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EMPIRICALLY GROUNDED CLINICAL INTERVENTIONS

The effectiveness of mindfulness-based cognitive therapy for social anxiety symptoms in people living with alopecia areata: a single-group case-series design

Connor Heapy[1], Paul Norman[1], Sarah Cockayne[2] and Andrew R. Thompson[1,3]

[1]Department of Psychology, University of Sheffield, Sheffield, UK, [2]Sheffield Teaching Hospitals NHS Foundation Trust, Royal Hallamshire Hospital, Sheffield, UK and [3]South Wales Clinical Psychology Training Programme, Cardiff University and Cardiff and Vale University Health Board, School of Psychology, Tower Building, Park Place, Cardiff, UK
Corresponding author: Andrew R. Thompson; Email: thompsona18@cardiff.ac.uk

Abstract
Background: Alopecia areata (AA) is an immunological disorder characterised by hair loss. Individuals with AA report high levels of social anxiety. One intervention that holds potential for reducing social anxiety in individuals with AA is mindfulness-based cognitive therapy (MBCT).
Aims: Our key aim was to investigate whether MBCT reduces social anxiety in individuals with AA. The study also investigated whether MBCT reduces depression, general anxiety, and increases quality of life and increases trait mindfulness in individuals with AA.
Method: Five participants with AA took part in an 8-session in-person MBCT intervention. A multiple-baseline single-group case series design was adopted. Idiographic measures of social anxiety were measured each day from baseline, through intervention, to follow-up. Standardised questionnaires of trait mindfulness, social anxiety, depression, anxiety, and quality of life were completed at baseline, post-intervention, and at 4-week follow-up.
Results: All participants completed the MBCT course, but one participant was excluded from the idiographic analysis due to a high amount of missing data. The remaining four participants demonstrated reductions in idiographic measures of social anxiety from baseline to follow-up. These effects were larger between baseline and follow-up, than between baseline and post-intervention. Two participants demonstrated significant improvement in standardised measures of wellbeing from baseline to follow-up – they also practised mindfulness most regularly at home between sessions.
Conclusion: MBCT may be effective in reducing social anxiety and improving wellbeing in individuals with AA, although this might be dependent on the extent to which participants regularly practise mindfulness exercises.

Keywords: alopecia areata; mindfulness; MBCT; single case experimental design; social anxiety

Introduction

Alopecia areata (AA) is an immunological disorder that affects around 0.1–0.2% of people worldwide (Sibbald, 2023). AA is characterised by small patches of non-scarring hair loss, and in more severe forms leads to total hair loss on the scalp (alopecia totalis) or total hair loss of the entire body (alopecia universalis). There have been recent advances in treatment for alopecia, nevertheless the full range of treatments are not yet widely available and are in any event not currently curative (Sibbald, 2023).

While the physical effects of AA are limited, the psychological effects can be profound. Hair is a central aspect of appearance and self-image for many people, and can express a person's gender, age, ethnicity, and social or political beliefs (Freedman, 1994). Indeed, AA has a significant negative impact on quality of life (Rencz *et al.*, 2016) and individuals with AA experience higher levels of anxiety and depression than controls (Hunt and McHale, 2005; Ruiz-Doblado *et al.*, 2003). Hair loss can also negatively impact an individual's sense of identity and self-esteem – particularly for groups of individuals whose hair is given high importance by sociocultural norms (Tucker, 2009). For example, sexuality, attractiveness and personality are more symbolically linked to a woman's hair than a man's hair (Hunt and McHale, 2005), and women report that problems adjusting to their condition are exacerbated because baldness in women is not socially acceptable (Hunt and McHale, 2004). Consequently, the psychosocial impact of AA is typically more severe in women than men (Aukerman and Jafferany, 2022).

When considering the social importance often placed on hair, it is perhaps unsurprising that one particularly prevalent difficulty for individuals with AA is social anxiety. In one of the largest surveys conducted into the psychosocial impact of AA, almost half of participants (47.5%) reported clinically significant levels of social anxiety, compared with around a third of participants reporting clinically significant levels of depression (29%) and general anxiety (35.5%) (total n = 338; Montgomery *et al.*, 2017). People living with AA have reported unhelpful reactions from others, such as negative comments, staring, and comparisons with people undergoing chemotherapy treatment (Montgomery *et al.*, 2017; Wiggins *et al.*, 2014). For some people, fear of negative reactions from others can lead to use of concealment strategies such as wearing a wig or avoidance of social situations altogether (Montgomery *et al.*, 2017; Wiggins *et al.*, 2014). Avoiding social contact likely increases an individual's sense of loneliness, which in turn increases feelings of depression and general anxiety (Beutel *et al.*, 2017). Reducing social anxiety in individuals with AA will therefore likely have a broad and significant positive impact on their lives.

