Coping with amplified emotionality among people with bipolar disorder: A longitudinal study

Abstract

Background: The amplified emotionality characteristics of bipolar disorder (BD) may interfere with goal pursuit in the recovery process. This is the first study to test the coping flexibility model empirically among people with BD. Finding ways to cope with goal-striving life events should shed light on managing elevated mood states.

Methods: Using a 12-month longitudinal follow-up design, this study examined the stability in coping flexibility with experimentally-devised Behavioral Approach System (BAS) activating life events and mood states at 6- and 12-month time points for individuals with BD (n = 83) and healthy controls (n = 89). Hierarchical linear modeling tested the individual growth model by studying the longitudinal data.

Results: The findings showed fluctuations in different components of coping flexibility and mood states across time. They confirmed the amplified emotionality characteristics of BD. Moreover, coping flexibility took precedence over BAS sensitivity and psychosocial functioning levels in predicting mood states.

Limitations: Measurements of BAS sensitivity may focus on trait nature only and prone to subjective bias. The assessment of mood or coping flexibility may not accurately capture actual experience in daily life. Lack of respective data on bipolar

subtypes and significant differences in some dimensions between the BD and control groups are further limitations of the study.

Conclusions: The study's findings have implications for coping with amplified emotionality within the personal recovery process for people with BD. Judicious application of coping strategies and adjustment of perceived controllability are crucial for individuals to reach goals pertinent to personal recovery and manage potential manic mood symptoms.

Keywords:

Bipolar disorder

Coping

Amplified emotionality

1. Introduction

Bipolar disorder (BD) is a serious mental illness characterized by chronic and recurrent mood fluctuations between depression and mania. According to worldwide mental health surveys, BD is the second highest ranking cause of missed work or school days (Alonso et al., 2011), which indicates a disability or role limitation in carrying out daily activities (Mall et al., 2015; Merikangas et al., 2007). In general, persistent psychosocial disability in individuals with BD fluctuates in parallel with changes in affective symptoms (Judd et al., 2005), concomitant with a high relapse rate and a chronic recurrent course (Miziou et al., 2015; Reinares et al., 2014; Yatham et al., 2009). On the other hand, amplified emotionality (Gruber et al., 2013) can be another crucial characteristic of BD. Behavioral Approach System (BAS) dysregulation theory (Alloy and Abramson, 2010) can help to illustrate. Having a high BAS sensitivity level (Nusslock et al., 2009; Urosevic et al., 2008), people with BD tend to be overresponsive in relation to BAS-activating or goal-striving life events that easily result in manic/hypomanic mood symptoms (Johnson et al., 2008; Johnson et al., 2016; Nusslock et al., 2007). In addition to this overresponsiveness to life events, poor emotion regulation (Green et al., 2007; Johnson et al., 2007; Phillips and Vieta, 2007) further leads to the maintenance of elevated mood states (Farmer et al.,

2006). Thus, finding ways to cope with amplified emotionality and extreme mood changes is vital for people with BD to manage their illness.

Instead of focusing on symptom reduction or relapse prevention in clinical recovery, a paradigm shift is placing more emphasis on personal recovery (Tse et al., 2014a) in which there is more focus on goal setting or self-empowerment (Tse et al., 2014b). Goal setting serves as an important element in the mental health recovery process (Clarke et al., 2009) and an integral component of strengths-based interventions, which self-directed empowerment can facilitate (Shanks et al., 2013; Tse et al., 2014b; Tse et al., 2016). Capitalizing on the individual's own vision of recovery, goal setting can even promote hope and enhance motivation (Clarke et al., 2012; Michalak et al., 2012). Goal setting can lead to the enhancement of positive emotions (Greenglass and Fiksenbaum, 2009; McCarthy et al., 2010) or vice versa (Marien et al., 2012; Orehek et al., 2011). However, goal pursuit could intertwine with emotional response for people with BD (Gilbert and Gruber, 2014). Specifically, ambitious or excessive goal striving may easily elicit a manic mood in people with BD (Alloy et al., 2012; Stange et al., 2013; Tharp et al., 2016). This dilemma is quite challenging, especially when people with BD have difficulties in regulating their positive emotions. Thus, further investigation is needed to fill this research gap and to

see if any dilemma-breaking means can help people with BD to achieve the set goals and go through a personal recovery process.

