



## Research paper

# The relationship between dysfunctional attitudes, maladaptive perfectionism, metacognition and symptoms of mania and depression in bipolar disorder: The role of self-compassion as a mediating factor

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## ABSTRACT

**Background:** Maladaptive cognitions appear to be associated with the severity of mood symptoms in bipolar disorder (BD), but findings are mixed and generally cross-sectional in design.

**Method:** This study ( $n = 331$ ) explored the associations between maladaptive cognitions and mood symptoms in BD over time (3 months), and the potential mediating effect of self-compassion cross-sectionally. Dysfunctional attitudes, maladaptive perfectionism and maladaptive metacognitions were explored separately with depressive and manic symptoms, and with current mood state in BD.

**Results:** The results showed maladaptive metacognitions to be the only significant predictor of depression at 3-month follow-up ( $\beta = 0.31$ ,  $p < .001$ ), with no relationship to mania over time. Cross-sectionally, self-compassion partially mediated the relationship between all maladaptive cognitions and depression, with higher dysfunctional cognitions and lower self-compassion predicting increased severity of depressive symptoms. Only the relationship between dysfunctional attitudes and mania was partially mediated by self-compassion, however, the relationship was weak and suggestive that higher self-compassion predicted increased mania.

**Limitations:** The study duration limited the possible analysis. Future longitudinal research is needed. Also, the study sample was not representative of the clinical population, making results less generalisable. Additionally, limited significant findings regarding manic symptoms supports the need for further research into active cognitions during this phase of BD.

**Conclusions:** Maladaptive metacognitions were predictive of future depression severity, therefore, further exploration of metacognitive therapy for BD should be explored. Furthermore, self-compassion was shown to partially mediate the relationship between negative cognitions and mood, therefore further exploration of compassion-based therapies for BD is needed.

## 1. Introduction

Bipolar disorder (BD) affects approximately 2.4 % of the global population (Merikangas et al., 2011); significantly impacting daily living, and can reduce life expectancy (Kessing et al., 2015). BD is characterised by episodes of (hypo)mania (Diagnostic and Statistical Manual of Mental Disorders, 5th ed.; DSM-5; American Psychological Association (2013)), as well as usually periods of depression. Knowledge about the role of cognitive processes in BD is limited compared to other disorders. Psychological therapies, such as cognitive behavioural therapy (CBT), can be effective for BD (Chiang et al., 2017), but primarily at reducing depressive symptoms (Oud et al., 2016) rather than mania.

## 1.1. Dysfunctional attitudes in bipolar disorder

Dysfunctional attitudes (DA) are thought to underlie mood symptoms of BD. Mansell et al.'s (2007) cognitive model of bipolar suggests extreme positive or negative appraisals given to maladaptive cognitions such as DA, drive further dysfunctional thinking or rumination. This becomes a self-perpetuating cycle leading to development of depressive or manic symptoms through engaging in ascent or decent behaviours. Findings about DA and their relationship with mood state are mixed. Some studies report higher DA compared to healthy controls (Batmaz et al., 2013; Fuhr et al., 2017; Goldberg et al., 2008) and other clinical groups (Lam et al., 2004; O'Garro-Moore et al., 2015), while others have

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reported no difference (Alatiq et al., 2010; Coulston et al., 2013; Fuhr et al., 2014; Granger et al., 2021). Research suggests DA could be mood state dependent, with depressed participants presenting with higher DA than euthymic BD participants and healthy controls (Granger et al., 2021; Jabben et al., 2012).

### 1.2. Maladaptive perfectionism in bipolar disorder

Mansell et al.'s (2007) transdiagnostic approach suggests that shame and self-criticism, concepts associated with perfectionism, influence DA, which can lead to the development of depressive or manic symptoms in BD. Research suggests those with BD have significantly higher maladaptive perfectionism (MP; (Jones et al., 2005; Lam et al., 2004; Wright et al., 2005), which is associated with extreme goal attainment (Johnson et al., 2012; Lam et al., 2004). Furthermore, perfectionism, alongside factors such as life events, can predict both manic and depressive symptoms (Alloy et al., 2009; Fletcher et al., 2019; Francis-Raniere et al., 2006). Together, findings suggest that perfectionism influences and predicts depression and mania symptoms in BD, and increases DA.

### 1.3. Maladaptive metacognitions in bipolar

Metacognition, or 'thinking about thinking' (Flavell, 1979), refers to self-understanding of ability to cope with and be in control of thoughts, and can contribute to the ability to manage distress. In BD, lack of insight (lack of awareness of symptoms as illness related experiences) is a key example of dysfunctional metacognition (Torres et al., 2016). Unhelpful appraisal of thoughts can add to psychological distress, particularly if thoughts surround unrealistic expectations (Sun et al., 2017). Wells and Matthews (1996) suggest that negative affect is the result of ineffective metacognitive coping strategies, such as rumination. Furthermore, Kannis-Dymand et al. (2020) suggested that metacognitive beliefs about the value of rumination may help to explain the onset and maintenance of cognitive mechanisms involved in perfectionism. Østefjells et al. (2017) found that maladaptive metacognitions significantly correlated with depression, and predicted the number of past depressive episodes in BD, while Batmaz et al. (2014) and Van Camp et al. (2019), found significant correlations between dysfunctional metacognitions and both depressive and manic symptoms.

