

RESEARCH ARTICLE

Aversive well-being comparisons in dysphoria and the role of brooding rumination

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Abstract

Objectives: Individuals frequently engage in comparisons on how they are doing relative to different standards. According to the general comparative-processing model, comparisons can be perceived as aversive (appraised as threatening the motives of the comparer) or appetitive (appraised as consonant with, or positively challenging the motives). Research indicates that aversive comparisons are associated with depression. We hypothesize that aversive comparisons play a significant role in the relationship between brooding rumination and depression. Drawing on central propositions of control theory that discrepancies instigate rumination, we investigated the mediating role of brooding rumination in this relationship. Reflecting the different directionality, we also examined whether well-being comparisons mediate the relationship between brooding rumination and depression.

Methods: Dysphoric participants ($N = 500$) were administered measures of depression and brooding rumination, and the Comparison Standards Scale for Well-being. The latter assesses aversive social, temporal, counterfactual, and criteria-based comparisons regarding their (a) frequency, (b) perceived discrepancy to the standard, and (c) engendered affective valence.

Results: The relationship between the frequency of aversive comparisons with depression was partially accounted for by comparison discrepancy and engendered affective valence and brooding rumination. The relationship between rumination and depression was partially mediated by sequential comparison processes.

Conclusions: Longitudinal research needs to unravel the underlying directionality of the relationship between depression, brooding, and comparison. Relevant clinical implications of well-being comparison are discussed.

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KEYWORDS

brooding, comparison theory, depression, well-being

Practitioner points

- People frequently judge their current well-being negatively relative to relevant standards
- Such aversive well-being comparisons are related to dysphoric symptoms
- They play a significant role in the relation between brooding rumination and depression
- Aversive well-being comparisons were empirically important in this relationship, and these findings may inform clinical practice

BACKGROUND

Well-being is highly relevant for most individuals (Diener et al., 2018). Research indicates that well-being is positively related to health outcomes, longevity, and recovery from mental illness (Diener et al., 2017; Keyes et al., 2010; Wood & Joseph, 2010). Accordingly, individuals frequently engage in comparisons of their current well-being relative to different types of standards. According to central theoretical propositions of the general comparative-processing model (gComp), these comparisons can be perceived as aversive (i.e., appraised as threatening the motives of the comparer) or appetitive (i.e., appraised as consonant with, or positively challenging one's own motives; Morina, 2021). Recent research indicates that aversive well-being comparisons in particular are related to dysphoric symptoms (Morina & Schlechter, 2023). However, the effect of well-being comparisons in conjunction with established cognitive risk factors for depression is currently understudied. One of the most robust cognitive risk factors for depression is repetitive engagement in negative self-evaluative thinking with a focus on obstacles to overcome problems, which is known as brooding rumination (Nolen-Hoeksema et al., 2008). To advance current understanding of aversive well-being comparisons, the present study draws on central theoretical accounts of comparison and rumination to investigate their interplay in dysphoric individuals.

Characteristics of the comparison process

Frame-of-reference theories posit that self-judgements rely on comparisons to certain standards rather than on some internal utility scale (Marsh et al., 2020; Morina, 2021; Vlaev et al., 2011). Accordingly, they postulate that comparisons are ubiquitous to everyday life and concern various self-attributes such as appearance, status, or intelligence. Consequently, when forming a judgement of one's own well-being individuals rely on different comparison standards. For example, in an interview-based study, clinical and non-clinical participants spontaneously reported different comparison types when asked about their well-being (Morina et al., 2022). Participants referred to comparison types beyond social comparison, highlighting the need to investigate comparisons more thoroughly. According to recent research, four different types of comparison play a central role in the context of well-being (Morina & Schlechter, 2023). Social comparisons (Festinger, 1954) take place when individuals think about how somebody else is doing compared to the own self with respect to their well-being. By using temporal comparisons (Albert, 1977), one's current well-being is compared to a recollection of how one was doing at a certain time in the past or how one thinks they will be doing in the future. Counterfactual comparisons (Hoppen & Morina, 2021; Kahneman & Miller, 1986; Schlechter et al., 2023) are defined as comparing one's current well-being to the well-being of a hypothetical self that might or should have occurred but did not actually occur. Finally,

criteria-based comparisons (Higgins, 1996; Lewin, 1951) of one's current well-being refer to internalized norms, requirements, or rules. Importantly, these comparison types share several conceptual parallels. They can each be subdivided into upward (e.g., I was doing better 2 years ago than currently), lateral (e.g., I am doing just as good as my friend), and downward (e.g., I would be doing worse if I had not quitted my first job) comparisons relative to the outcome of the comparison process. However, the motivational significance of the comparison outcome (i.e., the result of comparing the target with the standard) can be conceived in terms of outcome processing and appraisal relevant to the comparer's motives and goals. As a result, comparisons may be perceived as aversive (i.e., appraised as threatening the motives of the comparer), neutral, or appetitive (i.e., appraised as consonant with, or positively challenging the motives, Morina, 2021). The valuation of the comparison outcome initiates the comparer's reaction to the comparison outcome. According to gComp, *upward* social, past temporal, counterfactual, and criteria-based comparisons, and *downward* prospective temporal comparisons can be theoretically conceptualized as aversive (i.e., threatening one's own motives). *Downward* social, past temporal, counterfactual, and criteria-based, as well as *upward* prospective temporal can be conceptualized as appetitive outcomes (i.e., consonant with or challenging the motives). Recent factor analyses confirmed this theoretically proposed distinction for well-being comparisons (Morina & Schlechter, 2023).

