

## RESEARCH ARTICLE

# Are dysfunctional attitudes elevated and linked to mood in bipolar disorder? A systematic review and meta-analysis

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**Abstract**

**Objectives:** Dysfunctional attitudes (DA) are higher in depression; however, less is understood about their role in bipolar disorder (BD). This paper aimed to explore the presence of DA in BD in comparison to clinical and non-clinical groups. Also explored were the associations between DA and mood states of depression, mania or euthymia in BD.

**Methods:** A systematic review and meta-analysis were conducted. A total of 47 articles were included in the systematic review of which 23 were included in the meta-analysis. The quality of each study was rated.

**Results:** The meta-analysis showed significantly higher DA in BD than healthy controls ( $d = .70$ ). However, no difference was observed between BD and unipolar participants ( $d = -.16$ ). When reviewing mood state within BD, a significant mean difference was found between DA scores for euthymic and depressed participants ( $d = -.71$ ), with those who were depressed scoring higher. Three studies found that psychological therapies significantly reduce DA in BD ( $d = -.38$ ).

**Conclusions:** These findings imply not only that DA are both a characteristic of BD that is not as prevalent in healthy populations but also that a depressed mood state is associated with increased severity. This implies that DA could possibly go 'offline' when mood symptoms are not present. Psychological therapies appear to reduce DA in BD. Implications for future research as well as practice-based implications are expanded on in the discussion.

**KEYWORDS**

bipolar, depression, dysfunctional attitudes, meta-analysis, mood

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### Practitioner points

- Dysfunctional attitudes in bipolar disorder were examined significantly higher in bipolar compared to healthy controls.
- There was no difference in dysfunctional attitudes between bipolar and unipolar depression.
- It appeared that there is a relationship between mood state in bipolar and the severity of dysfunctional attitudes.
- There is evidence to suggest that psychological therapies significantly reduce dysfunctional attitudes in bipolar.

### Statement of contribution

#### *What Is already known on this subject?*

- Dysfunctional attitudes are known to be elevated in depression.
- There are inconsistent findings about whether they are elevated in bipolar disorder.

#### *What does this study add?*

- Dysfunctional attitudes are elevated in bipolar disorder compared to healthy controls, and similar to unipolar depression.
- Within bipolar disorder, dysfunctional attitudes are higher in those who are depressed compared to those who are euthymic.
- Psychological therapies appear to reduce dysfunctional attitudes in bipolar disorder.

## INTRODUCTION

In recent years there has been growing evidence for the efficacy of psychological therapies in bipolar disorder (BD; Oud et al., 2016). Research has shown high levels of perfectionism in this population which correlates with greater anxiety and depression (Fletcher et al., 2019), and low levels of self-compassion (Fletcher et al., 2019; Yang et al., 2020). Low levels of self-compassion have been hypothesized to result in further striving (mania), as it is unacceptable to fail, or in increased negative cognitions associated with perceived failure leading to depression (Johnson et al., 2012).

This concept of constant striving is captured in the cognitive model of mood swings in bipolar (Mansell et al., 2007), which suggests that attempts at regulating mood are disturbed by extreme meanings given to internal state changes. Those with BD attempt to regain control through extreme efforts which can then lead to maintenance of manic or depressive symptoms. Studies have found that goal attainment life events such as marriage or promotion have been seen to precede mania, while negative life events such as loss have been seen to precede depression (Johnson et al., 2000, 2008).

Dysfunctional attitudes (DA) have been well researched in unipolar depression, with consistent findings that levels are elevated (Keller, 1983) and linked to a larger number of previous depressive episodes (Otto et al., 2007). There is longitudinal evidence that DA are able to predict unipolar depressive symptoms (Kërçeli et al., 2013; Wang et al., 2010). Several studies have supported the notion that DA are a key characteristic of depression, and that they are not influenced by changes in mood, but rather are stable characteristics able to predict these changes (Brosse et al., 1999; Fresco et al., 2006). In contrast, Persons and Miranda (1991) suggest that while these DA are ever present in depressed individuals, to make the beliefs or assumptions come 'online' they must be triggered by a negative mood.

There are mixed findings on DA in BD overall: Lam et al. (2004) found significantly higher mean scores for 'goal attainment' in BD than unipolar. Studies have reported elevated overall Dysfunctional Attitudes Scale (DAS) scores in BD when compared to unipolar depressed participants and healthy controls (Batmaz et al., 2013; Thomas et al., 2009), while another study found no difference between the three groups (Alatiq et al., 2010). The mixed findings on the relationship between DA and BD may be somewhat explained by the associations with mood state. Whether DA are still present when an individual is euthymic continues to remain unclear, alongside whether DA may be a significant risk factor for future episodes of mania or depression (Jones et al., 2005; Scott & Pope, 2003).

To date, there have been no systematic reviews or meta-analyses which have attempted to collate and interpret the findings on the topic of DA in BD. Therefore, this systematic review and meta-analysis aim to:

1. explore the presence of DA in BD and compare it to healthy control or other clinical groups;
2. identify any correlates of DA in BD and its relationship with any mood state.

## METHOD

### Databases and search terms

The original search was carried out in December 2021 using the electronic databases Medline, PsycInfo and Web of Science. In October 2022, a cited search of all included papers was completed to update the search. In each of the databases, the following search terms were used to search all fields: 'bipolar' AND 'dysfunctional attitude\*' or 'dysfunctional belie\*' or 'dysfunctional assum\*' or 'negative cognitions' or 'maladaptive belie\*'.

### Inclusion and exclusion criteria

Papers could of any study design using original data collection or secondary data analysis and had to be in English in a peer-reviewed journal. Participants had to have a diagnosis of bipolar disorder and be aged 18 and over. The studies were required to report quantitative data on both DA and mood symptoms using a standardized measure (full scales or subscales). Intervention studies were included if DA and mood must have been measured at baseline prior to any intervention effects. To be included in meta-analysis, studies had to provide data on DA in the paper or via author request for at least two groups of participants to allow for comparison prior to any intervention (mean, standard deviation and sample size).

The preferred reporting items for systematic reviews and meta-analyses (PRISMA; Moher et al., 2009) was adhered to and the protocol was registered with PROSPERO (registration number: 42021283497). Title and abstract screening was completed by CW and a voluntary research assistant. A citation search and handsearching of references for additional studies were completed for one key paper. There was strong agreement between the two raters ( $\kappa = .848$ ; McHugh, 2012). Any disagreements were discussed with the wider research team. Articles included in the full paper search were reviewed only by the lead author. Data extraction from the included studies was completed by the author CW, and a small sample ( $n = 5$ ) was independently checked by a second member of the wider research team and international-rater reliability was perfect ( $\kappa = 1$ ).

### Quality assessment

An adapted version of the National Heart Lung and Blood Institute (National Heart, Lung, and Blood Institute, 2019) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was

used to evaluate the quality and to appraise the findings from each study. The NHLBI Quality Assessment Tool of Controlled Intervention Studies (National Heart, Lung, and Blood Institute, 2019) was used for the studies classified as randomized control trials (RCT). This evaluates the potential flaws in the methodology and design gaining an overall quality rating (poor/fair/good), and rates on 13 specific categories such as selection bias, with some 'fatal flaws' which automatically classify the study as 'poor'.

## Effect size computation for meta-analysis

Data were analysed via Review Manager version 5.4 (Review Manager, 2020). Due to the heterogeneity within studies, a random-effects meta-analysis was used. Group comparisons were made between BD and unipolar depression and healthy controls, as well as among those in a euthymic, depressive and manic state or between type I and type II bipolar participants. Very few studies directly reported correlation co-efficient between a measure of mood (depression/ mania) and a measure of DA, therefore this part of the research question is discussed in the narrative synthesis rather than part of the meta-analysis. Although some studies provided subscale data for the DAS, there was not enough data (using the same subscales as these vary depending upon DAS version used) to complete analysis on individual subscales. Therefore, only DAS total scores were used in the analysis.

## RESULTS

### Summary of studies

A total of 47 papers were included in the systematic review. [Figure 1](#) depicts the systematic review process followed.

### Key characteristics of studies

The key characteristics and overall quality rating of included papers are summarized in [Table 1](#). Studies were primarily conducted in the United Kingdom ( $n=16$ ), United States ( $n=9$ ) and Australia ( $n=6$ ).

The majority were cross-sectional ( $n=31$ ), while the remaining papers were either cohort studies (mainly prospective;  $n=13$ ) or a randomized control trial ( $n=3$ ). The percentage of female participants across all studies was 62.2% and the mean age was 39.76 years.

### Study quality

The results of the quality assessment are presented for cohort and cross-sectional studies ([Table 2](#)), controlled intervention studies ([Table 3](#)) and case-control study ([Table 4](#)). Overall, 73% of the papers were rated as fair, 14.5% as poor and 12.5% were rated as good. Approximately half of the studies ( $n=23$ ) did not perform well in defining the study population. Many provided information on the diagnosis and demographic information of the participants but provided little details about the setting and location. The same underlying criteria were used to select all participants in over half of the studies assessed ( $n=24$ ) and this was done using predetermined inclusion and exclusion criteria. For the remaining studies, it was frequently found that clinical groups were recruited from hospital or clinic settings while control groups were recruited using social media and widespread advertisements and did not specify if these were national or local.

