BJMHR
British Journal of Medical and Health Research
Journal home page: www.bjmhr.com

Affective and Cognitive Processes Underlying Decentering

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ABSTRACT

Decentering is a process in which a shift in perspective is undertaken towards an observer-like, non-judgmental stance towards self-related thoughts and feelings. In patients with depression, improving decentering abilities reduces the probability of relapse. However, it is important to clarify the causes for different decentering abilities. Hence, the role of affective components, aspects of attention, perspective taking and cognitive skills for decentering abilities remain to be elucidated. In the present investigation decentering, depressiveness and attention attributes were measured in 60 individuals using standardized questionnaires. Cognitive skills were indicated by IQ measures, and judgments on cognitive abilities were specified on a 6-point Likert-scale. Perspective-taking abilities were measured by reaction times and error-rates using a paradigm that required referring to different perspectives during performance. Data reveal negative associations between decentering, depressiveness and an inflexible self-attentive focus. Although IQ and IQ-judgments were associated as expected, no association was detected between decentering and IQ. Only one decentering factor was related to reaction times in a condition of the perspective-taking paradigm. We conclude that affective components and aspects of self-focused attention play a significant role for decentering abilities as opposed to more basal cognitive abilities.

Keywords: Depression, metacognition, decentering, attention, IQ, perspective taking

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Received 20 July 2016, Accepted 13 September 2016

Please cite this article as: Mainz V *et al*., Affective and Cognitive Processes Underlying Decentering . British Journal of Medical and Health Research 2016.

INTRODUCTION

The scope of the study at hand is to investigate mechanisms of decentering and to assess in how far basal cognitive–affective abilities are associated with decentering. Within mindfulness practice decentering is defined as "a process through which one is able to step outside of one's immediate experience, thereby changing the very nature of that experience" [1]. Through decentering, that is, "seeing thoughts in a wider perspective" [2,3] people view thoughts and feelings as transient objective events in the mind rather than observing them as true self reflections [1]. Moreover, deployment of beneficial effects on wellbeing, as well as stress-related, somatic and psychological symptoms is reported.

To date, there are some assumptions within mindfulness-based approaches as to how processes such as decentering are intermingled in the symptomatology of affective disorders (e.g., 4). The importance of decentering is underlined as a process in which a shift in perspective can be realized, involving a change away from relating to thoughts as "self" to objectively perceivable events that will pass by [5.] Fresco and colleagues [6] developed a questionnaire as a measure of decentering abilities, the Experiences Questionnaire (EQ). A psychometric evaluation of a German version by Gecht and colleagues (EQ-D; 7) revealed adequate internal consistency and construct validity. Interestingly, it was demonstrated that decentering could be seen as an important working mechanism of mindfulness, which mediates the relationship between mindfulness skills and severity of depressive symptoms[8; 9]. Another, more recent theoretical framework that describes four distinct, but closely interacting components through which mindfulness effects emerge, is delivered by Hölzel and colleagues [10]. The authors distinguish "attention regulation", "body awareness", "emotion regulation" and "change in perspective on the self". As the focus of our study is to investigate the role of basal cognitive abilities for decentering, we will briefly refer to the "attention regulation" and "change in perspective on the self" aspects that are relevant for our suppositions. It was found that mindfulness meditation enhances performance in tasks requiring orienting attention [11; 12]. Such attention regulation with a focus on attention oriented towards internal processes was posed as an important basic mechanism in order to profit from other mindfulness-based processes. Moreover, mindful, non-judgmental processing eases the process of dis-identification with the contents of consciousness. In this connection the "change in perspective on the self" aspect refers to the development of meta-awareness which is described as "(…) executive monitoring, in which one takes a nonconceptual perspective as a distributed form of attention toward the contents of conscious experience" [10] Decentering constitutes the process of facilitating an observer perspective and "a change in perspective about the sense of self and an alteration in first-person subjective experience" [10, 5; 9]. To date,

there is little research that conceptualizes either which specific cognitive processes are necessary to establish such a perspective on the self, or which common processes are possibly shared between the foci of perspective change (e.g., self, other). Interestingly, Hölzel and colleagues [13] found mindfulness intervention that causes perspective changes to the self to be associated with structural changes in a brain network involved in the projection of the self onto another perspective, such as perceiving the viewpoint of others [14; 15]. Concluding from this, it could be that processes facilitating a perspective shift, such as decentering, as well as those relevant to adopting the viewpoint of others, share a common set of cognitive mechanisms.

Moreover, the above theoretical embedment of decentering into mostly intervention-based framework shows that decentering is viewed as a changeable process that can be practiced, learned and improved. Research has shown that training in decentering abilities within Mindfulness-Based Cognitive Therapy (MBCT) reduced the impact of dysfunctional thoughts and negative affect and lowered relapse probability in patients with depression [5; 16; 17; 18; 19; 4; 20; 21; 22.] Furthermore, research indicates that habitual differences in the ability to decenter prior to therapy were associated with relapse probability [22]. Moreover, inter-individual differences in the decentering ability were also reported for non-clinical groups (23; 24). These findings point to decentering as an ability that should exist to some degree in any person without the need for special training. It remains unclear, however, how inter-individual differences and varying learnability of decentering abilities can be explained. One could speculate that basic intellectual abilities could explain these differences. Cognitive abilities vary inter-individually and are also sometimes deficient in depressive patients [25]. Moreover, if asked to judge the quality of their abilities, patients with depressive disorders tend to underestimate their aptitudes in comparison to healthy individuals [26; 27] Hence, either cognitive abilities could be seen as some kind of prerequisite or requirement for learning certain demanding cognitive abilities such as decentering, or biased perceptions could occupy resources in patients and hence interfere with other cognitive mechanisms, such as decentering, that are important for remaining stable during resilience.

Although decentering and its association with depressive symptoms within therapy settings are a well investigated research area, so far there has been little study of the relation between decentering and cognitive abilities, such as attention, perspective taking, or IQ, in healthy subjects. It remains unclear, which basal cognitive processes establish the basis for the ability to decenter. Following from its definition and theoretical embedding, provided above, it can first of all be assumed that decentering should be related to cognitive skills such as attention and perspective taking. Decentering comprises the ability to intentionally *attend* to ones

thoughts and emotions and to perceive those thoughts and emotions as mental events from an observer *perspective* in a way that conscious processing *shifts* away from the identification with the content and towards an enhanced non-judgmental awareness of mental events [1].