Cognitive models of social anxiety disorder emphasise the role of self-focused attention and rumination in the maintenance of symptoms (Clark and Wells, 1995; Rapee and Heimberg, 1997). Social situations trigger anxiety, with individuals viewing their audience as critical observers. Attention is biased towards threat-related social cues that the individual interprets as indicators of negative evaluation which, in turn, increases anxiety (Hirsch and Clark, 2004; Morrison and Heimberg, 2013).

Whilst people with AA experience negative reactions from people, research suggests that they display a stigmatisation bias, in the form of increased attention towards disease-related cues (Van Beugen *et al.*, 2016). Interventions which aim to reduce engagement in negative appearance-related thoughts, and attentional bias towards negative self-referential information, may be helpful for people with AA.

One group of interventions that may be helpful are based on mindfulness principles.

Mindfulness is defined as 'paying attention in a particular way: on purpose in the present moment and non-judgementally' (Kabat-Zinn, 1994; p. 4). Higher levels of trait mindfulness are related to lower levels of social anxiety in individuals diagnosed with social phobia (Schmertz *et al.*, 2012) and individuals with skin conditions (Montgomery *et al.*, 2016). Mindfulness-based stress reduction (MBSR) – a structured group intervention based on mindfulness principles – has been shown to reduce negative self-referential processing and emotional reactivity, and increase self-esteem, in people with social phobia (Goldin *et al.*, 2009; Goldin *et al.*, 2012; Goldin *et al.*, 2013). In addition, in a pilot study of individuals with AA, MBSR reduced distress and increase quality of life (Gallo *et al.*, 2017).

Mindfulness-based cognitive therapy (MBCT) is a similar intervention to MBSR but draws on elements of cognitive therapy and places more importance on understanding cognitions and psychological processes. The National Institute of Clinical Excellence recommends MBCT for reducing relapse risk in depression (National Institute of Clinical Excellence, 2009), and the processes involved in maintaining depression, such as rumination and attention bias towards

negative stimuli, are also relevant to social anxiety (Clark and Wells, 1995). In the only study to compare MBCT with cognitive behavioural therapy (CBT) for social anxiety, Piet *et al.* (2010) allocated 26 adults with a diagnosis of social phobia to group MBCT or group CBT in a crossover design. Both MBCT and CBT showed pre–post improvements in a composite measure of social anxiety. Moreover, no differences were found in social anxiety between MBCT and CBT following therapy at 6-month follow-up, or at 12-month follow-up.

However, whilst both CBT and MBCT hold promise for reducing social anxiety in individuals with AA, there are several benefits to investigating the impact of MBCT. First, although CBT is effective for social anxiety, approximately 40–50% of people referred for therapy show little or no improvement, and alternative options are therefore needed (Hofmann and Bögels, 2006; Rodebaugh *et al.*, 2004). Second, developing the evidence-base for MBCT – a relatively under-researched intervention – could increase client choice, which in turn could increase client engagement and outcomes (Constantino *et al.*, 2021). Finally, drop-out rates may be lower in MBCT than CBT, indicating MBCT is preferred by clients and may be more cost-effective. For example, a review of mindfulness and acceptance-based interventions for anxiety disorders found a mean attrition rate of 15% (Vøllestad *et al.*, 2012); whereas a review of CBT for anxiety disorders found a mean attrition rate of 24% (Carpenter *et al.*, 2018).

Despite the potential benefits of investigating whether MBCT reduces social anxiety in individuals with AA, no studies have been conducted to answer this question. However, Fordham *et al.* (2014, 2015) investigated the effectiveness of MBCT in another dermatology sample – individuals with psoriasis. Although the study did not assess social anxiety, interviews following the intervention found participants reported feeling calmer, more confident, and more sociable. This finding suggests that MBCT may improve self-efficacy in dealing with social interactions, in turn reducing social anxiety.

The current study is the first to investigate the effectiveness of MBCT for people with AA in reducing social anxiety. The study also aimed to examine whether MBCT reduces depression and general anxiety, and improves quality of life and trait mindfulness, in individuals with AA. This group intervention is an adapted version of MBCT for depression (Segal *et al.*, 2013), with sessions including psychoeducation on social anxiety, experiential practice of mindfulness meditation, and group discussion. The study will adopt a multiple-baseline single-group case series design, whereby wellbeing and mindfulness variables are assessed before, during and after the intervention. Single-case designs are commonly used in clinical research, particularly in the preliminary stages of investigation (Morley, 2018). Adopting this design also enables the measurement of idiographic targets – deemed as important to individual participants – each day.