The comparison process starts (a) with the selection of the comparison standard, which could be social, temporal, counterfactual or criteria-based comparisons. In a next step, (b) the comparison process initiates an evaluation of (dis-)similarities between one's own current well-being and the selected standard (e.g., someone else's well-being), which then leads to the comparison outcome (i.e., the perceived discrepancy between the target and the standard). Finally, (c) this outcome may trigger engendered emotional, cognitive, or behavioural responses (Morina, 2021). Despite the centrality of comparison processes in every-day life (Buunk & Gibbons, 2007; Morina, 2021; Mussweiler, 2003), little is known about well-being comparisons and depression (Morina et al., 2022; Morina & Schlechter, 2023).

Comparison and depression

Current knowledge about the association of comparative thinking and self-perception refers to social comparison. Theoretical accounts posit that in dysphoric individuals, perceptions of oneself are embedded in comparison with others, leading to more depressive symptoms and lower self-esteem (Buunk & Brenninkmeyer, 2000; Wood & Lockwood, 1999). Research demonstrates negative effects of upward social comparison on depression and self-esteem both in real life (Butzer & Kuiper, 2006) and online (Midgley et al., 2021). On a daily basis, in an experiencing sampling study, upward social comparison was associated with more negative and less positive affect (Diel et al., 2021). Meta-analytical evidence confirms that depressive symptoms are associated with negative self-evaluation in relation to others (McCarthy & Morina, 2020). Noteworthy, existing literature has assessed social comparison in a general manner, rather than focusing on a specific comparison dimension (e.g., well-being comparisons as assessed in this study). For example, most studies on depression have applied the Social Comparison Scale (Allan & Gilbert, 1995) to assess how individuals rate themselves on 11 bipolar dimensions, including feeling inferior versus superior or unattractive versus more attractive. In addition, although not directly targeting comparative thinking, a meta-analysis suggests a moderate correlation of $r = .26$ between counterfactual thinking and depression (Broomhall et al., 2017).

Research with samples with subclinical or clinical depression is limited, with only one recent study making a distinction between aversive and appetitive comparisons and suggesting a stronger association between aversive (rather than appetitive) comparisons and dysphoric symptoms (Morina & Schlechter, 2023). Furthermore, knowledge about well-being comparisons in relation to important cognitive risk factors for depression is lacking. Therefore, a more thorough investigation of aversive well-being comparisons in relation to brooding rumination is needed.

Brooding rumination

Depression is associated with great levels of disease burden (Kessler, 2012; Liu et al., 2020) and significant impairments in overall psychological well-being (Davison et al., 2012; Edmondson & MacLeod, 2015; Ryff, 2014). In dealing with depressed mood, individuals repetitively engage in negative self-evaluative thinking and focus on obstacles to overcome problems, which in literature has been labelled brooding rumination (Nolen-Hoeksema et al., 2008). A large body of evidence shows that brooding rumination plays a significant role in the onset and maintenance of depressive symptoms (Ehring, 2021; Ehring & Watkins, 2008; McLaughlin & Nolen-Hoeksema, 2011; Watkins & Roberts, 2020). Response Styles Theory of depression (Nolen-Hoeksema, 1991) proposes that rumination (including brooding rumination) exacerbates depressive symptoms by interfering with problem-solving behaviour. This theory further posits that the habitual trait-like brooding rumination tendency is an automatic response conditioned to triggering stimuli such as negative affect with the aim of lifting one's mood (Nolen-Hoeksema et al., 2008; Watkins & Nolen-Hoeksema, 2014). Control Theory as another prominent model of rumination suggests, however, that brooding rumination is caused by a discrepancy between individuals' perceptions of their current and desired goal states (Martin & Tesser, 1996). According to this model, negative mood caused by a goal discrepancy leads to increased thinking about the desired goal. Hence, brooding rumination represents an unsuccessful attempt at instrumental problem-solving that maintains depression (Watkins & Roberts, 2020) and is characterized by overly abstract and passive cognitive processing that may only increase the salience of perceived discrepancies (Ehring & Watkins, 2008; Watkins & Nolen-Hoeksema, 2014).