Sample sizes overall were small. In 35 of the 47 studies, the diagnosis of bipolar was clearly determined prior to any outcome measures being completed. The majority of studies ( $n=29$ ) used a validated

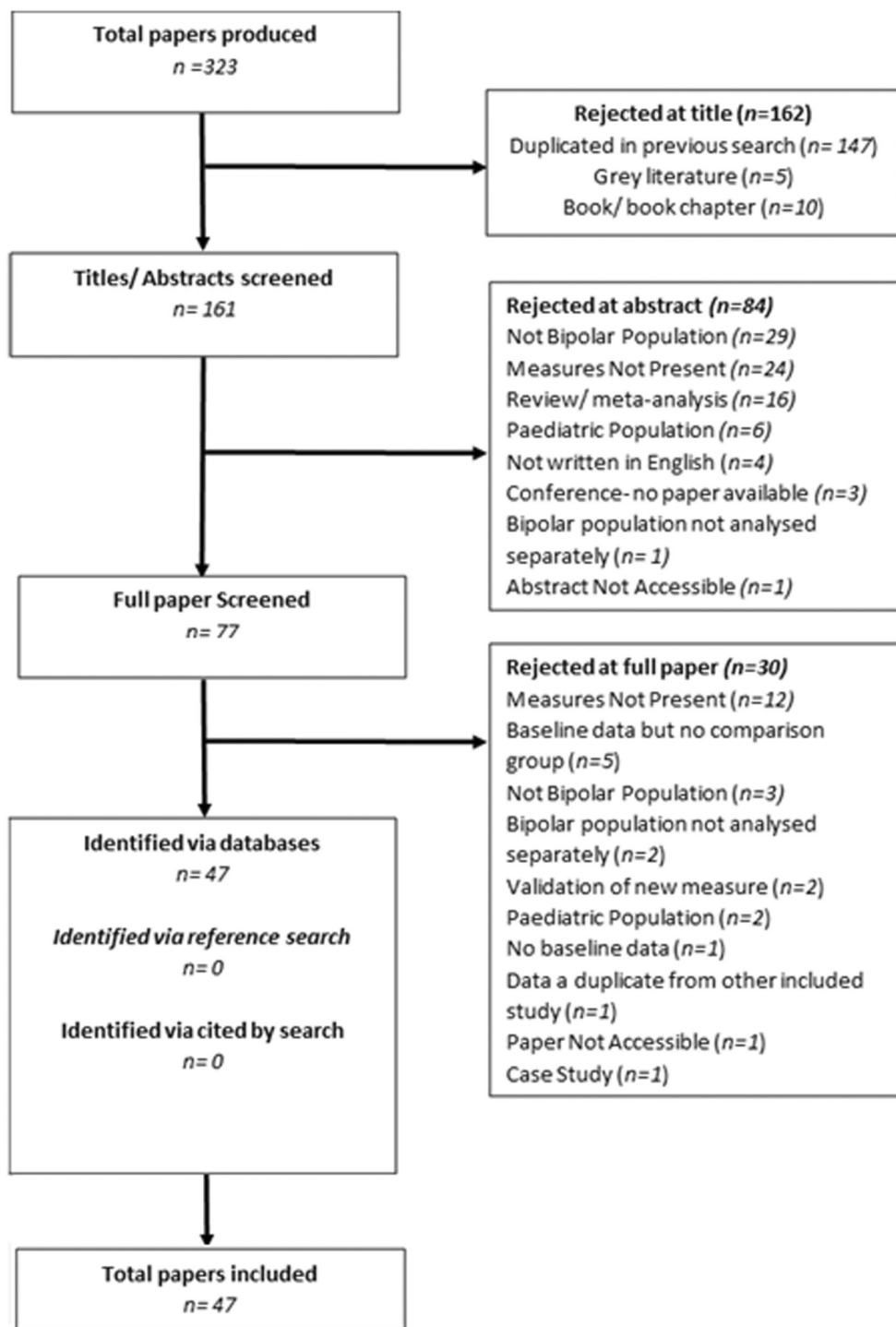


FIGURE 1 PRISMA diagram for paper selection process.

and reliable interview tool to determine diagnosis. The remaining studies either relied upon self-report, referral to the study with a pre-existing diagnosis given by a mental health professional or a self-report screening tool.

TABLE 1 Key characteristics of included studies.

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Alatiq et al. (2010)	Cross-sectional	UK	Grant-Wellcome Trust	40 BD Rem	60%	40.9 (13)
				20 UP Rem	60%	34.5 (13)
				20 HC	50%	29.6 (16)
Alloy et al. (2009)	Cross-sectional /cohort Study-Prospective study	USA	National Institute of Mental Health Grants	195 BSD194 HC	61.5% 59.3%	19.74 (1.71) 19.66 (1.79)
Atuk and Richardson (2021)	Cohort study-Prospective	UK	NIHR research Capability Funding	54 BD BD-I – 57.5% BD II – 15% BD NS – 25% BD I with psychotic symptoms – 2.5%	67.5%	49.05 (11.08)
Ball et al. (2006)	RCT	Australia	Aus Rotary Health Research Fund/Black Dog Institute	52 BD	57.69%	41.46 (14.61)
				25 CT grp	56%	42.52 (14.49)
				27 TAU	59.26%	
Batmaz et al. (2013)	Cross-sectional	Turkey	Not reported	70 BD189 UP	57.1%	36.73 (11.9)
				120 HC	67.2%	37.33 (12.25)
					64.2%	40.03 (12.67)

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	MINI	HAMD	DAS HAPPI	<ul style="list-style-type: none"> <li>DAS total scores showed no significant differences between groups (<math>F(2, 66) = 1.68; p = .195</math>) or in any of its subscales.</li> <li>HAPPI found significant differences between the groups in their total scores: <math>F(2, 67) = 7.83, p = .001</math>. Follow-up Bonferroni post-hoc comparisons indicated that bipolar patients scored higher than the unipolar patients (<math>M_i - j = 16.3, SE = 5.26, p = .009</math>) and healthy controls (<math>M_i - j = 15.2, SE = 4.61, p = .005</math>).</li> </ul>	F
None	GBI SADS-L	BDIHMI	DAS	<ul style="list-style-type: none"> <li>Significant difference between BD group and HC (<math>B = .245; t = 4.98, p &lt; .001</math>) was observed for DAS subscales of 'perfectionism'.</li> <li>No significant difference between groups for DAS subscale of 'approval by others'</li> </ul>	F
None	Not reported – all NHS patients	CES-D AS-RMS	DAS-24 Brief- HAPPI	<ul style="list-style-type: none"> <li>Significant positive correlation between baseline DAS subscale 'goal attainment' and baseline mania, <math>r = .33, p = .018</math>. There was no longer a significant association between baseline DAS-GA and follow-up mania scores when baseline mania was controlled for.</li> <li>A significant positive correlation between baseline DAS subscale 'dependency' and baseline depression, <math>r = .35, p = .015</math>. When controlling for the effects of baseline depression, baseline DAS-D continued to be significantly positively correlated with follow-up depression scores (<math>M = 24.40, SD = 14.83</math>), <math>r = .28, p = .042</math>.</li> <li>A significant positive correlation between baseline brief-HAPPI total mean and depression scores, <math>r = .32, p = .021</math>. When controlling for the effects of baseline mania, there was no longer a significant association</li> </ul>	F
Cognitive therapy for BD or TAU	SCID for DSM-IV	HAM-D-17 MADRS YMRS BDI	DAS	<ul style="list-style-type: none"> <li>DAS total scores post – treatment were significantly higher in TAU group compared to CT group [<math>p &lt; .05</math>] suggesting that CT may be effective in reducing DA in bipolar.</li> <li>However, these results were not sustained beyond the 12-month follow-up</li> </ul>	P
None	WHIPLASHED MDQ MINI	MADRS YMRS BDI	DAS	<ul style="list-style-type: none"> <li>DAS scores were significantly higher in bipolar compared to healthy controls and unipolar depressed groups (<math>p &lt; .05</math>).</li> <li>Correlations for all three groups (no data for BD separately) report a significant positive correlation between DAS scores and depression (<math>r = .417, p &lt; .001</math>), and a significant negative correlation between DAS scores and mania (<math>r = -.411, p &lt; .001</math>), both with a medium-to-large effect size</li> </ul>	F

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Corry et al. (2013)	Cross-sectional	Australia	Australian National Medical and Health Research Council (Program Grant)	141 BD (BD-I = 97 BD-II = 44)	66%	38.56 (12.09)
Coulston et al. (2013)	Cross-sectional	Australia	NHMRC Program Grant	77 BD 96 UP	59.74% 47.92%	39.56 (12.84) 41.98 (14.38)
Docteur et al. (2013)	Cohort Study –prospective	France	Not reported	73 BD (CBT 53 WL 20)	61.64%	45.24 (11.79)
Docteur et al. (2020)	Cohort Study –prospective	France	No funding	99 BD (62 MBCT 37 WL)	63% 50%	47.73 (10.46) 47.16 (11.70)
Docteur et al. (2021)	Cohort Study –prospective	France	Not reported	67 BD	64.19%	27.69 (10.55)
Fletcher et al. (2013)	Cross-sectional	Australia	National Health and Medical Research Council (NHMRC) Programme Grant	94 BDI 114 BDII 109 UP 100 HC	59.6% 60.5% 58.7% 57.0%	39.8 (10.6) 42.2 (11.1) 41.1 (10.8) 34.2 (11.7)
Fletcher et al. (2014)	Cohort Study	Australia	NHMRC Program Grant	151 BD 69 BDI 82 BDII	62.9% 62.3% 63.4%	42.5 (10.0) 39.8 43.8
Fuhr et al. (2014)	Cross-sectional (Study 1)	Germany	German Research Foundation Grant	53 BD-R 58 MDD-R 53 HC	N = 164 59.8%	N = 164 42.77 (12.54)



Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	SCID	DASS MADRS YMRS	DAS	<ul style="list-style-type: none"> <li>No significant correlations between DAS-GA and YMRS (mania) scores.</li> <li>Both anxiety and stress symptoms mediated the relationship between self-critical perfectionism and goal attainment beliefs, and bipolar depressive symptoms. This relationship remained significant after controlling for concurrent (hypo) manic symptoms</li> </ul>	F
None	MINI Or CIDI-Auto	DASS STAI BFNE MDQ	DAS	<ul style="list-style-type: none"> <li>No significant differences between BD or UP groups for dysfunctional attitudes, or the remaining subscales of the COPE (<math>p &gt; .05</math>)</li> </ul>	F
Group CBT vs. waitlist	None reported	HDRS MRS HARS	DAS	<ul style="list-style-type: none"> <li>Improved DAS total scores following CBT compared to waitlist group (<math>t = 3.30</math>, <math>df = 40</math>, <math>p = .001</math>)</li> </ul>	G
MBCT group vs. waitlist	SCID-1	BDI BAI	DAS	<ul style="list-style-type: none"> <li>For the mindfulness-based cognitive therapy group, no differences were observed between baseline and follow-up on the DAS (Cohen's <math>d = .09</math>)</li> </ul>	G
MBCT group vs. waitlist	SCID-1	BDI	DAS	<p>Baseline mean (<math>SD</math>) BDI-13 = 9.71 (8.06) DAS = 140.97 (33.92) Pre-MBCT-mean (<math>SD</math>) (<math>N = 61</math>) BDI-13 = 10.34 (7.10) DAS = 144.30 (35.01)</p>	F
None	MINI	ISS QIDS-SR ASRM STAI	DAS-24	<ul style="list-style-type: none"> <li>DAS total scores were highly correlated with current mood and anxiety symptoms in all groups (BD data not reported separately).</li> <li>Achievement and dependency-related dysfunctional attitudes were comparable in bipolar (I and II) and unipolar participants irrespective of current mood and anxiety symptoms</li> </ul>	F
None	MINI	ISS STAI	DAS HAPPI	<ul style="list-style-type: none"> <li>Bipolar I and II depressive severity and/or variability were associated with high HAPPI-total scores.</li> <li>Bipolar I depressive variability was uniquely positively associated with DA related to achievement.</li> <li>Positive relationships were observed between bipolar II depressive severity DA related to goal attainment and dependency.</li> <li>DAS did not predict BD-I depression.</li> <li>DAS did not predict hypo(manic) mood status at 6-month follow-up in either bipolar sub-type</li> </ul>	F
None	SCID-I	YMRS HRSD BDI-II	DAS DAS-A DAS-D	<ul style="list-style-type: none"> <li>DAS total scores did not differ significantly between BD group and UP group or HC. UP group scored significantly higher than the HC group.</li> <li>No significant differences between BD group and UP or HC group were found on the DAS subscale of achievement. BD group did score significantly higher than the other two groups on the dependency subscale</li> </ul>	G