Hence, the five specific aims of the present study were as follows. First, we examine the relationship between decentering and depressive symptoms. Because of the reported beneficial effects of decentering abilities on psychological wellbeing and on relapse probability in patients with depressive symptoms, we expected a negative relationship between decentering ability and degree of (sub-clinical) depressive symptoms.

Second, we intended to test the association between decentering and attention processes that are known to play an important role within depression and that constitute possible working mechanisms within mindfulness-based practice. Dysfunctional attention processes within depression are highly inflexible foci towards internal processes and a prolonged ruminative preoccupation with problems into which affected individuals feel drawn. Improved attention regulation towards a flexible adaptive experience, and regulation of negative affect can be viewed as functional attention processes enhanced through intervention. Specifically, it was hypothesized that decentering and functional attention processes were positively associated, whereas decentering and dysfunctional attention processes should show the opposite relationship.

Third, due to the supposition that processes facilitating a perspective shift, such as decentering and conceiving the viewpoint of others, share common cognitive mechanisms, we further aimed to assess the link between decentering and perspective-taking. We therefore planned to investigate differences in perspective-taking abilities between taking a first- and a third-person perspective. We assumed that individuals with higher decentering abilities are better able, in the sense of requiring less time and being less inaccurate, to take a third-person perspective compared to individuals with low decentering abilities. Moreover, we hypothesized that individuals with higher decentering abilities, that is, rather non-judgmentally observing from a distanced perspective, should require more time to indicate their own affect in a first-person perspective compared to indicating the affective state of another person when taking the third-person perspective.

Fourth, we aimed at investigating how decentering is related to basic intellectual abilities. We believe that decentering represents an ability, varying from individual to individual, that can be trained and improved relatively independent from intellectual abilities. Therefore we expected a null-correlation between decentering and IQ. Moreover, we hypothesize that higher decentering abilities are accompanied by more accurate judgments of one's own intellectual abilities.

Finally, considering that research predominantly addresses the role of decentering in psychological wellbeing, focusing, for example, on dysfunctional cognitions within affective disorders, we would like to investigate the extent to which decentering may be rooted in, or bound to depressiveness. Hence, we intended to test if decentering would be still associated to attention aspects and perspective-taking abilities when controlling for sub-clinical depressive symptoms in a healthy sample.

MATERIALS AND METHOD

Subjects

A total of 60 university students were recruited via advertisements. Exclusion criteria were an age of < 18, color vision deficiency, dyslexia, and a lack of command of the German language. All participants reported no physical or psychological constraints and did not meet the criteria of a depressive episode according to the International Diagnostic Checklist for DSM-IV and ICD-10 (IDCL; 28) on the day of testing. The IDCL is a clinical interview aimed at reaching a precise diagnosis according to ICD-10 classification. It was conducted by a research assistant who was trained and clinically experienced. One participant had to be excluded post hoc due to not completing the applied decentering measure at all. The remaining 59 volunteers, between 18 and 32 years of age (M = 24.17, SD = 3.23), were included in the data analyses. Information on socio-demographic data (e.g., gender, field of study) is provided in Table 1. All participants gave written consent to participation and received financial compensation for their participation. The study was approved by the local ethics committee.

Table 1: Sociodemographic data

***n* = 59**	***n***	**%**	**Field of study**	***n***	**%**
Male	18	30.5	Medicine	19	32.2
Female	41	69.5	Psychology	12	20.3
IDCL Diagnosis	0	0	Engineering	11	18.6
			Teaching professions	6	10.2
			Other nature sciences	11	18.6

Note. IDCL = International Diagnostic Checklist for DSM-IV and ICD-10 (Hiller, Zaudig & Mombour, 1999)[28].

Decentering

Participants filled out the German version of the Experiences-Questionnaire (EQ-D; 6; 7). The EQ-D is a self-report questionnaire on decentering and rumination. It requires answering 20 items on whether one has recently had "similar experiences" (e.g., "I view things from a wider perspective"). Responses are indicated on a 5-point Likert-scale (ranging from 0 = "never" to 4 = "all the time"). Higher scores indicate a higher ability of the respective aspect

of decentering. The full 20-item-version of the original EQ[6] was administered as recommended by Gecht and colleagues [7]. However, data analyses rely on the 8-item solution derived from the psychometric evaluation of the German version, the EQ-D. Psychometric analyses of the EQ-D revealed adequate internal consistency and construct validity, suggesting basing the interpretation of decentering scores on the two first-order factors "Accepting Self-Perception" (Factor 1: EQ-ASP) and "Distanced Perspective" (Factor 2: EQ-DP) [7]. All aspects of decentering are displayed in the following factors. The first factor, EQ-ASP, comprises appreciating and being aware of oneself as non-synonymous with one's own thoughts, that is, being aware that one's own personal characteristics belong and originate from oneself. The second factor, EQ-DP, refers to the ability to have a reflective and observing perspective on one's own inner experiences and mental processes. It is suggested that EQ-ASP refers to a *state* with regard to how people experience themselves as a person, whereas EQ-DP refers to a *cognitive process* by which people relate to their thoughts and emotions in a specific manner. Higher values indicate higher decentering abilities. The mean and standard deviation of the samples are displayed in Table 2. In the present sample, Cronbach's α for the first factor, EQ-ASP, was 0.7 and for the second factor, EQ-DP, Cronbach's α was.7, both indicating satisfactory internal consistency [29].