Unlike randomised controlled trials, this design ensures that the impact of the intervention on key individual problems is assessed in detail over time (Morley, 2018). Accordingly, we were most interested in the impact of the MBCT intervention on participants' idiographic measures of social anxiety.

Method

Design

This study adopted an A-B multiple-baseline, single-group case series design, with a follow- up period. Phase A was a 2- to 4-week baseline period. Phase B was an eight-session group intervention run over 9 weeks (mindfulness-based cognitive therapy; MBCT). The follow-up period lasted 4 weeks during which participants were encouraged to continue to practise mindfulness regularly. A single follow-up intervention session was run during the fourth week of the follow-up period. Outcome variables were assessed at frequencies typical of single-case designs (Morley, 2018). That is, the main outcome variable was two daily idiographic questions assessing social anxiety. Secondary outcome variables were standardised measures of the following variables, administered at three time-points: mindfulness, social anxiety, general anxiety, depression, and quality of life.

Table 1. Demographic and clinical information of participants

Participant	Sex	Age	Ethnicity	Diagnosis	Duration of alopecia areata	Mindfulness sessions attended (out of 9)	Mindfulness minutes practised (mean per day)
1	Female	37	White British	Alopecia areata	10 years	7	12 min
2	Female	41	White British	Alopecia totalis	30 years	8	12 min
3	Female	24	White French Canadian	Alopecia universalis	1 year	7	20 min
4	Female	41	White British	Alopecia universalis	14 years	8	25 min
5	Female	37	White British	Alopecia totalis	2 years	6	3 min

Participants

Seven participants were recruited to the study from social media, out-patient dermatology clinics, and an alopecia charity event. One participant dropped out before the first session due to practical reasons. One participant attended the MBCT intervention but was excluded from the analyses due to not having a diagnosis of alopecia areata, leaving a total of five participants in the study. Inclusion criteria were (i) aged 16 or over, (ii) primary health concern was alopecia areata (including alopecia totalis, and alopecia universalis), (iii) self-identified as experiencing social anxiety, and (iv) English language speaker. Exclusion criteria were (i) active thoughts of suicide or self-harm, (ii) experienced psychotic episode in the last 12 months, or (iii) currently engaged with other psychological talking therapies or due to start during the study period. No participants dropped out from the study after attending the first session. Participants' demographic information is included in Table 1. The MBCT intervention was free for participants and travel costs were reimbursed.

Measures

Demographic and medical

Demographic and medical information was collected at the start of the study. Participants reported their gender, age, ethnicity, diagnosis, and duration of AA (see Table 1).

Idiographic measures of social anxiety and mindfulness practice

Social anxiety was assessed by two idiographic questions that were chosen by the participants and completed each day. These questions represented areas of social anxiety that participants wanted to address. Question 1 was decrease-framed (i.e. something the participant wanted to decrease; e.g. 'How affected have you been today by people looking at your head/hair?') and question 2 was increase-framed (i.e. something the participant wanted to increase; e.g. 'How brave have you felt today (e.g. when in social situations and around others)?'). Questions were rated on a scale from 0 ('not at all') to 100 ('extremely'). Idiographic questions were completed by participants each day from baseline until the follow-up session.

Participants were also asked to indicate how many minutes they had spent practising mindfulness each day, from the start of the intervention period until the follow-up session.

Standardised measures

Participants completed measures of the following constructs at three time-points (pre- intervention, post-intervention, follow-up): mindfulness, social anxiety, depression, general anxiety, and quality of life.

Mindfulness was assessed using the the Five Facet Mindfulness Questionnaire (FFMQ: Baer *et al.*, 2006). This 39-item self-report questionnaire assesses five facets of mindfulness: observing, describing, act with awareness, non-judgement of inner experience, and non-reactivity to inner experience. Items are rated on a 5-point Likert scale and responses are summed. The FFMQ has demonstrated good psychometric properties in non-clinical samples and individuals with anxiety disorders (Baer *et al.*, 2006; Bohlmeijer *et al.*, 2011).

Social anxiety was assessed using the Brief Fear of Negative Evaluation, Straightforward items (BFNE-S: Carleton *et al.*, 2011; Rodebaugh *et al.*, 2004; Weeks *et al.*, 2005). This 8-item self-report questionnaire assesses social anxiety as a single factor. Items are rated on a 5-point Likert scale and responses are summed. Scores of 25 or over suggest clinical levels of social anxiety (Carleton *et al.*, 2011). The BFNE-S has demonstrated good psychometric properties in individuals with anxiety disorders (Carleton *et al.*, 2011), and has previously been used to assess social anxiety in individuals with AA (Montgomery *et al.*, 2016). This brief measure of social anxiety was chosen to limit participant burden.

