The International Journal of Indian Psychology
ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print)
Volume 10, Issue 4, October- December, 2022
DIP: 18.01.132.20221004, DOI: 10.25215/1004.132
https://www.ijip.in

Research Paper

How Psychotherapy Changes the Brain: Perspectives on The Effects of Psychoanalytic Therapy on Depression and Anxiety Neural Substrates

Nathan Zachary Fernandez[1]*

ABSTRACT

Depression and Anxiety are two of the most common psychopathologies with a high prevalence among clinical and general populations. The most commonly used form of psychotherapy is Cognitive-Behavioural Therapy, to treat the symptomatology of Depression and Anxiety; previously used treatments include the use of Psychoanalytic therapy. This perspective article aims to provide some consolidation on the neuropsychological aspects of Psychoanalytic therapy by merging the paradigms of psychoanalysis and neuropsychology. The intention is to underlie the point that while the aetiology of some symptoms of these two common psychopathologies may be addressed using present evidence-based standards, the core features may be of psychodynami nature and thus, it is relevant to students, teachers and researchers to keep this in mind while formulating classroom-teaching, psychoeducation, diagnosis and interventional strategies for people and families with these psychopathologies.

Keywords: *Mood disorders, Anxiety, Depression, Neuropsychology, Psychoanalysis and Psychodynamic therapies, Psychotherapy*

The brain is an extremely plastic system. While the most dramatic examples of neuroplasticity occur during a critical period of neural development, neuroplasticity can also occur in the adult neocortex and is activity-dependent. These results have emerged from several neurophysiological experiments and clinical observations over longer temporal distributions (Gynther et al., 1998). To study these processes, we need to have in place, evidence-based psychotherapy. Evidence-based psychotherapies are efficacious and cost-effective for a wide range of psychiatric conditions (Cook et al., 2017); mainly because people prefer psychotherapy over pharmacological treatments (McHugh et al., 2013). There are two types of neuroplastic changes that one can address, these would consist of mainly structural or functional changes. Functional changes become easier to observe in a psychotherapeutic session while structural changes require more intensive investigations.

Psychoanalysis as a field, examines the individuals' unconscious drives, motivations and desires as a mechanism through which the individual acts out in the world. Psychoanalysis

[1]Student of MSc in Neuropsychology, CHRIST (deemed to be) University, Bangalore
*Corresponding Author

Received: October 05, 2022; Revision Received: December 08, 2022; Accepted: December 14, 2022

explores how the individual, through early childhood experiences, moves through the world and forms attachments, and hierarchies, expresses anger, and cares for and nurtures others. From a therapeutic point of view, the field focuses on how the individual cannot overcome certain conflicts due to the primal nature of such conflict; arising from points of time so early in the life of the individual that they are not remembered, mostly because they are repressed or suppressed, and then how these traumas force individuals to act out unconsciously for their whole life.

The focus of psychoanalysis lies on the conative-affectual axis and as such, we may hypothesise that the affected brain areas are the upper brain stem and limbic areas of the brain. One of the core principles of psychoanalytic thought is that pharmacotherapy is effective only at symptom reduction. Thus, to cure emotional disorders, the patient's failure to meet their underlying needs must be addressed (Solms, 2018). This means changing deeply automatised action plans. Freud, who began his career as an anatomist, stated that one must assign the system of consciousness to a position in space; further correlations indicate that consciousness is an endogenous function of the brain (Solms, 2017) and that it was the methods employed by psychoanalysis that created resolutions. Through the use of unstructured, open-ended dialogues between patient and therapist, finding recurring themes in the patient's experience, bringing to conscious awareness the feelings regarded by the patient as unacceptable and finding interactions between present therapy relationships and other relationships (Blagys & Hilsenroth, 2000). Psychodynamic neuroscience thus explores interactions between the free-energy principle, resting-state networks and the Default-Mode Network in creating the Self (Cieri & Esposito, 2019).