Brooding as a mediator between well-being comparison and depression

With regard to perceived self-discrepancies, rumination has been reported to partly mediate the relationship between discrepancies between the actual and an ideal self and depressive and anxious symptoms in students (Dickson et al., 2019). Obviously, the goal discrepancy may also relate to one's own well-being, for example when an individual thinks that she is doing much worse than her best friend or than previously anticipated. In line with Control Theory, well-being comparisons that result in significant discrepancies between current well-being and a desired goal state (i.e., how one would like to be doing) represent a potential trigger for brooding rumination. This suggests that aversive comparisons may instigate brooding rumination, which then, in turn, maintains depressive symptoms. Given that aversive comparisons are defined on the basis of their motivational significance to the comparer and are likely to be followed by negative mood, the association of aversive well-being comparisons and depression may be mediated by brooding rumination with the aim of reducing the perceived discrepancy. From a gComp process perspective (Morina, 2021), the frequency of aversive well-being comparison initiates a perceived aversive comparison discrepancy. In line with Control Theory (Martin & Tesser, 1996), the perceived aversive comparison discrepancy compared to the standard may initiate brooding rumination. Accordingly, the pathway from aversive comparison frequency via brooding rumination toward depression may work via an interposed step including aversive comparison discrepancy as central element between aversive comparison frequency and depression. Similarly, from a process perspective reflecting Response Styles Theory of depression (Nolen-Hoeksema, 1991), aversive comparison frequency should first lead to engendered negative affective valence. The unfolding negative affective valence should evoke a habitual trait-like brooding rumination tendency as automatic response leading to depressive symptoms (Nolen-Hoeksema et al., 2008).

Well-being comparison as mediator between brooding and depression

On the other hand, brooding rumination may also lead to an increase in the frequency of aversive comparisons. A trait-like brooding rumination tendency as an automatic response leads to an engagement

in negative self-evaluative thinking (Nolen-Hoeksema et al., 2008). This negative self-evaluation needs to be based on ordinal comparisons (e.g., relative to other individuals or previous times), for which aversive comparisons may provide the means (Morina, 2021). These aversive comparisons could initiate a higher salience of perceived well-being discrepancies, thus increasing depressive symptoms. Accordingly, the pathway from brooding to depression may be accompanied by frequent aversive well-being comparisons, with aversive comparison discrepancy as the central element between brooding rumination and depression. Likewise, and in line with Response Styles Theory of depression (Nolen-Hoeksema, 1991), the interplay between brooding rumination and frequent aversive comparisons can intensify engendered negative affective valence, resulting in more depressive symptoms.

The present study

We aimed at investigating the role of well-being comparisons in the relationship between depressive symptoms and brooding rumination, with the latter being a robust and well-established predictor of depressive symptoms (McLaughlin & Nolen-Hoeksema, 2011; Watkins & Roberts, 2020). Drawing on central propositions of the gComp model (Morina, 2021), Control Theory (Martin & Tesser, 1996), and Response Styles Theory of depression (Nolen-Hoeksema, 1991), we tested two different types of multi-step multi-mediator models to examine well-being comparisons, brooding rumination, and depressive symptoms in dysphoric individuals. In the first type of models, the first mediator was *aversive comparison discrepancy*, which was theoretically expected to be instigated by *aversive comparison frequency*. In a second step, we included brooding rumination as a mediator to account for the relationship between *the discrepancy of aversive comparisons* with depressive symptoms (Model 1a). To scrutinize central theoretical accounts of Response Styles Theory, we tested the same models with *engendered affective valence* instead of discrepancy as first mediator variable (Model 1b). In the second class of models, we scrutinized the reverse directionality. Brooding rumination was conceptualized as predictor for depression. *Aversive comparison frequency* was then used as first mediator variable followed by *aversive comparison discrepancy* as second mediator variable (Model 2a). The same model was again tested with *aversive comparison affective valence* as second mediator variable (Model 2b).

METHODS

Openness and transparency

We provide all data to reproduce the current results in an anonymized form in the open science framework (https://osf.io/7q6yp/?view_only=23c0a69b0ad84caaacbfd2e5c24582b8). In addition, the corresponding R code that was used for the data analyses can be found in the open science framework. We further provide survey material including copies of the scales that have been used. We note that our study was not preregistered. The present study is part of a larger project that assessed several cognitive and social variables in relation to mental health outcomes. One manuscript of this project has been published on the development of the Comparison Standards Scale for Well-being (Morina & Schlechter, 2023), which we use in the present contribution to assess well-being comparisons.

Participants and procedure

In total, $N = 500$ individuals participated in this study. Recruitment took place on online panel provider Prolific Researcher (Palan & Schitter, 2018). Inclusion criteria were being fluent in English and older than 17 years of age in addition to providing informed consent. We used the Patient Health Questionnaire cut-off value of five to include only participants with dysphoric symptoms as this symptom level indicates

at least mild depression. None of the participants had to be excluded according to our pre-specified criteria (failing two or all three attention checks). Apart from these criteria, there were no other exclusion criteria. After the data were collected, they were screened for unreasonable response patterns that could however not be detected. Hence, no data were excluded. Of the participants in the current study, 46.6% ($n = 233$) were female, $n = 88$ had a graduate degree, $n = 123$ a bachelor's degree, $n = 103$ an associate degree, $n = 20$ had some college education but no degree, $n = 161$ had a high school (or equivalent) degree, and $n = 88$ had no high school degree. The majority of participants ($n = 356$) was single or never married, followed by being married ($n = 148$). On average, they were 28.08 ($SD = 8.7$) years old. The study was approved by the Ethics Committee of the University of Münster.