Coping with BAS-activating life events appears to be an outlet to counter the emergence of manic symptoms. In essence, coping is a dynamic process that changes according to the varying demands and appraisals of situations over time or from stage to stage (Carver et al., 1989; Holahan et al., 1996). Therefore, a flexible coping mechanism is necessary (Cheng, 2001; Cheng et al., 2014). Individuals' experience and cognition change over time. The cognitive interpretation of an experience sets the coping process in motion (Folkman et al., 1986; Roesch et al., 2002). Specifically, perceived controllability is seen as a key element in a cognitive appraisal with implications for how an individual determines his or her available personal or interpersonal resources for responding to a situation (Cheng, 2001; Folkman et al., 1986). These processes emerge and reemerge, influencing the selection and use of coping strategies (Lazarus, 1993). Therefore, repeated measures of appraisal and coping are necessary to identify both changing and relatively stable variables (Cheng and Cheung, 2005; Lazarus, 2000; Ptacek and Pierce, 2003). The use of longitudinal studies to identify the unknown issue of stability in coping flexibility, especially the temporal effect of the BAS response to experimentally manipulated BAS-relevant

stimuli (Urosevic et al., 2008), has been suggested (Cheng, 2001; Lazarus, 1999). Thus, further investigation is needed to fill this research gap.

Moreover, the coping flexibility model has just been applied to the normal population, but it has never been applied to people with mental health concerns (Cheng et al., 2014). Coping flexibility may apply differently to people with BD than to people without BD. First, individual affective states may color the judgment of an appraisal or coping response (Forgas and Eich, 2013). Second, the presumed effective coping in a normal population may be of no use to people with BD during their mood episodes (Urosevic et al., 2008; Wright et al., 2009). Further investigation is warranted. In addition, most previous studies focused only on coping with general stressors or prodromes (Lam et al., 2001; Wong and Lam, 1999) rather than life events. Detailed investigation of the impact of different styles of coping in relation to life events, particularly those that are BAS relevant, has yet to take place.

An exploration of how individuals cope with life events is relevant to the management of amplified emotionality, especially when taking the effects of individuals' BAS sensitivity and psychosocial functioning levels into account as well. Coping may play a role between mood states and an individual's BAS sensitivity level (Alloy and Abramson, 2010; Alloy et al., 2009) or psychosocial functioning level (Weinstock and Miller, 2008, 2010). A BAS hypersensitivity trait (Nusslock et al.,

2009; Urosevic et al., 2008) and psychosocial functional impairment (Nolen et al., 2004; Weinstock and Miller, 2008, 2010) can be significant risk factors for affective symptoms in BD. Therefore, further investigation can identify the role of coping, on top of BAS hypersensitivity and psychosocial functioning, in predicting mood symptoms.

This study had two aims. First, we examined the differences in the stability of mood states and coping flexibility across a year between participants with and without BD. Second, we investigated time-invariant variables (BAS sensitivity level and psychosocial functioning level) and time-varying variables (different components of coping flexibility) as predictors of changes, if any, in mood states over time. We hypothesized that coping should play a crucial role in managing amplified emotionality in people with BD. A 12-month longitudinal follow-up study design examined the stability in coping flexibility and mood states across time. Within the prospective analyses, corresponding measures occurring at two subsequent follow-up time points, 6 months and 12 months after the initial baseline measurement, indicated changes.

2. Materials and methods

2.1. Participants

Ninety participants diagnosed with BD I or II by a regional hospital and 90 healthy controls from the community were recruited through convenient sampling. The participants were fluent in Chinese, aged 18 to 65, and had a primary level of education or above. The participants with BD had to have been in a state of full remission for more than two months (Tohen et al., 2009). Exclusion criteria included a comorbid diagnosis of schizophrenia, schizoaffective disorder, substance misuse, organic brain syndromes, or intellectual disability. The diagnoses of BD were confirmed by corresponding psychiatrists with reference to the criteria cited in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (American Psychiatric Association, 2002). Participants underwent reassessment at 6-month and 12-month follow-ups. During the 12-month follow-up, seven participants with BD and one healthy control dropped out of the study (4.2% dropout rate); the reasons for dropping out were relapses or lack of interest in continued follow-up. The remission status of the participants with BD was strictly checked through the medical records in the hospital to ensure they met the criteria. Each participant was offered a coupon worth HK$100 (or US$12.80) after the completion of the whole study. Ethical approval was obtained from the Institutional Review Board of the University of Hong