Depression was assessed using the Patient Health Questionnaire (PHQ-9; Spitzer *et al.*, 1999). This 9-item self-report questionnaire measures symptoms of depression over the previous 2 weeks. Items are rated on a 4-point Likert scale and responses are summed. Scores of 10 or more suggest clinical levels of depression (Kroenke *et al.*, 2001). The PHQ-9 has demonstrated good psychometric properties in primary care patients (Kroenke *et al.*, 2001).

General anxiety was assessed using the Generalised Anxiety Disorder Questionnaire (GAD-7; Spitzer *et al.*, 2006). This 7-item self-report questionnaire measures symptoms of generalised anxiety over the previous 2 weeks. Items are rated on a 4-point Likert scale and responses are summed. Scores of 8 or more suggest clinical levels of anxiety (Kroenke *et al.*, 2007). The GAD-7 has demonstrated good psychometric properties in primary care patients (Kroenke *et al.*, 2001).

Quality of life was assessed using the Dermatology Life Quality Index (DLQI: Finlay and Khan, 1994). This 10-item self-report questionnaire assesses the impact of a skin condition on quality of life over the last week. The DLQI has been adapted to refer to hair loss specifically, rather than skin conditions more generally. Items are rated on a 4-point Likert scale and responses are summed. Higher scores suggest poorer quality of life. The DLQI has demonstrated good psychometric properties in individuals with a range of skin conditions, including alopecia areata (Basra *et al.*, 2008).

Procedure

Participants were first interviewed in-person for their eligibility. Those that were eligible were randomly allocated to a 2-, 3- or 4-week baseline period. During the eligibility interview, participants were asked to identify two target idiographic measures of social anxiety that were sent to them each day using an online text message service (ConnectTxt). Participants responded to the questions with numerical scores by replying to the text message. Participants completed paper copies of the standardised questionnaires. Participants attended the MBCT groups in-person at the University of Sheffield.

Intervention description

The MBCT intervention followed the protocol outlined by Segal *et al.* (2013), with adaptations to psychoeducation material to focus on social anxiety rather than depression. The group consisted of eight sessions and one follow-up session. Each session lasted two-and-a-half hours and participants were taught how to apply mindfulness to their lives. Participants were encouraged to carry out home practice each week based on the content of each session. Each session involved a review of home practice (e.g. mindful movement meditation), a formal meditation practice

(e.g. breathing meditation), and group discussion around a theme (e.g. 'thoughts are not facts'; see Supplementary material for a full outline).

Treatment fidelity

The intervention was led by an accredited mindfulness teacher with experience of running MBCT groups, and experience of working with people with social anxiety. The mindfulness teacher received clinical supervision as part of his existing NHS role. One session was video-recorded at random for fidelity review using the Mindfulness-Based Interventions Teaching Assessment Criteria (MBI:TAC; Crane *et al.*, 2013) by another experienced mindfulness teacher. Six elements of the mindfulness teaching were assessed using criteria ranging from 1 ('incompetent') to 6 ('advanced').

Data analysis

Daily responses to idiographic measures were graphed in Microsoft Excel and inspected for change (in means), trend, and variability across phases (Morley, 2018).

Idiographic data were analysed with Tau-U (Parker *et al.*, 2011) using an online calculator (Vannest *et al.*, 2016). Tau-U examines percentage of data non-overlap between each of the study phases (baseline, intervention, follow-up). Baseline scores were first assessed for trend, using the calculator, and any significant trend was corrected. Missing values were imputed using the expectation–maximisation procedure (Dempster *et al.*, 1977; Smith *et al.*, 2012). Weighted averages were also calculated for each idiographic measure using the same online calculator. One participant was excluded from the idiographic data analysis due to a high amount of missing data.

Changes in scores on secondary outcome measures (BFNE-S, FFMQ subscales, PHQ–9, GAD-7, DLQI) between pre-intervention, post-intervention and follow-up were investigated using Jacobson's reliable change index (Jacobson and Truax, 1991). This method demonstrates statistically reliable improvement or deterioration in standardised questionnaires. Reliable change criteria were calculated using means and standard deviations of the measures found in existing research data. The analyses were carried out using the Leeds Reliable Change Calculator (Morley and Dowzer, 2014).

Results

Participant characteristics can be seen in Table 1.