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Fuhr et al. (2017)	Cross-sectional	Germany	German Research Foundation Grant	61 BD-R 61 UP-R 60 HC	N= 182 55%	N= 182 42.31 (13.14)
Goldberg et al. (2008)	Cross-sectional	USA	NIMH Research Grant MH-01936 and a NARSAD Young Investigator Award (to J.F.G.).	34 BD-M 35 UP-D 29 HC	56% 69% 72%	42.7 (12.3) 43.5 (11.7) 33.4 (14.8)
Granger et al. (2021)	Cross-sectional	Aus. UK Canada	Not reported	26 BD-D 21 BD-E 26 UP-D 24 UP-E 69 HC	93% 81% 88.5% 75% 71%	35.88 (10.79) 38.95 (11.83) 29.42 (11.94) 31.92 (13.59) 27.84 (13.24)
Hawke et al. (2013)	RCT	Canada	Grant; Canadian Institutes for Health Research	204 BD	Not stated	40.9 (10.7)
Hollon et al., (1986)	Cross-sectional	USA	National Institute of Mental Health Grant	12 BD-D 16 UP-D 12 GPD 12 Med C 32 HC 12 BD-R 13 UP-R	75% 68.75% 41.67% 75% 68.75% 83.33% 76.92%	39.00 (14.75) 32.44 (9.70) 34.17 (12.49) 40.17 (13.22) 30.03 (7.48) 42.50. (14.04) 38.62 (9.89)

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	SCID-I	YMRS HRSD BDI	DAS	<ul style="list-style-type: none"> <li>The UP and BD groups showed significantly higher scores on the DAS compared to the control group (unipolar vs. controls: <math>p = .009</math>; bipolar vs. controls: <math>p = .02</math>) but did not differ from each other.</li> <li>Remitted patients with a history of mood disorders were more likely to report higher depressive symptoms, higher scores in dysfunctional attitudes and lower self-esteem compared to healthy controls, but did not differ from each other</li> </ul>	F
None	SCID	HAM-D YMRS CCL-M	DAS	<ul style="list-style-type: none"> <li>BD group currently in a manic episode scored significantly higher than control group on DAS total score.</li> <li>UP scored significantly higher than both the control and BD group on the DAS total score (<math>F = 8.862, df = 2.73, p &lt; .001</math>) and on the 'performance' subscale (<math>F = 11.62, df = 2.73, p &lt; .001</math>). No difference between any of the groups for the 'approval' subscale.</li> <li>BD groups were presenting with moderate manic and low depressive symptoms at point of DAS completion, while UP group had moderately high depressive symptoms and absence of mania.</li> <li>BD group CCL-M scores were highly and significantly associated with DAS scores, with significant associations evident in 4 of the 7 CCL-M domains ('spending,' 'excitement,' 'frustration' and 'activity'). No association for UP group</li> </ul>	F
None	MDQ	ASRM PHQ-9	DAS	<ul style="list-style-type: none"> <li>The bipolar depressed and unipolar depressed groups reported significantly higher DAS total scores than the healthy control group (<math>F(4, 152) = 5.73, p &lt; .001, \eta^2 = .13</math>). No such difference was seen between the euthymic groups and healthy controls</li> </ul>	P
Individual CBT/ group psycho-ed	SCID-I	CARSM HAM-D	DAS	<ul style="list-style-type: none"> <li>Baseline data found significantly higher DAS total scores in BD participants with co-morbid anxiety than in those with no anxiety disorder</li> </ul>	F
None	SADS-L Older study; DSM-III	BDI	DAS	<ul style="list-style-type: none"> <li>For the DAS total scores, the general psychiatric population control group did not differ from the syndrome depressed groups (BD-D, UP-D) in terms of level of dysfunctional attitudes. However, the depressed groups scored significantly higher than the remaining remitted, medical control and substance abuse groups.</li> <li>Intercorrelations of all subjects (not BD alone) showed that BDI (depression) scores significantly correlate with DAS total scores</li> </ul>	P

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Jabben et al. (2012)	Cross-sectional	Netherlands	Grant from Astra	60 BD-E	55.0%	43.9 (8.2)
			Zeneca & Eli Lilly	17 BD-D	47.1%	46.4 (6.7)
			Reports of role of	39 BD-Rel	48.7%	40.7 (12.2)
			funding source 'none'	61 HC	62.3%	45.3 (8.7)
Johnson and Fingerhut (2004)	Cohort Study –prospective (over 2 years)	USA	Young Investigator Award/ NIMH Grant	60 BD	55%	42.34 (10.46)
Jones et al. (2005)	Cross-sectional	UK	Wellcome Trust	110 BD-I	61%	48.34 (12.09)
			and Medical	258 UP	70.6%	48.50 (11.93)
			Research Council	264 HC	60.8%	48.99 (8.98)
Jones et al. (2009)	Cohort study	UK	Not reported	76 BD	63%	45.17 (11.53)
				123 UP	62%	43.45 (11.63)
Lam et al. (2004)	Cross-sectional	UK	Not reported	143 BD 109 UP	56% 55%	44.3 (12.7) 44.4 (12.8)
Lam et al. (2005)	RCT Computer-generated allocation	UK	Not reported	103 BD 52 CT 51 CC	53.8 58.8	46.4 (12.1) 41.5 (10.8)

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	Part of wider BIPOLCOG study	HDRS YMRS	DAS	<p>DAS subscales reported;</p> <ul style="list-style-type: none"> <li>• ‘Goal attainment’ subscale BD depressed group scored significantly higher than HC (<math>p = .03</math>). No significant difference between HC and BD euthymic or BD relative groups</li> <li>• ‘Dependency’ subscale – no significant group differences.</li> <li>• For the ‘achievement’ subscale, the BD depressed group scored significantly higher (<math>p &lt; .01</math>) than the HC, BD euthymic and BD relative group.</li> </ul> <p>The occurrence of DA was related to the presence of current depression, as depressed but not euthymic BD patients were characterized by achievement and GA DA</p>	P
None	SCID-P	MHRSD BRMS	DAS	<ul style="list-style-type: none"> <li>• DAS total scores were strongly related to depressive symptoms, both at baseline and at follow-up (baseline = .30, <math>p &lt; .05</math>, follow-up = .40, <math>p &lt; .01</math>) and were said to be a predictor of bipolar depression. The DAS total score was not correlated with manic symptoms</li> </ul>	G
None	SCAN	ASRM BDI	DAS	<ul style="list-style-type: none"> <li>• DAS total scores were significantly higher in the UP group when compared to BD type I and healthy controls.</li> <li>• More DA (greater need for achievement, greater dependency on others and greater need for control of self) among those with BD/ UP when compared to HC</li> </ul>	F
None	Interview with psychiatrist	MADRS	DAS	<ul style="list-style-type: none"> <li>• No significant difference in DAS total scores between the BD and UP groups.</li> <li>• DAS total scores were not found to be a significant predictor of depression</li> </ul>	F
None	SCID-I	BDI ISS	DAS-24	<ul style="list-style-type: none"> <li>• No significant difference in DAS total scores BD &amp; UP.</li> <li>• When depression &amp; internal state were controlled for, there was a significant difference between the two groups in the DAS goal attainment (<math>F = 4.48</math>, <math>P = .036</math> two-tailed).</li> <li>• Factor correlations for DAS subscales; ‘Dependency’ subscale correlated significantly with depression in both UP &amp; BD groups. ‘Goal attainment’ subscale correlated significantly with depression scores in the UP group, however, not in the BD group.</li> <li>• For the BD group, the ‘goal attainment’ subscale correlated significantly with past hospital admissions (<math>r = .20</math>, <math>n = 124</math>, <math>p = .019</math>) and past hospitalizations due to mania (<math>r = .17</math>, <math>n = 124</math>, <math>p = .03</math>, one-tailed)</li> </ul>	F
CT vs. Control Condition	SCID	HDRS MRS	DAS-A	<p>Data for DAS-A, MRS and HDRS available at 3 time points but no comparisons were made between the measures, only time intervals</p>	F

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Lee et al. (2010)	Cross-sectional	UK	Not reported	54 BD	59.3%	45.7 (10.8)
Lex et al. (2008)	Cross-sectional	Austria	Not reported	19 BD-I 19 HC	63.16% 52.63%	39.7 (10.6) 48.1 (15.2)
Lex et al. (2011)	Cross-sectional	Austria	Not reported	15 BD-HYP 26 BD-Re 21 HC	73.3% 57.7% 68.9%	43.33 (12.18) 49.35 (11.20) 43.43 (12.00)
Lomax and Lam (2011)	Cross-sectional/ case-control	UK	Not reported	30 BD-I 30 HC	60% 63%	47.17 (11.67) 41.07 (14.98)
Mansell and Jones (2006)	Cross-sectional	UK	Not reported	56 BD 39 HC	76.79% 74.36%	47.02 (9.98) 43.79 (14.22)
Mezes et al. (2021)	Cross-sectional and longitudinal	UK	PhD student ship funded by the University/ NHS	107 BD (90 BD at 6 m follow-up)	61.7%	46.13 (10.97)
Muralidharan et al. (2015)	Cross-sectional	USA	Woodruff Fellowship Professional development	22 BD 22 HC	45.45% 45.45%	25.18 (4.05) 26.44 (5.44)
O'Garro-Moore et al. (2015)	Cohort Study -prospective 6 m follow-up for only BDI and HMI	China	National Institute of Mental Health grants	48 BSD 50 BSD/Axe 43 HC	65.33% (combined BD) 68.18%	20.24, (2.11) - mean across all 3 groups

