

Potential Mechanisms in a Novel Positive Psychology Intervention Enhancing
Personal Recovery in Patients with Bipolar Disorder: A Mediation Analysis

Master of Science Thesis

by:

Elisa Bockholt

s1934945

1st Supervisor: Dr. J. T. Kraiss

2nd Supervisor: Dr. M. L. Noordzij

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Positive Clinical Psychology & Technology

Faculty of Behavioral, Management and Social Sciences

UNIVERSITY OF TWENTE.

Abstract

Despite increasing attention towards positive psychology interventions and the concept of personal recovery in research of bipolar disorder (BD), there is still lack of knowledge about potential mechanisms underlying the effectiveness of positive psychology interventions (PPIs). The current study was a secondary analysis of a randomized controlled trial investigating the effectiveness of a multicomponent PPI on personal recovery in euthymic BD patients. It focused on the three positive emotion regulation strategies dampening of positive emotion, emotion-focused and self-focused positive rumination as potential moderators for the effect of the PPI “Living well with bipolar disorder” on personal recovery. A sample of euthymic patients ($N = 97$) diagnosed with BDI or BDII between 18-65 years of age was randomly allocated to either the experimental or control condition. Personal recovery was measured at different points in time, including four-week in the intervention, post-measurement, and six-months follow-up. Simple and multiple mediation analyses have shown nonsignificant indirect effects for dampening ($ab = -0.67$, BC 95% CI = -2.37 to 0.42), emotion-focused ($ab = -0.09$, BC 95% CI = -0.96 to 1.06), and self-focused positive rumination ($ab = 0.07$, BC 95% CI = -0.84 to 1.08). Thus, there was no significant mediation effect of the three mechanisms on the relationship between the PPI and personal recovery. With that, the current study contradicts previous research on the importance of the specific emotion regulation strategies in personal recovery from BD. The limitations of the present study include a relatively small sample size which has led to underpowered statistical analysis.

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Globally, more than 46 million people are diagnosed with BD, one of the most severe affective disorders which is characterized by adverse symptomatology (Dattani, Richie, & Roser, 2021; Goodwin & Jamison, 2007). For the treatment of BD, positive psychology alongside the concept of personal recovery has increasingly gained attention, not least because of the demand of patients to acquire self-management of their illness to be able to live a meaningful life alongside their symptoms (Todd, Jones, & Lobban, 2012; Mead & Copeland, 2000). To date, however, there is little evidence on the working mechanisms of PPIs in BD treatment. A recent study on the effectiveness of the PPI “Living well with bipolar disorder” on personal recovery has drawn attention to patients’ response to positive mood states in BD as well as to the concept of positive emotion regulation (Kraiss et al., 2018). Positive emotion regulation includes strategies of dampening of positive emotion and positive rumination. Dampening is expected to have a negative effect on the course of BD due to its association with high emotional distress and lower life satisfaction (Gilbert et al, 2013; Quoidbach et al., 2010) and thus, to inhibit personal recovery in patients. Positive rumination is associated with higher levels of mania but can also lead to better functioning in patients because it increases positive emotions and hence might be a relevant predictor of personal recovery (Quoidbach et al., 2010; Kraiss et al., 2021). Although recent studies have investigated the nature of positive emotion regulation in BD patients, there is lack of research on the investigation of the concept as a potential working mechanism in the effect of PPIs on personal recovery. The aim of this study will be to close this gap by examining positive rumination and dampening as potential mediating factors that could influence the effectiveness of the PPI on patients’ personal recovery.

Bipolar Disorder

BD contains recurrent states of (hypo)mania alternating with major depressive episodes. Between episodes, patients find themselves in euthymic states in which they are relatively symptom-free. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) distinguishes two types of BD, bipolar disorder type I (BDI) and type II (BDII). For a diagnosis of BDII, the criteria of at least one hypomanic episode and one major depressive episode has to be met. However, BDII patients never experience a full manic episode. In BDI, individuals must have had at least one manic episode but do not necessarily experience a depressive episode, although such are common for this diagnosis as well (American Psychiatric Association, 2013).

The symptomatology of BD is associated with significant impairments to the quality of a person's life (IsHak et al., 2012). Patients usually indicate low life satisfaction going along with dysfunctional workplace performance and difficulties in maintaining social relationships (Toyoshima et al., 2019). Severe cognitive deficits in memory and attention as well as in emotion regulation might occur which tend to increase over time (Lima, Peckham, & Johnson, 2018). BD can lead to increased suicide risk in patients and high caregiver burden in terms of financial, emotional, and timewise costs (Gonda et al., 2012; Miller, Dell'Osso, & Ketter, 2014). Additionally, BD is associated with substantial societal costs (Kraiss, Wijnen, Kupka, Bohlmeijer, & Lokkerbol, 2020). In 2015 alone, the total costs of BDI in the United States were estimated at \$202.1 billion per year due to factors such as caregiving, unemployment, and treatment costs (Cloutier, Greene, Guerin, Touya, & Wu, 2018).