Why Treating Depression and Anxiety with Psychoanalytic Therapy may work

Based on these above assumptions, one can arrive at the fact that two conditions that can be addressed through psychodynamic therapies are Major Depressive Disorder and Anxiety spectrum disorders. Findings from a meta-analysis that employs voxel-based morphometry from 193 studies indicate that grey-matter loss converges across three regions: the dorsal-anterior cingulate, the right insula and the left insula. These common grey matter loss regions interfere with task and resting networks and are commonly associated with poor executive functioning (Goodkind et al., 2015). Major Depressive Disorder involves wider changes in the frontal lobe, hippocampus, temporal lobe, striatum, thalamus and amygdala. However, results are generally inconsistent and controversial because of the varied demographic and clinical characteristics of patients (Zhang et al., 2018). Studies indicate that depression is a neural circuit disorder and that the onset of depression may be located in different regions of the brain involving various transmitter systems and molecular mechanisms (Chaudhary et al., 2015). The mesolimbic-dopaminergic pathway made up of dopaminergic neurons in the ventral tegmental area and their projections to the nucleus accumbens are crucial for the recognition of emotionally salient stimuli such as rewards (Koob, 2008) and aversion (Wenzel et al., 2014). The dopaminergic neurons further play a role in modulating depression-related behaviours (Friedman et al., 2014). Changes in synaptic plasticity also occur during depression especially in the synaptic microenvironment in the astrocytes and microglia (Singh & Abraham, 2017) as well as changes in signalling remodelling between serotonin receptors and the extracellular matrix (Bijata et al., 2017). Similarly, the amygdala undergoes relatively permanent changes during stress where induced plastic changes in the amygdala strengthen conditioned fear while retarding function in the hippocampus; thus fear-memory formation increases while coping behaviours decrease heightening the anxiety that individuals feel (Suvrathan et al., 2014).

During the psychoanalytic process, anxiety signals a threat whenever a forbidden feeling emerges and this anxiety triggers defensive behaviour leading to clinical problems as such, anxiety regulation is a core aspect of psychodynamic therapy. The cognitive components of psychodynamic therapies show increased activation in the frontal cortical regions such as the prefrontal cortex and anterior cingulate cortex and decreased activity in subcortical regions and this works for both anxiety and depressive disorders (Grecucci et al., 2020).

Based on past literature, we have been able to examine how psychiatric disorders have caused the brain to experience dysfunction, however, Malhotra and Sahoo (2017), make a compelling case for how psychotherapy helps rebuild the brain. Focused on psychodynamic therapies, they explain that psychoanalysis first brings the unconscious mind to the conscious level through the reactivation of hidden memories (Gabbard & Westen, 2003). Furthermore, psychotherapy helps in restoring dysregulation between the two hemispheres; dysregulation results in a loss of balance between positive and negative affect (Silberman & Weingartner, 1986). Emotions are also associated with the subjective experience of nervous system states. Through psychotherapy, the therapist attempts to examine emotions and defences against emotions in a therapeutically controlled environment (Malhotra & Sahoo, 2017). Another aspect that produces change is the evaluation of childhood experiences that create changes in socialisation and impair future plasticity by creating distortions, falsifications and fabrications in memory (Malhotra & Sahoo, 2017). As a result of psychotherapy, through the mode of learning, new neurons are generated in different areas of the brain such as the hippocampus, amygdala, and frontal and temporal lobes (Eriksson et al., 1998; Gross, 2000). The actual process by which each change occurs and maintains itself is poorly documented and understood although it remains noted thoroughly.

CONCLUSION

The major functional outcome of any psychotherapy is to build a relatively permanent pattern of coping with life stressors stably. We see that neuroplasticity is an outcome of psychotherapy but most studies indicate that these are merely structural changes (Månsson et al., 2017; Price & Duman, 2019) and are aided by pharmacological therapies (Rădulescu et al., 2021). True functional changes in the brain are much harder to examine but, psychoanalysis provides insight into dynamic mental phenomena in a manner that enhances research through moment-to-moment interactions (Löffler-Stastka & Steinmair, 2021) that only lead us to more discoveries. “Time’s arrow is (only) bent into a loop.” -Tulving and so time is all we require to see the convergence between neuroscience, psychoanalysis and the changing dynamics in the brain.

