whether it is an intimate part of the syndrome or not, it clearly has an influence on outcome. Its assessment in the CHAMP study might have been thought a capricious addition to the many instruments selected, but it was clearly not, and both the patients and the many research assistants involved in the baseline assessments often commented that this was the most interesting component of the enquiry. The question posed by Hedman *et al.*<sup>34</sup> remains, does successful psychological treatment improve personality difficulty and disorder, and if so, how? If personality status had been recorded after 8 years, we might have had at least a partial answer to that question, but at present, it must remain in the air.

### **Acknowledgements**

The project was funded by the National Institute for Health Research (NIHR) under its Health

Technology Assessment (HTA) Programme (grant reference number 07/01/26). The views expressed are those of the authors and not necessarily of the NIHR or the Department of Health and Social Care. Paul Salkovskis, John Green, David Murphy, Barbara Barrett and Steven Reid were investigators, together with Peter Tyrer, Helen Tyrer and Mike Crawford, in the original trial. We particularly thank the Mental Health Research Network, and especially Sandra O'Sullivan, for adopting and promoting the trial, and support for excess treatment costs from the Department of Health. The North London and East Midlands hubs of the Mental Health Research Network, were invaluable in adopting, promoting and aiding recruitment in the trial, and it could not have been done without them. We thank Gene Paykel (chair) and later, John Brazier, Deborah Rutter and Paul Bassett of the Data Monitoring and Ethical Committee and Richard Mayou (chair), Amrit Sachar, Rosemary Davidson, Devaka Fernando and Roger Mulder of the Trial Steering Committee, and the many therapists who provided the treatment. We also thank Kate Davidson for her comments on the initial manuscript.

Jayne Morton, Kevin Connolly, Mary Wyatt and Gail Marcuson acted as the support group (CHASSIS) in the study, and in addition to the main research assistants, Faye Cooper, Amy Murphy, Lorraine O'Connell, Kate Rhodes, Julie Sinclair, Brendon Stubbs, David Trevor and Gemma Walker were also active in recruitment. We also give special thanks to Sharon McAllister, Yvonne Lisseman-Stones, Sarah Finnis, Simon Dupont and Kate Rhodes for their help in organizing and giving therapy, and Ian Lovett, Keith Mitchelmore, Mary Tourette, Lotte Dinesen and Sachin Thakrar for their help in ensuring full hospital data over the 8-year period. We also are grateful to the 107 consultants, but especially John Rowley, Marcus Harbord, Derek Bell and Maurice Partridge, who supported the study from its outset.

The full data from this study are available by contacting Peter Tyrer, Michael Crawford (m.crawford@imperial.ac.uk) and Duolao Wang (duolao.wang@lstmed.ac.uk).

## Conflict of interest

P. T. and M. C. were members of the World Health Organization ICD-11 work group between 2010 and 2017 for the revision of the classification of personality disorder.

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