Personal Recovery

Current treatment for BD for the most part focuses on mood stabilization and symptomatic recovery as well as on maintenance treatment with the aim of functional recovery

and relapse prevention (Vieta et al., 2018). Besides symptomatic and functional recovery, personal recovery is increasingly ascribed importance in the treatment of mental disorders. Anthony (1993) defines personal recovery as not only recovering from the illness and its symptoms itself but rather changing one's attitudes and feelings to the positive while shifting the focus to live a satisfactory, contributing life despite or rather *with* the restraining circumstances of a disorder. This implies that not the absence of psychopathological symptoms alone leads to recovery in patients but that the presence of well-being is important as well. A conceptual framework for recovery from mental disorders by Leamy, Bird, Le Boutillier, Williams, and Slade (2011) exemplifies this idea by manifesting five processes that are most relevant to personal recovery. These are connectedness, hope and optimism about the future, identity, meaning in life, and empowerment (CHIME) which emphasize the importance of positive and solution-oriented aspects in mental rehabilitation. For BD specifically, a growing body of literature brings attention towards person-centered approaches and personal recovery. From a client's perspective, the concepts of hope, social connectedness, empowerment, and meaning in life in defiance of their condition are important parts of recovery from BD and other severe mental disorders (Jones et al., 2012; Mead & Copeland, 2000; Pitt, Kilbride, Nothard, Welford, & Morrison, 2007; Todd, Jones, & Lobban, 2012; Jones et al., 2012). Patients furthermore indicate they rather want to learn about self-help skills and shifting burdensome feelings and attitudes to more positive ones when dealing with their disorder than taking medication every day. The knowledge of strategies that support life change and increase hope have been described as significant parts of their recovery process (Mead & Copeland, 2000). This gives a brief insight into the growing demand and preference of clients to also personally recover from their mental illness. Also, focusing on the patients' subjective experiences within the concepts of life satisfaction and well-being has shown to have promising effects on the course of BD, especially in buffering against recurrence (Bonnín et al., 2019). Additionally, a

recent study shows an association between personal recovery and higher adaptive coping compared to clinical recovery from BD (Mezes, Lobban, Costain, Longson, & Jones, 2021). In this study, the absence of personal recovery increased dysfunctional attitudes and negative self-dispositional appraisals in patients during their rehabilitation process. These findings considered, there is a need to further examine the concept of personal recovery and the factors influencing it in the treatment of BD.

Positive Psychology

One field of psychology that specifically focuses on the improvement of well-being and outcomes related to personal recovery is positive psychology (PP). Over the past two decades, PP as an alternative, solution-oriented treatment approach has not only increasingly gained acceptance but also popularity in practice. Here, the focus is on improving well-being by drawing attention to people's subjective experiences, resources, and strengths as well as positive events and influences in an individual's life (Seligman, 2000). This idea is strongly related to personal recovery, as both movements focus on empowering individuals to enhance their life circumstances through self-determination and creation of meaningful experiences (Resnick & Rosenheck, 2006). Moreover, PP and personal recovery share the intent to move beyond mental illness and towards the development of new purpose in life which suggests that PP is fostering recovery in patients (Slade, 2010; Schrank, Brownell, Tylee, & Slade, 2014).

Recent studies have shown that PP is an effective treatment for patients with clinical disorders and severe mental illness such as BD and can not only reduce symptoms but also improve mental health and well-being (Chakhssi, Kraiss, Sommers-Spijkerman, & Bohlmeijer, 2018; Geerling, Kraiss, Kelders, Stevens, Kupka, & Bohlmeijer, 2020). However, there still is a small body of research on the effects of PP on the course of BD specifically. A recent pilot randomized controlled trial found that a PPI might be a useful adjunctive treatment for the

management of depression in patients with BD. Here, participants reported to find different PP exercises helpful during the intervention process, and the intervention has shown to lead to higher positive affect and optimism (Celano et al., 2020). Furthermore, a study by Galvez, Thommi, and Ghaemi (2011) proposed the idea that PP treatment might be an innovative strategy for better clinical outcomes in patients because certain traits such as spirituality and resilience are associated with BD already. Thus, it can be assumed that the practical application of PP offers a helpful alternative approach in the treatment of BD.

Positive Emotion Regulation

Looking at mechanisms that potentially impede in the recovery from BD, difficulties in emotion regulation have found to be of great relevance in the course and maintenance of the disorder (Gruber, Harvey, & Gross, 2012). In BD, both up- and downregulation of positive emotions in particular are assumed to frequently occur in patients. The concept of positive emotion regulation is the individual's reaction to positive emotions and regulation of them based on their personal goals. Positive emotion regulation is likely to contribute to dysfunctional emotionality in BD patients (Carl, Soskin, Kerns, & Barlow, 2013).