REFERENCES

Bijata, M., Labus, J., Guseva, D., Stawarski, M., Butzlaff, M., Dzwonek, J., Schneeberg, J., Böhm, K., Michaluk, P., Rusakov, D. A., Dityatev, A., Wilczyński, G., Wlodarczyk, J., & Ponimaskin, E. (2017). Synaptic Remodeling Depends on Signaling between Serotonin Receptors and the Extracellular Matrix. *Cell Reports*, *19*(9), 1767–1782. https://doi.org/10.1016/j.celrep.2017.05.023

Blagys, M. D., & Hilsenroth, M. J. (2000). Distinctive features of short-term psychodynamic-interpersonal psychotherapy: A review of the comparative psycho therapy process literature. *Clinical Psychology: Science and Practice*, *7*(2), 167–188. https://doi.org/10.1093/clipsy.7.2.167

Chaudhury, D., Liu, H., & Han, M.-H. (2015). Neuronal correlates of depression. *Cellular and Molecular Life Sciences*, *72*(24), 4825–4848. https://doi.org/10.1007/s00018-015-2044-6

Cook, S. C., Schwartz, A. C., & Kaslow, N. J. (2017). Evidence-Based Psychotherapy: Advantages and Challenges. *Neurotherapeutics*, *14*(3), 537–545. https://doi.org/10.1007/s13311-017-0549-4

Eriksson, P. S., Perfilieva, E., Björk-Eriksson, T., Alborn, A.-M., Nordborg, C., Peterson, D. A., & Gage, F. H. (1998). Neurogenesis in the adult human hippocampus. *Nature Medicine*, *4*(11), 1313–1317. https://doi.org/10.1038/3305

Friedman, A. K., Walsh, J. J., Juarez, B., Ku, S. M., Chaudhury, D., Wang, J., Li, X., Dietz, D. M., Pan, N., Vialou, V. F., Neve, R. L., Yue, Z., & Han, M.-H. (2014). Enhancing Depression Mechanisms in Midbrain Dopamine Neurons Achieves Homeostatic Resilience. *Science*, *344*(6181), 313–319. https://doi.org/10.1126/science.1249240

Gabbard GO., & Westen D. (2003). Rethinking therapeutic action. *The International Journal of Psycho-Analysis*, *84*(Pt 4). https://doi.org/10.1516/002075703768284605

Goodkind, M., Eickhoff, S. B., Oathes, D. J., Jiang, Y., Chang, A., Jones-Hagata, L. B., Ortega, B. N., Zaiko, Y. V., Roach, E. L., Korgaonkar, M. S., Grieve, S. M., Galatzer-Levy, I., Fox, P. T., & Etkin, A. (2015). Identification of a Common Neurobiological Substrate for Mental Illness. *JAMA Psychiatry*, *72*(4), 305. https://doi.org/10.1001/jamapsychiatry.2014.2206

Grecucci, A., Sığırcı, H., Lapomarda, G., Amodeo, L., Messina, I., & Frederickson, J. (2020). Anxiety Regulation: From Affective Neuroscience to Clinical Practice. *Brain Sciences*, *10*(11), 846. https://doi.org/10.3390/brainsci10110846

Gross, C. G. (2000). Neurogenesis in the adult brain: death of a dogma. *Nature Reviews Neuroscience*, *1*(1), 67–73. https://doi.org/10.1038/35036235

Gynther, B. D., Calford, M. B., & Sah, P. (1998). Neuroplasticity and Psychiatry. *Australian & New Zealand Journal of Psychiatry*, *32*(1), 119–128. https://doi.org/10.3109/00048679809062718

Koob, G. F. (2008). A Role for Brain Stress Systems in Addiction. *Neuron*, *59*(1), 11–34. https://doi.org/10.1016/j.neuron.2008.06.012