### 1.4. The role of self-compassion and maladaptive cognitive processes in bipolar

Neff (2003b) suggests that self-compassion is the ability for an individual to show kindness, warmth and understanding towards themselves during times of difficulty. Further, to be self-compassionate one must be non-judgemental and accepting towards all experiences, positive and difficult. This contrasts with cognitive traits of BD such as high self-judgement and self-criticism (Rosenfarb et al., 1998). Gilbert (2005) suggests self-compassion is essential for emotion regulation, particularly through engagement of the soothe system. Gilbert (2005) suggests that change in mood states within BD can be explained by the three systems model, 1) the drive system either being over (mania) or under (depression) active, 2) the ability to soothe is limited, and 3) the threat system is on 'high alert'. Therefore, lower self-compassion in BD may be linked to a reduced ability to soothe and regulate distress. Research suggests that self-compassion is lower in conditions such as depression and anxiety (Døssing et al., 2015; MacBeth and Gumley, 2012), as well as higher self-compassion acting as a mediator between maladaptive cognitions and mood symptoms (Ferrari et al., 2018; Mehr and Adams, 2016). Evidence is growing for the efficacy of Compassion based interventions (CBI) in mood disorders (Krieger et al., 2013; Leaviss and Uttley, 2015). While CBI have been beneficial for those with high self-criticism (Rose et al., 2018), there is limited research into the role of self-compassion in BD. Recently, Fletcher et al. (2019) reported lower self-compassion correlated with increased emotional difficulties, and

self-compassion acted as a partial mediator between perfectionism and mood.

### 1.5. Aims of the study.

This study aimed to examine the relationship between four psychological factors (dysfunctional attitudes, maladaptive metacognitions, maladaptive perfectionism, self-compassion) and mood symptoms in BD. We hypothesised (1) BD mood symptoms will positively correlate with dysfunctional attitudes, maladaptive metacognitions, and maladaptive perfectionism. These psychological variables will predict mood symptoms over time (3 months) when controlling for baseline symptoms; (2) self-compassion will correlate negatively with the other psychological factors and mood symptoms, (3) participants in a current episode (manic, depressed, mixed) will score higher for dysfunctional attitudes, maladaptive metacognitions and maladaptive perfectionism than those who are euthymic, (4) self-compassion will mediate the relationship between dysfunctional attitudes, maladaptive metacognitions, maladaptive perfectionism and BD symptoms.

## 2. Method

### 2.1. Design

This observational, longitudinal questionnaire study collected data at baseline and follow-up, three months apart. Data was collected between August 2021 and January 2022 (anonymised data available here: <http://eprints.soton.ac.uk/id/eprint/468994>).

### 2.2. Participants and procedures

Participants were required to be over the age of 18, fluent in English, score above clinical cut-off on the screening tool Mood Disorder Questionnaire (MDQ; Hirschfeld et al. (2003), and have a self-reported formal diagnosis of BD (Type I, Type II or Not Otherwise Specified (NOS)) provided by a healthcare professional; cyclothymia diagnoses and self-diagnosis were excluded. Participants were recruited online via social media (Twitter, Facebook, Instagram, TikTok etc) and online support groups and charities (Bipolar UK, Crest BD). Participants completed demographic questions (Table 1), the measures, and were shown a debrief statement. The study took approximately 40 min to complete. Participants were advised that following completion they would be entered into a prize draw to win one of twelve gift vouchers. The study gained ethical approval from the University of Southampton Ethics Committee (ERGO II ID: 64021). Participants who had completed measures at baseline were sent an automatically generated email 3 months later requesting that they complete the same measures in the same order.

331 individuals provided complete data at baseline. Any participant with a completion rate below 92 % was excluded on the basis that key measures had not been completed. 173 participants (52.3 %) completed measures at follow-up 3 months later (see supplementary material for recruitment flow chart).

### 2.3. Measures

#### 2.3.1. Demographics

Participants reported gender, age, ethnicity, and information about diagnosis (see Table 1).

#### 2.3.2. Screening tool

Mood Disorder Questionnaire (Hirschfeld et al., 2003): a 15 item self-report screening instrument for BD. Questions include 'Has there ever been a period of time when you were not your usual self and you had much more energy than usual?'. Participants answer either 'yes' or 'no' to each statement, 7 or more 'yes' responses was suggestive of above

**Table 1**  
Baseline demographic information.

Participant characteristics (n = 331)	Mean (SD)	%	n
Age	46.0 (14.2)		
Gender			
Male		27.5	91
Female		70.4	233
Non-binary		1.80	6
Prefer not to say		0.30	1
Ethnicity			
White		92.4	306
Mixed or multiple ethnic groups		2.4	8
Asian or Asian British		2.1	7
Black, African, Caribbean or Black British		0.6	2
Latino		1.2	4
Other Ethnic group		1.2	4
Diagnosis			
Bipolar Disorder I		27.2	90
Bipolar Disorder II		40.8	135
Bipolar Disorder (not specified/not sure)		32.0	106
Diagnosis given by			
General Practitioner/family doctor		2.4	8
Psychiatrist		93.1	308
Psychologist		2.1	7
Other MH practitioner		2.4	8
Currently under the care of a MH team			
Yes		58.6	194
No		41.4	137
Currently taking psychotropic medication for BD			
Yes regularly		90.9	301
Yes, as needed		1.5	5
No		7.6	25
Comorbid MH diagnosis			
Yes		41.4	137
No		58.6	194
Hospitalisation due to BD			
Yes		59.2	196
No		40.8	135
Neurodiversity condition diagnosed			
Yes		19.0	63
No		81.0	268

clinical cut-off (Wang et al., 2019). The measure has good internal consistency ( $\alpha = 0.79$ ; Hirschfeld et al., 2003). Internal consistency for the current sample was poor ( $\alpha = 0.53$ ), however, this measure was not involved in the analysis only as a screening tool.

### 2.3.3. Mood symptoms

Centre for Epidemiological Studies Depression Scale (CES-D; (Radloff, 1977)): a 20-item questionnaire measuring depression in the general population. Statements include 'I felt that everything I did was an effort'; participants respond on a scale of 0 (rarely or none of the time) to 3 (most or all of the time), a higher score indicated more severe symptoms. Positively worded items were reversed scored. The specificity and sensitivity are reported to be good (Lewinsohn et al., 1997), as well as high reliability ( $\alpha = 0.90$ ; (Soler et al., 1997)). Studies in BD populations specifically have demonstrated similarly excellent reliability ( $\alpha = 0.9$ ) (Richardson et al., 2018). Internal consistency for the current sample was excellent ( $\alpha = 0.94$ ).