There are two positive emotion regulation strategies considered in this study: dampening of positive emotion and positive rumination. Dampening is used to downregulate positive emotions. Feldman, Joormann, and Johnson (2008, p. 509) define this concept as the "tendency to respond to positive mood states with mental strategies to reduce the intensity and duration of the positive mood state". In BD, the use of dampening has shown to be increased in patients (Gilbert, Nolen-Hoeksema, & Gruber, 2013). Intuitively, dampening may be perceived as an adaptive strategy for preventing the emergence of a manic episode. When sensing elevated mood, BD patients vulnerable to mania tend to actively engage in the downregulation of positive emotions in order to calm themselves and hence inhibit manic symptoms (Edge, Miller,

Johnson, Carver, Marquinez, & Gotlib, 2013; Feldman, Joormann, & Johnson, 2008). Paradoxically, dampening of positive emotion is associated with higher risk for mania and more depressive symptoms (Feldman, Joormann, & Johnson, 2008). Moreover, it leads to decreased life satisfaction in patients and has shown to elicit emotional distress which over the course of time worsens the patient's condition and can promote further mood dysregulation (Gilbert et al, 2013; Quoidbach et al., 2010). Thus, dampening can negatively predict the course of BD in the long run and is a barrier for personal recovery because it can prevent patients from living a pleasant life (Edge et al., 2013; Feldman, Joormann, & Johnson, 2008).

Positive rumination is the tendency to respond to affective states by recurrently focusing on empowering resources, self-qualities, and positive life circumstances. Thus, enhancement or maintenance of positive emotions might occur (Feldman, Joormann, & Johnson, 2008). A distinction is made between self-focused positive rumination which has its focal point on positive meanings of events to oneself, and emotion-focused positive rumination where the attention is on the individual's feelings and affective experiences (Gruber, Eidemann, Johnson, Smith, & Harvey, 2011). Whereas positive rumination has been suggested as a maladaptive strategy for patients with BD due to its correlation with higher frequency of (hypo)manic episodes, research has also found that the concept is positively and uniquely associated with personal recovery because it increases positive emotions and thus can improve patient's functioning (Quoidbach et al., 2010, Johnson, Tharps, Peckam, & McMaster, 2016). In addition, positive rumination diminishes depressive symptoms in BD patients and has shown to be related to better well-being outcomes (Feldman, Joormann, & Johnson, 2008; Quoidbach et al., 2010). Furthermore, Kraiss and his colleagues (2021) have detected positive rumination as a relevant predictor of personal recovery and assume that PPIs can support managing positive emotions and thus, positive rumination.

Present Study

Summing up, the positive emotion regulation strategy of dampening could perpetually disturb emotionality in patients with BD which might hinder them from personally recovering from their condition. Positive rumination is expected to increase the patient's functioning in everyday life due to its association with better personal recovery and might support cultivating positive emotions by the help of PPIs. Both concepts will be further examined in this study.

This research is based on a randomized controlled trial on the effect of PP on improving personal recovery in BD was conducted (Kraiss et al., 2019). In this study, positive emotion regulation was measured during and after conducting an PPI alongside personal recovery. The present study will be a secondary analysis of this randomized controlled trial and has the goal to investigate the positive emotion regulation strategies of dampening, self-focused and emotion-focused positive rumination as mediators in the effectiveness of the PPI "Living well with bipolar disorder" on patients' personal recovery. Different measurement points will be taken into consideration; the mediator values at four weeks into the intervention and at post-intervention will be analyzed while the time horizon for personal recovery is at post-intervention and in the long term six months after the intervention.

Method

Study Design

The present study concerns a secondary analysis. The primary study by Kraiss et al. (2018) received ethical approval by the Medical Ethical Committee Twente (Proposal No: NL62997.044.17) as well as the Ethics Committee of the Faculty of Behavioral, Management, and Social Sciences at the University of Twente. Additionally, the study was registered in the Dutch trial register (NTR6729).

Previously, a pragmatic multicenter randomized controlled trial (RCT) was used to examine the effectiveness of the multicomponent positive psychology intervention “Living well with bipolar disorder” on well-being and personal recovery of patients with BDI or II. Both experimental and control condition received care as usual (CAU) according to the Dutch multidisciplinary guideline for BD (Kupka et al., 2015). The participants assigned to the experimental condition additionally received the PPI. Data collection was carried out over a time span of 12 months and included five measurement points: (T0) baseline measurement, (T1) mid-treatment measurement four weeks after the start of the intervention, (T2) post measurement immediately following the intervention as well as (T3) two follow-up measures six months and (T4) 12 months after baseline (T4). The data used for the present study will only concern the measurements at T1, T2, and T3. For the purpose of this study, mediation analyses will be used to investigate whether the positive emotion regulation strategies *dampening* and *self-focused* as well as *emotion-focused positive rumination* have mediating effects on the outcome variable *personal recovery*.