Idiographic measures
Visual analysis

See Fig. 1 for the graphs of each parent's responses to the decrease-framed and increase-framed idiographic social anxiety measures. Mean weekly scores were calculated from daily responses over the course of the study (see Supplementary material for daily graphs).

Question 1: Decrease-framed idiographic social anxiety

Participant 1 demonstrated a slight reduction, and downward trend, in their decrease-framed idiographic measure of social anxiety in the intervention and follow-up phases, relative to the baseline phase. They also showed low variability in social anxiety across baseline, intervention, and follow-up phases.

Participant 2 demonstrated a slight reduction in their decrease-framed idiographic measure of social anxiety in the intervention and follow-up phases, relative to the baseline phase. They demonstrated a slight upward trend in social anxiety across the baseline phase, but this trend
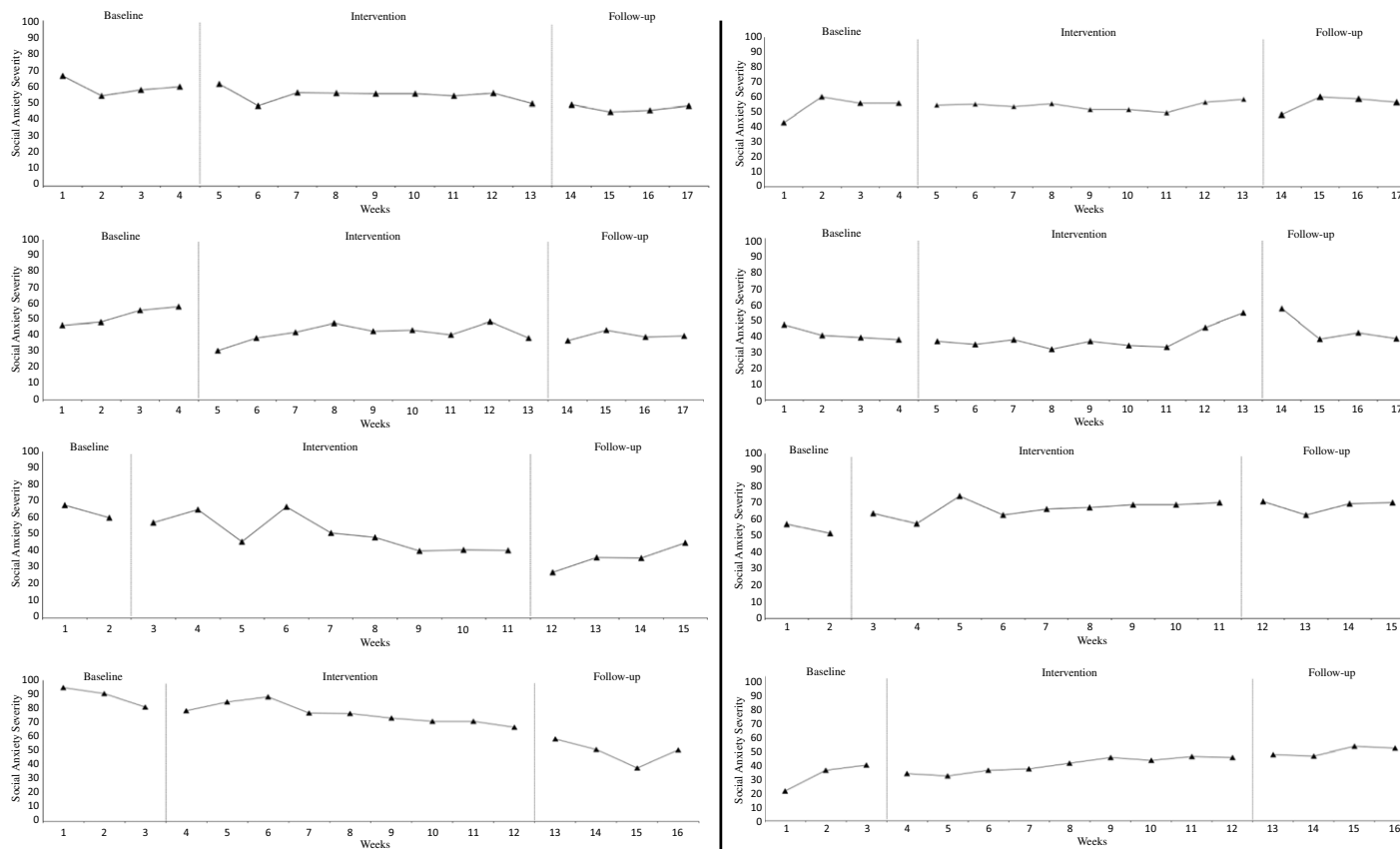
Participants 1 to 4

Figure 1. Weekly averages of daily scores for decrease-framed (on the left) idiographic ('How affected have you been today by people looking at your head/hair?') and increased-frame (on the right) social anxiety questions ('How brave have you felt today – e.g. when in social situations?').

levelled out during the intervention phase and reversed in the follow-up phase. Participant 2 showed high variability in scores in the baseline and intervention phase, but this reduced in the follow-up phase.