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	SCID	BDI ASRM	DAS-BD	<ul style="list-style-type: none"> <li>The BDI total score for depression was significantly correlated with the DAS total score (<math>r = .504, p &lt; .01</math>, two-tailed) for participants with BD</li> </ul>	F
None	SCID-I	BDI	DAS	<ul style="list-style-type: none"> <li>DAS total score was higher in the BD group compared to the HC group (<math>t(35) = 1.89, p = .06, d = .62</math>). Despite the medium effect size, the difference did not reach significance</li> </ul>	F
None	IDCL (for DSM-IV)	BDI BRMS	DAS	<ul style="list-style-type: none"> <li>A significant group effect for DAS total score (<math>F(2, 59) = 3.79, p = .03</math>, partial <math>\eta^2 = .11</math>)</li> <li>Post-hoc comparisons of the DAS total scores showed that BD hypomanic did not differ significantly from BD remission group, but reported significantly higher DAS scores than the HC. The BD remission did not sig differ from either group. It was found that depression scores did not significantly contribute to the effect, however, did result in the findings no longer meeting significance</li> </ul>	F
Mood induction	SCID-IV	MRS BDI VAS	DAS-BD	<ul style="list-style-type: none"> <li>DAS total scores were significantly higher for the BD group compared to HC group (<math>t = 2.595, df = 58, p = .012</math>).</li> <li>Specifically, higher levels of dysfunctional attitudes related to 'dependency' (<math>t = 3.288, df = 58, p = .002</math>) and 'achievement' (<math>t = 2.630, df = 58, p = .011</math>) subscales</li> </ul>	F
None	Not reported	ISS	Brief-HAPPI	<ul style="list-style-type: none"> <li>The brief-HAPPI total score was significantly higher in the BD group when compared to HC group (<math>p &lt; .001</math>). The brief HAPPI total mean score also correlated with depression (<math>r(52) = .29, p &lt; .05</math>) in the bipolar group</li> </ul>	P
None	SCID	CES-D AMRS	DAS-24	<ul style="list-style-type: none"> <li>Dysfunctional attitudes were associated with lower rates of personal recovery and more (hypo)manic and depressive episodes at baseline respectively.</li> <li>Higher rates of dysfunctional attitudes related to 'achievement' and 'goal attainment' subscales of the DAS may result in engagement in extremely pleasurable and goal-oriented activities, possibly resulting in (hypo)manic episodes</li> </ul>	F
Affective Stroop task	SCID SCID-II	HDRS YMRS	DAS-form A	<ul style="list-style-type: none"> <li>For the DAS 'perfectionism' subscale, there was no significant difference between the two groups</li> </ul>	F
None	GBI	HMI BDI	DAS SAS	<ul style="list-style-type: none"> <li>For the DAS total score, there was no significant difference between the bipolar groups combined and the HC.</li> <li>Comparisons revealed the bipolar with comorbid anxiety group scored higher than the bipolar group and healthy controls on the 'perfectionism' subscale, and higher than the healthy control group on the 'approval by others' subscale</li> </ul>	F

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Pavlickova et al. (2013)	Sample drawn from wider RCT. Cohort Study –prospective	UK	Grant from the MRC & National Institute for Social Care and HR	253 BD	65%	41.2 (10.2)
Perich et al. (2011)	Cross-sectional	Australia	NHMRC Program Grant	90 BD 36 UP-R 66 HC	52.7 80.6% 71.2%	41.18, (12.36) 44.17, (13.81) 38.41, (11.85)
Reilly-Harrington et al. (1999)	Cross-Sectional	USA	Not reported	49 BD 97 UP 23 HC	67% 62% 52%	19.24 (1.98) 20.59 (4.88) 19.38 (1.53)
Reilly-Harrington et al. (2010)	Large prospective Naturalistic study and a series of RCT. Cross-sectional analysis	USA	NIMH	395 BD	59.9%	42.3 (12.4)
Richardson et al. (2021)	Cross-sectional/cohort study	UK	Research Capability Funding NIMH	54 BD 29 BD I 10 BD II	68.5%	48.4 (11.0)
Scott et al. (2000)	Cross-sectional	UK	Not reported	41 BD-E 20 HC	67.0% 55.0%	44.7 (10.5) 43.0 (14.6)



Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
CBT vs. TAU		HAMD MAS	DAS	<ul style="list-style-type: none"> <li>DAS total scores were associated with depression, and this effect remained when controlling for mania.</li> <li>No effects of DAS score were found for the CBT vs. treatment as usual group, suggesting CBT was not effective at reducing dysfunctional attitudes</li> </ul>	G
MBCT vs. TAU	SCID-I CIDI	DASS STAI ISS	DAS	<p>DAS subscales reported;</p> <ul style="list-style-type: none"> <li>For the 'goal attainment' subscale, there were no significant differences found between the three groups.</li> <li>For the 'dependency' and 'achievement' subscales, the BD group scored significantly higher (<math>p &lt; .05</math>) than the UP or HC groups</li> </ul>	F
None	GBI/ BDI screener SADS-L	BDI	DAS	<ul style="list-style-type: none"> <li>For DAS total scores, there was no significant difference reported between the three groups at time point 1.</li> <li>BD &amp; UP participants with more DAs and a high number of negative life events experienced increases in depressive symptoms from Time 1 to Time 2, Suggesting that a combination of these factors could increase the likelihood of a depressive episode</li> </ul>	F
None	MINI ADE	MADRS YMRS	DAS	<ul style="list-style-type: none"> <li>Results indicated that the clinical status groups differed significantly on the DAS scores (<math>F(4, 388) = 9.06, p &lt; .001</math>).</li> <li>Patients in a mixed episode status exhibited significantly higher DAS scores than both manic/ hypomanic (<math>p &lt; .015</math>) and euthymic patients (<math>p &lt; .001</math>).</li> <li>Depressed patients also exhibited significantly higher DAS score than both manic/ hypomanic (<math>p &lt; .03</math>) and euthymic patients (<math>p &lt; .001</math>), but not mixed patients (<math>p &gt; .10</math>).</li> <li>There were significant correlations between the DAS scores and depression scores (<math>r = .36, p &lt; .001</math>) and significant but modest correlations between the DAS and mania scores (<math>r = .18, p &lt; .001</math>)</li> </ul>	F
None	Clinician stated diagnosis	BIS	DAS	<ul style="list-style-type: none"> <li>Greater compulsive spending, a common behaviour/ symptom in BD, at Time 2 was significantly</li> <li>Predicted by higher dependency and achievement dysfunctional assumptions at baseline after controlling for baseline compulsive spending</li> </ul>	F
None	Clinician observation	HRSD BDI	DAS SAS	<ul style="list-style-type: none"> <li>When compared to HC group, participants with BD demonstrated significantly higher scores on the DAS subscales of 'perfectionism' (<math>F = 28.2; df 1, 59; p &lt; .0001</math>) and 'need for approval' (<math>F = 7.4, df 1, 59; p &lt; .01</math>).</li> <li>Despite being clinician rated as 'euthymic', BD group reported significant residual depressive symptoms.</li> <li>Within the BD group, there was a significant association between higher level of morbidity and higher level of cognitive dysfunction</li> </ul>	F

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Scott and Pope (2003)	Cohort Study	UK	Not reported	16 UP 77 BD BD groups 26 REM 38 DEP 13 HYPO	69% 58%	45.7 (12.3) 41.4 (11.4)
Silverman et al. (1984)	Cross-sectional	USA	Not reported	10 BD 63 UP 19 SCH-A 22 HC 12 SCH-P	NR	NR
Stange et al. (2015)	Cohort Study	USA	NIMH grants	83 BD 89 HC	61.25% 67.44% Does not say if % given are male or female	19.56 (1.77) 20.04 (1.98)
Thomas et al. 2009	Cross-sectional	UAE	Not reported	14 BD-D 30 BD-M 11 BD-R 44 HC	21.43% 66.67% 63.64% 68.18%	38.28 (12.23) 45.86 (12.45) 44.36 (11.69) 37.40 (12.70)

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	'All patients met DSM-IV criteria' but no report on assessment tool used.	ISS	DAS SAS	<ul style="list-style-type: none"> <li>For the DAS total score, BD and UP scores did not show any significant differences on the MANOVA.</li> <li>Comparison of the BD sub-groups; those categorized as in 'remission' had significantly lower DAS total scores than 'depressed' and 'hypomanic' groups. They also had the highest scores for self-esteem.</li> <li>Total scores on the DAS suggested that hypomanic subjects had increased levels of dysfunctional attitudes in comparison to those in remission, but that subjects who were currently depressed showed the greatest level of dysfunction (<math>F=3.2, p=.04</math>)</li> </ul>	F
None	DSM-III criteria	NR	DAS	<ul style="list-style-type: none"> <li>For DAS total score, the BD group was significantly lower than all other groups. Euthymic BD patients displayed least dysfunctional thinking and even lower scores than healthy controls</li> </ul>	P
None	Phase I = GBI Phase II = SADS-L & IPDE for DSM-IV.	BDI HMI	DAS	<ul style="list-style-type: none"> <li>Individuals with BD had significantly higher DAS total scores and had fewer extreme optimistic dysfunctional attitudes than HC group.</li> <li>The prospective onset of episodes of depression was significantly predicted by extreme negative dysfunctional attitudes (<math>OR=1.17, p=.01</math>), but not by extreme positive dysfunctional attitudes (<math>OR=.97, p=.31</math>).</li> <li>The prospective onset of episodes of hypomania was significantly predicted by extremely negative dysfunctional attitudes (<math>OR=1.11, p=.04</math>), but not by extreme positive dysfunctional attitudes (<math>OR=.96, p=.25</math>).</li> <li>When accounting for overall DAS scores, extreme negative dysfunctional attitudes continued to predict the onset of depression at a trend level (<math>p=.06</math>); extreme positive dysfunctional attitudes continued not to predict the onset of depression. However, when accounting for overall dysfunctional attitudes, extremely negative dysfunctional attitudes no longer predicted the onset of hypomania</li> </ul>	G
None	Diagnosed by psychiatrist to meet ICD-10 criteria.	HDRS & BRMS Combined to make CHBRS	Sentence STEM completion task	<ul style="list-style-type: none"> <li>Dysfunctional attitudes assessed using the sentence stem completion task (Teasdale et al., 1995) were significantly higher in all three bipolar sub-groups when compared to healthy controls, but did not differ from one another.</li> </ul>	P