Altman Self-rating Mania Scale (ASRMS; (Altman et al., 1997)): a 5-item self-report scale measuring manic symptoms over the past week, participants respond to statements on a scale of 0 to 4. Statements included 'I do not talk more than usual' (0) to 'I talk constantly and cannot be interrupted' (4). Total scores range from 0 to 20, a score of 6 or above is suggestive of (hypo)mania; higher scores indicate more severe manic symptoms. Sensitivity and specificity for the measure are respectively 85.5 % and 87.3 %, as well as good reliability ( $\alpha = 0.79$ ) and validity ( $r = 0.72$ ) for the mania subscale (Altman et al., 1997). The current samples internal consistency was good ( $\alpha = 0.87$ ).

Self-rating of mania may be considered unreliable, due to the nature

of manic agitation and uncooperativeness. However, the ASRMS has demonstrated good reliability at mild, moderate and some severe symptomatology, with good clinician-patient rating agreement. Research has demonstrated that the measure is reliable in patients who have low clinical insight and psychotic symptoms and remains reliable over time (Altman, 1998; Meyer et al., 2020).

Internal State Scale (ISS; (Bauer et al., 1991)): a 16-item questionnaire measuring mood symptoms in the past 24 h in BD. Participants respond on a scale from 0 (Not at all) to 100 (Very much so) to statements such as 'today I feel impulsive'. The Activation and Wellbeing subscales are used to discriminate whether a participant is in one of the following four mood states: (hypo)manic, depressed, euthymic, or mixed state. The ISS internal consistency has been reported as  $\alpha = 0.76$  (Srinroongruang et al., 2005), and self-rating methodology considered reliable (Meyer et al., 2020). Internal consistency for the current sample was good for activation ( $\alpha = 0.89$ ) and acceptable for wellbeing ( $\alpha = 0.77$ ).

### 2.3.4. Psychological variables

Dysfunctional Attitudes Scale-24 (DAS-24; (Power et al., 1994)): a 24-item scale exploring dysfunctional beliefs. Statements include 'My life is wasted unless I am a success'. Participants respond on a scale of 1 (totally disagree) to 7 (totally agree), with a higher score indicating more extreme dysfunctional assumptions. Total scores can range from 24 to 168. In this study the Lam et al. (2004) DAS-24-BD subscales were used, 1) Achievement (DAS-A), 2) Dependency (DAS-D), 3) Goal-Attainment (DAS-GA). The DAS-24 has acceptable internal consistency for the subscales of 'Achievement' ( $\alpha = 0.85$ ) and 'Dependency' ( $\alpha = 0.74$ ), and good convergent validity with the longer versions of the DAS-A (0.90) and DAS-B (0.83) (Power et al., 1994). Internal consistency for the current sample DAS-total scores was excellent ( $\alpha = 0.94$ ). Internal consistency at baseline for all subscales was good or excellent (DAS-A,  $\alpha = 0.90$ ; DAS-D,  $\alpha = 0.81$ ; DAS-GA,  $\alpha = 0.82$ ).

Self-Compassion Scale- 26 (SCS-26; (Neff, 2003a)): a 26-item questionnaire containing six subscales measuring three positive ('I try to see my failings as part of the human condition') and three negative dimensions of self-compassion ('When times are really difficult, I tend to be tough on myself'). A mean global self-compassion score is calculated (negatively worded items are reversed). Items are scored on a Likert scale from 1 (almost never) to 5 (almost always). Both factors have good reliability ( $\alpha = 0.91$ , for self-compassionate attitude;  $\alpha = 0.89$ , for self-critical attitude) (Costa et al., 2016) and very good internal consistency. Internal consistency for current total scores was excellent ( $\alpha = 0.93$ ).

Metacognition Questionnaire-30 (MCQ-30; (Wells and Cartwright-Hatton, 2004)): a 30-item questionnaire assessing metacognitive beliefs across five subscales, participants respond to statements on a scale of 1 (do not agree) to 4 (agree very much). Subscale scores are combined to provide a total score ranging from 30 to 120. Higher scores indicate more unhelpful metacognitions. For the five subscales internal consistency has been demonstrated as good to excellent ( $\alpha = 0.72$  to  $\alpha = 0.93$ ) (Wells and Cartwright-Hatton, 2004). Current samples internal consistency was excellent ( $\alpha = 0.93$ ).

Almost Perfect Scale- Revised (APS-R; (Slaney et al., 2001)): a 23-item questionnaire measuring both adaptive and maladaptive perfectionism on a 7-point Likert scale (1 = strongly disagree, 7 = Strongly agree) comprising of statements such as 'I have high expectations for myself'. Higher total scores indicate more perfectionistic traits and range between 23 and 161, demonstrating adequate internal consistency (up to  $\alpha = 0.87$ ) and validity (Rice et al., 2014). Current samples internal consistency was excellent ( $\alpha = 0.93$ ).

## 2.4. Statistical analysis

Data was collected using Qualtrics (<https://www.qualtrics.com>) and analysed using IBM SPSS V 27.0 for Windows (IBM, 2020). Eight participants had missing data at baseline, and four at follow-up, and was

imputed with the sample mean (Tabachnick and Fidell, 2013). Data at baseline and follow-up were checked for adherence to the assumptions of normality, linearity, homoscedasticity, and absence of multicollinearity. The (hypo)mania item ASRMS at baseline and follow-up did not meet assumptions of normality and was not correctable through transformation. Scores were dichotomised with a cut-off score of 6 suggestive of mania symptoms, splitting participants into ‘below cut-off for mania’ and ‘above cut-off for mania’, and utilised non-parametric analyses.

Sample size was calculated in G\* Power (Faul et al., 2007) using a priori computation to generate a moderate effect (0.3) and high power (0.95) for the initial bivariate correlations; 111 was the recommended sample size, and the study was sufficiently powered ( $n = 331$  at baseline and  $n = 173$  at follow-up = 173).

