Journal of Evidence-Based Psychotherapies,
Vol. 24, No. 2, September 2024, 105-116.

10.24193/jebp.2024.2.13

IMPAIRED EMOTIONAL PROCESSING IN MAJOR DEPRESSIVE DISORDER. ACCURACY VERSUS PROCESSING SPEED

Bogdan Nemeș[1], Horia G. Coman[2], Dana C. Herța[3], Raluca N. Trifu[4], and Doina M. C. Cozman[5]*

[1] Department of Medical Psychology and Psychiatry, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca. ORCID ID: https://orcid.org/0000-0002-1381-798X
[2] Department of Medical Psychology and Psychiatry, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca; 3rd Psychiatry Department, Cluj County Emergency Clinical Hospital. ORCID ID: https://orcid.org/0000-0001-8734-2852
[3] Department of Medical Psychology and Psychiatry, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca. ORCID ID: https://orcid.org/0000-0003-1437-3361
[4] Department of Medical Psychology and Psychiatry, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca. ORCID ID: https://orcid.org/0000-0002-9883-3697
[5] Department of Medical Psychology and Psychiatry, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca. ORCID ID: https://orcid.org/0000-0001-7102-2432

Abstract

Depression is one of the most frequent conditions within the general population, ranking among the most burdensome in terms of public health expenses, productivity loss and social costs. The condition has been linked with cognitive deficits that may even continue in remission phases, social cognition being one potentially affected cognitive function. In our study, the Penn's Emotional Acuity Test included in the Cogtest™ battery was used to assess emotion recognition accuracy and processing speed. The Structured Clinical Interview for the Montgomery-Asberg Depression Rating Scale was used to assess the intensity of the symptomatology. A total of 48 depressed individual individuals (65% females), with a mean age of 49.8 ± 10.4 years, and 40 healthy controls (75% females), with a mean age of 35.2 ± 6.9 years were included. As compared to controls, depressive participants recorded significantly less correct answers (9.3 ± 3.8 vs. 11.2 ± 3.6, $p = 0.019$ – Student's t test) and slower processing speeds (6795 ± 3366 vs. 4042 ± 1623, $p < 0.001$ – Mann-Whitney U test) in emotion processing. Furthermore, symptom severity significantly influences only processing speed and not accuracy in emotion recognition tasks. Thus, we conclude that depressive

* Correspondence concerning this article should be addressed to Bogdan Nemeș, Medical Psychology and Psychiatry Department, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca, 43rd Victor Babeș St., 400012 Cluj-Napoca, Romania.
E-mail: nemes.bogdan@umfcluj.ro

individuals have a significant deficit in processing speed and accuracy when identifying the intensity of other peoples' emotions.

Keywords: major depressive disorder, emotional processing, social cognition.

Depression is one of the most frequent conditions within the general population, with up to 20% of all individuals going through a depressive episode at some point during their lives (Kessler & Wang, 2009; Hasin et al., 2018). It is also one of the most debilitating diseases (Murray & Lopez, 1996) in terms of public health costs (WHO, 2001; Zhdanava et al., 2021), loss of productivity (Kessler et al., 2006) and social costs (Gotlib & Joorman, 2010). The loss in productivity and high social costs have been linked to cognitive symptoms in this disorder, as they significantly impact both occupational and social functioning (McIntyre et al., 2013).

Specifically, numerous studies have proven that depressed individuals show important deficits in various domains of cognitive functioning such as, but not limited to: working memory, verbal and visual memory, verbal fluency, attentional set-shifting, motor speed, inhibitory control etc., and that these deficits may continue after the remission of the depressive episode, impairing full functional recovery (McIntyre et al., 2013; Hasselbalch et al., 2011; Marazziti et al., 2010; Jaeger et al., 2006; Tabur et al., 2024). Other cognitive dimensions of depression such as social cognition have been less well documented, although they have long been considered at the core of depressive symptoms and thought to play a crucial role in successful interpersonal and day-to-day functioning (Weightman et al., 2014; Baune & Air, 2016).