Depression

As a measure of the degree of (sub-clinical) depressive symptoms, the Adaptive-Depression Screening (A-DESC) was used [30; 31]. All participants specified the extent to which 36 items on depression applied to them on a 5-point Likert-scale (ranging from 0 = "never" to 4 = "always") [30;31]. The A-DESC is a Rasch-homogeneous computer-adaptive screening instrument indicating person parameters for depression scorings on a unidimensional interval scale (see Table 2). Rasch model based theta values (CAT) indicate that the degree of depressive symptoms can range between + - ∞ where higher values point to a higher degree of depressive symptoms (for details on Rasch analyses see 32). The sample showed a mean CAT theta value of -2.4 (*SD* = 0.8). The cut-off score to indicate a clinically significant depression reported from an external validation study with a sample of 367 patients was -1.36 [31]. Cronbach's α in the present sample was.95, demonstrating excellent internal consistency [29].

Functional and dysfunctional attention

Functional and dysfunctional aspects of attention were assessed with the help of the Functional and Dysfunctional Self-consciousness questionnaire (DFS; 33). The instrument includes 22 items that are answered on a 5-point Likert-scale (ranging from 1 = "not at all applicable" to 5 = "totally applicable"). Two scales are distinguished. The first scale,

"dysfunctional self-consciousness" (DFS-DS) measures inflexibility of the state of self-awareness. DS is a characteristic of dysfunctional cognitive operations which lack flexibility. It indicates a prolonged state of self-focused attention or preoccupation with problems even in situations in which no improvement can be expected. The other scale, "functional self-consciousness" (DFS-FS), represents regulative aspects of self-consciousness such as the generation of effective problem-solving strategies or alternatives and the recognition of behavioral borders and, thereof, flexible and adaptive self-focused attention. It also involves aspects of confidence in problem-solving abilities. Higher values indicate higher functional or dysfunctional aspects of attention, respectively. Means and standard deviations can be found in Table 2. Cronbach's α for DS in the present sample was 0.9, indicating excellent internal consistency. Cronbach's α for FS was 7, indicating satisfactory internal consistency[29].

Intelligence

To assess basic intellectual abilities, the first part of the Culture Fair Test - 20 - Revision (CFT-20-R; 34) was used. According to Cattels' "General Fluid Ability", the CFT-20-R assesses non-verbal intelligence based on image patterns and geometric forms. The four subtests consider completing series, classifications, progressive matrices and topological reasoning. Following the IQ assessment, participants were asked to indicate the quality of their performance in the preceding test on a 6-point Likert-scale (IQ-judgment ranging from 1 = "very good" to 6 = "insufficient" [according to German school grades]). The means and standard deviation of the samples are displayed in Table 2.

Perspective-taking

Perspective taking abilities were attained using a computer paradigm adapted from Schnell, Bluschke, Konradt and Walter[35]. In this paradigm, participants' view 32 short stories each consisting of three subsequent pictures involving a black-rimmed protagonist. The task requires making judgments from either the first-person perspective (1st pp) or the third-person, that is, the protagonists' perspective (3rd pp) after each picture whereby the participants either indicate changes in visuospatial representations (number condition: i.e., recognizing less, equal, or more living beings compared with the previous picture), or changes of affective states (affect condition: i.e., feeling worse, equal, or better compared to the previous picture). Reaction times and responses were recorded for the four conditions (1st pp number, 1st pp affect, 3rd pp number, 3rd pp affect). Good perspective-taking abilities are reflected in lower reaction times and in lower error rates in the 3rd pp. It is recommended to exclude participants that score too low a number of correct answers in the 3rd pp number condition (<30%). This high threshold seems appropriate to ensure that participants are able to solve the 3rd pp affect condition whereby visuospacial perspective-taking can be seen as a

prerequisite for the ability to judge affective states in others. For further details see Schnell et al. (2011). Means and standard deviations are displayed in Table 3.

Procedure

A telephone interview was conducted prior to the examination in order to check the exclusion criteria and to acquire general demographic information. On the examination day, participants were interviewed with the IDCL. After this, they filled out the standardized questionnaires, that is, the EQ-D to measure decentering [6; 7], the A-DESC to acquire sub-clinical depression scores [30; 31], and the DFS as a measure of functional and dysfunctional attention[33]. Further, the measure of intellectual ability, the CFT-20-R [34], was applied and subjects participated in the perspective-taking paradigm[35].

Data analyses

All data was analyzed in SPSS 22.0.

Decentering, depression, functional and dysfunctional attention, IQ and IQ judgments. Associations between decentering (EQ-D), depression (A-DESC), functional and dysfunctional attention (DFS) and IQ scores (IQ, IQ-judgment) were analyzed for the final sample $n = 59$. For the EQ-D, as recommended by Gecht et al.[7], the presentation of the results and the interpretation of decentering scores are based on the sum of the scores of the two first-order factors (EQ-ASP, EQ-DP), respectively. In the analyses for the A-DESC, the individual CAT theta values were used, for the DFS the individual sum of the scores in the respective scales DFS-DS and DFS-FS. For the IQ, the CFT-20-R scores were entered into the analyses, and for the IQ-judgments, the individual ratings were considered (see Table 2). Pearson correlation analyses were calculated for the questionnaire data (EQ-ASP, EQ-DP, A-DESC, DFS-FS, DFS-DS) and IQ scores (IQ, IQ-judgment). Results are reported on a significance level of $p < .05$ (2-sided). According to Cohen's guidelines, Pearson's correlations of $r = .1$ represent a small, $r = .3$ a medium, and $r = .5$, a large effect [36].

Decentering and perspective-taking

Concerning decentering and perspective-taking, the data were analyzed by examining the sample that finally resulted after the exclusion of outliers in the perspective-taking task (as described above) and after excluding participants with reaction times or error rates deviating more than 2 SD from the group mean in the respective conditions (resulting $n = 35$). Further, to identify differences in perspective-taking between people with high and low decentering scores, a median spilt was conducted resulting in $n = 17$ participants with decentering scores < 22 and $n = 18$ with decentering scores $>= 22$.

To analyze perspective-taking abilities reaction times (seconds) in the correct trials and error rates (%) in the four conditions were used for data analyses (see Table 3). To analyze the

differences between the conditions in the perspective-taking paradigm, a multivariate 2x2 analysis of variance (MANOVA) was applied with the factors *perspective* (1st pp and 3rd pp) and *task* (affect and number) and the dependent variables *reaction times* and *error rates*, respectively. The MANOVA was followed by univariate analyses of variance (ANOVA). The reported significances for the above analyses were Bonferroni corrected. To acquire the association between decentering and perspective-taking Pearson correlation analyses were calculated between EQ-ASP, EQ-DP and error rates and reaction times of the paradigms' four conditions and results are reported on a significance level of $p < .05$ (2-sided). Further, to identify differences in perspective-taking between people with high and low decentering scores, independent samples *t*-tests were used.

