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Mini Review

The Neuroscience of Motivational Interviewing

Papaioannou-Spiroulia A[1*] and Melikopoulos V[2]

[1]*Professor-Researcher in Clinical-Cognitive Psychology Specialized Supervisor in Systemic-Multicultural Education and Communication Issues, Greece*

[2]*Psychologist, Neuropsychologist, Researcher at "Psychonisida" Center, Greece*

***Corresponding author:** Papaioannou-Spiroulia A, PhD, Founder & Scientific Supervisor of "Psychonisida" Center, Systemic-Family Therapist & Marte Meo Colleague Trainer, Professor-Researcher in Clinical-Cognitive Psychology Specialized Supervisor in Systemic-Multicultural Education and Communication Issues, Greece,

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Introduction

Psychosocial interventions have found increased success over the last few decades in resolving dysfunctional behaviors addressing malignant cognitions and attitudes, including addictive and compulsive behaviors, anxiety disorders, eating and feeding disorders and patients' dealing with chronic pain issues [1-3]. Motivational Interviewing (MI) aims to alter dysfunctional attitudes and beliefs with the ultimate goal of changing the clients' undesired behaviors. Specifically, MI, with verbal interaction as its main tool, focuses on the development and empowerment of the individuals' motivation to make the desired change [4,5]. In other words, MI is a client-centered directive method for enhancing inner motivation to change negative behavior by exploring and resolving ambivalence [6].

While most of research revolving around this topic focuses on the relationship between cognition and behavioral change in terms of the intervention, the understanding of the neurobiological basis of these changes is equally important. The behavioral changes of such interventions, and specifically MI, attributed to a neurobiological level recently drew the attention of modern studies in a variety of fields. Such evidence can drastically improve our understanding of the given methods. Firstly, by drawing a connection between cognition and behavior changes to specific neural networks and brain regions involved in the process of those changes and hence, help us make related intervention methods more direct and effective [7]. Secondly, the deeper understanding of the neurobiological mechanisms involved in such processes can help us track the progress of the given treatment by adding the biological variable to the behavioral/cognitive one, and provide us a more specific, person-centered and holistic knowledge of the given situation [8]. Finally, this could help in the more accurate categorization of individuals that seek to change their dysfunctional behaviors not only via behavioral characteristics but also via neurobiological underpinnings that are not so easily identified using behavior-based measures, considering the importance of the individual differences during the interventions. Such evidence can therefore give us critical information ranging from treatment planning to the effectiveness of the treatment methods and approaches used to treat/alter a plethora of dysfunctional behaviors [6,8,9].

The Neurobiological Basis of MI

Even though most research centered around the neurobiological underpinnings and behavioral changes has focused on other intervention methods, such as Cognitive Behavioral Therapy (CBT), there have been a few studies that have specifically focused on 'change talk', a key aspect of MI (for review of change talk see, Rollnick et al., 2010 [10]). Change talk reflects a basic side of an individual's ambivalence about changing. In general, it refers to the individuals' statements about their ability, need and desire for change [11]. Due to research, it is associated with enhanced motivation for change; and motivation is associated with increased likelihood of actual change (Miller & Rollnick, 2013; Moyers et al., 2005) [4,11].

The handful of studies that have focused on the neurobiological alteration of individuals undergoing MI based therapy have had mixed findings. Specifically, Houck et al. (2013) [12], who investigated specific neural networks underlying change talk, found significant activation in brain regions directly related to the philosophy and approach of MI. These regions are mostly involved in self-perception, attitude change and cognitive dissonance, and include the inferior frontal gyrus, the insula and the superior temporal cortex.

As MI has found increased success in treating substance abuse disorders (Smedslund et al., 2011) [13] and is directly focused on motivation, it is therefore safe to assume that the treatment process of MI is somewhat related to the reward circuits of the brain. By this token, Feldstein et al. (2011) [7] found that individuals that have successfully underwent MI treatment for alcohol abuse showed no activation in regions related to reward processing (e.g., orbitofrontal cortex, nucleus accumbens, insula, caudate, putamen). Despite the identical target group of above-mentioned studies, there were several inconsistencies in their findings mostly centered around the activation of the insula. However, such inconsistencies may be attributed to different methodologies of those studies ranging from the imaging methods used to the stimuli presentation of the cues.

Conclusions

Even though the above representative studies investigating the neurobiological basis of MI have had somewhat inconsistent results, they all seem to agree that there are specific neural networks and brain regions (similar to the ones identified in CBT) which are directly related to the effectiveness of the treatment approach (in our case, at least for substance abuse-related disorders). Those findings indicate the importance of an extensive multidisciplinary investigation of those methods. Based on our clinical experience, we strongly believe that MI conversations meet psychological needs, build socio-emotional skills, enhance neural integration, increase problem-solving skills and resolve ambivalence.

We therefore suggest that an appropriate approach to study the neurocognitive underpinnings of MI, would be an in-depth investigation of the networks involved in the processes underlying it. An important aspect of the human brain is that its functionality is tied to modules (Fox et al., 2005) [14]. Therefore, a modularity-oriented approach, focused between and within network activation related to executive functioning, reward and motivation will help us in the identification and understanding of specific activation patterns and the functional organization of the brain related to MI, and possibly in designing more effective intervention methods (Melikopoulos & Papaioannou-Spiroulia, 2019) [6].

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Conflict of Interest

No conflict of interest.

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