Social cognition refers to the mental processes underlying social interactions (Horan et al., 2011) encompassing identification, perception and interpretation of social cues (Kandalaft et al., 2012), and generating responses to the intentions, emotions and behaviors of others (Kunda, 1999; Fiske & Taylor, 1991). Thus, previous research on social cognition in major depressive disorder has focused primarily on the ability of depressed individuals to correctly perceive facial expressions of emotion (i.e. facial expression recognition) or their ability to attribute feelings, beliefs, intentions and desires to others (i.e. theory of mind) (Weightman et al., 2014). In this sense, a recent meta-analysis has suggested that depressive patients show a general, low-strength, emotion recognition deficit (Dalili et al., 2015). However, the authors also concluded that more research is needed to investigate the accuracy of emotion recognition in major depressive disorder patients and the relationship of this impairment with the severity of depressive symptoms (Dalili et al., 2015), since the currently available data is scarce.

In line with these findings, the aim of this study was to investigate the accuracy and processing speed of emotion recognition in major depressive disorder patients and its relationship with the severity of depressive symptomatology.

Method

Participants

Patients being treated for depression in the 3rd Psychiatry Clinic of the Cluj County Emergency University Hospital were asked to participate in the study. After being provided with detailed information about study procedures and being offered adequate time to make an informed decision, patients that agreed to participate in the study were asked to sign a study-specific Informed Consent Form. Two consultant psychiatrists confirmed the diagnosis independently, based on the criteria defined by WHO (1992) in the International Classification of Diseases and Related Health Problems 10th Revision (ICD-10). The inclusion criteria also required participants to be of adult age (i.e. 18 years old or more), were required to have completed at least 8 years of formal education, be fluent in Romanian and possess the ability to read and understand the informed consent.

Healthy individuals were asked to participate in the study in order to establish the control group. Healthy controls were recruited via public advertisement and underwent the same inclusion procedure as the depressed individuals. After obtaining informed consent, psychiatric disorders were excluded independently by two consultant psychiatrists, using the ICD-10 criteria (WHO, 1992).

Participants with somatic disorders capable of significantly influencing the results of the neuropsychological testing were excluded (i.e. movement disorders, significantly impaired visual acuity, acute infectious disease, etc.). Patients with comorbid psychiatric disorders were also excluded from the study.

After revising the inclusion and exclusion criteria, participants underwent clinical and neuropsychological testing to assess for the severity of depression and cognitive impairment, respectively.

The study protocol was designed in accordance with all national and international regulations, including the guidelines of the World Health Organization (WHO) and the Declaration of Helsinki, and was approved by the Ethics Commission of the Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca.

Measures

The Penn's Emotional Acuity Test (PEAT) included in the Cogtest™ computerized battery was used to assess for emotion recognition accuracy (Erwin et al., 1992; Rojahn et al., 2000). In short, participants were presented with 40 human faces displaying emotional expressions varying from very happy to very sad. No time limit was given for the assessment of the images by participants. The participants were asked to rate the respective faces on a 7-point Likert scale: *very*

happy (7), *moderately happy* (6), *slightly happy* (5), *neutral* (4), *slightly sad* (3), *moderately sad* (2) and *very sad* (1). The number of exact answers (e.g. classifying a moderately happy face as slightly happy or any other answer was considered incorrect) and the processing speed (i.e. time taken to answer) were automatically recorded for each participant.

The intensity of the depressive symptomatology was assessed using the Structured Clinical Interview for the Montgomery-Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979; Williams & Kobak, 2008). This assessment was conducted on the same day with the neuropsychological evaluation by an experienced and certified rater.

Statistical analysis

Means and standard deviations are given to describe scale data distributions in each group. The χ^2 test was used to assess for differences in the distribution of categorical data, with Fisher's Exact test where necessary. The Kolmogorov-Smirnov test was used to assess whether data was normally distributed. Furthermore, the skewness and kurtosis and their respective standard errors were calculated. Whenever the data was normally distributed or when the data was not normally distributed but the ratio between skewness / standard error of skewness and the ratio between kurtosis / standard error of kurtosis for each group were situated between -2 and 2, the Student's t test was used to test for differences between groups, with the Levine statistic used to assess for the differences of variances. Conversely, when the data was not normally distrikbuted and the ratios between skewness / standard error of skewness and that between kurtosis / standard error of kurtosis were outside of the [-2,2] interval, the Mann-Whitney U test was used to test for between-group differences. Pearson and Spearman correlation coefficients were used to evaluate associations between quantitative variables. Linear, multivariate regression models were built to investigate the relationship between emotional processing accuracy and speed, on one hand, and sex, age and severity of depressive symptomatology on the other hand. The statistical analysis was performed using the Statistical Pack for Social Sciences – SPSS, version 22.