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Tosun et al. (2015)	Cross-sectional	Turkey	No funding	118 BD-R 103 HC	64.41% 72.82%	38.96 (11.52) 34.17 (7.95)
Tzemou and Birchwood (2007)	Cohort study –prospective	UK	Not reported	29 BD 21 UP 20 HC Selected at the 'height of an acute episode'	69% 67% 65%	45.1 (13.7) 44.8 (12.5) 41.0 (12.7)
Wright et al. (2005)	Cross-sectional	UK	University of London Central Research Fund	40 BD-E 40 UP-E 40 HC	60.0% 80% 60.0%	44.0 (10.6) 46.7 (11.6) 43.6 (10.6)

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	Clinician reported diagnosis of BD I or II and MDQ.	None	HAPPI DAS	<ul style="list-style-type: none"> <li>For DAS total scores, the BD group scored significantly higher than HC (<math>t(214) = 5.886; p &lt; .001</math>).</li> <li>For the brief-HAPPI total score, the BD group also scored significantly higher than the HC group (<math>t(214) = 2.243; p &lt; .05</math>).</li> <li>Results suggest that dysfunctional cognitions may be utilized as possible indicators for the risk of relapse in clinical groups and vulnerability for BPD among other populations.</li> <li>Duration of remission (in months) was significantly correlated with the HAPPI (<math>r = -.24; p &lt; .05</math>) and DAS (<math>r = -.21; p &lt; .05</math>) demonstrating that as the duration of remission increases, dysfunctional and hypomanic attitudes of the individuals diagnosed with BPD decrease</li> </ul>	F
None	Not reported – recruited from psychiatric inpatient. Met DSM-IV criteria.	BDI ASRM	DAS-24	<ul style="list-style-type: none"> <li>For the DAS total score, a significant difference was found between the groups (<math>F(2, 67) = 13.27, p &lt; .001</math>).</li> <li>DAS total scores for the BD group were significantly lower than UP group, but still higher than the HC (<math>p = .026</math> and <math>p = .024</math>, respectively). Difference between the groups was eliminated when mood was added as a covariate.</li> <li>At follow-up, DAS total score was significantly higher in the UP group vs. BD group (<math>F(1, 37) = 4.29, p &lt; .05</math>).</li> <li>DAS subscales; ‘dependency’ – BD group scored similarly to controls but UP scored significantly higher (<math>F(2, 67) = 10.5, p &lt; .0001</math>), ‘achievement’ – overall group difference (<math>F(2, 67) = 14.7, p &lt; .001</math>) ‘control’ – BP and UP were both elevated compared to HC group (<math>F(2, 67) = 7.3, p &lt; .001</math>), all fell to a non-significant level when controlling for depression and mania</li> </ul>	F
Positive and negative mood induction	SCID-IV MRS	BDI MRS VAS	DAS-24	<ul style="list-style-type: none"> <li>No significant difference between groups (BD, UP &amp; HC) for DAS total scores at baseline prior to mood induction.</li> <li>Past experience of CBT significantly predicted change in DAS total score; those who had received CBT showed less increase in DAS total score after negative mood induction</li> </ul>	F

TABLE 1 (Continued)

Study (year)	Study design	Country	Funding	N/diagnosis	Female %	Age (mean $\pm$ SD)
Yesilyaprak et al. (2019)	Cross-sectional	Turkey	Not reported	100 BD	57%	40.13 (11.36)
				100 UP	76%	34.94 (11.93)
				100 HC	52%	39.99 (10.77)
Zaretsky et al. (1999)	Matched case-control	Canada	Not reported	8 BD-D	75%	43.9
				8 UP-D	75%	45.5

Of the longitudinal and cohort studies where follow-up data were available ( $n=17$ ), eight studies reported poor attrition with loss to follow-up being higher than 20%. Finally, the majority of studies ( $n=34$ ) identified and adjusted for confounding variables such as age and gender.

## Key measures used in the review and meta-analysis

### Measures of dysfunctional attitudes

There were two key measures used to assess DA in bipolar: The Dysfunctional Attitudes Scale (DAS; Weissman, 1979) and the Hypomanic Attitudes and Positive Predictions Inventory (HAPPI; Mansell, 2006). The DAS self-report questionnaire has 100 items measured on a 7-point Likert scale and was developed into two 40-item measures known as DAS form-A and DAS form-B (Weissman, 1979). Since this time, adapted versions of the measure have been created including the DAS-24 (Power et al., 1994), which includes subscale ratings related to 'achievement', 'dependency' and 'self-control'. Further to this, Lam et al. (2004) developed the DAS-24-BD (bipolar disorder), a measure reflecting the high goal-striving attitudes experienced by those with bipolar which are not found commonly in the unipolar population. This version included subscales of 'goal attainment', 'dependency' and 'achievement'. Within this review the term DAS is used as an overarching term for the different versions, and where relevant the version used is discussed. The majority of more recent research included in the review used the DAS-24.

The HAPPI comprises 104 items and is rated by intersecting the line between 0% (not true/relevant) and 100% (completely true/accurate). The more commonly used measure in this review was the 30-item Brief-HAPPI (Mansell & Jones, 2006).

## Meta-analysis results

Of the 47 studies, 23 were included in the meta-analysis.

Intervention	Diagnostic tool	Mood measure	DA measure	Results	Overall quality
None	Not reported – no mention of DSM or ICD-10	YMRS HCL BDRS MADRS HAM-A	DAS HAPPI	<ul style="list-style-type: none"> <li>DAS total scores were significantly higher in UP group when compared to BD and HC groups. BD group also had higher total scores on the DAS than the HC group (<math>p &lt; .001</math>)</li> <li>'Achievement' subscale of the UP group scored higher than the BD and HC groups (<math>p = .005</math>). No difference was found between the BD and HC groups. 'Dependency' subscale was higher in the UP group compared to the other two groups (<math>p &lt; .001</math>). No difference between BD &amp; HC.</li> <li>Brief-HAPPI total = no difference between the UP and BD groups, but both were higher than the HC group (<math>p = .005</math>)</li> </ul>	F
20 sessions CBT	SADS-L RDC	BDI	DAS	<ul style="list-style-type: none"> <li>Pre-therapy scores were not statistically analysed, however, scores in the BD group appear to be higher than the UP group</li> </ul>	F

## Dysfunctional attitudes, bipolar versus unipolar

### *Overall finding for bipolar versus unipolar*

When comparing DA between bipolar and unipolar groups, a total of 13 studies were included. [Figure 2](#) displays the random effects analysis which revealed a non-significant effect size of  $-.16$  (95% CI =  $[-.05, 2.07]$ ). Visual inspection of the funnel plot ([Figure 3](#)) showed a symmetric distribution of the overall effect sizes, suggesting that publication bias was minimal.

### *Bipolar depressed versus unipolar depressed*

Three studies provided data to comparing dysfunctional attitude scores of those with a bipolar diagnosis in a depressed mood state compared to those with a unipolar diagnosis also in a depressed mood state at the time of completion ([Figure 4](#)). The result indicated a non-significant standardized mean difference (*SMD*) between the two groups ( $SMD = .21$ , 95% CI =  $[-.33, .76]$ ).

### *Breakdown of bipolar remission/euthymic versus unipolar remission/euthymic*

Four studies ([Figure 5](#)) provided the data to examine DA in bipolar and unipolar while in a euthymic state, as this. The result indicated a non-significant *SMD* between groups ( $SMD = -.05$ , 95% CI  $[-.28, .17]$ ).

### *Dysfunctional attitudes, bipolar versus healthy controls*

Fourteen studies were included comparing DA in bipolar participants versus healthy controls ([Figure 6](#)). The results indicated a significant effect size of  $.70$  (95% CI  $[.55, .85]$ ) with higher scores for those with bipolar. Visual inspection of the funnel plot ([Figure 7](#)) showed a very narrow funnel of distribution, suggesting overall similarities and that publication bias can be considered to be minimal.

## Dysfunctional attitudes and mood in bipolar

### *DA in bipolar euthymic versus bipolar depressed*

Two studies included data for DA when either in a euthymic or depressed state ([Figure 8](#)). The results indicated a significant effect size of  $-.71$  (95% CI =  $[-1.19, -.22]$ ), with higher scores for those depressed than euthymic. There was not enough data to provide a comparison for those in a manic episode.

TABLE 2 Quality assessment tool for cohort and cross-sectional studies.

Study	1. Question & Objective	2. Population specified and defined	3. Participation rate > 50%	4. Similar populations	5. Sample size justification	6. Exposure causes outcome
Alatiq et al. (2010)	Yes	No	CD	CD	Yes	Yes
Alloy et al. (2009)	Yes	Yes	Yes	Yes	NR	Yes
Atuk and Richardson (2021)	Yes	CD	NR	Yes	No	Yes
Batmaz et al. (2013)	Yes	Yes	CD	Yes	No	Yes
Corry et al. (2013)	Yes	Yes	CD	Yes	No	Yes
Coulston et al. (2013)	Yes	Yes	Yes	Yes	NR	No
Docteur et al. (2013)	Yes	No	Yes	Yes	Yes	Yes
Docteur et al. (2020)	Yes	Yes	Yes	Yes	No	Yes
Docteur et al. (2021)	Yes	Yes	Yes	Yes	No	Yes
Fletcher et al. (2013)	Yes	No	CD	Yes	No	Yes
Fletcher et al. (2014)	Yes	No	CD	Yes	No	Yes
Fuhr et al. (2014)	Yes	No	Yes	Yes	Yes	Yes
Fuhr et al. (2017)	Yes	No	Yes	No	No	No
Goldberg et al. (2008)	Yes	Yes	Yes	Yes	No	Yes
Granger et al. (2021)	Yes	No	CD	NR	No	No
Hollon et al. (1986)	Yes	Yes	NR	No	No	No
Jabben et al. (2012)	Yes	Yes	CD	No	No	Yes
Johnson and Fingerhut (2004)	Yes	Yes	Yes	Yes	No	Yes
Jones et al. (2005)	Yes	No	No	No	CD	Yes
Jones et al. (2009)	Yes	No	CD	Yes	No	Yes
Lam et al. (2004)	Yes	Yes	CD	Yes	Yes	Yes
Lee et al. (2010)	Yes	Yes	CD	NA	No	Yes
Lex et al. (2008)	Yes	Yes	Yes	No	No	No
Lex et al. (2011)	Yes	No	CD	No	No	No
Lomax and Lam (2011)	Yes	No	CD	No	No	No
Mansell and Jones (2006)	Yes	No	CD	No	No	No
Mezes et al. (2021)	Yes	Yes	Yes	No	Yes	Yes
Muralidharan et al. (2015)	Yes	Yes	CD	Yes	No	No
O'Garro-Moore et al. (2015)	Yes	Yes	No	Yes	No	Yes
Pavlickova et al. (2013)	Yes	Yes	Yes	Yes	No	Yes
Perich et al. (2011)	Yes	Yes	Yes	No	No	Yes
Reilly-Harrington et al. (2010)	Yes	No	Yes	No	No	Yes
Reilly-Harrington et al. (1999)	Yes	Yes	CD	Yes	No	Yes
Richardson et al. (2021)	Yes	Yes	No	NA	No	Yes
Scott et al. (2000)	Yes	No	CD	CD	No	Yes
Scott and Pope (2003)	Yes	No	Yes	Yes	No	Yes
Silverman et al. (1984)	No	No	CD	Yes	No	Yes
Strange et al. (2015)	Yes	Yes	CD	Yes	Yes	Yes
Thomas et al. (2009)	Yes	No	CD	No	No	Yes
Tosun et al. (2015)	Yes	Yes	CD	No	No	Yes