Measures

To assess the degree of engagement in comparisons, we used the *Comparison Standards Scale for Well-being* (CSS-W; Morina & Schlechter, 2023). The CSS-W demonstrated good psychometric properties including validity. This scale was developed to examine upward and downward comparisons via social, temporal, counterfactual, and criteria-based standards related to one's own well-being. The CSS-W consists of (1) 14 obligatory items assessing the frequency of well-being comparisons in the past 3 weeks on six-point Likert scales (0 = not at all to 5 = very often). When this question is answered with a score above 0, it (2) assesses 14 sub-items pertaining to the discrepancy compared to the standard on a six-point Likert scale (0 = not at all to 5 = much better/worse). A further question is then asked with again (3) 14 potential sub-items tapping into the affective outcome on a bipolar seven-point Likert scale for the engendered affective valence ($-3 =$ much worse to $+3 =$ much better). For instance, an upward social comparison item first asks about the frequency "Over the past three weeks when considering your well-being, how often have you compared with others in your close circles who were doing better than you?" If participants indicate values higher than "0 – not at all", they are additionally asked "How much better have you considered them to be doing?" (i.e., discrepancy assessment) and "On average during the past three weeks, how did the comparison make you feel?" (i.e., affect assessment). This scale is constructed in a way that participants only respond to parts (b) and (c) of the respective item when they reported to have engaged in this comparison type. If they did not engage in any comparisons, they received a zero on the respective discrepancy and affect item as they cannot detect any discrepancy, nor can they be emotionally affected when they did not engage in the respective comparison type. In a previous psychometric analysis, the structure of the scale was best described by a two-factor model capturing the two correlated latent factors aversive and appetitive comparisons (Morina & Schlechter, 2023). This factor solution fitted the data better than a bifactor model with one overarching comparison factor and two orthogonal specific factors capturing aversive and appetitive comparisons. The two-factor solution demonstrated measurement invariance across gender and the resulting scale scores had good validity. *Upward* social, past temporal, counterfactual, and criteria-based comparisons, and *downward* prospective temporal comparisons constituted the aversive comparison factor (i.e., threatening one's own motives). *Downward* social, past temporal, counterfactual, and criteria-based, as well as *upward* prospective temporal constituted the appetitive comparison factor (i.e., consonant with or challenging the motives). For the current purpose, we used only the subscale assessing aversive comparisons. This was based on the above-outlined findings that aversive (rather than appetitive) comparisons are associated with dysphoric symptoms (Morina & Schlechter, 2023). This subscale comprises seven items, which produced an acceptable internal consistency for comparison frequency ($\alpha = .65$) and comparison discrepancy ($\alpha = .61$), and good internal consistency for aversive comparison affect ($\alpha = .80$).

We used the *Brooding* subscale of the *Response Style Questionnaire* (RSQ; Nolen-Hoeksema, 1991) to assess the disposition to engage in brooding responses to sad mood. This well-documented five-item scale instructs participants to indicate how they generally react when in a depressed mood (e.g., "Think what am I doing to deserve this?") with a range from 0 ("never") to 3 ("always"). Research has demonstrated that brooding represents the dysfunctional style of depressive rumination associated with current

and future symptoms of depression (Treyner et al., 2003). Internal consistency in the present study was $\alpha = .64$.

To assess depressive symptoms, we used the eight-item version of the *Patient Health Questionnaire* (PHQ-8; Kroenke et al., 2009). The PHQ-8 assesses symptom severity (e.g., “Feeling tired or having little energy”) on a 4-point scale (0 “not at all” to 3 “nearly every day”). Symptom endorsement is assessed over the last 2 weeks. Mild depressive symptoms are indicated by a total score of 5 or higher (Kroenke et al., 2001). As described above, this cut-off was applied in the current study to index dysphoria. Cronbach's alpha was .82.

Statistical analyses

All analyses were conducted in R (R Core Team, 2021) version 4.01. To investigate our proposed pathway models, we used the *lavaan* package in R (Rosseel, 2012). To examine the associations of the well-being comparisons with brooding rumination, and depressive symptoms, we first tested their single associations by using Pearson's correlations. To discern the incremental contribution of aversive comparisons, we conducted multiple regression models using *aversive comparisons* and brooding rumination to predict depressive symptoms while adjusting for gender. Despite not having any a priori considerations, we exploratorily tested moderation models with brooding rumination \times *aversive comparisons* interactions with depressive symptoms as criterion variables. These analyses were conducted separately for all three aversive comparison domains (frequency, discrepancy and engendered affective valence).

Pathway models

Then, we tested our a priori specified pathway models to understand the relation among well-being comparisons, brooding rumination, and depressive symptoms more thoroughly (Figures 1 and 2). We applied 10,000 bootstrap resamples to estimate confidence intervals for the assessment of indirect effects in our pathway models (Hayes, 2015).

Model 1. First, *aversive comparison frequency* served as predictor variable for depression. *Aversive comparison discrepancy* was then introduced as a first mediator variable followed by brooding rumination as second mediator variable (Model 1a). The same model was again tested with *aversive comparison affective valence* as first mediator variable (Model 1b).

Model 2. In the second class of models, brooding rumination was conceptualized as predictor for depression. *Aversive comparison frequency* was then used as first mediator variable followed by *aversive comparison discrepancy* as second mediator variable (Model 2a). The same model was again tested with *aversive comparison affective valence* as second mediator variable (Model 2b).