Results

A total of 48 individuals with a diagnosis of depression, and 40 healthy controls were included in the study, based on the above-mentioned inclusion and exclusion criteria. The main demographic characteristics of the participants are detailed in Table 1. While the difference in sex and education level distributions across the two groups were not statistically significant, depressive participants were significantly older than controls. All subsequent statistical analyses were therefore

controlled for age. None of the participants underwent any form of psychological treatments or psychosocial programs and were compliant to the pharmacological treatment prescribed as per current protocols.

Table 1. Demographic characteristics of the participants

	Clinical group N = 48	Control group N = 40	*p*
Sex (% - females)	64.58	75.00 %	NS[1]
Age (years)*	49.8 ± 10.4	35.2 ± 6.9	< 0.002[2]
Education (years)	13.0 (10; 14)	14 (10; 15)	NS[1]

M ± SD – mean ± standard deviation; NS – not significant at the 0.05 level; [1] χ^2 test; [2] - Mann-Whitney U test; * the skewness of age for the clinical group was -1,220 with a standard error of 0,343, and the kurtosis was 1,005 with a standard error of 0,674, while the skewness for the control group was 0.227 with a standard error of 0.383, and the kurtosis was -0.387 with a standard error of 0.750.

As compared to controls, depressive participants recorded significantly less correct answers and slower processing speed in emotion processing (Table 2).

Table 2. Intergroup differences in emotional processing performance and depressive symptomatology

	Depressive participants			Controls			
	Mean (SD)	Skewness (SE)	Kurtosis (SE)	Mean (SD)	Skewness (SE)	Kurtosis (SE)	*p*
No. of correct answers	9.3 (3.8)	0.586 (0.343)	0.327 (0.674)	11.2 (3.6)	-0.014 (0.374)	-0.052 (0.733)	0.019[1]
Processing speed (ms)	6795 (3366)	2.188 (0.343)	5.717 (0.674)	4042 (1623)	2.408 (0.374)	6.578 (0.733)	< 0.001[2]
MADRS total score	30.2 (8.5)	-0.225 (0.343)	-0.333 (0.674)	2.2 (2.8)	1.517 (0.374)	1.940 (0.733)	< 0.001[2]

[1] Student's *t* Test; [2] Mann-Whitney U Test;

Both emotional processing accuracy and processing speed significantly correlated with age, severity of depressive symptomatology and each other. Zero order correlation coefficients are presented in Table 3.

Table 3. Zero order correlations (Spearman's rho) between emotional processing parameters and demographic/clinical parameters

	Age	MADRS total score	No. of correct answers	Processing speed
Age (years)	1	0.456**	-0.264*	0.586**
MADRS total score	0.456**	1	-0.227*	0.568**
No. of correct answers	-0.264*	-0.227*	1	-0.399**
Processing speed (ms)	0.586**	0.568**	-0.399**	1

* $p < 0.05$; ** $p < 0.01$

Regression models revealed that the only variable that significantly influences the number of correct answers is processing speed (*Std(B)* = -0,400, $p <$ 0,001 – Std(B), *Adj*. R^2 = 0,192, $p <$ 0,001 – ANOVA), with all other variables being ruled out as not significant.

When using processing speed as a dependent variable in hierarchical regression models, the best fit is reached with age and MADRS total scores as independent variables (Table 4).

Table 4. Best-fit model for emotional processing speed

Independent variables	*Std(B)*	*p – Std(B)*	Adj. R^2	*p* – ANOVA
Age (years)	0,347	0.001	0.377	< 0.001
MADRS total score	0.367	0.001		

Discussion

Our findings indicate that depression is associated with a significant impairment in emotional processing, both in terms of accuracy and in terms of processing speed. Furthermore, our results show that the severity of depressive symptomatology is correlated with processing speed, but not accuracy, in emotional processing tasks.

The fact that depressive patients show a significant deficit in correctly identifying facial expressions of emotions has been relatively well-established in the past (Bourke et al., 2010) by using various paradigms and stimulus sets, but most of these studies used full intensity facial expressions (Gotlib & Joorman, 2010) of the six basic emotions (Ekman & Friesen, 1971). In real life, however, people are confronted with various intensities of facial expressions of emotion (mostly with low to moderate intensities), and correct identification of both the emotion and its intensity is necessary for the coherent adaptation of one's behavior to the emotions of others. Regarding the correct identification of specific emotions, currently available data indicates that depressive patients show deficits in correctly identifying anger, disgust, fear, happiness, and surprise, but not sadness (Dalili et al,. 2015). On the other hand, the very few studies conducted so far using subtle facial expressions of emotions support the hypothesis that depressive patients show difficulties in identifying subtle expressions of happiness, but not sadness (Joormann & Gotlib, 2006). Building on these results, we have evaluated the accuracy with which depressive patients classify the intensity of emotions on a continuum from sadness

to happiness and found that depressive patients are less accurate in classifying the intensity of emotions based on their facial expressions.