Participant 3 showed a large reduction in their decrease-framed idiographic measure of social anxiety in the intervention and follow-up phases, relative to the baseline phase. They also demonstrated a prominent downward trend in social anxiety across the intervention phase, and this levelled out in the follow-up phase. Participant 3 showed moderate variability in scores across phases.

Participant 4 showed a large reduction, and downward trend, in their decrease-framed idiographic measure of social anxiety in the intervention and follow-up phases, relative to the baseline phase. They showed moderate variability in scores across phases.

Question 2: Increase-framed idiographic social anxiety

Participant 1 showed no noticeable change, or trend, in their increase-framed idiographic measure of social anxiety across phases.

Participant 2 demonstrated a slight improvement in their increase-framed idiographic measure of social anxiety in the follow-up phase, relative to baseline phase. They showed some downward trend in social anxiety during the baseline phase, but this reversed to a positive trend in the intervention phase, and then levelled out during the follow-up phase. Participant 2 showed moderate variability across phases.

Participant 3 showed a moderate increase in their increase-framed idiographic measure of social anxiety in the intervention and follow-up phases, relative to the baseline phase. Participant 3 also showed a slight downward trend in social anxiety during the baseline phase, but this was reversed in the intervention phase and continued as a positive trend in the follow-up phase. They showed moderate variability in scores across all phases.

Participant 4 showed a moderate increase, and upward trend, in their increase-framed idiographic measure of social anxiety in the intervention and follow-up phases, relative to the baseline phase. They showed low variability in scores across all phases.

Tau-U analysis

All four participants demonstrated significant improvements in their decrease-framed (question 1) idiographic measure of social anxiety from baseline to intervention, and from baseline to follow-up. Weighted average of all participants also demonstrated overall significant improvement in social anxiety (question 1) from baseline to intervention, and baseline to follow-up (see Table 2).

Only two of the participants (3 and 4) demonstrated significant improvements in their increase-framed (question 2) idiographic measure of social anxiety from baseline to intervention, and from baseline to follow-up. Weighted average of all participants showed overall significant improvement in social anxiety (question 2) from baseline to intervention, and baseline to follow-up (see Table 2).

Standardised measures

Jacobson reliable change

The following scores were considered as reliable change for each measure: BFNE-S = 5; FFMQ O = 7; FFMQ D = 6; FFMQ AwA = 6; FFMQ NJ = 7; FFMQ NR = 7; PHQ-9 = 6; GAD-7 = 4; DLQI = 6 (see Table 3).

Two participants (3 and 4) showed reliable improvement in social anxiety from baseline to post-intervention and follow-up. Three participants (3, 4 and 5) showed reliable improvement in at least one mindfulness facet from baseline to post-intervention or follow-up. Three participants

Table 2. Tau-U results for decrease- and increase-framed questions for each participant

		Decrease-framed idiographic stress measure (question 1)				Increase-framed idiographic stress measure (question 2)			
Participant	Comparisons	Tau	SDTau	P	CI (90%)	Tau	SDTau	P	CI (90%)
1	Baseline–intervention	−0.39	0.11	0.003	−0.607 to −0.173	0.03	0.13	0.79	−0.18 to 0.25
	Baseline–follow-up	−0.78	0.15	<0.001	−1 to −0.52	0.14	0.15	0.38	−0.12 to 0.67
	Intervention–follow-up	−0.57	0.13	<0.001	−0.79 to −0.36	0.10	0.13	0.44	−0.11 to 0.32
2	Baseline–intervention	−0.42	0.13	0.001	−0.64 to −0.21	-0.11	0.13	0.40	−0.33 to 0.11
	Baseline–follow-up	−0.60	0.15	<0.001	−0.85 to −0.34	-0.11	0.15	0.44	−0.13 to 0.37
	Intervention–follow-up	−0.10	0.13	0.45	−0.31 to 0.12	0.27	0.13	0.04	0.05 to 0.48
3	Baseline–intervention	−0.53	0.17	0.002	−0.81 to −0.25	0.46	0.17	0.008	0.18 to 0.74
	Baseline–follow-up	−0.94	0.19	<0.001	−1.00 to −0.63	0.56	0.19	0.003	0.25 to 0.88
	Intervention–follow-up	−0.54	0.13	<0.001	−0.75 to −0.32	0.12	0.13	0.34	−.091 to 0.34
4	Baseline–intervention	−0.64*	0.15	<0.001	−0.88 to −0.40	0.33*	0.14	0.022	0.093 to 0.58
	Baseline–follow-up	−0.78*	0.17	<0.001	−1.00 to −0.51	0.70*	0.17	<0.001	0.43 to 0.98
	Intervention–follow-up	−0.91	0.13	<0.001	−1.00 to 0.70	0.69	0.13	<0.001	0.47 to 0.91
Weighted average	Baseline–intervention	−0.49	—	<0.001	−0.61 to −0.37	0.16	—	0.03	0.04 to 0.28
	Baseline–follow-up	−0.77	—	<0.001	−0.90 to −0.63	0.37	—	<0.001	0.23 to 0.50
	Intervention–follow-up	−0.41	—	<0.001	−0.52 to −0.31	0.29	—	<0.001	0.19 to 0.40