Associations between variables were explored through one-tailed bivariate correlations, due to the direction of the hypotheses. To avoid a Type-II error, only those with a  $p$ -value  $\leq .01$  were included in regression analysis to explore whether psychological variables (DAS-24, MCQ-30, APS-R, SCS) significantly predicted mood ((Andrade, 2019; Chen et al., 2017). The effect of current mood state (ISS) on dependent variables (DAS-24, MCQ-30, APS-R, SCS) was explored using one-way multivariate ANOVAs. Categorical variables with three or more levels were computed into dummy variables (Hardy, 1993) to be included in the regression. Hierarchical multiple linear and logistic regressions utilised the enter method to explore whether demographics, baseline mood scores and psychological variables predicted mood at follow-up. PROCESS for IBM SPSS (v4.1; (Hayes, 2022)) was used to conduct mediation analysis. Results are based on 95 % confidence intervals and 5000 bootstrapped samples. Mediation analysis was used to explore whether psychological variables could predict mood and whether this effect was mediated by self-compassion. Alternate moderation models were also included to see if they explained the data better.

### 3. Results

#### 3.1. Sample characteristics

331 participants provided baseline data (135 BD-II, 106 BD NOS, 90 BD-I), with a larger proportion of females (70.4 %; see Table 1 for demographics).

#### 3.2. Bivariate correlations

DAS-24, MCQ-30 and APS-R were all positively correlated with CES-D and with one another, and negatively correlated with SCS. SCS was negatively correlated with CES-D (see Table 2). Correlations between independent variables were significant, suggesting suitability for regression, but were not so correlated that multicollinearity was an issue.

**Table 2**  
One-tailed bivariate correlations at baseline ( $n = 331$ ).

	1	2	3	4	5	6	7	8
1. DAS	–							
2. DAS-G	.83***	–						
3. DAS-D	.87***	.60***	–					
4. DAS-A	.91***	.74***	.72***	–				
5. APS-R	.64***	.52***	.53***	.65***	–			
6. MCQ	.67***	.56***	.58***	.61***	.57***	–		
7. SCS	–.66***	–.47***	–.64***	–.58***	–.51***	–.52***	–	
8. CESD	.47***	.33***	.42***	.40***	.38***	.50***	–.48***	–
9. ASRMS <sup>a</sup>	.16**	.17**	.14**	.18**	.07*	.18***	–.04	.10

<sup>a</sup> One-tailed Spearman’s correlation results due to ASRMS not meeting normality assumptions.

\*\*\*  $p < .001$ .

\*\*  $p < .01$ .

\*  $p < .05$ .

#### 3.3. One-way Multivariate Analysis of Variance (MANVOA)

Participants were categorised into one of four mood states using the ISS: manic ( $n = 64$ , 19.6 %), mixed-state ( $n = 44$ , 13.5 %), depressed ( $n = 119$ , 36.4 %) and euthymic ( $n = 100$ , 30.4 %) (see Table 3).

The differences between the mood states on the combined dependent variables was statistically significant,  $F(24, 917) = 3.542, p < .001$ ; Wilks’  $\Lambda = 0.773$ ; partial  $\eta^2 = 0.082$ . Follow-up univariate ANOVAs showed that DAS-24 ( $F(3,323) = 12.246, p < .001$ ; partial  $\eta^2 = 0.102$ ), APS-R ( $F(3, 323) = 7.437, p < .001$ ; partial  $\eta^2 = 0.065$ ), MCQ-30 ( $F(3, 323) = 15.355, p < .001$ ; partial  $\eta^2 = 0.125$ ), and SCS ( $F(3, 323) = 12.346, p < .001$ ; partial  $\eta^2 = 0.103$ .) were statistically significantly different between the four mood states, using a Bonferroni adjusted  $\alpha$  level of 0.025 (see Table 3 for post-hoc tests). For DAS-24 and MCQ-30, the euthymic group had significantly lower scores than the other three groups. The mixed group also scored significantly higher than depressed. For APS-R, the euthymic group had significantly lower scores than the mixed and manic groups, while the mixed group also scored significantly higher than the depressed. For SCS, the mixed group scored significantly lower than all three other mood states, and the euthymic group scored significantly higher for self-compassion than the depressed group.

#### 3.4. Longitudinal hierarchical multiple regression

A hierarchical multiple regression ( $n = 171$ ) was run to determine if the addition of psychological variables DAS-24, MCQ-30, APS-R, and SCS obtained from a submaximal test predicts symptoms of depression at follow-up over and above age, gender, and depression scores at baseline (see Table 4). The full model of gender, age, baseline depression, DAS-24, MCQ-30, APS-R and SCS to predict follow-up depression (Model 3) was statistically significant,  $R^2 = 0.416, F(7, 163) = 16.609, p = .007$ ; adjusted  $R^2 = 0.391$ . The addition of four psychological variables (DAS-24, MCQ-30, APS-R, SCS) to the prediction of depression at follow-up (Model 3) led to a statistically significant increase in  $R^2$  of 0.052,  $F(4, 163) = 3.622, p = .007$ . Of the four psychological variables, depression at follow-up was associated only with maladaptive metacognitions.

#### 3.5. Longitudinal hierarchical binary logistic regression

Due to the lack of normality in the ASRMS data, mania scores were dichotomised using the originally reported cut-off (Altman et al., 1997; Skokou et al., 2021) (a score of 6 or more being suggestive of mania symptoms), and participants were allocated to ‘below cut-off’ (67.8 %) or ‘above cut-off’ (32.2 %). A hierarchical binary logistic regression ( $n = 171$ ) was run to determine if the addition of psychological variables DAS-24, MCQ-30, APS-R, and SCS were associated with the presence of manic symptoms at follow-up over and above age, gender and categorical ASRMS scores at baseline. The model was not significant, ( $\chi^2(7,$

**Table 3**

One-way MANOVA Tukey post hoc comparisons determining the effect of current mood on psychological variables ( $n = 327$ ).