Kong/Hong Kong West Cluster of the Hospital Authority (UW13-176). Throughout the 12-month study period, the research participants' data were kept in password-protected files and the questionnaire booklets were put in a locked file cabinet. Participation in the study was on voluntary basis, and the services provided to the research participants were not affected if they decided to withdraw from the study.

2.2. Measures

We measured the baseline pre-event affective symptoms (including depressive and manic mood) with the Modified Hamilton Rating Scale for Depression (MHRSD; Miller et al., 1985) and the Bech-Rafaelsen Mania Scale (BRMS; Bech et al., 1979), respectively. Both scales use a standardized interview format, with higher scores representing higher symptom severity. We measured the post-event mood states with the Internal State Scale (ISS; Bauer et al., 1991), which consists of four subscales: Activation (ACT), Well-Being (WB), Perceived Conflict, and Depression Index. The ISS is a self-report instrument that is sensitive to changes in affective states. Higher scores, specifically in the subscales of ACT and WB, indicate elevated mood states. Translation of all the participant-report assessment tools took place with reference to the guidelines for the translation and cultural adaptation of psychometric scales (Wild et al., 2005). The translated materials (in Chinese) are available from the corresponding author upon specific request. For the present study, we used Mansell

and Lam's (2006) present state version of ISS, and we only report the ISS_ACT and ISS_WB subscales. The assessment took place immediately after mood induction.

We measured coping flexibility in terms of cognitive appraisal and coping responses by means of the Coping Flexibility Questionnaire (Cheng, 2001, 2003). For the corresponding measurements, we developed a total of 10 BAS activation-relevant life-event scenarios with reference to the Life Events Scale (Francis-Raniere et al., 2006). To make the life-event scenarios vivid, all of them were role-played and videotaped by the author (SC) and a research assistant; this approach has been found to be a reliable means of inducing positive mood change (Martin, 1990). Each scenario was role-played for two to three minutes. The 10 life-event scenarios were centered around individual achievement as well as gratifying interpersonal relationships or interactions:

(i) Received praise from family or friends for completion of household chores

(ii) Received a huge amount of money to enable the achievement of life goals

(iii) Found a much-wanted job

(iv) Accepted into desired social group

(v) Received positive reaction from family or friends about doing well at work

(vi) Received a salary increment or a promotion from boss due to good work performance

(vii) Planned, organized, or prepared for going on a vacation or trip

(viii) Won a significant award for achievements at work

(ix) Hosted a social event very successfully

(x) Accomplished an important assignment at work

Before actual implementation, a pilot trial was run with a group of 10 people who have lived experience of BD using these 10 life-event scenarios video clips. The contents of the life-event scenarios were verified by the pilot group as being BAS-activating events in everyday life. In the actual field study, we presented two compulsory and two elective scenarios at each time point. The participants were asked to view the video clips and vividly imagine encountering the situations portrayed in the scenarios in real life and then to give ratings for the following coping indices for each scenario:

(a) Perceived controllability score. After viewing the corresponding video clips, the participants rated the perceived controllability of the life events on a six-point scale, with a higher score indicating greater perceived controllability (CTR). The scores included the average and its variance (VCTR) across four life events.

(b) Coping strategies score. We compiled a list of 16 coping strategies that included the strategies of problem-focused (PF) and emotion-focused (EF) coping (Carver, 1997; Carver et al., 1989), behavioral-activation and behavioral-deactivation coping (Lam et al., 2001; Wong and Lam, 1999), and emotion-amplifying and emotion-diminishing coping (Edge et al., 2013). Participants reported their repertoire of coping responses after their ratings of CTR. The operationalization of the coping strategies score included two major dimensions: (i) the mean of PF and EF and their variances (VPF and VEF) and (ii) the mean of behavioral-activation/emotion-amplifying (AA) and behavioral-deactivation/emotion-diminishing (DD) and their variances (VAA and VDD) across the four life events.