*Baseline corrected.

Table 3. Scores at three time-points, across the intervention, on standardised measures of social anxiety, mindfulness (all five facets), depression, general anxiety, and quality of life

	Participant 1			Participant 2			Participant 3			Participant 4			Participant 5		
	Baseline	Post-intervention	Follow-up	Baseline	Post-intervention	Follow-up	Baseline	Post-intervention	Follow-up	Baseline	Post-intervention	Follow-up	Baseline	Post-Intervention	Follow-up
Social anxiety (BFNE-S)	31	32	32	23	26	26	31	21 [I]	25 [I]	36	27 [I]	26 [I]	34	32	32
Observe (FFMQ)	23	21	21	29	23	26	29	38 [I]	37 [I]	27	35 [I]	35 [I]	29	35	24
Describe (FFMQ)	24	14 [D]	16 [D]	23	24	23	25	31	32 [I]	18	17	25 [I]	27	17 [D]	24
Act with awareness (FFMQ)	27	19 [D]	19 [D]	23	26	22	20	27 [I]	22	12	26 [I]	24 [I]	22	26	20
Non-judgement (FFMQ)	21	18	21	21	24	22	18	27 [I]	28 [I]	23	22	24	16	22	18
Non-reactivity (FFMQ)	23	19	20	21	19	20	14	22 [I]	20	13	24 [I]	23 [I]	16	24 [I]	20
Depression (PHQ-9)	7	7	5	2	3	1	14	13	10	16	14	8 [I]	13	14	18
Anxiety (GAD-7)	8	8	7	6	5	8	13	7 [I]	12	16	7 [I]	14	17	16	18
Quality of life (DLQI)	2	0	0	6	4	5	20	11 [I]	13 [I]	21	20	12 [I]	3	Missing	Missing

[I]Reliable improvement from baseline score; [D]reliable deterioration from baseline score.

(3 and 4) showed reliable improvement in depression or anxiety from baseline to post-intervention or follow-up. Two participants (3 and 4) showed reliable improvement in quality of life from baseline to post-intervention or follow-up.

Home practice
Participant 5 practised mindfulness at home the least ($M = 3$ minutes per day), followed by participants 1 and 2 ($M = 12$ minutes per day), and participant 3 ($M = 20$ minutes per day). Participant 4 practised the mindfulness at home the most ($M = 25$ minutes; see Table 1).

Treatment fidelity
The mindfulness teacher scored 4 ('competent') or higher in each domain, confirming treatment fidelity.

Discussion
We investigated the effectiveness of MBCT for people with AA in reducing social anxiety, depression, general anxiety, and improving quality of life. To achieve this, we used a multiple-baseline single-group case series design and measured wellbeing variables across a baseline, intervention and follow-up period. All participants showed improvements in idiographic measures of social anxiety from baseline to post-intervention, and baseline to follow-up. In addition, two of the five participants showed improvement in at least one wellbeing measure from baseline to post-intervention or follow-up. Finally, two of the participants showed an increase in trait mindfulness from baseline to follow-up. Overall, our adaptation of MBCT shows promise in reducing distress associated with AA.

Our key finding was that the MBCT intervention reduced scores on idiographic measures of social anxiety in individuals with AA. Participants in the group intervention likely developed a range of mindfulness skills that contributed to reduced social anxiety. For example, by viewing thoughts as 'just thoughts', participants may have begun to disengage from negative appearance-related thoughts. By paying close, non-judgemental attention to internal and external stimuli, participants may have reduced their attentional bias towards negative-self-referential information. Indeed, participants who reported practising mindfulness most between sessions also saw the largest reductions in social anxiety. Encouragingly, reductions in social anxiety were larger at the end of the follow-up period than at the end of the intervention period, as indicated by larger Tau scores. This finding suggests the positive effects of MBCT developed beyond the last formal teaching session.