Psychological variables	ISS Mood State A	ISS Mood State B	Mean A (SD)	Mean B (SD)	95 % CI		p
					Upper	Lower	
DAS-24	Mania	Mixed	105.78 (25.72)	112.91 (22.10)	-20.77	6.52	.532
	Mixed	Euthymic	112.91 (22.10)	86.57 (27.10)	13.74	38.95	.000*
	Euthymic	Depressed	86.57 (27.10)	98.48 (29.07)	-21.36	-2.46	.007*
	Depressed	Mania	98.48 (29.07)	105.78 (25.72)	-18.10	3.50	.302
	Mania	Euthymic	105.78 (25.72)	86.57 (27.10)	8.06	30.37	.000*
APS-R	Mixed	Depressed	112.91 (22.10)	98.48 (29.07)	2.14	26.72	.014*
	Mania	Mixed	119.52 (26.26)	127.23 (22.71)	-21.01	5.59	.440
	Mixed	Euthymic	127.23 (22.71)	106.31 (26.24)	8.63	33.20	.000*
	Euthymic	Depressed	106.31 (26.24)	114.55 (27.56)	-17.46	0.97	.098
	Depressed	Mania	114.55 (27.56)	119.52 (26.26)	-15.49	5.57	.617
MCQ-30	Mania	Euthymic	119.52 (26.26)	106.31 (26.24)	2.33	24.08	.010*
	Mixed	Depressed	127.23 (22.71)	114.55 (27.56)	0.69	24.66	.034*
	Mania	Mixed	76.52 (19.34)	81.05 (15.08)	-13.44	4.38	.555
	Mixed	Euthymic	81.05 (15.08)	62.12 (17.25)	10.69	27.16	.000*
	Euthymic	Depressed	62.12 (17.25)	69.62 (18.75)	-13.67	-1.32	.010*
SCS-26	Depressed	Mania	69.62 (18.75)	76.52 (19.34)	-13.95	0.15	.058
	Mania	Euthymic	76.52 (19.34)	62.12 (17.25)	7.11	21.68	.000*
	Mixed	Depressed	81.05 (15.08)	69.62 (18.75)	3.40	19.46	.002*
	Mania	Mixed	2.33 (0.68)	1.86 (0.56)	0.13	0.82	.003*
	Mixed	Euthymic	1.86 (0.56)	2.60 (0.76)	-1.06	-0.42	.000*
SCS-26	Euthymic	Depressed	2.60 (0.76)	2.27 (0.67)	0.09	0.57	.002*
	Depressed	Mania	2.27 (0.67)	2.33 (0.68)	-0.34	0.21	.923
	Mania	Euthymic	2.33 (0.68)	2.60 (0.76)	-0.55	0.02	.078
	Mixed	Depressed	1.86 (0.56)	2.27 (0.67)	-0.72	-0.10	.005*

ISS = Internal State Scale, DAS-24 = dysfunctional attitudes scale, APS-R = Almost perfect scale-Revised, MCQ-30 = Metacognitions questionnaire- 30, SCS-26 = Self-compassion Scale.

\*  $p < .05$ .

**Table 4**

Hierarchical multiple regression analysis predicting follow up depression from Age, Gender, Baseline Depression, DAS, MCQ, APS and SCS ( $n = 171$ ).

Variable	Depression at Follow-up					
	Model 1		Model 2		Model 3	
	B	$\beta$	B	$\beta$	B	$\beta$
Age	-.23*	-.21	-.10	-.09	-.04	-.04
Gender	.10	.003	-1.10	-.03	-1.21	-.04
Baseline Dep			.60**	.58	.49**	.47
DAS-24					-.04	-.08
MCQ-30					.25**	.31
APS-R					-.02	-.03
SCS					-.61	-.03
R <sup>2</sup>	.042		.364		.416	
F	3.73*		31.92**		16.61**	
$\Delta R^2$	.042		.322		.052	
$\Delta F^2$	3.73*		84.59**		3.62*	

\*  $p < .05$ .

\*\*  $p < .001$ .

$n = 171$ ) = 2.01,  $p = .733$ ) and none of the psychological variables were found to be individually significant.

### 3.6. Mediation analysis

Six separate parallel mediation models were constructed to test whether self-compassion would be a significant mediator of DA with mania and depression, maladaptive perfectionism with mania and depression and maladaptive metacognition with mania and depression. This was a cross-sectional analysis using baseline data only.

#### 3.6.1. Dysfunctional attitudes

**3.6.1.1. Model A: dysfunctional attitudes and depression ( $n = 331$ ).** DA were a negative and significant predictor of self-compassion (path a)  $b = -0.02$ ,  $SE = 0.001$ ,  $t(331) = -14.86$ ,  $p < .001$ ; Self-compassion was a negative and significant predictor of depression (path b),  $b = -6.07$ ,  $SE$

= 1.30,  $t(331) = -4.67$ ,  $p < .001$ ; Total effect of DA on depression severity was positive and significant,  $b = 0.24$ ,  $SE = 0.03$ ,  $t(331) = 9.09$ ,  $p < .001$ . The indirect effect was significant, whereby self-compassion mediated the relationship between DA and depression,  $b = 0.10$ ,  $\beta = 0.19$ , bootstrapped  $SE = 0.02$ , 95 % CI [0.06, 0.14]. There remained a significant direct effect between DA and depression severity (path c');  $b = 0.14$ ,  $t(331) = 4.27$ ,  $p < .001$ , even when accounting for self-compassion, suggesting a partial mediation. Overall, DA and self-compassion explained 48 % of the variance in depression scores (Model A, Fig. 1).

**3.6.1.2. Model B: dysfunctional attitudes and mania ( $n = 331$ ).** Self-compassion positively and significantly predicts mania (path b),  $b = 0.97$ ,  $SE = 0.46$ ,  $t(331) = 2.13$ ,  $p = .034$ . Total effect of DA on mania severity was positive and significant,  $b = 0.02$ ,  $SE = 0.01$ ,  $t(331) = 2.55$ ,  $p = .011$ . The indirect effect was significant, whereby self-compassion mediated the relationship between DA and mania,  $b = -0.02$ ,  $\beta = -0.10$ , bootstrapped  $SE = 0.01$ , 95 % CI [-0.03, -0.0002]. There remained a significant direct effect between DA and mania (path c');  $b = 0.04$ ,  $SE = 0.01$ ,  $t(331) = 3.33$ ,  $p = .001$ , even when accounting for self-compassion, suggesting a partial mediation. Overall, DA and self-compassion explained 20 % of the variance in mania scores (Model B, Fig. 1).