(c) Strategy-situation fit score. This score represents the goodness-of-fit hypothesis specified by the transactional theory of coping (Lazarus and Folkman, 1984). A response that meets the goodness-of-fit criteria (i.e., Fit1 = using PF or EF respectively in controllable or uncontrollable events; Fit2 = using AA or DD respectively in controllable and uncontrollable events) would have a score of 1, whereas all other responses would score 0. We derived the fit score by averaging the scores of the four life events, so possible average scores ranged from 0 to 1.

We measured the BAS trait sensitivity using the Behavioral-Inhibition System/ Behavioral-Approach System (BIS/BAS) scales (Carver and White, 1994). This self-report scale consists of three BAS subscales: Reward Responsiveness, Drive, and Fun-Seeking. We used an overall BAS score, which is the result of summing the three subscales and which can indicate the whole picture of approach behavior (Bowins, 2012), to represent an individual's BAS sensitivity level. Higher scores indicated a higher sensitivity level. We also made translations and cultural adaptations of the scale (Wild et al., 2005) for the present study.

We measured psychosocial functioning level by means of the Functioning Assessment Short Test (FAST; Rosa et al., 2007). The FAST is a brief interviewer-administered instrument that comprises six specific areas of psychosocial functioning: autonomy, occupational functioning, cognitive functioning, financial issues, interpersonal relationships, and leisure time. The global score, the result of summing the six areas, represents an individual's psychosocial functioning level. Lower scores indicate higher psychosocial functional levels.

2.3. Data analysis

We analyzed the data using SPSS, version 20.0. We used hierarchical linear modeling (HLM) to test the individual growth model by studying repeatedly measured data. This integrated random-coefficients approach usually operates on two levels:

Level 1, or the within-subject model, is the model for repeated measures with time-varying variables nested within individuals, whereas Level 2, or the between-subject model, is the model for time-invariant variables between groups of individuals. We formulated three HLM individual growth models to test the hypotheses of the study:

2.3.1. Unconditional model

This was the baseline model that did not contain any predictors. It was also known as the random effects ANOVA model. The model specification was as follows:

Level 1: $Y_{it} = \pi_{0i} + r_{it}$

Level 2: $\pi_{oi} = \beta_{00} + U_{0i}$

The above two equations specified the HLM model for the dependent variable, Y_{it} for the *i*th participant on the *t*th occasion of measurement, which is a function of a systematic growth trajectory plus random error. For ease of interpretation, we took the three measurement occasions as $t = 0, 1, 2$, which is the most common type of coding for models examining individual change (Heck et al., 2010; Raudenbush and Bryk, 2002).

2.3.2. Linear and quadratic growth models

By comparing these models with the baseline unconditional model, we examined whether these models were necessary to fit the present data. To examine the parallelism hypothesis regarding the variability of Y_{it} (i.e., post-event mood states

and different components of coping flexibility) in growth rates between the two groups, we created cross-level interaction terms. The model specification of the quadratic growth model was as follows:

Level 1: $Y_{it} = \pi_{0i} + \pi_{1i}(Time_{it}) + \pi_{2i}(Time_{it})^2 + r_{it}$

Level 2: $\pi_{oi} = \beta_{00} + \beta_{01}Group + U_{0i}$

$\pi_{1i} = \beta_{10} + \beta_{11}Time * Group + U_{1i}$

$\pi_{2i} = \beta_{20} + \beta_{21}Time^2 * Group + U_{2i}$

The terms $Time_{it}$ (where t = 0, 1, 2) and $(Time_{it})^2$ specified the linear and quadratic changes for Y_{it}, respectively. The linear time variable was the rate of change per unit of time, whereas the quadratic time variable captured the change in the rate of change over the three measurement time points. The terms π_{oi}, π_{1i}, and π_{2i} referred to the initial Y_{it} (intercept) as well as the rates of linear changes and rates of quadratic changes over time. The random terms (i.e., U_{0i}, U_{1i}, and U_{2i}) allowed individuals to have different initial statuses as well as different rates of linear and quadratic changes.