Depressive patients showed significantly slower processing speeds than controls. This is attributable to psychomotor retardation, a core symptom of depression (WHO, 1992; APA, 2013), and in line with previous findings showing that depressive patients exhibit slower processing speeds or slower reaction times virtually irrespective of the tested cognitive domain (McIntyre et al., 2013). Nevertheless, our study is one of the few that addressed the speed of emotional processing bringing evidence that this cognitive subdomain is also impaired in depressed patients.

Some evidence exists to support the hypothesis that symptom severity positively correlates with emotional processing impairment, but it is not sufficient to draw definite conclusions (Dalili et al., 2015). Adding to current evidence, our results show that symptom severity (as assessed by the MADRS) is associated with processing speed, but not emotional processing accuracy. These findings are in line with previous research pointing to an association between emotional processing impairment and self-reported depressive symptoms, as assessed by the Beck Depression Inventory – BDI, but not with clinician-based measures of depressive symptoms, as is the case of the Hamilton Rating Scale for Depression (HAM-D) for example (Kohler et al., 2011). Several hypotheses have been formulated to explain this discrepancy thus far, including the possibility that the BDI studies used samples with higher clinical acuity or that self-identified depression and social cognition are somehow related, but none of these theories are backed up by sufficient evidence (Kohler et al., 2011). Another explanation could be that the accuracy of emotional perception is a trait of depressed individuals and therefore not linked to depressive symptomatology. This latter explanation would be in line with previous findings reporting persistence of emotional processing deficits after the remission of illness (Leppanen et al., 2004). However, this remains a topic that needs to be addressed in future research.

Our results also point to the conclusion that age is negatively correlated with processing speed and not significantly associated with the accuracy of emotional processing. These results are opposed to previous findings, which found a positive association between age and emotional processing (Elfenbein & Ambady, 2002; Johnson & Fredrickson, 2005; Merten, 2005), and speculated that greater life experience with emotions might help older patients in their ability to correctly identify facial expressions of emotions (Kohler et al., 2011). One possible explanation for this discrepancy could be that, in our sample, age positively correlated with symptom severity, just as emotional processing parameters did. In fact, the use of various samples, paradigms and stimulus sets has made it very difficult to compare results across studies so far (Dalili et al., 2015). It is therefore

arguable that a consensus for evaluating cognitive deficits in depression needs to be reached, similar to the ones used in schizophrenia, e.g. NIMH-MATRICS Consensus Cognitive Battery (Green et al., 2004).

Furthermore, in line with previous findings (Kohler et al., 2011), we have found no significant association between sex and emotional processing, although a minor association was proven in general population-based studies pointing to better emotion perception abilities in women (Merten, 2005).

Several limitations of our study need to be pointed out. First, we have a rather small sample size, although more than double the median sample size of the studies included in the latest available meta-analysis on the subject (Dalili et al., 2015). Therefore, our results need to be replicated by further studies before accepting these conclusions beyond reasonable doubt. Also, the patients included in the clinical sample were under treatment with antidepressants, mood stabilizers and antipsychotics. The treatment plans of the patients were very complex and heterogeneous. Thus, including medication as a confounder in the present analysis was not possible. However, none of the patients included had sedation as a side effect of their treatment plan. Nevertheless, a further analysis on how specific medications influence patients' ability to accurately identify emotions would be of interest, since some of these medications can influence cognitive functioning. Furthermore, we have not extracted data on negative bias of emotional processing, i.e. the presumable tendency of depressive patients to classify ambiguous faces as happy vs. sad, although currently available data on this topic shows that more research is needed on the matter (Leppanen et al., 2004; Dalili et al., 2015). This remains to be investigated in further research.

Conclusion

The present study brings evidence that depressive individuals have a significant deficit in accurately identifying the intensity of other peoples' emotions, as assessed on a sadness-happiness continuum, and are significantly slower in processing such information than controls. Furthermore, we have shown that symptom severity significantly influences only processing speed and not accuracy in emotion recognition tasks.

Authors' Notes

The first two authors had the same contribution to this manuscript.

Declaration of interest. We have no known conflict of interest to disclose.