Participants and Procedure

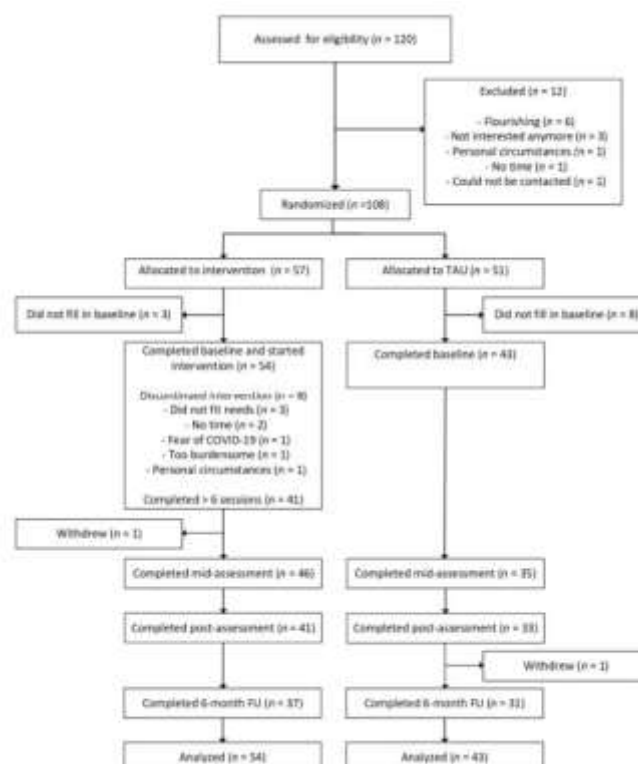
In the study of Kraiss et al (2018), 97 participants diagnosed with BD type I or II in the euthymic state were included from six Dutch mental health centers in the east and west of the country. The inclusion criteria of the study were: (1) being diagnosed with BDI or BDII, (2) being between 18-65 years old, (3) having participated in four or more supportive sessions in the last 12 months, and (4) showing only residual manic or depressive symptoms. An initial screening for participants to assess their symptomatology and its severity was conducted by therapists with the help of the Clinical Global Impression Scale – Bipolar (CGI-BP; Spearing, Post, Leverich, Brandt, & Nolen, 1997), determining whether they could be included in the study. If the patients were currently in a manic or depressive episode or showed symptoms of

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addiction, they were excluded from the sample. The data collection took place between September 2018 and November 2021. When the participants had fulfilled the criteria in the initial screening and after signing the informed consent, they were invited for an additional screening. Here, the MINI international neuropsychiatric interview (Sheehan et al., 1998) to verify the diagnosis of BDI or II was conducted as well as the Mental Health Continuum – Short Form (MHC-SF; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011) to assess their well-being. Before allocating the eligible participants to experimental or control condition, baseline measurements were conducted about two weeks before the intervention started. The test battery consisted of 13 questionnaires which took about 35-40 minutes to fill out at baseline measurement and in an adjusted version at the following four measurement points. All details can be found in the study protocol by Kraiss and his colleagues (2018).

Figure 1

Participant timeline (Kraiss et al., 2018)



Measurements

The data gathered during the trial is self-reported data which has been collected via the online survey program *Qualtrics* (<https://www.qualtrics.com>). In the following section, the measures of personal recovery and positive emotion regulation relevant for the current study will be described. An overview of all measures can be found in the study protocol (Kraiss et al., 2018).

Personal recovery. In order to assess personal recovery in participants, the 15-items version of the Questionnaire about the Process of Recovery (QPR) was applied (Neil et al., 2009). The items measuring personal recovery in the past 7 days were scored on a 5-point Likert scale ranging from ‘strongly disagree’ (0) to ‘strongly agree’ (4) at which higher scores indicate better recovery. Psychometric evaluations have found a high internal consistency of 15-items version of the QPR in samples of individuals experiencing psychosis ($\alpha = .89$; Williams et al., 2015) and diagnosed with schizophrenia spectrum disorder ($\alpha = .93$; Law et al., 2014). Using forward and backward translation, the originally English questionnaire was translated to Dutch for the purpose of the study (Kraiss et al., 2019). This Dutch version has been validated in a Dutch sample ($\alpha = .93$).

Positive emotion regulation. For the assessment of positive emotion regulation including the concepts of dampening, self-focused and emotion-focused positive rumination, the Responses to Positive Affect Questionnaire (RPA) was used (Feldman, Joormann, & Johnson, 2008). The questionnaire measuring individuals’ responses to positive affective states includes 17 items which were scored on a 4-point Likert scale, ranging from ‘almost never’ (1) to ‘almost always’ (4). Higher scores on the dampening subscale demonstrate a tendency to suppress positive emotions while higher scores on the two positive rumination subscales indicate more self- or emotion-focused rumination in participants. For the Dutch version of this questionnaire, the dampening subscale showed an acceptable internal consistency ($\alpha = .80$; Kraiss et al., 2018).