Löffler-Stastka, H., & Steinmair, D. (2021). Future of processing and facilitating change and learning. *World Journal of Psychiatry*, *11*(9), 507–516. https://doi.org/10.5498/wjp.v11.i9.507

Malhotra, S., & Sahoo, S. (2017). Rebuilding the brain with psychotherapy. *Indian Journal of Psychiatry*, *0*(0), 0. https://doi.org/10.4103/0019-5545.217299

Månsson, K. N. T., Salami, A., Carlbring, P., Boraxbekk, C.-J., Andersson, G., & Furmark, T. (2017). Structural but not functional neuroplasticity one year after effective cognitive behaviour therapy for social anxiety disorder. *Behavioural Brain Research*, *318*, 45–51. https://doi.org/10.1016/j.bbr.2016.11.018

McHugh, R. K., Whitton, S. W., Peckham, A. D., Welge, J. A., & Otto, M. W. (2013). Patient Preference for Psychological vs Pharmacologic Treatment of Psychiatric Disorders. *The Journal of Clinical Psychiatry*, *74*(06), 595–602. https://doi.org/10.4088/jcp.12r07757

Price, R. B., & Duman, R. (2019). Neuroplasticity in cognitive and psychological mechanisms of depression: an integrative model. *Molecular Psychiatry*, *25*(3), 530–543. https://doi.org/10.1038/s41380-019-0615-x

Rădulescu, I., Drăgoi, A., Trifu, S., & Cristea, M. (2021). Neuroplasticity and depression: Rewiring the brain's networks through pharmacological therapy (Review). *Experimental and Therapeutic Medicine*, *22*(4). https://doi.org/10.3892/etm.2021.10565

Silberman, E. K., & Weingartner, H. (1986). Hemispheric lateralization of functions related to emotion. *Brain and Cognition*, *5*(3), 322–353. https://doi.org/10.1016/0278-2626(86)90035-7

Singh, A., & Abraham, W. C. (2017). Astrocytes and synaptic plasticity in health and disease. *Experimental Brain Research*, *235*(6), 1645–1655. https://doi.org/10.1007/s00221-017-4928-1

Solms, M. (2017). What is "the unconscious," and where is it located in the brain? A neuropsychoanalytic perspective. *Annals of the New York Academy of Sciences*, *1406*(1), 90–97. https://doi.org/10.1111/nyas.13437

Solms, M. (2018). The scientific standing of psychoanalysis. *BJPsych International*, *15*(1), 5–8. https://doi.org/10.1192/bji.2017.4

Suvrathan, A., Bennur, S., Ghosh, S., Tomar, A., Anilkumar, S., & Chattarji, S. (2014). Stress enhances fear by forming new synapses with greater capacity for long-term potentiation in the amygdala. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *369*(1633), 20130151. https://doi.org/10.1098/rstb.2013.0151

Wenzel, J. M., Rauscher, N. A., Cheer, J. F., & Oleson, E. B. (2014). A Role for Phasic Dopamine Release within the Nucleus Accumbens in Encoding Aversion: A Review of the Neurochemical Literature. *ACS Chemical Neuroscience*, *6*(1), 16–26. https://doi.org/10.1021/cn500255p

Zhang, F.-F., Peng, W., Sweeney, J. A., Jia, Z.-Y., & Gong, Q.-Y. (2018). Brain structure alterations in depression: Psychoradiological evidence. *CNS Neuroscience & Therapeutics*, *24*(11), 994–1003. https://doi.org/10.1111/cns.12835

Acknowledgement

The author appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author declared no conflict of interest.

How to cite this article: Fernandez N. Z. (2022). How Psychotherapy Changes the Brain: Perspectives on The Effects of Psychoanalytic Therapy on Depression and Anxiety Neural Substrates. *International Journal of Indian Psychology*, *10(4)*, 1401-1405. DIP:18.01.132.20221004, DOI:10.25215/1004.132