In addition, we conducted univariate *t* tests to investigate the simple effects of group on different variables at each time point. We adopted an adjusted alpha level of 0.016 (0.05/3) to control for overall Type I error. In addition, we examined the simple effects of time (growth curve) on different variables for each group by repeated

measure ANOVA analysis. The three measurement time points were the within-subject variables. We treated comparisons between the BD group and the control group as between-group variables. Changes in the components of coping flexibility and mood states were the criterion variables. We then identified the main effect of time by trend analysis.

2.3.3. Individual growth model with time-invariant and time-varying predictors.

The model specification for the individual growth model was as follows:

Level 1: $Y_{it} = \pi_{0i} + \pi_{1i}(Time_{it}) + \pi_{2i}(Time_{it})^2 + \pi_{3i}X_{it} + r_{it}$

Level 2: $\pi_{oi} = \beta_{00} + \beta_{01}Z + U_{0i}$

$\pi_{1i} = \beta_{10} + \beta_{11}Z + U_{1i}$

$\pi_{2i} = \beta_{20} + \beta_{21}Z + U_{2i}$

$\pi_{3i} = \beta_{30}$

In this model, we proposed a time-invariant variable, *Z*, as the predictor for the initial status (π_{oi}), the linear change (π_{1i}), and the quadratic change (π_{2i}) of Y_{it}. We also tested such a time-invariant predictor to see the moderating effect for the initial status, linear change, and quadratic change of Y_{it}. On the other hand, we hypothesized X_{it} as the time-varying predictor for Y_{it} in the model.

We started the analysis with the unconditional model, which was fitted to Equation 1 without any predictors, and then we fitted the linear and the quadratic

growth models in Equation 2 to see the change in Y_{it} over time. We carried out analyses on alternative covariance structures to identify the model that could best fit the present data (Raudenbush, 2002). At Level 1, we used the autoregressive covariance structure (AR1) with homogeneous variances. This structure is useful in a repeated-measure design because frequently participants' scores at one time point correlate with their scores at the subsequent time points, with adjacent scores correlating most strongly, i.e., the residuals correlate from occasion to occasion within individuals (Field, 2009; Leech et al., 2011).

At Level 2, we fitted and compared three common covariance structures: (a) the variance components model, (b) the AR1 model, and (c) the diagonal model. We chose a better model based on a smaller value of the Akaike information criterion (AIC). Specifically, the AIC is a fitness index for trading off the complexity of a model against how well the model fits the data. Moreover, researchers use the AICc (correction for finite sample size) instead of the AIC, especially when the sample size is small and the number of parameters is large (Burnham and Anderson, 2002, 2004; Konishi and Kitagawa, 2008). Finally, we used standard multiple regression to identify whether any changes in the independent variables (components of coping flexibility) could predict the changes in the dependent variables (mood states) across time.

3. Results

3.1. Linear and quadratic growth model

A total of 172 participants completed the entire process of the study. About 60% of the participants were female in both groups. Relatively, the people in the control group were younger with higher socio-occupational functioning. Detailed descriptive information is presented in Table 1. The baseline affective symptoms were comparable between the two groups at the beginning (t = 1.870, p = .063 for MHRSD; t = 1.684, p = .094 for BRMS), and this similarity remained at the final time point (t = 1.765, p = .079 for MHRSD; t = 1.932, p = .055 for BRMS). Maintenance of medication was counterchecked using nursing care records, and other kinds of routine care or therapy were assured by checking medical records during follow-ups by the first author. Thus, by assuming stable mental states, we performed further comparison of post-event mood states between the two groups. First, for each Y_{it}, we fitted the corresponding unconditional model in Equation 1 without any predictors. Then, we fitted the linear and the quadratic growth models in Equation 2 to see the stability of Y_{it} over time. We chose the model with the lowest AICc value. The results of the parameter estimates of fixed effects of Group X time interaction for all Y_{it} are presented in Table 2. In terms of mood states, there were significant differences between the two groups with regard to ISS_ACT, including initial status (β_{01}), linear

change (β_{11}), and quadratic change (β_{21}), yet there was no significant difference in ISS_WB. Regarding the perceived controllability of coping flexibility, there was a significant difference in initial status (β_{01}) for CTR, as well as in linear change (β_{11}) and quadratic change (β_{21}) for VCTR. Regarding the coping strategies of coping flexibility, there were significant differences in initial status (β_{01}) for PF, EF, AA, DD, Fit1, and Fit2, which implied that significant discrepancies occurred between the two groups at the beginning, but that the subsequent changes that occurred across time were quite similar between the groups. Regarding DD, VPF, and VAA, there were significant differences in linear change (β_{11}), indicating that there were also significant differences in linear gradient between the two groups. However, no significant differences in VEF and VDD existed in linear or quadratic change across time.