For the subscale self-focused positive rumination ($\alpha = .80$) and emotion-focused positive rumination ($\alpha = .72$), the internal consistency was satisfactory as well (Raes, Daems, Feldmann, Johnson, & Van Gucht, 2009).

Statistical Analysis

In order to test whether the relevant variables influence the effect of the intervention on personal recovery, mediation analysis was performed with the help of the PROCESS macro by Hayes (2012) in IBM SPSS Statistics 27. Therefore, continuous self-report data of both experimental and control group at the measurement points T1, T2, and T3 were analysed, taking completers only into consideration. *Dampening*, *self-focused positive rumination*, and *emotion-focused positive rumination* were tested as potential mediator variables, *intervention* (coded as 0 = control group, 1 = experimental group) as the independent variable, and *personal recovery* as the outcome variable. Simple and multiple mediation models were performed including one mediator in the simple analyses, and all three mediators per model in the multiple analyses. In each model, X is the *intervention* and Y *personal recovery* at different measurement points. Three simple mediation models were conducted measuring the effects of the three mediator variables at a four-week measurement point (T1). Here, the outcome variable was *personal recovery* at post-measurement (T2). Three further simple mediation models were applied to analyse the effects of the potential mediators at post-measurement (T2) on the effect of the *intervention* on *personal recovery* at 6-months follow-up (T3). In addition, two multiple mediation models were conducted. The first one included *intervention* as the independent variable, the three mediator variables at T1, and *personal recovery* at T2. The second model with the same independent variable measures the potential mediators at T2 and *personal recovery* at T3.

For both mediator and independent variables, observed scores were used. Bootstrapping was applied to calculate confidence intervals of the indirect effects in order to have appropriate estimates of the sampling distribution. Bootstrapping makes the data more robust and enhances accuracy by resampling the dataset creating a larger number of simulated, smaller samples which simplify fulfilling data assumptions (Hayes, 2012). The current analyses are based on a number of 5,000 bootstrapped resamples. For each analysis, unstandardized regression coefficients were calculated for all paths. Total, direct, and indirect effects were interpreted. Path *a* represents the effect of *intervention* on the mediator variable, path *b* the effect of the mediator variable on *personal recovery* at the relevant measurement point. The total effect in the analyses describes the sum of the indirect and direct effects is reported as the *c*-path. The direct effect controlling for M in the effect of X on Y is designated as the *c'*-path. The indirect effect ($a \times b$) is the product of paths *a* and *b*. For interpretation of the indirect effect, bias-corrected (BC) 95% confidence intervals (CIs) were reported in all models. When zero is not included between the lower and upper limit of the CI, the indirect effect is significant and thus, the effect of the intervention on the outcome is mediated through the mediator (Hayes, 2012). Partial mediation is present when the reduction in variance explained by the independent variable is significant when the mediator is included. For complete mediation, the independent variable no longer affects the dependent one after the mediator has been introduced, so that the direct effect is insignificant (Kenny, 2008). Additionally, the threshold level for significance of the potential mediators has been set to $p < 0.1$ in the current study. This was done similar as in previous research on mediational analysis of recovery-focused treatment for BD patients (Jones, Knowles, Howarth, Lobban, & Emsley, 2021) to detect all relevant working mechanisms.

Results

Description of the Sample

The remaining 97 participants in the study by Kraiss et al. (2018) had a mean age of 47.4 years in a range from 24 to 66 years ($SD = 10.33$). The majority with about two-thirds of the participants were female. Regarding their personal backgrounds, most of the participants indicated a low or moderate level of education as well as an inability to work, or a paid or unpaid employment status. Most of them were either married or in a registered relationship, divorced or never married (see Table 1).

The total number of participants who completed the questionnaires decreased at the three measurement points (see Table 2). During baseline measurement, 97 participants completed the questionnaires which are considerably more than after four weeks ($N = 81$) and during post-measurement ($N = 74$) as well as at 6-months follow-up ($N = 68$).

Table 1

Sample Characteristics (N = 97)

Variable	Sub-categories	<i>N</i>	%
Gender	Male	69	71.1
	Female	28	28.9
Marital status	Married or registered relationship	33	34.0
	Divorced	23	23.7
	Never married	25	25.8
	Other	16	16.5
Education	Low	44	45.3
	Moderate	38	39.3

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	High	14	14.4
Employment status	Unable to work	35	36.1
	Paid work	28	28.9
	Unpaid work	25	25.8
	Unemployed	6	6.2
	Student/other	3	3.1
Diagnosis	BDI	52	53.6
	BDII	42	42.3
	Other	4	4.1

Note. Variations in *N* due to missing data.