Acknowledgements. This paper was published under the frame of the European Social Fund, Human Resources Development Operational Programme 2007-2013, project no. POSDRU/159/1.5/S/138776.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.).

Baune, B. T., & Air, T. (2016). Clinical, Functional, and Biological Correlates of Cognitive Dimensions in Major Depressive Disorder – Rationale, Design, and Characteristics of the Cognitive Function and Mood Study (CoFaM-Study). *Frontiers in Psychiatry*, *7*. https://doi.org/10.3389/fpsyt.2016.00150

Bourke, C., Douglas, K. M., & Bryant, R. A. (2010). Processing of Facial Emotion Expression in Major Depression: A Review. *Australian and New Zealand Journal of Psychiatry*, *44*(8), 681–696. https://doi.org/10.3109/00048674.2010.496359

Dalili, M. N., Penton-Voak, I. S., Harmer, C. J., & Munafò, M. R. (2015). Meta-analysis of emotion recognition deficits in major depressive disorder. *Psychological Medicine*, *45*(6), 1135–1144. https://doi.org/10.1017/s0033291714002591

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, *17*(2), 124–129. https://doi.org/10.1037/h0030377

Elfenbein, H. A., & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin*, *128*(2), 203–235. https://doi.org/10.1037/0033-2909.128.2.203

Erwin, R. J., Gur, R. C., Gur, R. E., Skolnick, B. E., Mawhinney-Hee, M., & Smailis, J. (1992). Facial emotion discrimination: I. Task construction and behavioral findings in normal subjects. *Psychiatry Research-Neuroimaging*, *42*(3), 231–240. https://doi.org/10.1016/0165-1781(92)90115-j

Fiske, S. T., & Taylor, S. E. (1991). *Social Cognition*. McGraw-Hill Humanities, Social Sciences & World Languages.

Gotlib, I. H., & Joormann, J. (2010). Cognition and Depression: Current Status and Future Directions. *Annual Review of Clinical Psychology*, *6*(1), 285–312. https://doi.org/10.1146/annurev.clinpsy.121208.131305

Green, M. F., Nuechterlein, K. H., Gold, J. M., Deanna, M., Cohen, J. D., Essock, S. M., Fenton, W. A., Frese, F., Goldberg, T. E., Heaton, R. K., Keefe, R. S., Kern, R. C., Kraemer, H. C., Stover, E., Weinberger, D. R., Zalcman, S. S., & Marder, S. R. (2004). Approaching a consensus cognitive battery for clinical trials in schizophrenia: The NIMH-MATRICS conference to select cognitive

domains and test criteria. *Biological Psychiatry*, *56*(5), 301–307. https://doi.org/10.1016/j.biopsych.2004.06.023

Hasin, D. S., Sarvet, A. L., Meyers, J. L., Saha, T. D., Ruan, W. J., Stohl, M., & Grant, B. F. (2018). Epidemiology of Adult DSM-5 Major Depressive Disorder and Its Specifiers in the United States. *JAMA Psychiatry*, 75(4), 336–346. https://doi.org/10.1001/jamapsychiatry.2017.4602

Hasselbalch, B. J., Knorr, U., & Kessing, L. V. (2011). Cognitive impairment in the remitted state of unipolar depressive disorder: A systematic review. *Journal of Affective Disorders*, *134*(1–3), 20–31. https://doi.org/10.1016/j.jad.2010.11.011

Horan, W. P., Harvey, P. O., Kern, & Green. (2011). Neurocognition, social cognition and functional outcome in schizophrenia. In W. Gaebel (Ed.), *Schizophrenia Current Science and Clinical Practice* (pp. 74–80). John Wiley & Sons.

Jaeger, J., Berns, S., Uzelac, S. M., & Davis-Conway, S. (2006). Neurocognitive deficits and disability in major depressive disorder. *Psychiatry Research-Neuroimaging*, *145*(1), 39–48. https://doi.org/10.1016/j.psychres.2005.11.011

Johnson, K. J., & Fredrickson, B. L. (2005). "We All Look the Same to Me." *Psychological Science*, *16*(11), 875–881. https://doi.org/10.1111/j.1467-9280.2005.01631.x

Joormann, J., & Gotlib, I. H. (2006). Is this happiness I see? Biases in the identification of emotional facial expressions in depression and social phobia. *Journal of Abnormal Psychology*, *115*(4), 705–714. https://doi.org/10.1037/0021-843x.115.4.705

Kandalaft, M. R., Didehbani, N., Cullum, C. M., Krawczyk, D. C., Allen, T. T., Tamminga, C. A., & Chapman, S. C. (2012). The Wechsler ACS Social Perception Subtest. *Journal of Psychoeducational Assessment*, *30*(5), 455–465. https://doi.org/10.1177/0734282912436411

Kessler, R. C., & Wang, P. S. (2009). Epidemiology of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (pp. 5–22). The Guilford Press.