3.2. Group and time effects

Regarding the simple effects of group on different variables at each time point, participants in the control group maintained a higher fit index (t = -2.83 to -3.56, p < .001) and CTR (t = -2.96 to -3.64, p < .001) than the BD group across time, but participants in the BD group retained significantly higher PF (t = 2.92 to 4.53, p < .001) and relatively higher AA (t = 1.93 to 3.34, p = ns to < .016) than the control group. For ISS_ACT, there were marked differences between the two groups at Time

1 and Time 3: participants in the BD group scored significantly higher than those in the control group (t = 2.63 to 2.68, p < .016). A similar pattern for ISS_WB was also noted, but not at a significant level.

We then investigated the simple effects of time on the above variables for each group (Table 3). As per the trend analysis in the BD group, we observed V-shaped patterns in some components of the coping flexibility, including CTR, VCTR, PF, AA, and VAA. Similar V-shaped patterns were also observed in mood outcomes involving ISS_ACT and ISS_WB. Regarding the growth curves of different variables in the control group, there were various patterns of changes. However, the changes in different components of coping flexibility seemed independent of the changes in mood states.

3.3. Individual growth models with time-invariant and time-varying predictors

As there were significant linear and quadratic changes of ISS_ACT in the BD group, we further fitted an individual growth model with time-invariant (baseline BAS and FAST) and time-varying (different components of coping flexibility) predictors in Equation 3.

Table 4 shows the parameter estimates of the individual growth model of the BD group on ISS_ACT. The quadratic change (β_{20}) was significant, and the linear change (β_{10}) was marginally significant. This indicated that there was a quadratic

change in ISS_ACT after controlling for the effects of all predictors. The parameter estimate for the linear change was negative, but for the quadratic change it was positive, which implies that ISS_ACT dropped sharply at first and then increased gradually at subsequent time points. Specifically, time-invariant predictors were nonsignificant in predicting linear or quadratic change of ISS_ACT. Alternatively, AA and VAA were significant time-varying predictors of ISS_ACT. The estimates for both the estimates for AA ($\beta = 20.672$) and VAA ($\beta = 14.703$) suggested a similar relationship with ISS_ACT over time. Thus, participants with BD with decreased AA and VAA tended to report lower ISS_ACT levels. Furthermore, we performed a multiple regression of changes in ISS_ACT for the BD group with time-varying predictors in two periods separately (i.e., Time 1 to Time 2; Time 2 to Time 3). The results were consistent, indicating that a reduction in VAA ($\beta = .417$, $p < .05$) had positive effects on the decrease of ISS_ACT in the BD group from Time 1 to Time 2. The pertinent partial regression plots of VAA are shown in Figure 1.

4. Discussion

This study examined the longitudinal changes or stability of mood states and coping flexibility by comparing the differences between people with and without BD. Conceptually, to the best of the authors' knowledge, the present study is the first study to extend the application of the coping flexibility model to a clinical population, that

is, people with bipolar illness. As demonstrated by the individual growth models in this study, coping flexibility took precedence over both BAS sensitivity level and psychosocial functioning level in predicting mood states among people with BD. There was a longitudinal change in coping flexibility across time which had a significant influence on corresponding mood variations. According to the trend analysis, the maintenance of elevated amounts of coping strategies and perceived controllability contributed to over-elevated mood states among people with BD across time. As per the individual growth model, people with BD may consider regulating their mood by reducing the amount of behavioral-activation/emotion-amplifying coping when encountering BAS-activating life events.