Table 2

Means and standard deviations for all mediator variables and the dependent variable

Variable	Measurement point	<i>M</i>	<i>SD</i>
Emotion-focused positive rumination	Baseline	12.03	3.18
	4 weeks	11.94	3.22
	Post-measurement	12.20	3.60
Self-focused positive rumination	Baseline	6.67	3.26
	4 weeks	7.86	3.11
	Post-measurement	7.81	3.40
Dampening	Baseline	14.78	5.26
	4 weeks	15.46	4.88
	Post-measurement	14.47	4.36
Personal Recovery	Baseline	33.24	9.81

Post-measurement	36.17	10.20
6 months follow-up	36.93	9.89

Simple Mediation Models

The mediating effect of dampening, self-focused, and emotion-focused positive rumination on the effect of the intervention “Living well with bipolar disorder” on the patients' personal recovery was analysed in six simple mediation models. Table 3 shows the unstandardized regression coefficients on the change in personal recovery at T2 (mediators T1) and T3 (mediators T2). The *a*- and *b*-paths have shown to be non-significant in all mediation models. The coefficients for the total (*c*-path) and direct effects (*c'*-path) of the intervention on the change in personal recovery were significant in the mediation models at T1. Additionally, the BC 95% confidence intervals (CIs) of the indirect effects contained zero in all models and thus, were non-significant indicating no existent mediation.

In the mediation models at T2, the *c*-paths as well as the coefficients for the direct effects were insignificant with an exception for the *dampening* variable ($B = 5.04, p = 0.05$). *Dampening* also showed significant results in the *b*-path ($B = -.60, p = 0.07$), as well as *emotion-focused positive rumination* did ($B = .75, p = 0.07$) which indicates a significant influence of these two mediators on personal recovery at 6-months follow-up. The BC 95% CIs of the indirect effects again contained zero in all models and thus were non-significant, showing that the analysis did not meet the criteria for complete nor partial mediation.

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Table 3

Results of simple mediation analyses examining the effects of the PPI on personal recovery at different measurement points (T2; T3) and the effects of the three mediator variables at a four-week measurement point (T1) and at post-measurement (T2)

Mediators T1	<i>a</i>	<i>b</i>	Total effect <i>c</i>	Direct effect <i>c'</i>	Indirect effect <i>a x b</i> (95% CI) ^a
Emotion-focused positive rumination	-0.22	0.26	5.66**	5.72**	-0.06 (-0.83, 0.83)
Self-focused positive rumination	-0.35	0.17	5.66**	5.72**	-0.06 (-0.97, 0.65)
Dampening	1.71	-0.38	5.66**	6.31**	-0.65 (-2.34, 0.38)
<hr/>					
Mediators T2					
Emotion-focused positive rumination	1.32	0.75*	4.08	3.08	0.99 (-0.05, 0.34)
Self-focused positive rumination	1.09	0.54	4.08	3.49	0.06 (-0.50, 2.45)
Dampening	1.60	-0.60*	4.08	5.04*	-0.96 (-2.70, 0.37)

^aBootstrap results for the indirect effect corrected for bias, number of resamples is 5,000

* $p < 0.1$; ** $p < 0.05$

Multiple Mediation Models

Multiple mediation analysis was conducted for personal recovery at the measurement points T2 and at T3 (Figure 2). In both models, the *a*- and *b*-paths have found to be non-significant. In the analysis examining personal recovery at T2, the intervention had significant total and direct effects on the outcome variable personal recovery. The BC 95% CIs for the indirect effects contained zero for emotion-focused positive rumination ($ab = -0.09$, BC 95% CI = -0.96 to 1.06), self-focused positive rumination ($ab = 0.07$, BC 95% CI = -0.84 to 1.08), as well as dampening ($ab = -0.67$, BC 95% CI = -2.37 to 0.42), making the indirect effects non-significant.

In the analysis for personal recovery at T3 as the outcome variable, the *c*-path and *c'*-path have shown to be insignificant ($p = .11$; $p = .13$). The indirect effects for emotion-focused positive rumination ($ab = 0.95$, BC 95% CI = -2.19 to 2.71), self-focused positive rumination ($ab = -0.07$, BC 95% CI = -1.80 to 1.57), and dampening ($ab = -0.84$, BC 95% CI = -2.51 to 0.35) contained zero as well which indicates non-significance. The results suggest that the three working mechanisms at different measurement points after four weeks and at post-measurement did not significantly improve the effect of the intervention on patients' personal recovery at T2 or T3.