Kessler, R. C., Akiskal, H. S., Ames, M., Birnbaum, H. G., Greenberg, P. B., Hirschfeld, R., Jin, R., Merikangas, K. R., Simon, G. E., & Wang, P. S. (2006). Prevalence and Effects of Mood Disorders on Work Performance in a Nationally Representative Sample of U.S. Workers. *American Journal of Psychiatry*, *163*(9), 1561–1568. https://doi.org/10.1176/ajp.2006.163.9.1561

Kohler, C. G., Hoffman, L. A., Eastman, L., Healey, K. M., & Moberg, P. J. (2011). Facial emotion perception in depression and bipolar disorder: A quantitative review. *Psychiatry Research-Neuroimaging*, *188*(3), 303–309. https://doi.org/10.1016/j.psychres.2011.04.019

Kunda, Z. (1999). *Social Cognition: Making Sense of People*. MIT Press.

Marazziti, D., Consoli, G., Picchetti, M., Carlini, M., & Faravelli, L. (2010). Cognitive impairment in major depression. *European Journal of Pharmacology*, *626*(1), 83–86. https://doi.org/10.1016/j.ejphar.2009.08.046

McIntyre, R. S., Cha, D. S., Soczynska, J. K., Woldeyohannes, H. O., Gallaugher, L. A., Kudlow, P., Alsuwaidan, M., & Baskaran, A. (2013). Cognitive deficits and functional outcomes in major depressive disorder: Determinants, substrates, and treatment interventions. *Depression and Anxiety*, *30*(6), 515–527. https://doi.org/10.1002/da.22063

Merten, J. (2005). Culture, gender and the recognition of the basic emotions. *Psychologia*, *48*(4), 306–316. https://doi.org/10.2117/psysoc.2005.306

Montgomery, S., & Åsberg, M. (1979). A New Depression Scale Designed to be Sensitive to Change. *British Journal of Psychiatry*, *134*(4), 382–389. https://doi.org/10.1192/bjp.134.4.382

Murray, C. J. L., & Lopez, A. D. (1996). Evidence-Based Health Policy—Lessons from the Global Burden of Disease Study. *Science*, *274*(5288), 740–743. https://doi.org/10.1126/science.274.5288.740

Puura, K., Milders, M., Bell, J. S., Terrière, E., & Hietanen, J. K. (2004). Depression biases the recognition of emotionally neutral faces. *Psychiatry Research-Neuroimaging*, *128*(2), 123–133. https://doi.org/10.1016/j.psychres.2004.05.020

Rojahn, J., Gerhards, F., Matlock, S. T., & Kroeger, T. L. (2000). Reliability and validity studies of the Facial Discrimination Task for emotion research. *Psychiatry Research-Neuroimaging*, *95*(2), 169–181. https://doi.org/10.1016/s0165-1781(00)00169-4

Tabur, S. T., Akın, E., & Turkcapar, M. H. (2024). Personality Traits, Preoperational Thinking, and Mental Health. *Journal of Evidence-Based Psychotherapies, 24*(1), 117-134.

Weightman, M., Air, T., & Baune, B. T. (2014). A Review of the Role of Social Cognition in Major Depressive Disorder. *Frontiers in Psychiatry*, *5*. https://doi.org/10.3389/fpsyt.2014.00179

Williams, J. B. W., & Kobak, K. A. (2008). Development and reliability of a structured interview guide for the Montgomery-Åsberg Depression Rating Scale (SIGMA). *British Journal of Psychiatry*, *192*(1), 52–58. https://doi.org/10.1192/bjp.bp.106.032532

World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines*.

World Health Organization. (2001). *The World health report : 2001 : Mental health : new understanding, new hope*.

Zhdanava, M., Pilon, D., Ghelerter, I., Chow, W., Joshi, K., Lefebvre, P., & Sheehan, J. J. (2021). The Prevalence and National Burden of Treatment-Resistant Depression and Major Depressive Disorder in the United States. *The Journal of Clinical Psychiatry*, 82(2), 20m13699. https://doi.org/10.4088/JCP.20m13699