Regression analyses

Finally, regression analyses were conducted for the sample $n = 59$ to test whether the derived correlates predict the decentering factors they were associated with when controlling for sub-clinical depression. Only the significant correlates were entered into the regression. First, depression scores were entered into the analyses in order to control for depression scores in the next stages. Following this, the order of entry was then determined by strength of association. With two hierarchical approaches, the incremental predictive power of the (competing) predictors was determined: one for the decentering factor EQ-ASP and the other for the factor EQ-DP.

RESULTS AND DISCUSSION

Decentering, Depression and Functional and Dysfunctional Attention

The two Decentering factors, EQ-ASP and EQ-DP, were correlated with $r = .28$, $p < .05$. Further, both factors were negatively associated with the CAT theta scores of the A-DESC with $r = -.50$, $p < .001$, between EQ-ASP, and the A-DESC score and $r = -.41$, $p < .01$, between EQ-DP, and the A-DESC score. Both Decentering factors were positively correlated with DFS-FS, EQ-ASP: $r = .41$, $p < .01$; EQ-DP: $r = .36$, $p < .01$, and negatively with DFS-DS, EQ-ASP: $r = -.42$, $p < .01$; EQ-DP: $r = -.66$, $p < .001$. Data revealed a positive association between the A-DESC score and DFS-DS, $r = .61$, $p < .001$, and a negative correlation between the A-DESC score and DFS-FS, $r = -.29$, $p < .05$.

Decentering, IQ and IQ judgments

Neither Decentering Factor 1 (EQ-ASP) nor Decentering Factor 2 (EQ-DP) were associated with IQ scores, EQ-ASP: $r = .03$, $p = .82$; EQ-DP: $r = .15$, $p = .27$. There were no significant correlations between IQ-judgments and the two Decentering factors, EQ-ASP: $r = -.23$, $p = .08$; EQ-DP: $r = -.06$, $p = .68$. IQ and IQ-judgments were negatively associated with $r = -.59$,

$p < .001$. This association remained stable when controlling for depression by including the CAT theta scores in a partial correlation analysis, $r_{partial} = -.56$, $p < .001$.

Decentering and Perspective-Taking

First, a MANOVA comparing EQ-ASP, EQ-DP, A-DESC, DFS-DS, DFS-FS, IQ, and IQ-judgments between the sample of $n = 35$ that were included with the sample of $n = 24$ that were excluded from the analyses in the perspective-taking paradigm, revealed no significant main effect, $F(7,51) = 1.00$, $p = .44$, $\eta_p^2 = .12$. Means and univariate test results are displayed in Table 2.

Table 2: Group means and standard deviations for decentering, depression, attention and IQ and comparison between the included and excluded samples in the perspective taking paradigm

		Group 1 (n = 59)[a]		**Group 2 (n = 35)**[a]		**Group 3 (n = 24)**[a]		**Comparison between Group 2 & 3**[b]		
		M	***SD***	***M***	***SD***	***M***	***SD***	***F***	***p***	η_p^2
Decentering	EQ-ASP[c]	12.66	2.01	12.69	2.04	12.63	2.02	.01	.91	.00
	EQ-DP[d]	9.31	2.66	9.06	2.53	9.67	2.85	.74	.39	.01
Depression	A-DESC[e]	-2.44	0.81	-2.41	0.90	-2.47	0.68	.06	.81	.00
Attention	DFS-DS[f]	33.41	8.37	32.89	7.07	34.17	10.09	.33	.57	.01
	DFS-FS[g]	30.03	4.11	30.34	3.65	29.58	4.74	.48	.49	.01
Intelligence	CFT-20-R[h]	108.54	14.22	109.09	14.13	107.75	14.62	.12	.73	.00
	IQ-judgment	2.85	0.85	2.89	0.87	2.79	0.83	.17	.68	.00

Note. [a]Group 1: Total group (sample size $n = 59$), Group 2: participants included in the analyses of the perspective-taking paradigm (sample size $n = 35$), Group 3: participants excluded from the analyses of the perspective-taking paradigm due to reaction times or error rates deviating more than 2 SD from the total groups` mean (sample size $n = 24$); [b]Univariate test results of the MANOVA: linear independent pairwise comparison of estimated marginal means between group 2 & 3; [c]EQ-ASP = Experiences Questionnaire factor 'Accepting Self-Perception'(Gecht et al., 2014a)[7]; [d]EQ-DP = Experiences Questionnaire factor 'Distanced Perspective' (Gecht et al., 2014a)[7]; [e]A-DESC = Adaptive-Depression Screening (Forkmann et al., 2009, 2013) [33]; [f]DFS-DS = Functional and Dysfunctional Self-consciousness questionnaire 'dysfunctional self-consciousness' (Hoyer, 2000)[33]; [g]DFS-FS = Functional and Dysfunctional Self-consciousness questionnaire 'functional self-consciousness' (Hoyer, 2000); [h]CFT-20-R = Culture Fair Test – 20 – Revision (Weiß, 2008)[34].