RESULTS

Descriptive statistics

Table 1 shows the descriptive statistics of all variables separately for men and women. Women reported a higher frequency of *aversive comparisons* than men. In addition, they reported lower positive affective valence after engaging in aversive comparisons compared with men. Higher values for women compared to men also emerged for brooding rumination and depressive symptoms.

TABLE 1 Descriptive statistics for the entire sample and separately for males and females.

	<i>M</i>	<i>SD</i>	<i>M</i> female	<i>SD</i> female	<i>M</i> male	<i>SD</i> male	<i>t</i>	<i>p</i>	Cohens <i>d</i>
Comparison frequency	2.13	.97	2.29	.99	1.99	.94	3.38	<.001	.30
Comparison discrepancy	2.21	.95	2.29	.94	2.15	.97	1.68	.092	.15
Comparison affect	-.96	.90	-1.07	.91	-.87	.87	-2.46	.014	-.22
RSQ-brooding	1.64	.61	1.74	.63	1.55	.58	3.48	<.001	.30
PHQ-8	11.28	5.25	12.40	5.22	10.24	5.09	4.65	<.001	.42

Abbreviations: *M*, mean; *SD*, standard deviation.

* $p < .05$; ** $p < .01$; $p < .001$.

TABLE 2 Correlations of the variables among each other.

	1.	2.	3.	4.	5.
1. Comparison frequency	–	.82 [.78; .84]***	-.61 [-.66; -.55]***	.53 [.46; .59]***	.53 [.47; .59]***
2. Comparison discrepancy	–	–	-.59 [-.64; -.53]***	.47 [.44; .51]***	.48 [.44; .55]***
3. Comparison affect	–	–	–	-.35 [-.43; -.27]***	-.48 [-.55; -.41]***
4. RSQ-brooding	–	–	–	–	.54 [.47; .60]***
5. PHQ-8	–	–	–	–	–

Abbreviations: PHQ, Patient Health Questionnaire; RSQ, Response Style Questionnaire, Brooding.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Single associations among the variables

Table 2 shows single associations of all three comparison components (frequency, discrepancy, and engendered affective valence) among each other and with brooding rumination, and depression. All comparison components correlated among each other. A higher frequency of *aversive comparisons* correlated positively with brooding and depression. A higher discrepancy for *aversive comparisons* correlated positively with brooding rumination and depression. A more positive affective valence after engaging in *aversive comparisons* was negatively related to depression and brooding. Brooding rumination correlated positively with depressive symptoms.

Multiple regression models

In all models, depressive symptoms were positively associated with brooding rumination, and negatively with male gender (Table 3). For the frequency and discrepancy components, aversive comparisons were positively associated with depression. With respect to the affective valence component, more negative affective valence resulting from comparisons was associated with depression. No significant moderation effect emerged in any of the tested models, all $ps > .152$.

Pathway models

Model 1. Both pathway models of the association between comparison frequency and depressive symptoms displayed similar patterns (see Figure 1; Model 1a with aversive comparison discrepancy and Model 1b with engendered aversive comparison affective valence). The indirect effect of comparison frequency on depression through the mediation of brooding was significant. In addition, the indirect effect of comparison frequency on depression through the mediation of perceived comparison discrepancy was significant. However, the serial mediation of discrepancy and then brooding in the relationship between aversive comparison frequency and depression was not supported. Results of the serial mediation of

TABLE 3 Linear regression model predicting depression.

	Frequency				Discrepancy				Affect			
	β	<i>SE</i>	<i>p</i>	R^2	β	<i>SE</i>	<i>p</i>	R^2	β	<i>SE</i>	<i>p</i>	R^2
Depression				.39				.38				.40
Aversive comparisons	.26	.03	<.001		.24	.03	<.001		-.27	.03	<.001	
Brooding rumination	.60	.07	<.001		.66	.07	<.001		.70	.06	<.001	
Male gender	-1.08	.38	.004		-1.31	.38	<.001		-1.14	.37	.002	

Abbreviation: *SE*, standard error.

comparison affective valence and then brooding were very similar (see Figure 1 for the tested models). In both models, perceived comparison discrepancy (or engendered affective valence) did not predict brooding rumination. Furthermore, the direct effect of comparison frequency on depression was significant. This suggests that the effect of comparison frequency on depression is partially mediated by comparison discrepancy (or comparison affect) and brooding rumination, respectively.

Model 2. Both pathway models of the association between comparison frequency and depressive symptoms displayed similar patterns (see Figure 2; Model 2a with aversive comparison discrepancy and Model 2b with engendered aversive comparison affective valence as second mediator). A direct effect of brooding rumination on depression emerged. The serial mediation of aversive comparison frequency and then discrepancy (Model 2a)/ affect (Model 2b) in the relationship between brooding rumination and depression was supported. In both models, the indirect effect of aversive comparison frequency in the relationship between brooding rumination and depression was also supported. However, there was no indirect effect of aversive comparison discrepancy (Model 2a) or engendered affective valence (Model 2b) alone on the relation between brooding and depression.

