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The relation between empathy and depressive symptoms in a Dutch population sample

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ABSTRACT

Background: Impairments in social functioning are common in individuals with (sub)clinical levels of depression. One possible underlying mechanism of this relationship is low empathy. The present study examined linear and non-linear associations between empathy and depressive symptoms, and whether these associations were moderated by gender.

Methods: Using the Empathy Quotient scale, cognitive and affective empathy were assessed using a large convenience sample from the general Dutch population ($N = 3076$). Depressive symptoms were indexed by the Depression, Anxiety and Stress Scale (DASS) and the Quick Inventory of Depressive Symptomatology (QIDS-SR16).

Results: Low cognitive empathy was associated with more depressive symptoms. There was a weak positive relation between affective empathy and depressive symptoms, indexed by the QIDS rather than the DASS.

Limitations: Generalizing results to the general population remains difficult with a convenience sample. Self-reported data may be affected by social-desirability or sex-stereotypical reporting biases.

Conclusions: Our results support a linear relationship between cognitive empathy and symptoms of depression. There was some evidence for non-linear associations and a moderating role of gender, but these patterns were not observed across all types of analysis.

1. Introduction

Impairments in social functioning are common in individuals with (sub)clinical levels of depression (Hirschfeld et al., 2000; Kessler et al., 2003), and may persist after remission of a depressive episode (Burcusa and Iacono, 2007). Social functioning impairments not only precede depression (Verboom et al., 2014), but also prevent the occurrence of positive interactions with others that might help mitigate stressful periods (Oshri et al., 2017). Enduring impairments in social functioning likely contribute to the recurrent and sometimes chronic nature of depression. Yet the mechanisms underlying the bidirectional relation between social functioning impairments and depression remain poorly understood.

One possible mechanism might involve empathy (Kupferberg et al., 2016), as low empathic abilities may negatively influence social interactions and role fulfillment. Indeed Chambliss et al. (2012) have previously found that depression is associated with limited empathy for others' successes. Schreiter et al. (2013) reviewed studies on empathy and depression. Their results identified no clear relationship between depression and empathic concern, an aspect of affective empathy.

However, depression was positively related to empathic stress, an aspect of affective empathy representing emotional contagion and shared pain when perceiving others in difficult situations. Moreover, depression was negatively related to cognitive empathy (i.e., poor perspective taking, theory of mind and empathic accuracy). In line with this, a more recent review found a negative association between theory of mind and depression (Berecz et al., 2016).

However, the results of the studies reviewed by Schreiter et al. (2013) and Berecz et al. (2016) were often inconsistent. Possible explanations include limited sample sizes (Schreiter et al., 2013); mean $N = 32$ and $N = 263$ in clinical and non-clinical studies, respectively) and the use of various depression measures. Additionally, gender might moderate the relation between empathy and depression. Cognitive empathy was often lower in depressed women than in depressed men (Schreiter et al., 2013), and prevalence rates of depression are typically higher in women than in men (de Graaf et al., 2002). Nonetheless, surprisingly few studies examined the potential moderating role of gender in the link between empathy and depression (Schreiter et al., 2013; Tully et al., 2016).

Additionally, most studies have not considered the possibility of

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non-linear associations between empathy and depressive symptoms. Tully et al. (2016) found both extremely low and extremely high levels of affective and cognitive empathy to be positively associated with levels of depressive symptoms, although the non-linear effect of affective empathy only occurred in individuals with good emotion regulation skills. Thus, empathy might both help and hinder social functioning, and thereby both decrease and increase depressive symptoms.

The present study examined (a) both linear and non-linear associations between empathy and depressive symptoms in a large sample of 3076 adults, and (b) moderation of these associations by gender. Conforming to previous research (Tully et al., 2016), we hypothesized a non-linear association between cognitive empathy and depressive symptoms. In addition, we predicted a positive linear association between affective empathy and depressive symptoms. We predicted these associations to be stronger in women than in men.

2. Methods and materials

2.1. Participants

In the HowNutsAreTheDutch (HND) project, inhabitants of the Netherlands were invited to participate in a crowdsourcing study via an open call launched on local and national media by visiting the website www.HoeGekIs.nl. Inclusion criteria were consent for data use and a minimum age of 18 years. Details on the HND project, which includes a cross-sectional and a longitudinal component, were previously published (Van der Krieke et al., 2016). Data collection is ongoing; the total number of participants to date is 15,000.