7. Timeframe	9. IV clearly defined, valid, reliable	10. Assessed over time	11. Outcome measures	12. Assessors blinded	13. Loss to follow-up <20%	14. Confounding variables	15. Overall quality rating
No	Yes	No	Yes	CD	NA	Yes	F
Yes	Yes	Yes	Yes	CD	Yes	Yes	F
No	No	Yes	Yes	NA	No	Yes	F
No	Yes	No	Yes	CD	NA	Yes	F
NA	Yes	No	No	CD	NA	Yes	F
No	Yes	No	No	CD	NA	Yes	F
Yes	No	Yes	No	CD	No	Yes	G
Yes	Yes	No	Yes	CD	Yes	Yes	G
Yes	Yes	No	No	CD	Yes	No	F
NA	Yes	No	Yes	No	NA	Yes	F
Yes	Yes	Yes	Yes	CD	No	Yes	F
NA	Yes	No	Yes	Yes	NA	Yes	G
No	Yes	No	No	Yes	NA	Yes	F
No	Yes	No	No	NR	NA	Yes	F
No	No	No	Yes	NA	NA	NR	P
No	No	No	No	No	NA	No	P
No	CD	No	No	No	NA	Yes	P
Yes	Yes	Yes	Yes	CD	Yes	Yes	G
No	Yes	No	No	CD	NA	Yes	F
Yes	CD	No	Yes	CD	No	Yes	F
No	Yes	No	No	CD	NA	Yes	F
No	Yes	No	No	CD	NA	NA	F
No	Yes	No	Yes	CD	NA	Yes	F
No	Yes	No	Yes	CD	NA	Yes	F
Yes	Yes	No	Yes	CD	NA	Yes	F
No	No	No	Yes	NA	NA	Yes	P
Yes	Yes	Yes	Yes	CD	Yes	Yes	F
No	Yes	No	Yes	CD	NA	Yes	F
Yes	Yes	CD	Yes	Yes	CD	Yes	F
Yes	Yes	Yes	Yes	CD	No	Yes	G
No	Yes	No	Yes	CD	NA	No	F
No	Yes	No	Yes	CD	NA	Yes	F
No	Yes	Yes	Yes	Yes	CD	Yes	F
Yes	No	No	Yes	CD	No	No	F
No	CD	No	Yes	CD	NA	Yes	F
Yes	No	No	Yes	CD	No	Yes	F
No	No	No	Yes	CD	NA	No	P
Yes	Yes	Yes	Yes	Yes	NR	Yes	G
No	No	No	No	No	NA	No	P
No	No	No	Yes	NA	NA	No	F

TABLE 2 (Continued)

Study	1. Question & Objective	2. Population specified and defined	3. Participation rate > 50%	4. Similar populations	5. Sample size justification	6. Exposure causes outcome
Tzemou and Birchwood (2007)	Yes	Yes	Yes	Yes	No	Yes
Wright et al. (2005)	Yes	No	Yes	No	No	Yes
Yesilyaprak et al. (2019)	Yes	Yes	CD	Yes	Yes	Yes

Note: 1. Was the research question or objective in this paper clearly stated? 2. Was the study population clearly specified and defined? 3. Was the participation rate of eligible persons at least 50%? 4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants? 5. Was a sample size justification, power description or variance and effect estimates provided? 6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? 7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? 9. Were the exposure measures (independent variables) clearly defined, valid, reliable and implemented consistently across all study participants? 10. Was the exposure(s) assessed more than once over time? 11. Were the outcome measures (dependent variables) clearly defined, valid, reliable and implemented consistently across all study participants? 12. Were the outcome assessors blinded to the exposure status of participants? 13. Was loss to follow-up after baseline 20% or less? 14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

Abbreviations: CD, cannot determine; NA, not applicable; NR, not reported. Overall rating: F, fair; G, good; P, poor.

### *The effect of psychological therapy on dysfunctional attitudes*

Three papers contained the required information for post-intervention data for the impact of psychological therapy versus treatment as usual on DA in bipolar disorder (Figure 9). The result indicated a significant effect size of  $-.38$  (95% CI  $[-.66, -.10]$ ).

## Heterogeneity of the studies

Heterogeneity analysis revealed a considerable inconsistency of effects between bipolar and unipolar groups ( $Q=49.73$ ,  $df=12$ ,  $p<.001$ ,  $I^2=76\%$ ). The remaining analyses scored within the range of unimportant to moderate heterogeneity; DAs in bipolar depressed versus unipolar depressed ( $Q=3.18$ ,  $df=2$ ,  $p=.20$ ,  $I^2=37\%$ ), DAs in bipolar euthymic versus unipolar euthymic ( $Q=.10$ ,  $df=3$ ,  $p=.99$ ,  $I^2=0\%$ ), DAs in bipolar versus healthy controls ( $Q=25.44$ ,  $df=13$ ,  $p=.02$ ,  $I^2=49\%$ ), DAs in bipolar euthymic versus bipolar depressed ( $Q=.22$ ,  $df=1$ ,  $p=.64$ ,  $I^2=0\%$ ) and DAs post-psychological therapy versus treatment as usual for bipolar disorder ( $Q=2.40$ ,  $df=2$ ,  $p=.30$ ,  $I^2=17\%$ ). Heterogeneity should be interpreted with caution for the analysis where fewer than four studies were included.

## Narrative synthesis

### Dysfunctional attitudes in bipolar versus healthy controls – using the DAS

Nine studies found significantly higher overall DAS scores in bipolar compared to healthy controls (Batmaz et al., 2013; Fuhr et al., 2017; Goldberg et al., 2008; Jones et al., 2005; Lex et al., 2011; Lomax & Lam, 2011; Scott et al., 2000; Stange et al., 2015; Tosun et al., 2015). Lex et al. (2008) found DA were higher in the bipolar group than in healthy controls; the effect size was moderate although did not reach significance. Some also reported subscale findings: Lomax and Lam (2011) and Perich et al. (2011) reported that the dependency and achievement subscales were significantly higher in the bipolar group than in healthy controls, while others found no difference (Alloy et al., 2009).

Five studies reported no significant difference between DAS total score for healthy controls and those with BD (Alatiq et al., 2010; Fuhr et al., 2014; O'Garro-Moore et al., 2015; Reilly-Harrington

7. Timeframe	9. IV clearly defined, valid, reliable	10. Assessed over time	11. Outcome measures	12. Assessors blinded	13. Loss to follow-up <20%	14. Confounding variables	15. Overall quality rating
Yes	No	NA	Yes	NA	Yes	Yes	F
NA	Yes	No	Yes	CD	NA	Yes	F
No	No	No	Yes	NA	NA	No	F

et al., 1999; Yesilyaprak et al., 2019). Several studies analysed subscales separately and found a significant difference between healthy controls and the bipolar population (Fuhr et al., 2014; Jones et al., 2005). However, Muralidharan et al. (2015) and Goldberg et al. (2008) reported that bipolar participants did not significantly differ on subscales, yet Goldberg et al. (2008) did find a difference in the overall DAS score. Only one study, which was rated as poor quality, reported lower scores on the DAS for participants with BD when compared to HC (Silverman et al., 1984).

Several studies (Granger et al., 2021; Hollon et al., 1986; Jabben et al., 2012; Wright et al., 2005) found that those classed as ‘bipolar depressed’ scored significantly higher than the healthy controls, however, for the ‘bipolar euthymic’ groups, there were no such differences found. Lex et al. (2011) compared ‘bipolar hypomanic’ mood state with healthy controls, and DAS scores were significantly higher in the bipolar group; however, there was no difference found with the ‘bipolar euthymic’ mood state. Finally, Thomas et al. (2009) used a sentence stem completion task as an implicit measure of DA showing that all bipolar sub-groups (euthymic, manic and depressed) scored higher for DA compared with healthy control group but did not vary significantly from one another.

## Dysfunctional attitudes in bipolar versus unipolar disorder – using the DAS

Ten studies that compared DAS scores for bipolar and unipolar depressed participants found no significant difference between the two groups (Coulston et al., 2013; Fuhr et al., 2014, 2017; Granger et al., 2021; Jones et al., 2009; Lam et al., 2004; Reilly-Harrington et al., 1999; Scott & Pope, 2003; Wright et al., 2005; Yesilyaprak et al., 2019). Even when exploring individual subscales of the DAS, no significant differences were reported. Fletcher et al. (2013) reported that ‘Achievement’ and ‘Dependency’-related DA were comparable in bipolar (I and II) and unipolar participants irrespective of current mood and anxiety symptoms.

Only three studies reported significantly higher levels of DA in bipolar participants when compared to unipolar subjects, one of which was only evident when using the HAPPI rather than DAS (Alatiq et al., 2010). The other studies by Perich et al. (2011) and Lam et al. (2004) found significantly higher levels of DA in the bipolar ‘euthymic’ group when compared to the major depressive disorder group reported to be in remission. Lam et al. (2004) found that the difference between DAS scores was

TABLE 3 Quality assessment tool for controlled intervention studies.