The reaction times are reported for the correct trials of the respective condition in seconds, error rates are presented in percentages. In the final sample, error rates in the conditions did not exceed 32%. This ensured that all subjects followed the instructions to change the perspective in the 3rd pp condition. Reaction times and error rates of the sample that was included in further analyses are displayed in Table 3. The MANOVA revealed no significant

main effect for the factor *perspective*, MANOVA: F(2,135) = 3.00, p = .05, η_p^2 = .04, and a significant main effect for the factor *task*, MANOVA: F(2,135) = 114.19, p < .00, η_p^2 = .63. In addition, a significant interaction effect emerged with respect to *perspective* by *task*, MANOVA: F(2,135) = 94.34; p < .00; η_p^2 = .58. Subsequent analyses of variance (ANOVA) revealed that both reaction times and error rates significantly differed between 1st and 3rd pp in the affect task, $ANOVA_{Reaction\ times}$: F(1,68) = 21.38, p < .00, η_p^2 = .24; $ANOVA_{Error\ rates}$: F(1,68) = 77.08, p < .00, η_p^2 = .53. Similar, reaction times and error rates both significantly differed between 1st and 3rd pp in the number task, $ANOVA_{Reaction\ times}$: F(1,68) = 9.71, p < .00, η_p^2 = .13; $ANOVA_{Error\ rates}$: F(1,68) = 144.84, p < .00, η_p^2 = .68. Moreover, reaction times and error rates significantly differed between affect and number task in the 1st pp, $ANOVA_{Reaction\ times}$: F(1,68) = 57.02, p < .00, η_p^2 = .46; $ANOVA_{Error\ rates}$: F(1,68) = 336.10, p < .00, η_p^2 = .83. Finally, neither reaction times nor error rates significantly differed between affect and number task in the 3rd pp, $ANOVA_{Reaction\ times}$: F(1,68) = 0.59, p = .45, η_p^2 = .01; $ANOVA_{Error\ rates}$: F(1,68) = 0.96, p = .33, η_p^2 = .01. Means of error rates and reaction times with the according effect sizes (η_p^2) are displayed in Figure 1. Error bars are displayed as standard errors of mean (*SEM*).

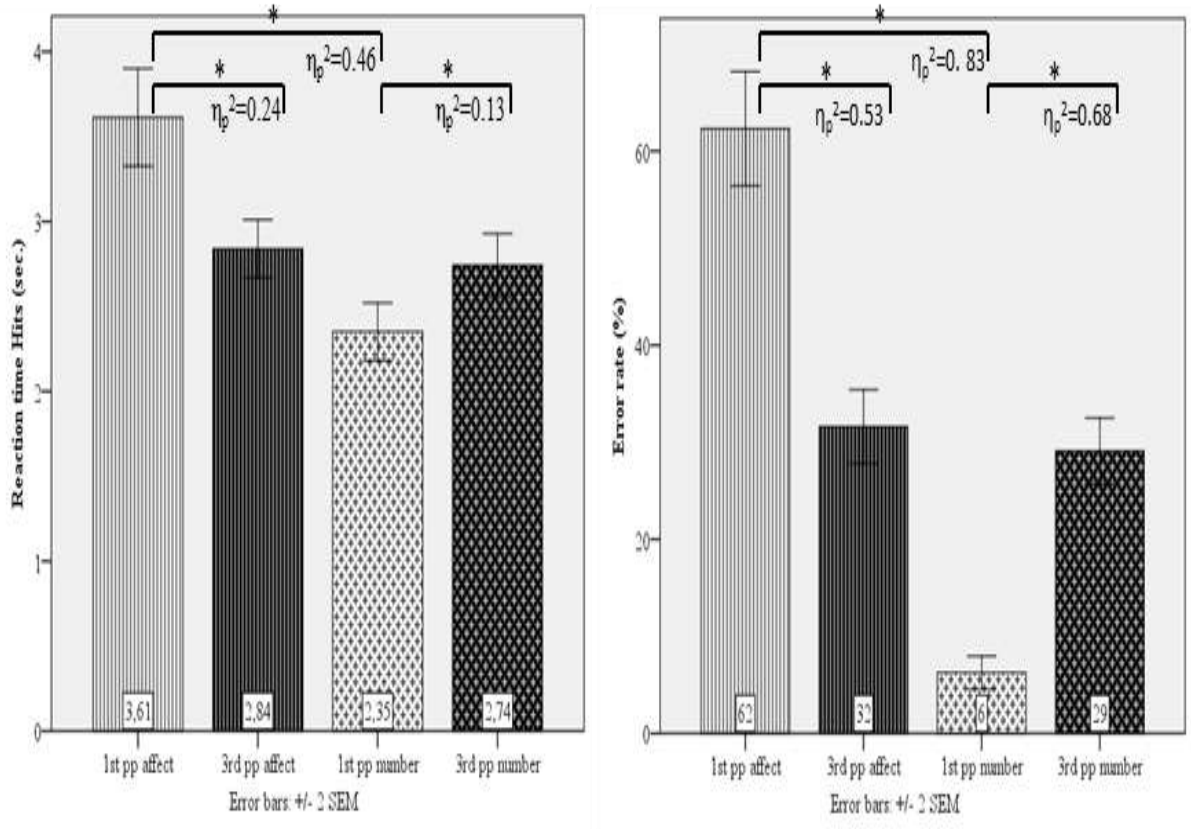

Figure 1: Perspective taking paradigm

Mean reaction times of the correct trials (in seconds) and percent error rates in the respective conditions of the perspective taking paradigm.

1st pp affect = first person perspective, 3rd pp affect = third person perspective; Error bars are displayed as standard errors of mean (SEM); η_p^2: partial eta squared effect sizes.

**Analyses of variance, p < .01

High versus low decenterers.

No significant differences were found between groups reaction times when dividing the sample into high and low decenterers (Median split < 22: *n* = 17; > = 22: *n* = 18), t-test$_{\text{independent samples}}$, all *p* n.s.. Further, no significant differences were found between groups error rates, t-test$_{\text{independent samples}}$, all *p* n.s.. Reaction times, error rates and *p*-values can be found in Table 3.