The present study concerns a convenience sample comprised of the 3076 individuals who (1) participated in the cross-sectional study between the launch date of the HND internet platform (December 19, 2013) and the end of the first study year (December 13, 2014), and (2) completed the instruments for depressive symptoms and empathy. Sociodemographic information is provided in Table 1.

2.2. Procedure

To participate, individuals had to create an account on www.HoeGekIs.nl. In the cross-sectional component, they were subsequently invited to complete various 'modules,' each containing one or more questionnaires covering a specific domain. The first module was mandatory and included sociodemographic questions. After completing this module, three additional modules became available: (1) living situation, (2) affect/mood (including depressive symptoms), and (3) well-being. After completing these modules, in a self-chosen order, all other modules became available (including one on empathy). Participants

were rewarded by providing them with automatic and instant feedback on their completed questionnaire scores.

The study was conducted according to the common ethical principles as described in the 1964 Declaration of Helsinki and its later amendments.

2.3. Materials

Depressive symptoms were assessed using the Depression, Anxiety and Stress Scale (DASS; de Beurs et al., 2001) and the Quick Inventory of Depressive Symptomatology (QIDS-SR16; Rush et al., 2003). The DASS depression subscale comprises 14 items rated for experienced frequency or severity on a 4-point Likert scale, assessing dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The DASS has been proven to be sensitive to subclinical symptoms (Wardenaar et al., 2017). The internal consistency in the present study was excellent ($\alpha = 0.95$). The QIDS assesses depressive symptoms in the past week with 16 items rated on a 3-point Likert scale and has good psychometric properties (Rush et al., 2006). QIDS scores of 0–5 indicate no depression, 6–10 mild, 11–15 moderate, 16–20 severe, and > 20 extremely severe depression (Rush et al., 2003). The Cronbach coefficient alpha in the present study was 0.79, indicating acceptable internal consistency.

Cognitive and affective empathy were assessed using 28 items of the Dutch version of the Empathy Quotient scale (Groen et al., 2015). We did not consider social skills for lack of a rationale and due to questionable internal consistency of this subscale in the present study ($\alpha = 0.64$). The cognitive empathy (CE, sample items: "I can pick up quickly if someone says one thing but means another", "I can tell if someone is masking their true emotion") and affective empathy (AE, sample items: "I get upset if I see people suffering on news programs", "I tend to get emotionally involved with a friend's problems") subscales each contained 11 items. Response options ranged from "strongly disagree" to "strongly agree" on a 4-point Likert scale. Responses on "strongly disagree" and "fairly disagree" were both scored 0 ('lacking empathic ability'), and responses on "fairly agree" and "strongly agree" were scored 1 ('mild empathic ability') and 2 ('strong empathic ability'), respectively (Baron-Cohen and Wheelwright, 2004). The present study found acceptable to good internal consistency of the subscales (CE: $\alpha = 0.90$; AE: $\alpha = 0.80$).

2.4. Statistical analyses

We performed multiple linear regression analyses in SPSS version 24 (SPSS Inc., Chicago, Illinois). First, we entered both CE and AE (to assess their unique contribution), and the covariates educational level,

Table 1
Descriptive statistics of and Spearman rank correlations^a among the study variables.

Variable	Mean	SD	Range	2.	3.	4.	5.	6.	7.
1. Education ^b	7.03	1.13	1–8	–0.146***	.027	.022	.048**	–0.133***	–0.123***
2. Age	48.64	14.04	18–81		–0.208***	–0.075***	–0.058**	–0.068***	–0.070***
3. Gender ^c	0.67	0.47	0–1			.198***	.301***	.104***	.061**
4. CE	12.65	4.73	0–22				.603***	–0.038*	–0.083***
5. AE	12.75	4.38	0–22					.019	–0.033
6. Depressive symptoms (DASS)	6.32	7.48	0–42						.761***
7. Depressive symptoms (QIDS)	5.72	4.43	0–26						

Note. N = 3076. CE = Cognitive Empathy. AE = Affective Empathy.

^a We used Spearman Rank correlations because there were indications for non-normality in the dependent variables (DASS: skewness = 1.74, kurtosis = 3.09; QIDS: skewness = 1.26, kurtosis = 1.55).

^b Education was assessed with the question "what is your highest achieved education?", with no primary education (= 1), primary education (= 2 to 4), vocational education (= 5 to 6), higher education (= 7), and master degree or higher (= 8) as answer categories.

^c Female gender coded as 1.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

age, and gender in the same model (model 1). In model 2 non-linear associations were examined by adding the quadratic terms of CE and AE.