#### 3.6.2. Maladaptive perfectionism

**3.6.2.1. Model C: Maladaptive perfectionism and depression ( $n = 330$ ).** Maladaptive perfectionism was a significant predictor of self-compassion (path a)  $b = -0.01$ ,  $SE = 0.001$ ,  $t(330) = -9.75$ ,  $p < .001$ . Self-compassion was a negative and significant predictor of depression (path b),  $b = -7.77$ ,  $SE = 1.15$ ,  $t(330) = -6.73$ ,  $p < .001$ . Total effect of maladaptive perfectionism on depression severity was positive and significant,  $b = 0.20$ ,  $SE = 0.03$ ,  $t(330) = 6.72$ ,  $p < .001$ . The indirect effect was significant, whereby self-compassion mediated the relationship between maladaptive perfectionism and depression,  $b = 0.10$ ,  $\beta = 0.18$ , bootstrapped  $SE = 0.02$ , 95 % CI [0.07, 0.13]. There

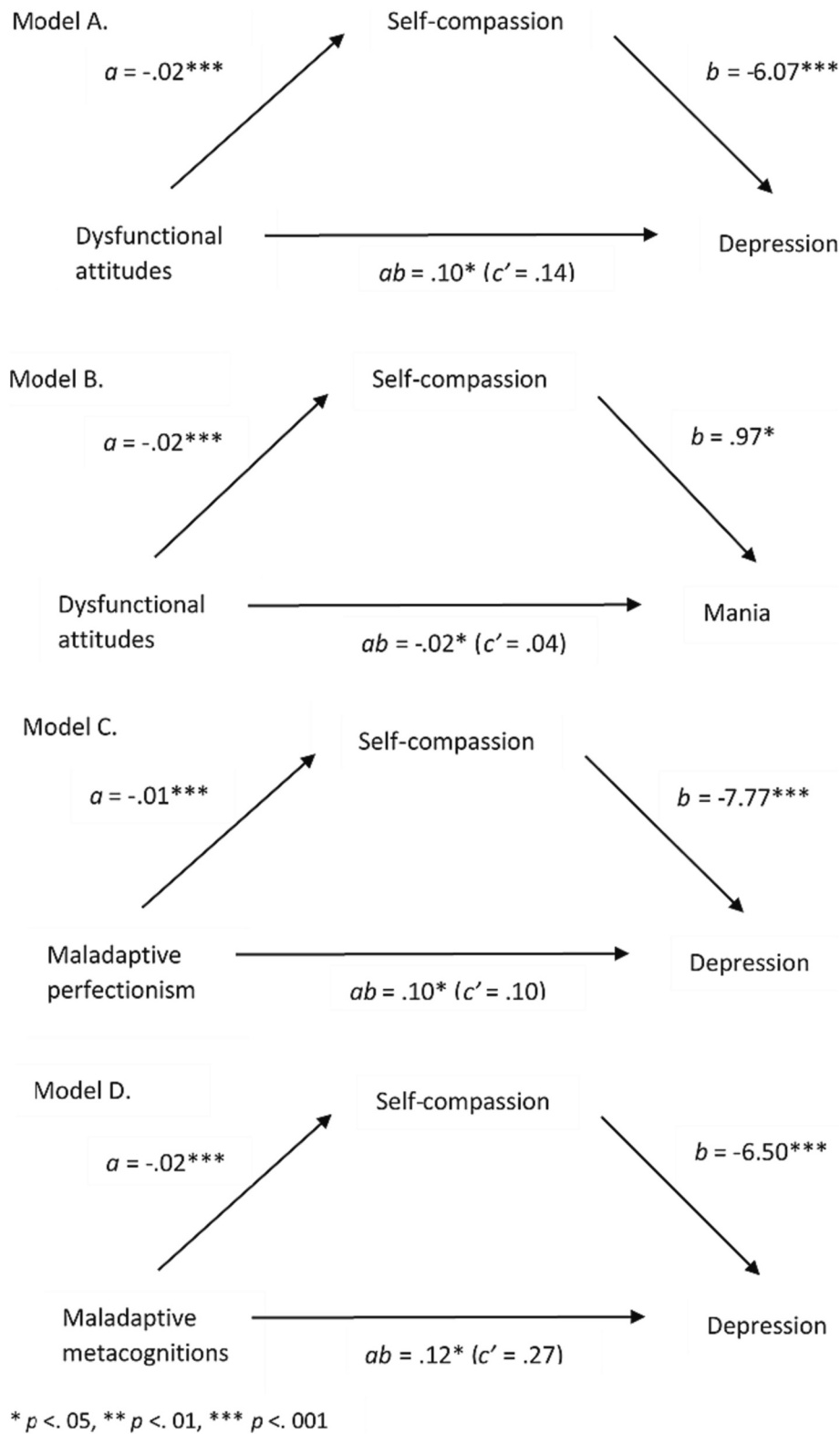


Fig. 1. Mediation models for the three psychological factors and mood outcomes.

remained a significant direct effect between maladaptive perfectionism and depression severity (path  $c'$ );  $b = 0.10$ ,  $SE = 0.03$ ,  $t(330) = 3.10$ ,  $p = .002$ , even when accounting for self-compassion, suggesting a partial mediation. Overall, maladaptive perfectionism and self-compassion explained 39 % of the variance in depression scores (Model C, Fig. 1).

3.6.2.2. *Maladaptive perfectionism and mania* ( $n = 330$ ). When exploring mania and maladaptive perfectionism, mediation was not supported. Both the indirect and direct effect were non-significant ( $b = -0.003$ , bootstrapped  $SE = 0.01$ , 95 % CI [-0.01, 0.01];  $b = 0.01$ ,  $SE = 0.01$ ,  $t(330) = 1.10$ ,  $p = .292$  respectively).