Table 3: Decentering and Perspective Taking

Conditions		Groups[a]	Reaction times (sec.)			Error rates (%)		
			M	***SD***	***p***[b]	***M***	***SD***	***p***[b]
Affect	1st pp[c]	Total	3.61	0.85	-	62	17.38	-
		Low	3.51	0.79	.5	65	17.81	.4
		High	3.71	0.92		60	17.17	
	3rd pp[d]	Total	2.84	0.51	-	32	11.24	-
		Low	2.82	0.54	.8	32	10.93	.9
		High	2.86	0.48		32	11.83	
Number	1st pp[c]	Total	2.35	0.50	-	6	5.03	-
		Low	2.42	0.46	.4	6	5.41	1.0
		High	2.28	0.55		6	4.79	
	3rd pp[d]	Total	2.74	0.55	-	29	10.05	-
		Low	2.75	0.49	.9	31	9.50	.3
		High	2.73	0.61		27	10.53	

Note. [a]Total: *n* = 35; Low: decentering scores < 22 in the Experiences Questionnaire (Gecht et al, 2014a)[7], *n* = 17; High: decentering scores > = 22 in the Experiences Questionnaire (Gecht et al, 2014a) [7], *n* = 18; [b]Results of the independent samples *t*-Tests between high and low decenterers; [c]1st pp: first person perspective; [d]3rd pp: third person perspective

Associations between decentering and perspective-taking. The only significant positive association between decentering and perspective-taking was found between the Decentering Factor 2 (EQ-DP) and the reaction times in the 1st pp affect condition with $r = .357$, $p < .05$. Reaction times and error rates of all other conditions were not associated with any of the two decentering factors.

Regression analyses

In order to test how far the significant associations found in our correlation analyses are predictive for either of the decentering abilities, two hierarchical regression analyses, one for each subscale of decentering (EQ-ASP, EQ-DP) were explored. The results are presented in Table 4. In the hierarchical regression for EQ-ASP the A-DESC-scores were entered as predictors in the first step (Model 1), and DFS-DS and DFS-FS were entered in the second step (Model 2). The rationale for the entry into regression was to enter those scores that

revealed a significant association with the decentering scores. Moreover, depression scores were entered first as we assumed a closer relationship between the concept of decentering and depressiveness than between decentering and the attention-related concept of DFS-FS and DFS-DS. Moreover, we aimed at testing the predictive power of the correlates when controlling for depression scores. Both regression models were significant (see Table 4). The degree of (sub-clinical) depressive symptoms was a significant predictor of the decentering factor EQ-ASP, β = -.5, p < .01, explaining 24% of variance. After entering DFS-DS and DFS-FS in Model 1 this association remained significant, β = -.34, p < .05. Moreover, DFS-FS was a significant predictor for the decentering factor EQ-ASP, β = .27, p < .05, adding a further 6% of variance, but there was no significant association between DFS-DS and EQ-ASP, β = -.13, p = .34, (Model 2). In the hierarchical regression for EQ-DP, A-DESC-scores were entered as predictors in the first step (Model 1) and DFS-DS and DFS-FS were entered in the second step (Model 2). Both regression models were significant. The decentering factor EQ-DP was significantly associated with the degree of depressive symptoms, β = -.41, p < .01, explaining 15% of variance. After entering DFS-DS and DFS-FS in Model 1, this association did not remain significant, p = .86. Here (Model 2), DFS-DS, β = -.62, p < .01, was significantly associated with EQ-DP, explaining an additional 29% of variance and DFS-FS did only marginally failed to reach significance, β = .19, p = .07.

Table 4: Results of the hierarchical linear regression analyses

Decentering	**EQ-ASP[a] (*n* = 59)**						**EQ-DP[b] (*n* = 59)**								
***n* = 59**	**Model 1**			**Model 2**			**Model 1**			**Model 2**					
	Stand Beta	***T***	***p***	***Stand Beta***	***T***	***p***	***Stand Beta***	***T***	***p***	***Stand Beta***	***T***	***p***			
A-DESC[c]	-.50	-4.36**	.00	-.34	-2.44*	.02	-.41	-3.40**	.001	.02	0.18	.86			
DFS-DS[d]	-	-	-	-.13	-0.96	.34	-	-	-	-.62	-5.00**	.00			
DFS-FS[e]	-	-	-	.27	2.32*	.02	-	-	-	.19	1.84	.07			
RT 1st pp affect[f]	-	-	-	-	-	-	-	-	-	-	-	-			
Adj. R^{2}[g]	.24			.30			.15			.44					
Model	F(1,57) = 19.01, p < .01			F(3,55) = 9.26, p < .01			F(1,57) = 11.58, p < .01			F(3,55) = 16.45, p < .01					
Decentering							EQ-DP[b] (*n* = 35)								
n = 35							Model 1			Model 2			Model 3		
							Stand Beta	*T*	*p*	*Stand Beta*	*T*	*p*	*Stand Beta*	*T*	*p*
A-DESC[c]							-.35	-2.14*	.04	.11	0.57	.57	.12	0.61	.55
DFS-DS[d]							-	-	-	-.56	-2.96*	.01	-.53	-2.77*	.01
DFS-FS[e]							-	-	-	.35	2.47*	.02	.31	2.14*	.04
RT 1st pp affect[f]							-	-	-	-	-	-	.14	0.98	.34
Adj. R^{2}							.10			.36			.36		
Model							F(1,33) = 4.58, p < .05			F(1,31) = 7.47, p < .01			F(4,30) = 5.83, p < .01		

Note: [a]EQ-ASP = Experiences Questionnaire factor 'Accepting Self-Perception'(Gecht et al., 2014a)[7]; [b]EQ-DP = Experiences Questionnaire factor 'Distanced Perspective' (Gecht et al., 2014a)[7]; [c]A-DESC: Adaptive-Depression Screening (Forkmann et al., 2009, 2013)[30,31] CAT theta values reflecting the degree of depressive symptoms; [d]DFS-DS = Functional and Dysfunctional Self-consciousness questionnaire 'dysfunctional self-consciousness' (Hoyer, 2000)[33]; [e]DFS-FS = Functional and Dysfunctional Self-consciousness questionnaire 'functional self-consciousness' (Hoyer, 2000) [33]; [f]RT 1st pp affect: reaction time in the 1st person perspective affect condition; [g]Adj. R^{2} = adjusted R-squared.*p < .05; **p < .01

Finally, as we excluded 24 participants from the analyses between decentering and perspective-taking, we conducted a third hierarchical regression analysis post hoc that only included the remaining 35 participants for the subscale EQ-DP. The predictors of EQ-DP were entered into the models in the same order as reported above. Here, we chose to enter the reaction times in the 1st pp affect condition last to keep the order of entry similar for the two decentering factors and because results revealed the smallest associations between decentering and reaction times. All regression models were significant. Again, degree of depressive symptoms significantly predicted EQ-DP, β = -.35, p < .05, explaining 10% of variance. After entering DFS-DS and DFS-FS in Model 1 this association did not remain significant, p = 0.6. In Model 2, DFS-DS, β = -.56, p < .05, was significantly associated with EQ-DP and DFS-FS also reached significance, β = .35, p < .05, explaining the additional 26% of variance. The association between DFS-DS and DFS-DP remained significant after entering the reaction times in the 1st pp affect condition into Model 2, but reaction times did not significantly predict the decentering factor EQ-DP, p = .34, (Model 3). The explained variance remained the same.