The results from the present study indicate that people with BD react to positive life events by increasing their energy and goal directedness, which subsequently heightens their mood (Alloy et al., 2009; Johnson et al., 2008). In the current study, this was manifested by the higher profile and significant quadratic changes of ISS_ACT identification in the BD group, but not in the control group. Thus, the results confirmed the amplified emotionality characteristics of BD (Gruber et al., 2013). Specifically, the present findings are consistent with the results of Farmer et al.'s (2006) study, which showed that people with BD exhibit prolonged

durations of self-reported positive affect during laboratory studies when compared with controls.

Moreover, in this study, the people in the BD group maintained higher mood states despite a relatively low level of fit index. The fit index should relate to a positive mood state or to adaptive psychological wellbeing (Cheng, 2001; Cheng et al., 2007; Fresco et al., 2006). The application of the fit index to a healthy control group signifies the notion of adaptiveness. However, it seems inapplicable to people with BD as there are unfavorable outcomes due to their propensity to trigger (hypo)manic symptoms easily (Alloy et al., 2009). Despite their tendency for amplified emotionality, it seems that people with BD may deactivate or activate their mood states by changing their perceived controllability of life events and the corresponding coping strategies for dealing with these events, as inferred by the findings of this study. According to the individual growth model and the multiple regression on changes, decreasing AA contributed significantly to the attenuation of ISS_ACT from Time 1 to Time 2 in the BD group. In other words, subduing the perceived controllability (Gruber et al., 2014) or reducing the amount of activation or "amplifying" coping strategies (Edge et al., 2013; Lam and Wong, 1997; Wong and Lam, 1999) is purported to be an effective option for emotion-regulation strategies when dealing with BAS-activating life events (Johnson et al., 2007).

Johnson (2005) highlighted that cultivating the ability to regulate positive emotions is imperative for people with BD. The results from the present study imply that the judicious use of coping is essential to overcome the possible activation of mood states after encountering goal pursuing or BAS-relevant life events. This study supports such prudent use of coping strategies, as is apparent from the fluctuations and changes in coping flexibility and mood states confirmed by the longitudinal data, along with the indication of disturbance in emotion regulation (Johnson et al., 2016). The maintenance of amplified emotionality towards BAS-activating life events across time implies persistence in pursuing goals or making positive responses to the anticipation of receiving rewards (Nusslock et al., 2009; Urosevic et al., 2008). Thus, diminishing the level of perceived controllability and the number of coping strategies should help to regulate over-activated mood states. Such attempts can take place along the journey of personal recovery among people with BD, so that they can still maintain euthymia when striving for their own personal goals. This resonates with findings showing that interventions aimed at empowering people to feel able to manage their mood could facilitate personal recovery in people with BD (Dodd et al., 2017). Personal recovery has being increasingly recognized as a valued outcome for people with BD (Jones et al., 2013; Tse et al., 2014b). The encouragement of goal setting within a personal recovery process might be compromised by the propensity of

goal-elicited manic symptoms among people with BD (Clarke et al., 2012; Tharp et al., 2016). Thus, the findings from this study suggest achieving a balance between goal striving and over-elevation of mood. This dilemma-breaking effort should play a significant role in the recovery process. It has been suggested that an understanding of the psychological mechanisms underlying recovery is crucial to inform effective recovery-focused therapies (Jones et al., 2015). Further intervention research is needed to validate the benefit of utilizing an individual's intention to manage their personal goals through stable mood regulation in the recovery process.

The present study demonstrates the integration of the components of coping flexibility within the BAS dysregulation theory. The BAS dysregulation theory was originally a framework for understanding the generation of different mood symptoms through excessive BAS activation or deactivation in people with BD after encountering BAS activation-relevant or deactivation-relevant events, respectively (Alloy and Abramson, 2010; Urosevic et al., 2008). The addition of the coping flexibility framework to the BAS dysregulation theory can enrich the application of this theory on an intervention dimension. Actually, the role of coping with BAS-relevant life events is critical in counteracting a BAS-sensitive temperament or the activation effects of BAS-relevant life events. The findings from this study can be perceived as a recourse for people with BD in dealing with BAS-activating life

events. Specifically, the judicious use of coping strategies and adjustments of perceived controllability is deemed to be crucial for managing potential manic mood symptoms. While the BAS dysregulation theory has laid important groundwork to conceptualize the formation of mood symptoms in people with BD, the coping flexibility framework can modify the mechanism of symptom formation. Further intervention and feasibility research studies are recommended.