Subsequently, we added the interaction terms gender*CE and gender*AE to our first model (yielding model 3). Finally, we entered the additional interaction terms gender*CE² and gender*AE² (yielding model 4).

As a robustness check all models were repeated by (1) using QIDS scores as dependent variable instead of DASS scores, and (2) performing logistic regression analyses with being in the lowest versus highest quartile of QIDS scores as the dependent variable (extreme-group approach; scores were < 3 and > 7, respectively).

In large-sized samples, the linear regression technique is known to remain valid even when dependent variables violate the normality assumption (Li et al., 2012). Nonetheless, to ensure the robustness of our results, we bootstrapped all regression analyses ($k = 1000$ with bias corrected confidence intervals).

3. Results

3.1. Descriptive statistics

Fifty-eight percent of the sample had no depression ($n = 1797$), 27.7% mild depression ($n = 852$), 9.9% moderate depression ($n = 303$), and 3.1% severe depression ($n = 95$). Finally, 0.9% had extremely severe depression ($n = 29$).

Table 1 shows descriptive statistics of the variables and their non-parametric Spearman Rank correlations. CE and AE scores were strongly correlated, as were DASS and QIDS scores. Correlations among other variables were negligible.

Compared to women, men had lower scores on the DASS (mean difference = -0.59) and the QIDS (mean difference = -0.84), as well as lower scores on CE (mean difference = -2.02) and AE (mean difference = -2.88) (p 's < 0.05). The lowest QIDS quartile group (59.5% female) had 'no depression' (QIDS $M = 1.47$, $SD = 0.76$), and the highest QIDS quartile group (72.5% female) had 'moderate depression' (QIDS $M = 11.67$, $SD = 3.58$).

3.2. Associations between empathy and depressive symptoms

The outcomes of all tested models are provided in Table 2. For parsimony reasons, in the text we only present the final model (model 4). There was a negative relation between CE and depressive symptoms. Moreover, the quadratic term involving CE indicated that this relation was stronger at lower levels of CE (see supplementary Figure S1). The relation between AE and depressive symptoms was not significant.

3.3. Moderation by gender

The interaction terms involving gender were not significant. This indicates that gender did not moderate the effects of CE and AE on depressive symptoms indexed by the DASS.

3.4. Analyses with QIDS scores instead of DASS

When we conducted the analyses with QIDS scores instead of DASS scores, the results for CE were unchanged. The relation between AE and depressive symptoms became significant (see supplementary Table S1). Similar to the analyses with the DASS, gender did not moderate the associations.

3.5. Extreme-group approach

CE was again negatively related to depressive symptoms (see Supplementary table S2). The quadratic term involving CE was not significant, indicating that this relationship was linear rather than non-

Table 2

Linear regression analysis with depression (DASS) as dependent variable ($n = 3076$).

Predictor	B	β	95% CI B	p	R ²
Model 1					
Intercept	6.32		6.06	6.58	<0.001
Education	-1.00	-0.15	-1.27	-0.74	<0.001
Age	-0.04	-0.08	-0.06	-0.03	<0.001
Gender ^a	0.68	0.04	0.09	1.27	.027
CE	-0.16	-0.10	-0.24	-0.09	<0.001
AE	0.03	0.02	-0.06	0.11	.472
Model 2					
Intercept	5.70		5.36	6.07	<0.001
Education	-0.99	-0.15	-1.25	-0.72	<0.001
Age	-0.04	-0.08	-0.06	-0.02	<0.001
Gender ^a	0.80	0.05	0.27	1.33	.002
CE	-0.16	-0.10	-0.24	-0.08	<0.001
AE	0.05	0.03	-0.03	0.14	.224
CE*CE	0.02	0.06	0.00	0.03	.010
AE*AE	0.01	0.05	0.00	0.03	.022
Model 3					
Intercept	6.22		5.94	6.49	<0.001
Education	-0.99	-0.15	-1.28	-0.73	<0.001
Age	-0.04	-0.08	-0.06	-0.03	<0.001
Gender ^a	0.81	0.05	0.23	1.38	.006
CE	-0.16	-0.10	-0.23	-0.09	<0.001
AE	0.03	0.02	-0.05	0.12	.395
Gender*CE	0.15	0.04	-0.01	0.32	.068
Gender*AE	0.06	0.02	-0.10	0.22	.459
Model 4					
Intercept	5.71		5.34	6.08	<0.001
Education	-0.98	-0.15	-1.25	-0.73	<0.001
Age	-0.04	-0.08	-0.06	-0.02	<0.001
Gender ^a	0.69	0.04	-0.05	1.38	.071
CE	-0.17	-0.11	-0.25	-0.09	<0.001
AE	0.06	0.04	-0.02	0.15	.145
CE*CE	0.01	0.06	0.00	0.03	.020
AE*AE	0.01	0.04	-0.00	0.03	.071
Gender*CE	0.13	0.04	-0.04	0.29	.106
Gender*AE	-0.01	0.00	-0.18	0.17	.908
Gender*CE ²	0.01	0.04	-0.01	0.04	.248
Gender*AE ²	-0.01	-0.02	-0.04	0.02	.532