DISCUSSION

In several therapy outcome studies decentering is described as one important process variable within MBCT during relapse prevention of patients with remitted depression (e.g., 16; 17; 22). There is evidence that decentering is an ability that is trainable and present in individuals to varying degrees and, moreover, in patients, even in absence of depressive symptoms (e.g., 23; 18). Still, the exact cognitive processes in which decentering is intermingled are not known and, similarly, the perspective change aspects of decentering, as derived from its definition, have not yet been verified. The study aimed at investigating the associations between decentering, intelligence and the ability to change perspective in a student sample. Further, associations between decentering, depressive symptoms and related functional and dysfunctional attention aspects were explored.

Results reveal a negative association between decentering and depressive symptoms, indicating that individuals with higher decentering abilities display fewer depressive symptoms. This finding is in line with previous studies that found decentering within MBCT to be a process promoting wellbeing (e.g., 5; 23; 37). The negative correlation between decentering and depression was higher for the factor EQ-ASP compared to EQ-DP, indicating that individuals with higher depression scores have a less accepting attitude toward themselves. Moreover, but to a lesser degree, individuals with higher depression scores show a diminished ability to refer to their thoughts and feelings from an objective perspective. Similarly, regression analyses reveal that depressiveness was a significant predictor for either

decentering ability. One could speculate that decentering can be seen as a resource-like process having a beneficial effect on resilience towards depressive symptoms. Further, the associations between depression, decentering and functional and dysfunctional attention-related processes were as expected. Whereas an inflexible state of self-attention (DFS-DS) and decentering abilities were negatively associated, an adaptive, regulative, flexible self-focused attention (DFS-FS) and both decentering factors showed positive correlations. In line with this, a positive relationship was revealed for DFS-DS and depression. Depression and DFS-FS were negatively associated. Regression analyses for the decentering factor EQ-ASP show that whilst depression is a significant negative predictor of the decentering ability, consulting self-attention processes (DFS-DS and DFS-FS) was accompanied by a weakened relation between depression and decentering. One can conclude, since model 2 of the regression analyses explains more variance than model 1, that DFS-FS is a significant predictor of the decentering ability EQ-ASP even when depression is controlled for. In regression analyses for the decentering factor EQ-DP, depression scores were significant negative predictors of EQ-DP, but when adding DFS-FS and DFS-DS into the model the significant influence of depression on the decentering ability vanished. Most variance is explained in model 2 by attention aspects towards the self. An explanation of the above findings could be that the EQ-ASP aspect of decentering is closer related to affective aspects of depressiveness. The decentering aspect EQ-DP, however, seems closer related to attention aspects. Altogether, we believe that degree of depressiveness cannot per se explain abilities concerning the two decentering aspects. Not depressive symptoms alone, but functional and dysfunctional attention aspects relate to the decentering factors.

Drawing from findings in therapy settings, there has been little research on techniques and processes like decentering in healthy populations although decentering abilities are trainable and, hence, inter-individually variable [23; 24]. Moreover, the assumption of associations between cognitive and decentering skills has been sparsely investigated (e.g., 10; 11; 12). The definition of decentering as a process enabling people to take a perspective without engagement in cognitive evaluation, and the phenomenon of biased judgments of their cognitive abilities shown by patients with depressive disorders, led to the question of the role that intellect could play in processes such as decentering [26; 27]. Our data show that intelligence as measured by the CFT-20-R was not associated with either decentering ability. Interestingly, IQ and IQ-judgments were significantly negatively associated. This means that students with higher intellectual abilities adequately judged their IQ with better school grades. This indicates that the participants were reasonably aware of their intellectual status. When controlling this association by introducing depression scores into a partial correlation

analysis, results remained significant, demonstrating that confidence in task performance and task performance itself were not influenced by depressive symptoms. Further, results suggest that in our healthy sample, decentering abilities were not influenced by basic intellectual abilities because these do not appear to represent some kind of requirement for such demanding, cognitive abilities. Given that our investigation focused on healthy students, it could, moreover, be that the results were caused by restricted variance. This means that given an average IQ, which was not affected by clinically relevant depressive symptoms, decentering processes were not preoccupied by compensation of diminished intellectual abilities at the expense of higher cognitive processes such as decentering.

Our final assumption focused on the associations between decentering and perspective-taking abilities. Decentering is defined as a process that enables the individual to non-judgmentally attend to thoughts and emotions by changing the perspective away from an identification with mental events towards a different viewpoint[1]. Little research conceptualizes which cognitive processes are necessary to establish a distanced perspective on the self. Moreover, it is unclear if processes are shared between different foci of perspective change (e. g., self-focus, taking the viewpoint of other). Some relations between aspects of mindfulness, concepts of social cognition and structural changes in brain networks involved in the projection on the self onto another perspective have been reported [10; 14; 15; 38]. Hence, we expected to find associations between decentering and perspective-taking abilities as measured by a paradigm where participants had to indicate changes of affective states or visuospacial information either taking the 1st pp or a 3rd pp, respectively. Inspection of the reaction times and error rates in high and low decenterers showed the same pattern of results as found in our total sample and in the investigation of Schnell and colleagues[35]. This hints at the possibility that higher decentering abilities are not necessarily accompanied by better performances in perspective-taking. It becomes clear that conditions that either comprise affective components or 3rd pp seem to draw upon more complex cognitive processes than self-referential visuospacial judgments and, hence, lead to different reaction times and error rates. The only significant correlation between decentering and reaction times was found between the decentering factor EQ-DP and the 1st pp affect condition to the effect that a higher ability to distance oneself (EQ-DP) was accompanied by longer reaction times in the condition that required judging ones' own affective state. One could speculate that very distanced people need longer to gain access to their feelings, as they are characterized as being detached and, hence, accessing feelings is prolonged. Alternatively, those people who established a distanced, decentered perspective could be viewed as being able to judge own feelings less impulsive. Nonetheless, regression analyses reveal no additional explained variance for the

decentering factor EQ-DP through introducing reaction times of the 1st pp affect condition in model 3 of the third regression analysis. Apparently, the ability to perform perspective changes, as investigated with our paradigm, was not associated with decentering abilities in the expected degree.