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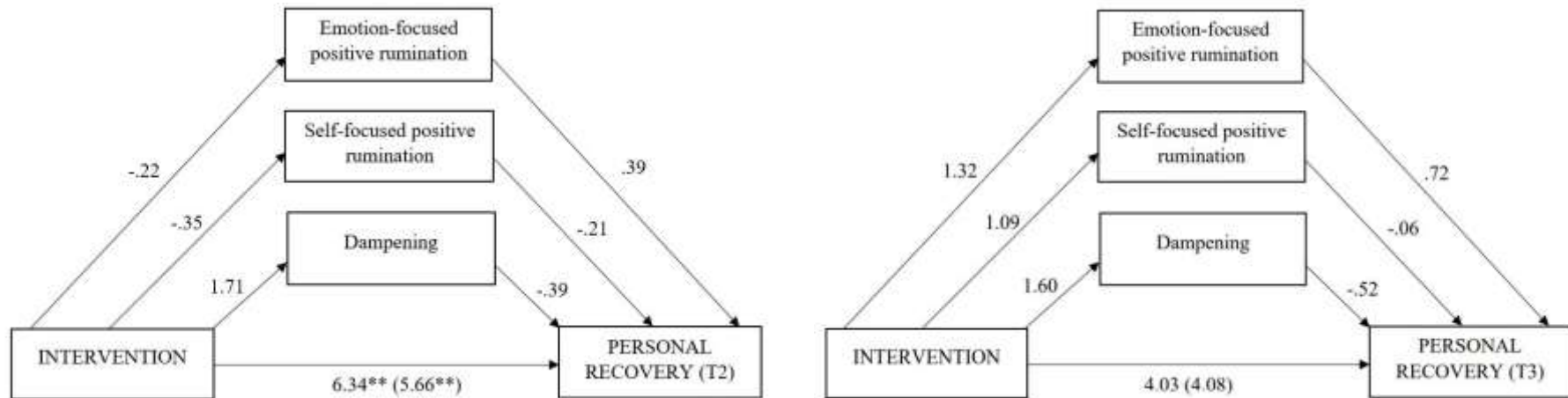


Figure 2

Results of multiple mediation analyses of the three mediator variables after 4 weeks of the intervention (T1) on personal recovery at post-measurement (T2), and at post-measurement (T2) on personal recovery at 6-months follow-up (T3)

Notes: * $p < 0.1$; ** $p < 0.05$

Discussion

The present study is the first one to investigate potential underlying mechanisms of a multicomponent PPI and its effect on patients' personal recovery in a sample of euthymic BD patients. Previously, it has been found that PPIs might be an effective treatment in improving mental health and well-being of individuals with severe clinical disorders such as BD (Geerling et al., 2020), and have positive effects on the individuals' condition by promoting higher levels of optimism and improvement of positive affect (Celano et al., 2020). Additionally, patients have a growing demand for living a meaningful, contributing life alongside their illness and thus, for recovering not only symptomatically but personally (Mead & Copeland, 2000; Todd, Jones, & Lobban, 2012). However, disturbances in patients' emotion regulation potentially hinder them from successful recovery from BD. Whereas dampening was expected to be negatively associated with personal recovery due to its association with higher risk for manic symptoms in the long run and heightened emotional distress in patients (Gilbert, Nolen-Hoeksema, & Gruber, 2013; Feldman, Joormann, & Johnson, 2008; Quoidbach et al., 2010), positive rumination was assumed to improve the course of the disorder as it has been found to be positively associated with measures related to personal recovery, such as higher life satisfaction (Quoidbach et al., 2010; Kraiss et al., 2021). Thus, both strategies are expected to have an influence the effectiveness of an intervention on patient's personal recovery. The specific purpose of the current study as a secondary analysis is to examine whether the processes of positive emotion regulation in patients including emotion-focused and self-focused positive rumination as well as dampening would mediate the effect of an 8-week positive psychology treatment on the patients' personal recovery.

Different from initial assumptions, the intervention did not have a significant effect on emotion-focused, self-focused positive rumination nor dampening. These novel findings suggest that the content of the intervention might not be related to the mediators introduced in

the model. Contradictory, previous research on PP and emotion regulation strategies has found that PP and emotion regulation are closely linked to each other (Tamir & Gross, 2011) and that positive emotion-inducing strategies are central to PPIs (Quoidbach, Mikolajczak, & Gross 2015), as well as that PP exercises can help in cultivating positive emotions (Carl, Soskin, Kerns, & Barlow, 2013). Dampening and positive rumination specifically have not been investigated by previous studies in the light of PPIs so far, and the results of the present study show other than expected that the effect of this specific PPI does not have an effect on both strategies.

Furthermore, the three mediators were not significantly associated with personal recovery at post-intervention. However, dampening and emotion-focused positive rumination both had an effect on personal recovery at 6-months follow-up, indicating that these strategies play a role in the course of BD patients' personal recovery. In particular, dampening was negatively associated with personal recovery, and emotion-focused positive rumination showed a positive effect on the outcome variable. This evidence is consistent with previous research investigating the role of dampening and emotion-focused positive rumination in patients with BD. Dampening has shown to significantly predict symptoms of BD and mania in particular (Gilbert et al., 2013) as well as it decreases life satisfaction (Quoidbach, Berry, Hansenne, & Mikolajczak 2010) which goes along with reduced personal recovery in patients. Additionally, a study by Kraiss et al. (2019) discovered that dampening is moderately associated with reduced personal recovery. Regarding emotion-focused positive rumination on personal recovery at 6-months follow-up, a previous study as well determined this strategy as being moderately associated with personal recovery (Kraiss et al., 2019).