### 3.6.3. Maladaptive metacognitions

**3.6.3.1. Model D: maladaptive metacognitions and depression ( $n = 330$ ).** Maladaptive metacognitions were a significant predictor of self-compassion (path a)  $b = -0.02$ ,  $SE = 0.002$ ,  $t(330) = -9.81$ ,  $p < .001$ . Self-compassion negatively and significantly predicted depression (path b),  $b = -6.50$ ,  $SE = 1.11$ ,  $t(330) = -5.85$ ,  $p < .001$ . Total effect of maladaptive metacognitions on depression severity was positive and significant,  $b = 0.39$ ,  $SE = 0.04$ ,  $t(330) = 9.57$ ,  $p < .001$ . The indirect effect was significant, whereby self-compassion mediated the relationship between Maladaptive Metacognitions and depression,  $b = 0.12$ ,  $\beta = 0.15$ , bootstrapped  $SE = 0.02$ , 95 % CI [0.08, 0.17]. There remained a significant direct effect between maladaptive metacognitions and depression severity (path c');  $b = 0.27$ ,  $t(330) = 6.03$ ,  $p < .001$ , even when accounting for the mediator (self-compassion), suggesting a partial mediation. Overall, maladaptive metacognitions and self-compassion explained 50 % of the variance in depression scores (Model D, Fig. 1).

**3.6.3.2. Maladaptive metacognitions and mania ( $n = 330$ ).** When exploring mania and maladaptive metacognitions, mediation was not supported. The indirect effect and direct effect observed between maladaptive metacognitions and mania was non-significant.

### 3.7. Moderation analyses

Alternative moderation models were all non-significant (Supplementary Materials).

## 4. Discussion

This study examined the relationship between psychological factors (dysfunctional attitudes, maladaptive metacognitions, maladaptive perfectionism, self-compassion) and mood symptoms in BD using correlation and regression analyses.

Correlations showed dysfunctional attitudes, maladaptive metacognitions and maladaptive perfectionism were all positively associated with depression and with one another. However, only DA were positively associated with mania. This lack of association with perfectionism has been found in previous research (Fletcher et al., 2019). Self-compassion was negatively associated with all maladaptive cognitive styles and depression symptoms, in keeping with previous findings (Døssing et al., 2015), however no relationship was observed for mania. This can perhaps be understood by low self-esteem, commonly associated with depression (Orth and Robins, 2013), being associated with lower self-compassion (Døssing et al., 2015), while during manic episodes self-esteem is understood to be higher (Winters and Neale, 1985). Furthermore, associations between mania and self-compassion may have been more difficult to detect due to the relatively low prevalence of mania across the 3 months compared to depression.

A MANOVA demonstrated that euthymic participants scored significantly lower on DA and maladaptive metacognition than the three symptomatic groups (manic, depressed, mixed), in line with previous findings (Granger et al., 2021), and supports the theory that depression and mania are not polarised when considering negative cognitions (Lyon et al., 1999). The mixed group scored higher on all dysfunctional cognitions and lower on self-compassion when compared to the depressed and euthymic groups. Previous research (Fountoulakis et al., 2012) has suggested that that mixed state episodes in BD tend to be more severe, and it could be this increased severity the leads to increased negative cognitions.

Maladaptive perfectionism was the only negative cognitive style to not differ significantly between the euthymic and depressed group, however this remained significantly higher in mania and mixed groups. This implies that perfectionism may be more present in mania than in

other stages of the condition, or that perfectionism is a trait that is present during euthymia but is increased by mood severity, supported by previous research (Alloy et al., 2009; Corry et al., 2013; Lam et al., 2004).

There has been limited longitudinal research regarding negative cognitive styles in BD and whether they are able to predict future mood episodes (Johnson and Fingerhut, 2004). This study demonstrated that once age, gender, and baseline depression scores were controlled for, only maladaptive metacognitions were a significant predictor of depression severity 3-months later. This further highlights ambiguity in whether these cognitive mechanisms are state (Granger et al., 2021; Jabben et al., 2012) or trait dependent in BD (Kannis-Dymand et al., 2020), and whether the relationship is bidirectional (Reilly-Harrington et al., 2010). While maladaptive metacognitions have been shown to predict depression cross-sectionally in BD (Batmaz et al., 2014; Van Camp et al., 2019), this study demonstrated the same effect longitudinally, and it was maintained when controlling for other maladaptive cognitive styles. Our findings are in keeping with other longitudinal studies looking at disorders such as depression (Papageorgiou and Wells, 2009). Maladaptive metacognitions share similarities with ruminations, a common cognitive process which potentially promotes depressive symptoms (Kannis-Dymand et al., 2020; Wells and Matthews, 1996). Being able to promote healthier metacognitions through therapy could potentially reduce the severity of future depressive episodes, as well addressing relevant maladaptive cognitions during non-symptomatic periods. If DA are state rather than trait dependent (Persons and Miranda, 2002), this might help to explain why DA may not have been a predictor of depression. Only 36 % of those who took part in the study at time point one were presenting as depressed. Furthermore, maladaptive perfectionism may have not predicted depression because perfectionism is more closely linked to the striving behaviours present during manic phases.