In addition, the findings from the present study can further extend the role of coping flexibility when applying cognitive behavioral therapy (CBT) within the recovery process for people with BD. Jones and his colleagues (Jones and Burrell-Hodgson, 2008; Jones et al., 2015) devised a recovery-focused CBT by incorporating the recovery elements into CBT. One of the core features of the therapy is to enhance coping skills by considering the role of appraisals in fluctuations in affect. The results from the present study can further enrich the literature regarding coping and mood states. Specifically, cognitive appraisals (i.e., perceived controllability) and the use of different kinds of coping strategies can be applied differently, leading to various effects on changes of mood, in particular when taking BAS-relevant life events into account. It is possible that the above suggestion may further improve clinical and personal recovery outcomes and augment pertinent psychosocial interventions.

5. Limitations and Conclusions

First, there was no breakdown of the BD group into the two different subtypes in this study. Considering substantial differences in BAS sensitivity and its association with mood variability have been quantified in BD I and BD II (Fletcher et al., 2013), it is suggested that although a similar pattern of functional impairment may be observed in both groups (Rosa et al., 2010), the different degrees of amplified emotionality and subsequent coping of individuals with BD I and BD II should lead to more specific interpretations and treatments for these two different subtypes of BD. Second, in spite of the similar gender pattern and comparable pre-event mood states observed in both groups, caution should be exercised in any comparison due to the significant differences in age and socio-occupational functioning level. The participants in the BD group, who were relatively older than those in the control group, had a more extensive repertoire of coping methods when experiencing positive emotions. This could be compatible with the broaden-and-build theory of positive emotions (Fredrickson, 2001) rather than the BD diagnosis. In addition, the higher sense of perceived controllability in the control group could in fact be attributed to the higher educational level of this group (Leganger and Kraft, 2003; Slagsvold and Sørensen, 2008). Third, on the basis of the assumption that BAS has a trait nature, we only measured BAS once at the beginning, but it would have been wise to confirm its

stability by measuring it again at the end of the 12-month follow-up. Fourth, although we administered the FAST test properly, there may have been subjective bias as only one rater was available. Fifth, despite administering a baseline measurement of affective symptoms and Mansell and Lam's (2006) present state version of the ISS in this study, these may not have accurately captured the instant changes in mood states following the procedure with the vignettes due to the lack of pre-event mood measures. Sixth, regarding the assessment of coping flexibility, the participants' responses toward the experimentally devised scenarios may not reflect their actual experiences in daily life. Furthermore, individual life experiences may contribute to changes that may not be easily controlled. Further research on actual coping in naturalistic settings should be considered. Additionally, contextual factors may have had an impact on the propositions or interpretations we put forward here. As highlighted by Tse and colleagues (Tse et al., 2014c; Wang et al., 2009), Chinese culture may play an important role in coping. Researchers should consider replication of this work on Western populations.

Despite these limitations, this study provides valuable information on helping people with BD to deal with their amplified emotionality when facing BAS-activating life events. People with BD may struggle to use the appropriate coping strategies to cope with their elevated mood episodes (Tse et al., 2014c). Thus, being able to cope

effectively can minimize the effects of stress on mood symptoms and empower patients to pursue their own recovery goals (Mueser et al., 2002). In sum, empowering clients by using appropriate coping is crucial along the course of personal recovery. Perhaps further research on intervention studies is necessary to strengthen this role of coping in the recovery journey for people with BD.

Appendix

Abbreviations used in this study: AA = Behavioral-activation/emotion-amplifying; ACT = Activation; AIC = Akaike information criterion; AR1 = autoregressive covariance structure; BAS = Behavioral Approach System; BD = Bipolar disorders; BRMS = Bech-Rafaelsen Mania Scale; CTR = Perceived controllability; DD = Behavioral-deactivation/emotion-diminishing; EF = Emotion-focused; FAST = Functioning Assessment Short Test; Fit1/Fit2 = Fit index; HLM = hierarchical linear modeling; ISS = Internal State Scale; MHRSD = Modified Hamilton Rating Scale for Depression; PF = Problem-focused; V = Variance; WB = Well-being

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