Note. CE = Cognitive Empathy, AE = Affective Empathy.

^a Female gender coded as 1. Significant effects ($p < .05$) in bold.

linear. The CE*gender interaction was now significant. Lower CE scores increased the likelihood to have a higher QIDS score in men ($b = -0.04$, $SE = 0.01$, $t = -3.00$, $p < .05$), but not in women ($b = 0.03$, $SE = 0.03$, $t = 0.93$, $p = .35$). The relation between AE and depressive symptoms was not significant.

4. Discussion

Cognitive empathy was related to depressive symptoms measured with the DASS and QIDS, and using an extreme group approach. This linear negative relationship was observed across all types of analysis. A non-linear relationship was only observed using the DASS and the QIDS: cognitive empathy was negatively related to depressive symptoms at lower levels of cognitive empathy, but this relationship was absent at higher levels of cognitive empathy. Hence, our results suggest that low cognitive empathy may confer risk for depression, while moderate to good cognitive empathy skills are not counterproductive, but also did not protect against depressive symptoms. However, this is based on the assumption that the correlational relationship in our study indicates a causal effect of cognitive empathy on depressive symptoms which is not necessarily true, because cognitive empathy may be a consequence of depressive symptoms or the relationship is explained by a common factor. We did not observe a non-linear pattern in the extreme group, perhaps due to reduced variance. Therefore we remain cautious in interpreting this finding, also because this was not in line with the study of Tully et al. (2016), see introduction.

Concerning affective empathy, we found a positive relation with depressive symptoms on the QIDS, but not on the DASS and the extreme group approach (using the QIDS). The discrepancy between the findings is difficult to explain. A possible explanation is that the QIDS includes more physiological symptoms (Wardenaar et al., 2017). As the results were inconsistent across models and types of analysis, we cannot conclude that there is a relation between depressive symptoms and affective empathy, measured by the Empathy Quotient. As this measure primarily taps into empathic concern (Lawrence et al., 2004) this is consistent with Schreiter et al. (2013), whose literature review revealed no association between empathic concern and depressive symptoms.

There was some evidence that gender moderates the relation between cognitive empathy and depressive symptoms. In the extreme-group analyses the association between cognitive empathy and depressive symptoms was only significant in men. A speculative explanation is that depression in men (versus women) is more often characterized by problems in theory of mind, because the -on average- stronger female tendency towards empathizing may protect females from empathic disturbances (Dinsdale et al., 2016). However, given the limited literature on gender differences in the link between cognitive empathy and depression (for a review see Schreiter et al., 2013), future research should consider the boundary conditions in which the moderating role of gender may or may not be present.

A limitation of this study is that despite the large sample, generalizing results to the general population is difficult, as the sample is based on convenience sampling, and characterized by a high prevalence of women and higher educated individuals. A longitudinal study with more specific subjective and objective measures of empathy before and after an episode of depression is warranted to examine whether altered empathy precedes depression, and to unravel the underlying mechanisms of this relationship. Experimental studies may examine whether interventions that enhance theory of mind result in a reduction of depressive symptoms.

To conclude, we found that depressive symptoms were negatively associated with cognitive empathy, particularly in men. Our results support further investigation of non-linear patterns and gender differences in the relation between cognitive empathy and depression in large clinical samples.

Contributors

MahR, BFJ, and ECB devised the outline of the manuscript. ECB analyzed the data and wrote the first draft of the manuscript. BFJ collected the data. MahR, BFJ, and ECB edited several versions of the manuscript. All authors contributed significantly to the study and approved the final version of the manuscript.

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Conflict of interest

All authors declare no conflicts of interest.

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Supplementary materials

Supplementary material associated with this article can be found in the online version, at doi:10.1016/j.jad.2018.08.008.

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