Not all participants showed increases in trait mindfulness from baseline to follow-up, suggesting additional mechanisms may explain reduced social anxiety. One possibility is that MBCT developed skills or knowledge that were not captured by the questionnaire used to measure trait mindfulness. For example, the intervention included psychoeducation and participants learnt about the contributing role of self-focused attention on maintaining anxiety – knowledge that could lead to reduced social anxiety but not necessarily an increase in trait mindfulness. Another mechanism we believe likely contributed to reductions in social anxiety is regular, weekly exposure to the other group participants. Cognitive behavioural approaches for social anxiety highlight the benefit of exposure to social situations for reducing social anxiety (e.g. Clark and Wells, 1995). The three mechanisms described here – increased mindfulness, increased knowledge of social anxiety, increased exposure to social situations – are likely to be contributory, rather than mutually exclusive.

We were also interested in the impact of the MBCT intervention on other aspects of the participants' wellbeing. Two of four participants showed improvements in quality of life from

baseline to follow-up. These two participants also reported practising mindfulness most regularly at home, compared with other members of the group. The two participants who did not show improvements in quality of life, however, showed relatively little impairment at baseline, leaving little room for improvement through the intervention. Indeed, one participant scored so low on the quality of life measure that there was no room for reliable improvement. The effect of MBCT on depression and general anxiety was minimal, with only one participant showing a decrease in depression, and no participants showing a decrease in general anxiety, from baseline to follow-up, and this is perhaps unsurprising given that we focused on adapting MBCT to tackle social anxiety-type symptoms. In summary, MBCT appears beneficial in improving quality of life and social anxiety in those with AA who have particularly impaired quality of life.

Limitations and future directions

The generalisability of the findings is limited due to the small sample size. Nevertheless, it was appropriate to adopt a single-group experimental design in this early stage of investigating the effectiveness of MBCT with individuals with AA. Future studies should aim to investigate the feasibility and acceptability of MBCT compared with CBT in larger samples of individuals with AA through a pilot randomised controlled trial. Allocating individuals with AA to a second control group, involving a weekly group discussion, would help to separate the benefits of mindfulness from the benefits of social exposure. Outcomes in the trial could include social anxiety, depression, anxiety, and quality of life. Attrition rates and cost-effectiveness could also be monitored, and qualitative methods could be used to explore client views of MBCT and CBT. The intervention could also be improved by acknowledging that participants' difficulties lie within a broader societal context. That is, many people with AA do receive negative reactions from others, such as staring and insults (e.g. Davey *et al.*, 2019), and this could be acknowledged and discussed in an early session to reduce self-blame in the group members.

Recruitment to the current study was difficult, despite receiving support from a local dermatology clinic, relevant national charities, and local wig stores. This difficulty is understandable when considering that individuals experiencing social anxiety were invited to attend a regular group meet-up with people they do not know – meaning those who were most socially anxious may not have attended. That the intervention was run in-person may have also prevented people with disabilities or lack of transport from attending (although travel costs were reimbursed). Despite recruitment difficulties, the benefits of the group format (e.g. more cost-effective than individual therapy, shared experiences with other members, exposure to social situations) warrant further investigation. A pilot randomised controlled trial would therefore benefit from a multi-site approach with more targeted recruitment to potential participants, to clarify whether a large-scale RCT would be feasible. Collecting data after a longer follow-up period would clarify whether the benefits of the intervention are long lasting. In addition, further single-group experimental designs would be useful in demonstrating the effectiveness of MBCT in more diverse samples of individuals with AA, such as men or individuals from minority ethnic backgrounds. The lack of diversity in mindfulness-based intervention studies is a broader issue, with samples typically consisting of white, educated, middle-aged females (Eichel *et al.*, 2021). Diversifying samples may be achieved by increasing diversity within the research team (including the intervention facilitators), collaborating with marginalised communities, and carefully considering the intervention setting (e.g. running the group in a community centre, rather than at a university; Eichel *et al.*, 2021). Finally, the importance of home practice should be emphasised to future participants, both during the screening process and during the mindfulness sessions, perhaps with a more focused discussion on potential obstacles and ways of overcoming them.

In conclusion, MBCT appears beneficial in reducing social anxiety and improving wellbeing in some individuals with AA, particularly those who practise mindfulness at home regularly between

sessions. Idiographic measures of social anxiety continued to reduce beyond formal MBCT teaching, suggesting the intervention may provide benefits beyond the final session.

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