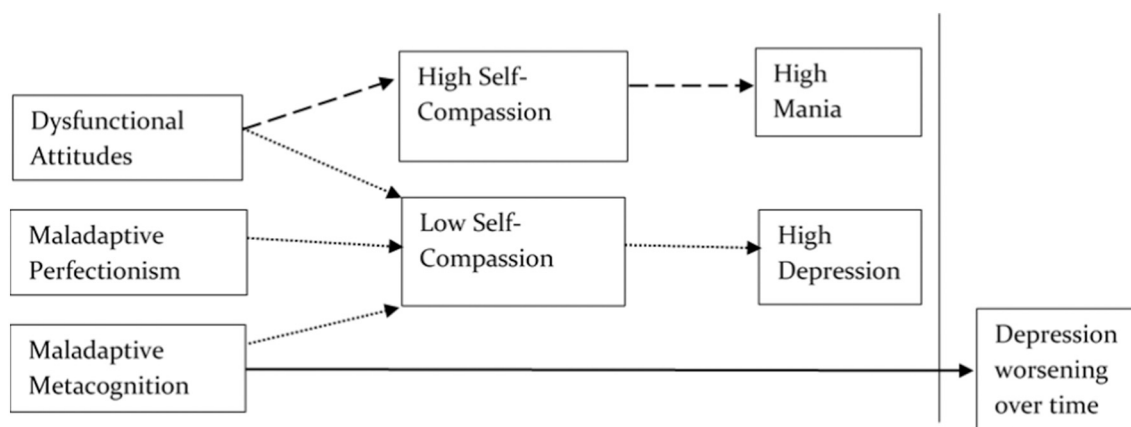
Self-compassion was a partial mediator between all three maladaptive cognitive styles and depression (Fig. 2). While for mania, self-compassion was only a partial mediator between dysfunctional attitudes. Interestingly, the mediation model (Fig. 1, Model-B) for DA and mania found that higher self-compassion predicted higher mania scores, contrary previous research (Yang et al., 2018). However, higher self-confidence and increased self-esteem are both linked to higher self-compassion, and often present during manic phases (Knowles et al., 2007; Park et al., 2014).

The possible relationship between higher self-compassion and mania severity requires further research. Self-esteem is closely linked to self-compassion in BD and is often inflated during mania (Park et al., 2014) which could also share a relationship with increased self-compassion. Our results clearly demonstrate that self-compassion is one way in which maladaptive cognitions associated with BD influence symptoms of depression.

### 4.1. Future research and clinical implications

Measuring metacognitive beliefs could help to prevent depressive episodes by allowing essential cognitive therapeutic work to be done to prevent or to limit severity of depressive symptoms. The findings that those in a mixed or manic state scored equal to, or higher than, depressed participants for all maladaptive cognitions, suggests that cognitive change techniques could also be helpful to those presenting with (hypo)manic symptoms such as striving, or achievement based dysfunctional cognitions. Pilots with small samples sizes have already begun to show promising findings (Callesen et al., 2020). Further research into metacognitive beliefs and interventions using meta-cognitive therapy in BD could also be of interest.

The finding that higher self-compassion predicted higher mania scores suggests that caution may need to be taken when offering compassion-based interventions (CBI) to those with BD. The ICD-11 (World Health Organization, 2018) states that 'inflated self-esteem', a



**Fig. 2.** Proposed model of self-compassion mediating the association between maladaptive cognitions and mood symptoms and maladaptive cognitions predicting increase severity of mood symptoms over time.

psychological factor closely linked to self-compassion (Park et al., 2014) is one of the key diagnostic symptoms of mania. Therefore, if an individual is experiencing DA relating to striving and goal attainment, making further attempts to increase self-esteem through CBI could increase unrealistic goal setting, and in turn increase mania symptoms. This is in keeping with Mansell et al.'s (2007) cognitive model, where rumination and the extreme appraisal given to the DA results in ascent behaviours that lead to mania.

Future research should examine the mediation effects of self-compassion on the relationship between negative cognitions and mood in BD using a longitudinal design, as the longitudinal multiple regression was suggestive that metacognitions could predict depression, but it is unknown if this relationship would be sustained when adding in the mediating effect of self-compassion. Findings regarding the mediating effects of self-compassion are also clinically relevant as this should inform the use of CBI with this client group. Furthermore, what this study has shown is that more research is needed into mania with larger sample sizes, to understand the cognitive processes which underly the phase.

#### 4.2. Limitations

The study had several limitations. A self-report screening tool (MDQ) was used instead of a structured clinical interview to assess BD. The MDQ has been criticised for poor recognition of BD type-II and not detecting less severe symptomology (Miller et al., 2004) potentially reducing homogeneity of the sample. This may be due to collecting data during the Covid-19 pandemic. Generally, experiences of depression increased in the general population (Witteveen et al., 2023) in the early pandemic, and data from the middle of the pandemic (2021–22) is still emerging. Data on the impact of the Covid-19 pandemic on BD is mixed (Fornaro et al., 2021), reporting both worsening and improvement in clinical presentations during stressors such as social isolation measures. Collecting data during this period may have impacted the prevalence of depression symptoms. Further, the decision to dichotomise the data due to a severe skew limited the statistical analysis. However, the dichotomisation was based on previously reported clinical cut off scores (Altman et al., 1997; Skokou et al., 2021).

This emphasises the importance of future research including equal samples of depressed and manic participants.

This study used the self-compassion scales (Neff, 2003a) 'total score'. The SCS has come under scrutiny due to its inclusion of measuring uncompassionate features that are more closely associated with psychopathology and the suggestion that this is not in keeping with measuring the protective mechanism of self-compassion (Muris et al., 2016). Finally, the sample was skewed towards white, female participants,

reducing generalisability.

#### 5. Conclusion

The current study found a positive association between all maladaptive cognitions and depression. A positive association was found only between DA and mania. This provides evidence for why addressing these cognitions therapeutically using change techniques might be helpful at reducing depressive symptoms. Self-compassion was found to be negatively associated with all maladaptive cognitions and depression scores, while no correlation was observed for mania. When exploring current mood, negative cognitions were generally found to be significantly lower in euthymic vs. symptomatic participants. Low self-compassion mediated the relationship between all three maladaptive cognitions and depression; however, high self-compassion mediated the relationship between only DA and mania. More research about self-compassion and mania is needed, as CBI has the potential to be unhelpful during the manic phase of BD.

The longitudinal aspect of the current study found that only maladaptive metacognitions were able to predict depression at the 3-month follow-up, therefore, further exploration of metacognitive therapy for BD is recommended.

#### Contributors

C. Woods, T. Richardson and E. Palmer-Cooper were involved in the initial study design. All other aspects (literature review, data analysis, and preparation of the manuscript) were led by C. Woods with supervision by T. Richardson & E. Palmer-Cooper.

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#### Declaration of competing interest

None.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2023.08.117>.

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