Finally, the analyses demonstrate significant effectiveness of the PPI in improving patients' personal recovery in mid-treatment. This finding is consistent with other studies investigating the effect of PPIs on personal recovery which indicate that PP is promoting

recovery from mental illness (Schrack et al., 2014), and fostering recovery goals (Resnick & Rosenheck, 2006) as well as it is of particular relevance to personal recovery due to shared taxonomies of the two concepts (Slade, 2010). After introducing the mediators of the present study, the effect of the PPI on personal recovery remained significant at the four-week measurement point, indicating no significant mediation by the positive emotion regulation strategies.

The findings of the current study show with its insignificant effects that there is no mediation of dampening and positive rumination on the effectiveness of the PPI on personal recovery. A possible explanation are other unobserved and more promising mediators as the intervention took multiple other working mechanisms into account, such as positive relationships and symptoms of anxiety (Kraiss et al., 2018). Anxiety symptoms are highly comorbid with symptoms of BD (Keller, 2006) and thus might play a mediating role in patients' personal recovery (Kraiss et al., 2021; Quoidbach et al., 2010). Additional social variables such as fulfillment of social roles and intimate, positive relationships that are important to the individual's life satisfaction and meaning in life can be significant factors when personally recovering from BD which would be in line with previous research on these concepts (Kraiss et al., 2021). Furthermore, this study gives evidence that dampening and emotion-focused positive rumination play an important role in the process of personal recovery which lies a solid foundation for further investigation of these two concepts.

Strengths, Limitations, and Directions for Future Research

This study has the strength of novelty in investigating positive emotion regulation strategies and their mediating effects in a PPI on personal recovery in BD patients. Since the results indicate non-significance for the mediation effects, the study proves differently from previous assumptions that the three concepts do not play as an important in the effectiveness of the PPI

on patients' personal recovery which is a finding that contradicts earlier research on dampening as a barrier for personal recovery and positive rumination as a strategy that could potentially help in cultivating positive emotions. Furthermore, the current study has detected an association between dampening and emotion-focused positive rumination and personal recovery at post-intervention which emphasizes the need and gives a basis for future research in this direction with a focus on personal recovery in the PP treatment of BD and its long-term effects.

Several limitations apply to the current study. Most importantly, due to a small sample size and missing data, there was a lack of statistical power for conducting mediation analyses. Hardly 100 participants were included in the study, whereas research suggests including at least 100-150 participants to have a sufficient amount of data for this kind of analysis (Koopman, Howe, Hollenbeck, & Sin, 2015; Schoemann, Boulton, & Short, 2017). Underpowered analysis can cause misleading results which, in this study, means that the outcome shows smaller effects than there might be which is why not too much emphasis should be put on the nonsignificant effects in this study and concluding from them (Fritz, Cox, & MacKinnon, 2015). Furthermore, this study only considers three different working mechanisms for mediation, although there are far more potential underlying mechanisms measured in participants during the intervention period. As mentioned before, additional unobserved mediators could account for an effect of the intervention on personal recovery, giving the proposed mediators of the present study less significance. Nevertheless, this study gives a valuable first insight into potential mechanisms in an PPI focused and its effect personal recovery in a clinical group of patients and additionally shows that the PPI is effective for people diagnosed with BD without being affected by the introduced emotion regulation strategies.

In terms of future research, it might be interesting to look at other factors that could be involved in the effectiveness of the PPI on personal recovery. Also, when tying in with the current findings indicating a negative association of dampening with personal recovery, and a

positive association between emotion-focused positive rumination and personal recovery at post-intervention, a closer look should be taken on the long-term effects of these variables in the process of personal recovery in BD patients. However, it is necessary to examine underlying working mechanisms in larger clinical samples. The results of the present study lay a foundation for broadening the evidence of PPIs on personal recovery from BD and draw attention to the need of further research regarding potential underlying mechanisms.

Conclusion

The present study has found that the strategies of dampening, emotion-focused and self-focused positive rumination do not play as an important role as previously assumed in the relationship between the intervention at hand and personal recovery in patients with BD. However, the PPI has proven to be effective in increasing personal recovery in patients. Furthermore, it is evident that dampening and emotion-focused positive rumination are relevant factors in the patients' process of personal recovery. Both concepts are to further examine in the context of positive psychology. Also, the results have drawn attention to the need of future research in the direction of PPIs in recovering from BD and should be further investigated in larger clinical samples.

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