Altogether, it has become clear that basal cognitive processes seem to play a smaller role whereas affective components as the extent of depressive symptoms and aspects of self-focused attention play a significant role for the decentering abilities in question.

Clinical implications

Investigating the proposed constructs, that are, basal cognitive-affective abilities such as IQ, attention and perspective change as mechanisms of decentering can help to gain a better understanding of what it is about decentering that explains treatment gains of patients with affective disorders that have been attributed to decentering improvements within MBCT.

Decentering is described as one of the fundamental aspects through which patients with affective disorders are enabled to let their automatic dysfunctional cognitive patterns (e.g., ruminative thoughts that habitually follow the perception of symptoms) pass by without engaging or evaluating them (2, p. 39; see also, 3). It has, therefore, been suggested that decentering helps patients to reduce depressive rumination tendencies during relapse situations by adopting more flexible ways of relating to dysfunctional cognitions [2; 37]. Teasdale [4] describes how MBCT combines the enhancement of attention control, modifications of affect-related mental schema, and "aspects of cognitive therapy for depression [39] explicitly designed to foster a decentered relationship ('thoughts aren't facts') to negative thoughts" (4, p. 73). In this context decentering is underlined as a process in which a shift of perspective can be realized, involving a change towards an objective stance on thoughts as events that will pass by [5].

First, our findings reveal a relation between decentering and depressive symptoms that is in line with previous studies showing that patients with affective disorders who exhibit decentering abilities prior to therapy are less likely to suffer a relapse as compared to patients with diminished decentering abilities and that training decentering abilities within MBCT reduces the impact of dysfunctional thoughts and negative affect [4; 5; 16; 17; 18; 19; 20; 21; 22]. We speculated that varying intellectual abilities might explain the differences of peoples' decentering abilities. Our findings could not corroborate this assumption indicating that decentering and intellectual abilities do not per se influence one another and that intellectual abilities do not seem to be required to enhance decentering skills. For therapeutic settings this means that despite diminished intellectual abilities, which may occur due to depressive symptoms, decentering can be trained and practiced and does not seem to be preoccupied by

compensation of diminished intellectual abilities. Moreover, functional and dysfunctional attention aspects relate to decentering in a way that patients may profit from practicing a flexible self-focused attention. Especially the EQ-DP aspect, which shows the strongest relationship to DFS-FS should profit from specific training of, for example, the recognition of behavioral borders and regulative aspects of self-consciousness which enhances a flexible and adaptive self-focused attention. Finally, our finding that a higher ability to distance oneself (EQ-DP) was accompanied by longer reaction times in the condition of the perspective taking paradigm that required to judge own affective states could indicate an objective stance towards the self, hence either judging less impulsive or being less "drawn into" own affective states. This finding supports the literature that a dis-identification from internal experiences mediated treatment gains within mindfulness intervention (e.g., 5; 22). Although there are parallels between decentering as an ability to establish a metacognitively detached, observing perspective and cognitive processes needed to perform a perspective change to adopt the viewpoint of others, it does seem that decentering draws upon additional cognitive processes than those required in our cognitive perspective taking task [10; 35].

Limitations and future outlook

There are some concerns that need to be addressed. First, we investigated a sample of healthy students. Depressive symptoms therefore - as intended - did not reach clinical significance. Given that one of our assumptions was that cognitive resources could be somehow preoccupied by symptoms that, in turn, lead to difficulties in applying decentering abilities, it is possible that the effects would have been more pronounced if the sample had displayed dysfunctions (e.g., impaired intellectual abilities). Furthermore, this could be problematic as we may have found restricted variance concerning decentering as well as intellectual abilities that, as a consequence, did not reflect the expected associations between decentering and basal cognitive abilities. Studies are needed to address the above issues in clinical samples and to compare these results with healthy controls. Second, the instructions in the perspective change paradigm may not have been precise enough to lead to equally thorough judgments in 1st pp and 3rd pp. It could be, that in the 3rd pp people consult only rationally objectively retrievable information to perform the task without taking the subjective viewpoint of the other person. However, when taking the 1st pp, judgments comprise objective information and, moreover, subjective references (e.g., relating to similar experiences, feelings etc.). Future studies should address the perspective change aspect within decentering, using a paradigm that asks participants to stay in the 1st pp whilst changing the strategy how to view events from this subjective perspective. Perhaps the perspective change that was taking place when viewing personal things from a different angle is different from a perspective change

from 1st to another persons' perspective. Still, Hölzel and colleagues [10;13] pointed to certain relations between these processes in the field of neuroscience with respect to brain function and structure that gave rise to the assumed association between decentering and other perspective change processes. Third, the correlational and regression design does not allow us to draw causal conclusions from our data. We can only detect how the decentering correlates compete against each other, show overlapping variance between predictors, and speculate on possible mechanisms contributing to our findings. Finally, further intervention or training studies would help to understand whether and how decentering abilities can be practiced and if learning such abilities could also promote wellbeing in healthy populations as some kind of guard against difficult life events or stressful situations. It would be interesting to see if, and how emotion regulation changes if (healthy) people change their awareness and acceptance of events and if this improves attention control. Patients would profit insofar as higher decentering abilities may help to attend to deficits at an earlier stage and to respond with less reactivity to symptoms.

ACKNOWLEDGMENTS

This research project was supported by the START-program of the Faculty of Medicine, RWTH Aachen University (grant number 691201). The funding source was not involved in the conduct of the research.

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