Study	1. Described as RCT	2. Method of randomization	3. Treatment allocation concealed	4. Participants and providers blinded	5. Outcome assessors blinded	6. Groups characteristics similar at baseline
Ball et al. (2006)	Yes	Yes	Yes	No	Yes	Yes
Hawke et al. (2013)	Yes	Yes	Yes	No	Yes	Yes
Lam et al. (2005)	Yes	Yes	Yes	No	Yes	CD

*Note:* 1. Was the study described as randomized, a randomized trial, a randomized clinical trial or an RCT? 2. Was the method of randomization adequate (i.e. use of randomly generated assignment)? 3. Was the treatment allocation concealed (so that assignments could not be predicted)? 4. Were study participants and providers blinded to treatment group assignment? 5. Were the people assessing the outcomes blinded to the participants' group assignments? 6. Were the groups similar at baseline on important characteristics that could affect outcomes (e.g. demographics, risk factors, co-morbid conditions)? 7. Was the overall drop-out rate from the study at endpoint 20% or lower of the number allocated to treatment? 8. Was the differential drop-out rate (between treatment groups) at endpoint 15 percentage points or lower? 9. Was there high adherence to the intervention protocols for each treatment group? 10. Were other interventions avoided or similar in the groups (e.g. similar background treatments)? 11. Were outcomes assessed using valid and reliable measures and implemented consistently across all study participants? 12. Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power? 13. Were outcomes reported or sub-groups analysed prespecified (i.e. identified before analyses were conducted)? 14. Were all randomized participants analysed in the group to which they were originally assigned, that is, did they use an intention-to-treat analysis?

Abbreviations: CD, cannot determine; NA, not applicable; NR, not reported. Overall rating: F, fair, G, Good; P, poor.

insignificant until those experiencing a current depressive episode were removed, leaving only euthymic participants in the analysis.

Four studies reported significantly lower overall DAS scores for the bipolar group when compared to unipolar participants. These, however, should be interpreted with caution. Goldberg et al. (2008) reported significantly higher overall DAS scores for unipolar participants, however, when looking individually at subscales, the only one to remain significantly higher was 'performance'. The bipolar participants were also currently manic, and the unipolar group was currently in a depressive episode. This is a contrast to many other studies requiring participants to be euthymic. The remaining studies had small or uneven sample sizes or fell into non-significance when manic and depressive symptoms were controlled for in the analysis (Jones et al., 2005; Silverman et al., 1984; Tzemou & Birchwood, 2007).

### Dysfunctional attitudes measured using the HAPPI in the bipolar population

All but one of the studies (Yesilyaprak et al., 2019) that used the HAPPI found that bipolar groups scored significantly higher than either the healthy control or unipolar groups (Alatiq et al., 2010; Mansell & Jones, 2006; Tosun et al., 2015). Tosun et al. (2015) also reported that these findings may be utilized as an indicator of risk of relapse. The result also showed a significant negative correlation between DA scores and duration a person with bipolar remains in remission.

### The relationship between dysfunctional attitudes and psychological aspects of bipolar disorder

Two studies (Atuk & Richardson, 2021; Corry et al., 2013) found an initial positive correlation between manic symptoms and the 'goal attainment' factor of DAS. However, for Atuk and Richardson (2021), this relationship was not significant over time. There was also a significant positive correlation between depression and the 'dependency' subscale of the DAS, which remained significant at follow-up (Atuk & Richardson, 2021). Mezes et al. (2021) reported similar findings that DAS total scores were associated with lower rates of personal recovery and more (hypo)manic and depressive episodes at baseline.

7. Dropout 20% or less	8. Differential dropout rates (15% or lower between groups)	9. High adherence to intervention protocol	10. Other interventions avoided	11. Outcomes valid, reliable and consistent	12. Sample size sufficient (80% power)	13. Outcomes prespecified	14. Pts analysed in groups originally assigned	15. Overall quality
No	No	Yes	Yes	Yes	No	Yes	Yes	P
No	Yes	Yes	Yes	Yes	No	Yes	No	F
No	Yes	Yes	No	Yes	CD	Yes	Yes	F

Richardson et al. (2021) showed compulsive spending in bipolar participants at follow-up could be predicted by higher ‘dependency’ and ‘achievement’ DAS subscale scores, after controlling for baseline compulsive spending.

Fletcher et al. (2014) used the brief-HAPPI to explore hypomanic DA within bipolar subtypes; scores were positively associated with depressive symptom variability in both subtypes and no relationship with hypomanic symptoms. However, at follow-up (4 weeks), the brief-HAPPI predicted hypomanic and not depressive symptoms showing some inconsistency in their findings. Corry et al. (2013) reported no correlation between the subscale of goal attainment and manic symptoms.

Studies that explored DAS scores and depressive symptoms generally found that they were positively correlated (Jabben et al., 2012; Johnson & Fingerhut, 2004; Lee et al., 2010; Mansell & Jones, 2006; Pavlickova et al., 2013), and no correlations found with other mood states (Jabben et al., 2012). Reilly-Harrington et al. (2010) reported that those in a mixed episode or depressed state scored significantly higher on the DAS than both (hypo)manic and euthymic groups, however, the mixed episode and depressed group did not differ. There were significant correlations between DAS and both depression and manic symptoms, although smaller effect sizes for mania. Jones et al. (2009) reported that DA were not a predictor of depression. Hawke et al. (2013) reported that DAS total scores were significantly higher in bipolar participants with a comorbid anxiety disorder than those without.

Stange et al. (2015) reported that extreme negative DA were a predictor of both depressive and hypomanic symptoms, however, extreme positive DA were not a predictor of hypomania and there was no link between mood symptoms and overall DAS score. Tzemou and Birchwood (2007) findings suggest that when DA are monitored over the course of mood change, it is difficult to determine whether they are present as a symptom of depression or hypomania, or whether they are always present but simply come ‘online’ when a mood state is activated.

## Psychological therapy and dysfunctional attitudes in bipolar disorder

The studies that explored the impact of cognitive therapy on DA in bipolar disorder generally reported mixed findings. The meta-analysis was suggestive of lower DA in those who had engaged in cognitive therapy compared to treatment as usual; however, due to small samples and limited study numbers, these findings should be interpreted cautiously. Of the studies included Docteur et al. (2020) was the



7. Controls selected from eligible cases	8. Concurrent controls	9. Exposure occurred prior to event	10. Exposure clearly defined/ valid/ reliable	11. Assessors blinded	12. Confounding variables	13. Overall rating
CD	CD	Yes	Yes	CD	Yes	Fair

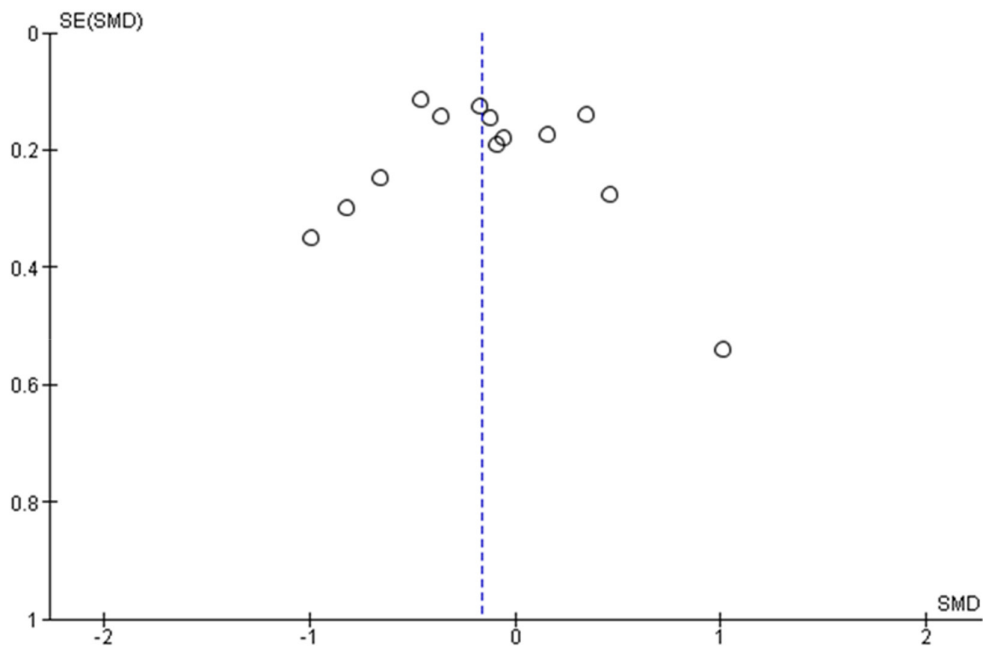


FIGURE 3 Funnel plot for studies comparing Dysfunctional Attitudes Scale scores in bipolar disorder and unipolar.

manic state (Goldberg et al., 2008), therefore it cannot be considered that the BD group is representative of BD more generally, and the link between DA and manic symptoms is unclear. When comparing depressed mood state groups and euthymic groups together, there was also no difference in DA, suggesting that when presenting as either depressed or euthymic, DA do not vary significantly between the two clinical groups. This therefore implies that DA are not only not unique to unipolar depression as previously thought (Abela & D'Alessandro, 2002; Keller, 1983) but also not more extreme in bipolar depressive episodes.

Within bipolar, those who were depressed had significantly higher DAS scores than the euthymic group, although due to small sample size this should be interpreted with caution. This is in keeping with previous findings which have implied that DA come ‘online’ dependent on an individual's state, rather than being a trait of their diagnosis (Persons & Miranda, 2002).

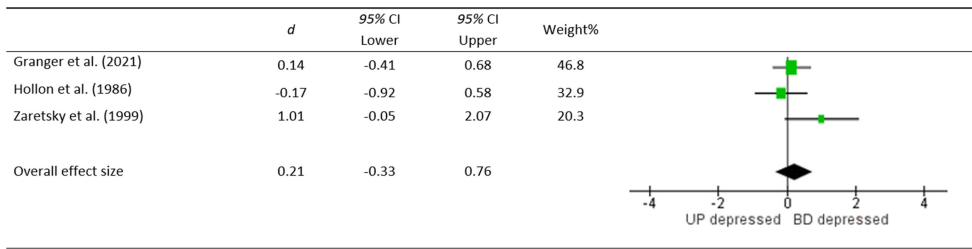


FIGURE 4 Forest plot for the analysis of dysfunctional attitudes for bipolar depressed state versus unipolar depressed state.