DISCUSSION

The goal of the present study was to understand the interplay of well-being comparisons, brooding rumination, and depressive symptoms in dysphoric individuals. To this end, we tested models that were derived from central propositions of gComp (Morina, 2021), Control Theory (Martin & Tesser, 1996), and Response Styles Theory of depression (Nolen-Hoeksema, 1991). As expected, all constructs correlated significantly among each other. Importantly, well-being comparisons explained variance in depressive symptoms beyond brooding rumination in dysphoric individuals.

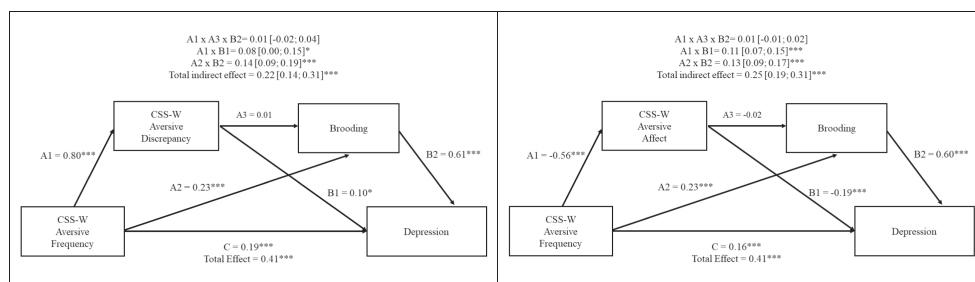


FIGURE 1 Model 1: Serial multiple mediation models of the association between aversive comparison frequency (X) and depressive symptoms (Y). Model 1a is displayed in the left panel with comparison discrepancy as first mediator (M1). Model 1b is depicted in the right panel with comparison affect as first mediator (M1). In both models, brooding serves as second mediator variable (M2). $*p < .05$; $**p < .01$; $***p < .001$.

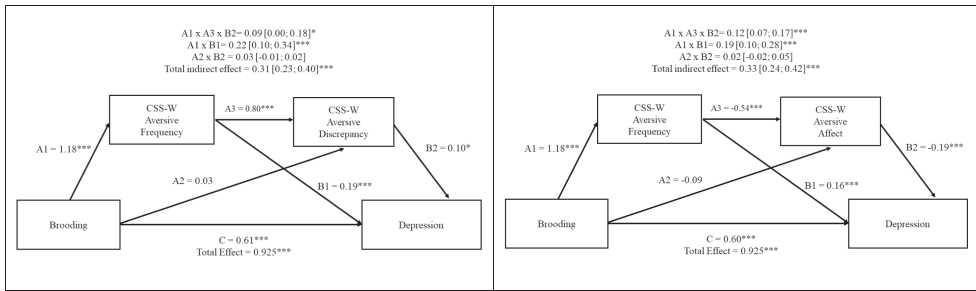


FIGURE 2 Model 2: Serial multiple mediation models of the association between brooding (X) and depressive symptoms (Y). In both models, aversive comparison frequency serves as first mediator variable (M1). Model 2a is displayed in the left panel with comparison discrepancy as second mediator (M2). Model 2b is depicted in the right panel with comparison affect as second mediator (M2). * $p < .05$; ** $p < .01$; *** $p < .001$.

The first mediation model on the association between aversive comparison frequency and depressive symptoms revealed that brooding rumination partially mediates this relationship. The perceived discrepancy and engendered affective valence also served as partial mediators of the relationship between comparison frequency and depression, respectively. First, the findings supported the notion that comparison discrepancy (Model 1a) and engendered affective valence (Model 1b) have a specific indirect effect on the relationship between comparison frequency and depression. Accordingly, the findings reinforce the need to examine comparative thinking as a process that goes beyond comparison frequency. A focus on the role of comparison discrepancy and engendered affective valence as they relate to well-being is likely to increase our knowledge about well-being in general and psychopathology in particular. A second relevant result revealed that high comparison frequency is associated with high levels of brooding rumination, which in turn led to high levels of depressive symptoms (partial mediation). This suggests that comparison frequency affects depression symptoms through brooding rumination. Accordingly, comparing to better-off standards seems to intensify brooding rumination, which then in turn seems to intensify depressive symptoms. Several studies have demonstrated the significant role of brooding rumination in the onset and maintenance of depressive symptoms (McLaughlin & Nolen-Hoeksema, 2011; Watkins & Roberts, 2020). It is therefore essential to investigate factors that may instigate brooding rumination processes in the context of depression (Roberts et al., 2020). Previous research yielded that cueing an unresolved goal triggers state rumination (Roberts et al., 2013, 2020). Our findings suggest that frequently engaging in evaluations of how poorly one is doing relative to other standards signifies an insufficient rate of goal progress, which in turn seems to instigate brooding rumination as postulated by Control Theory (Martin & Tesser, 1996). Brooding rumination is then aimed at reducing goal discrepancy, which if perceived as unhelpful in achieving this aim will then exacerbate depressive mood (Nolen-Hoeksema et al., 2008). Contrary to our assumption, however, the two-mediator model of discrepancy (or engendered affective valence) and brooding yielded that neither discrepancy nor engendered affective valence are significantly related to brooding. This suggests that out of the three facets of comparative thinking assessed in this study (i.e., comparison frequency, discrepancy, and engendered affective valence), comparison frequency is the key driver that explains how comparative thinking relates to brooding and depression. One explanation for this finding relates to the fact that we did not measure the extent to which participants perceived the discrepancy between the target and the standard as attainable. Attainability (or controllability) in this respect relates to the degree to which one thinks that one's well-being will improve over time (Morina, 2021), which may shift attention toward means to attain the desired goal (Crusius & Lange, 2014). Previous research has shown that cueing goals perceived as unresolved increases rumination to a greater extent than cueing goals perceived as resolved (Roberts et al., 2020). Likewise, extreme upward comparisons were associated with more disengagement (e.g., giving up on the goal; Diel et al., 2021). Similarly, we assume that unattainable comparison discrepancy (relative to attainable comparison discrepancy) displays an indirect effect on the association between comparison frequency and brooding rumination. We further assume that the notion of attainability is similarly related to engendered