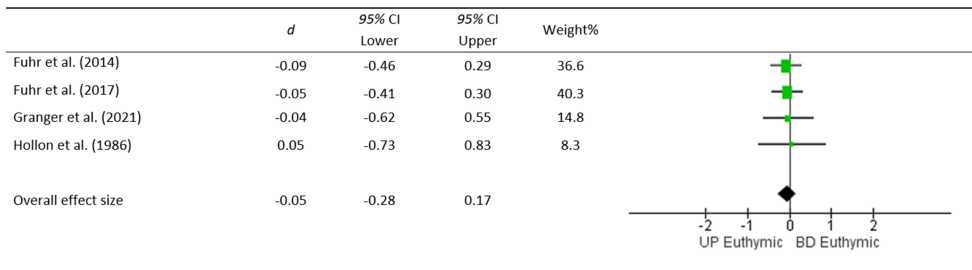


FIGURE 5 Forest plot for the analysis of dysfunctional attitudes for bipolar depressed state versus unipolar depressed state.

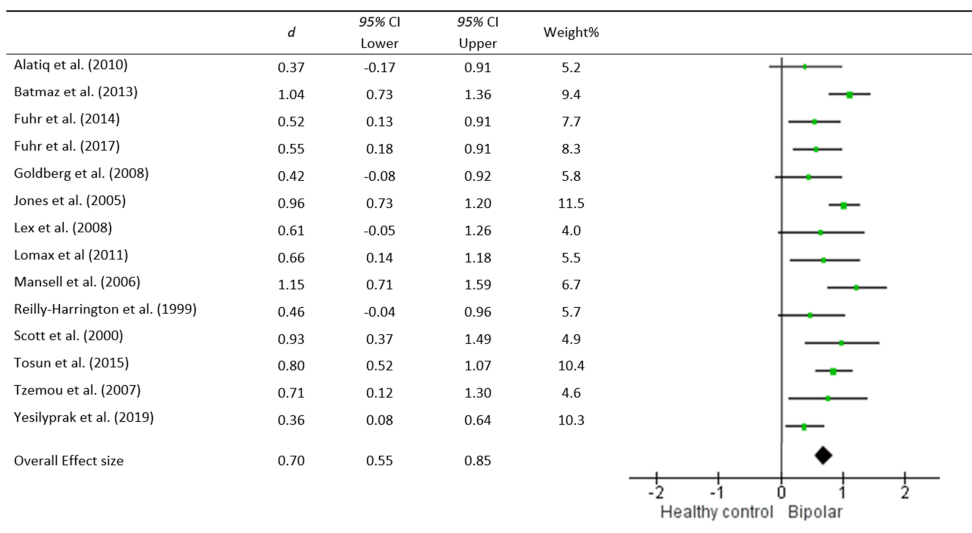


FIGURE 6 Forest plot for the analysis of dysfunctional attitudes in bipolar participants versus healthy controls.

The meta-analysis result demonstrated a medium-to-large effect between bipolar individuals and healthy controls for DA. This included participants who were euthymic or in a current mood episode. Previous research has also shown that DA are predominately influenced by the presence of low mood (Farmer et al., 2001), and as healthy controls were free from any depression, it makes sense that DA would be significantly lower. Something that could not be explored in the meta-analysis due to lack of data was whether there was a difference between healthy controls and those with bipolar who were



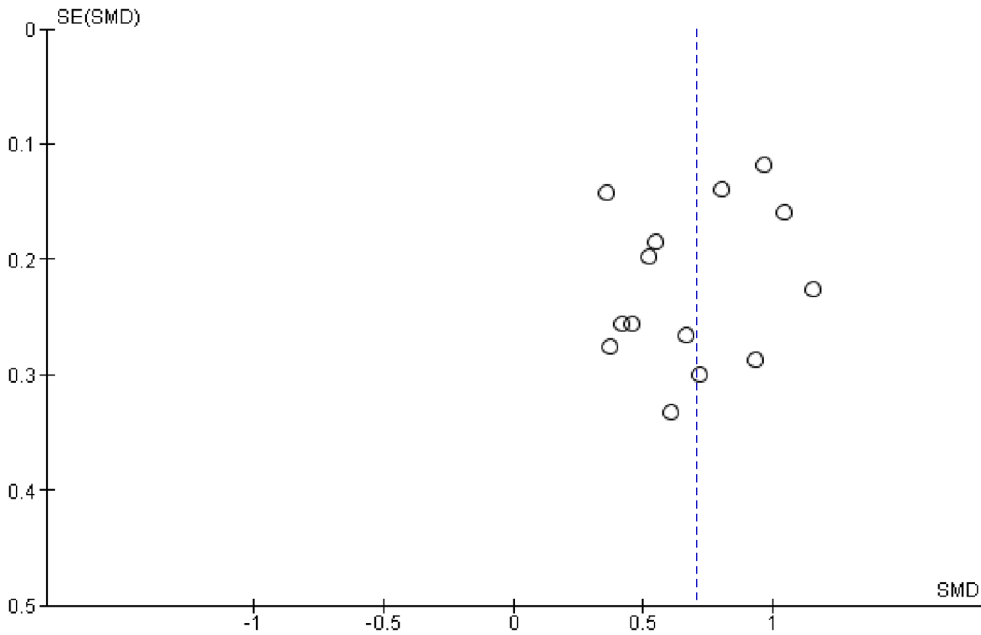


FIGURE 7 Funnel plot for studies comparing Dysfunctional Attitudes Scale scores in bipolar disorder and control.

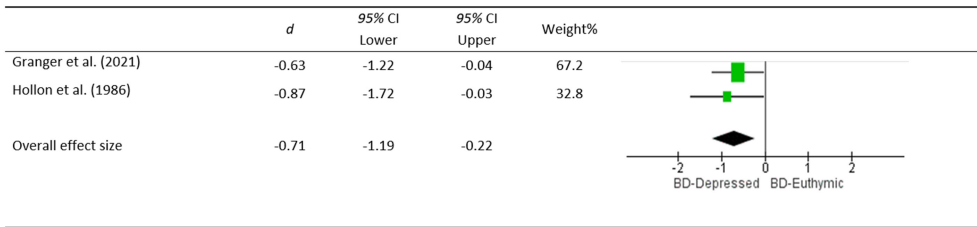


FIGURE 8 Forest plot for the analysis of dysfunctional attitudes in bipolar participants in a euthymic versus depressed mood state.

currently euthymic. Individual studies by Granger et al. (2021) and Fuhr et al. (2014) found no significant difference between healthy controls and bipolar euthymic groups' DA scores, suggesting that DA are more likely to be mood state dependent. However, this is an area where further research is required.

Few studies have adopted a longitudinal design, therefore, evidence for whether DA appear to be a predictor of a mood episode, or *vice versa*, is still relatively unknown. Fletcher et al. (2014) reported that DA scores did not predict depression or mania scores at 6-month follow-up. Jones et al. (2009) reported that DA did not predict depression. However, other research has suggested that higher DAS scores were reported to be a predictor of depression both current and at follow-up, but not a predictor of manic symptoms (Johnson & Fingerhut, 2004). Reilly-Harrington et al. (1999) reported that when DA scores interacted with negative life events, this was a significant predictor of depression. Stange et al. (2015) reported that extremely negative DA could predict both a hypomanic and depressive episode, not positive or overall DA.

The meta-analysis results suggested high heterogeneity within the studies comparing bipolar and unipolar participants. Effect sizes varied considerably within studies and removal of each study, and re-running of the analysis did not improve heterogeneity. Such difference may be explained by both methodological and demographic variance in the studies as well as differences in the current mood state

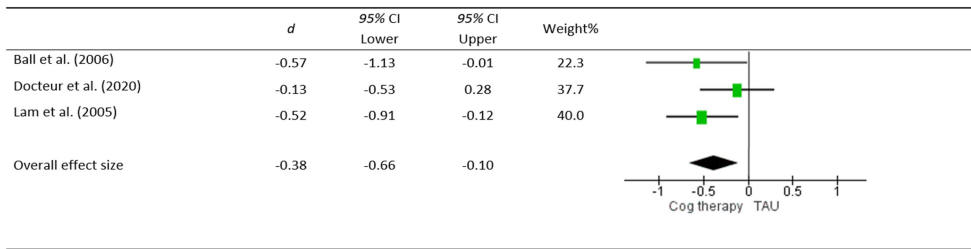


FIGURE 9 Forest plot for the analysis of cognitive therapy versus treatment as usual on dysfunctional attitudes in bipolar disorder.

of participants: when limiting analysis to specific mood states, the heterogeneity fell within the low-moderate range, although there were a small number of studies included.

The majority of studies used a version of the DAS which was initially developed to identify DA in those with unipolar depression, not bipolar disorder. There have been adaptations made to the measure, for example, Lam et al. (2004) developed the DAS-24-BD to include the subscale of goal attainment. Unfortunately, there was insufficient data to compare subscale scores in the meta-analysis although individual studies showed differences between depression and bipolar. The HAPPI (Mansell & Jones, 2006) was used in very few studies included in this review and identified difference between clinical groups that were not otherwise identified by the DAS (Alatiq et al., 2010).

## Limitations

The National Heart, Lung, and Blood Institute (2019) quality assessment tool was used here, however, some of the questions were less applicable as they focused on intervention studies. Furthermore, this tool does not provide strict criteria on what qualifies each rating. The quality assessment of the included studies resulted in mostly 'fair' ratings. The majority of studies not being longitudinal in design was a significant limitation of this review, as was the inability to look at subscale differences due to lack of data.

## Clinical implications and recommendations for future research

This review indicates that DA are most active when individuals are in a depressed state. Clinicians working with BD clients can focus on cognitive change techniques that challenge DA during the depressive phase of the illness when they are likely to be most problematic. Furthermore, the limited evidence suggests that psychological therapy is a useful tool for reducing DA in Bipolar, however, further research is needed to understand which components of therapy are responsible for this change. The finding that DA are significantly higher in BD than in healthy controls means that DA could be targeted in therapy, even when individuals are currently euthymic. Measuring DA routinely could also be a helpful indicator of an emerging depressive episode, and potentially help to prevent relapse. Previous research has suggested that DA could be a risk factor for depression (Jones et al., 2005; Scott & Pope, 2003).

The studies included in the review only touch briefly on the assessment of DA during a (hypo) manic episode, and this appears to be a current gap in the literature. It was not possible to draw any conclusions on the presence of DA during this phase of the illness, yet in the development of the DAS-24-BD, there were specific subscales identified around goal attainment, a feature most commonly found during (hypo)mania. Furthermore, very few studies to date have explored how mood states (depression, mania and remission) impact DAs within bipolar disorder; most have compared a single mood state



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