affective valence following comparison, with unattainable comparison standards leading to stronger negative impact, which in turn exacerbates brooding rumination.

In the second set of models, we tested the different directionality with aversive well-being comparisons as mediator between brooding rumination and depression. In these models, brooding rumination prompted an increase in the frequency of aversive comparisons. This is in line with theoretical notion that trait-like rumination tendencies trigger automatic responses that lead to an engagement in negative self-evaluative thinking (Nolen-Hoeksema et al., 2008). Negative self-evaluations are likely to be based on aversive comparisons (Morina, 2021) and any engagement in negative self-evaluative thinking can trigger new aversive comparisons. The tested models suggested that aversive comparisons initiated a higher salience of perceived well-being discrepancy, thus increasing depressive symptoms (Model 2a). Accordingly, the pathway from brooding rumination to depression was partially mediated by aversive well-being comparisons via perceived discrepancy as an additional element between aversive brooding and depression. In line with Response Styles Theory of depression (Nolen-Hoeksema, 1991), rumination appeared to instigate frequent aversive comparison, which then triggered negative engendered affective valence, resulting in more depressive symptoms (Model 2b). Here, we also found a partial mediation effect. In both models, brooding rumination did not directly lead to a higher perceived discrepancy or engendered affective valence but only via the interposed step of frequently engaging in aversive comparisons, which is plausible and in line with gComp conceptualizations (Morina, 2021). Altogether, the findings indicate that comparing one's well-being to aversive standards represents a potential mechanism by which brooding rumination might be targeted in order to reduce it. This finding awaits, however, replication using both experimental designs as well as longitudinal surveys.

Previous research has already established that social comparison plays a significant role in both mental and physical well-being (Arigo et al., 2014; Butzer & Kuiper, 2006; Buunk & Gibbons, 2007; Hoppen et al., 2020; McCarthy & Morina, 2020; Myers & Crowther, 2009). Our findings add to this literature in four important ways. First, they suggest that different comparison types that share relevant conceptual features play a role in well-being. Second, they indicate that it is essential that we investigate the distinct role of aversive comparisons rather than general comparison orientation. Third, they demonstrate the need to study comparative behaviour as a process, which in our case consists of frequency, discrepancy, and engendered affective valence. Fourth, they hint to the need to investigate comparative behaviour as a mechanism that might influence other variables known to maintain psychopathology. Another variable that deserves attention in this context is self-esteem, which is an important variable in the context of social comparison and depression (Butzer & Kuiper, 2006; Wood & Lockwood, 1999). Altogether, our data indicate that comparative thinking plays a significant role in the relationship between brooding rumination and depression, which is highly relevant because rumination is a robust and well-established predictor of depressive symptoms (McLaughlin & Nolen-Hoeksema, 2011; Watkins & Roberts, 2020).

Importantly, brooding rumination and well-being comparisons are theoretically related but nonetheless distinct constructs. Brooding rumination has been defined as a method of coping with negative mood, as “moody pondering” (Treyner et al., 2003, p. 251), and “a mode of responding to distress that involves repetitively and passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms” (Nolen-Hoeksema et al., 2008, p. 400). Well-being comparisons on the other hand have been defined in accordance with the gComp model (Morina, 2021) as evaluating (dis-)similarities between one's current well-being and some standard at hand (Morina & Schlechter, 2023). Both constructs have in common that they describe preoccupation with one's own well-being and brooding rumination may also involve comparative thinking about the self. For example, the widely used RSQ (Nolen-Hoeksema, 1991) comprises two items to assess counterfactual and social thinking (“Think about a recent situation, wishing it had gone better” and “Why do I have problems other people don't have?”), respectively. In addition, one item may refer to several comparison types (“Why can't I handle things better?”). Nonetheless, there exist at least four relevant distinctions between the two constructs. First, well-being comparisons focus entirely on the extent to which an individual compares their *current* well-being with some other standard (e.g., “Thought that if you had behaved differently in the past, you would currently be doing better?”, Morina & Schlechter, 2023). The RSQ example

of counterfactual thinking (i.e., “Think about a recent situation, wishing it had gone better.”) might involve only low levels of cognitive elaboration and easily include cognitive processes not directly linked to evaluations of current well-being (Hoppen & Morina, 2021). Well-being counterfactual comparisons, on the other hand, require thinking about the extent to which well-being is different currently than in a counterfactual world. Second, brooding rumination involves “moody pondering” (Treyner et al., 2003) without involving any comparative thinking (e.g., “What am I doing to deserve this?” as measured with the RSQ). Third, a crucial proposition by gComp is that comparative thinking informs one's judgement of well-being (Morina, 2021). For example, comparing one's well-being to that of an individual with very severe depression versus a healthy individual may produce two different evaluations of one's own well-being that may be followed by different affective or behavioural responses. This is in contrast to brooding rumination that is defined as responding to distress and focusing on the possible causes and consequences of the complaints and that entirely focuses on trying to understand why things are the way they are (Nolen-Hoeksema et al., 2008). Finally, well-being comparisons were measured in this study not only with respect to how frequent they are, but also with respect to the discrepancy between the target and the standard, and the engendered affective valence, whereas the assessment of brooding rumination usually focuses on frequency only. In future research, factor analytical methods could be used to investigate whether these theoretical distinctions hold empirically. Notably, comparative thinking and brooding rumination might be reciprocally associated, i.e., comparative thinking may influence brooding, which in turn, might influence comparative thinking. Nonetheless, our findings provide empirical justification for further controlled and longitudinal examination of the relations between brooding rumination and comparative thinking and their differential effects among individuals with depressive symptoms.

Clinical implications

Understanding the role of well-being comparisons in brooding rumination and depression has relevant clinical implications. Our study provided first insights about these relationships in dysphoric individuals, which may improve our knowledge about psychopathology and further inform psychological interventions. For instance, therapists may assess whether frequent comparative thinking is often followed by brooding rumination. If this is the case, cognitive interventions may help to elaborate the perceived discrepancies in an appropriate context of time and personal circumstances (Koster et al., 2009). On the other hand, when brooding rumination is the starting point, focusing on specific thinking instead of abstractly engaging in comparisons may be a fruitful approach to counteract the negative cascade resulting from an engagement in subsequent aversive comparisons (Ehring, 2021). Indeed, research testing an online-training program indicates that reducing ruminating about social comparison affects well-being positively (Weber & Hagmayer, 2018). Overall, it appears valuable to investigate systematically how these considerations may improve psychological interventions. However, all this needs to be grounded in more robust knowledge requiring further studies, for which the present contribution may serve as a starting point.

Limitations and future research

The present study has important limitations. Most importantly, the cross-sectional design of the study does not allow for conclusions of causal relations between the measured variables and therefore the results of the mediation analyses must be interpreted with caution. We formulated theoretical considerations for both directions, but it must be noted that some pathways in our models are not necessarily a proof of directionally as they also work in the other directions. Given that the same variables were used, model equivalence prevents us from drawing more solid conclusions. Therefore, longitudinal and experimental studies are necessary to provide insights about directionality, which can further substantiate theory building. However, given the understudied nature of this topic, our study provides a first starting point for such endeavours. In a similar vein, the more depressed individuals are the more often they will find

superior comparison standards (Appel et al., 2015). Noteworthy, frequent comparing to superior standards may also lower the comparer's own well-being (Morina, 2021). Therefore, more fine-grained analytic approaches like experience sampling studies are necessary to discern the directionality of such effects on a within-person level. Our sample consisted of individuals with dysphoric symptoms and the findings need to be replicated with individuals with clinical symptoms of depression. That being said, we used the PHQ-8 to include dysphoric individuals. The same questionnaire was also used to assess depressive symptoms, thus restricting the range of variance in the total scores. Accordingly, some of the presented estimates may be even lower than estimates obtained with the full range of variance. Despite our moderation models not being significant, it is important to investigate further potential moderators that may influence the proposed relationships. Although we did not expect any moderation effects in this context, identifying further moderator variables may serve a more fine-grained theory building of well-being comparisons. Although we did not conduct specific a priori power calculations, our sample size was sufficiently large for stable correlations and parameter estimates in the mediation models (see Schönbrodt & Perugini, 2013; Wolf et al., 2013). Finally, some internal consistencies of the CSS-W were rather low, which may be attributable to the complexity and breadth of the construct. Nonetheless, the psychometric evaluation of the CSS-W supports its validity (Morina & Schlechter, 2023).

Conclusions

The present study suggests that aversive well-being comparisons play a significant role in the well-established relationship between brooding rumination and depression. Our study further offers insights in different directionalities that may underly these relationships. Aversive well-being comparisons may constitute an important clinical factor, which awaits further examination in prospective studies.

AUTHOR CONTRIBUTIONS

Pascal Schlechter: Conceptualization; formal analysis; investigation; validation; writing – original draft; writing – review and editing. **Nexhmedin Morina:** Conceptualization; data curation; investigation; methodology; software; supervision; validation; writing – original draft; writing – review and editing.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

We provide all data to reproduce the current results in an anonymized form in the open science framework (https://osf.io/7q6yp/?view_only=23c0a69b0ad84caaacbfd2e5c24582b8). In addition, the corresponding R code that was used for the data analyses can be found in the open science framework. We further provide survey material including copies of the scales that have been used. We note that our study was not preregistered.

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