Replacing Unhealthy EE with Healthy EE in Schizophrenia: Towards a Public Health Model of Cognitive Rehabilitation for Low-Resource Settings

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Introduction

Individuals with schizophrenia face several challenges through their path towards recovery. Here, I focus on two seemingly unrelated challenges: expressed emotions and cognitive deficits. Adverse influence of living with families with high levels of negative expressed emotions (viz., emotional over involvement, critical comments and hostility) on the course of schizophrenia is well known [1]. Less exposure to environments with high expressed emotions is associated with better outcomes [2]. Influence of social and non-social cognitive deficits, which are ubiquitous in schizophrenia, on functioning is also well documented [3]. Interventions to remedy these deficits also improve personal and social functioning [4]. Some approaches in rehabilitation of persons with schizophrenia have combined these two aspects [5]. Family interventions, which address expressed emotions, and interventions to remedy cognitive deficits rightly find their mention in standard guidelines for psychosocial interventions for persons with schizophrenia [6, 7]. They have potential to make substantial difference to patients' and caregivers' lives.

However, not only are these human-resource intensive, but they are typically administered by highly trained specialists. Globally, there is severe dearth of human resource for mental health [8]. This, and a host of other challenges, including direct and indirect costs of care, acceptability of these interventions across different cultures and settings, longevity of their effect (particularly in the aftermath of psychotic relapses, which are commonplace in practice), etc., are serious impediments for millions of patients to avail these treatments [9].

Enriched Environment and Cognition

Methods to enhance the growth of brain structure and function through enhancing appropriate environmental stimulation may be termed as 'enriched environment' (alternatively called environmental enrichment). Initially, better cognitive ability was observed in animals reared in environments with higher stimulations. Later experiments have found similar results in animal models of developmental disorders including autism, attention-deficit hyperactivity disorder and fragile X syndrome (see Ball et al., for a review [10]) as well as in animal models of stress and anxiety [11, 12]. In animals, enriched environment typically involves providing richer inanimate and social stimulations. Sensory integration therapies, which involve many components of enriched environment (viz., multiple sensory experiences, novelty,

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and engaging in challenging cognitive, sensory, and motor tasks [13]), have shown promise in children with neurodevelopmental disorders [14]. Among adults, recent research has suggested that enrichment of environment helps in rehabilitation of individuals with stroke [15]. Finally, preliminary studies have shown that enriching environment with music helps in enhancing cognitive functions in schizophrenia [16, 17].

Time is now ripe to systematically examine the effect of environmental enrichment on cognitive deficits in schizophrenia. Development of newer synapses through neural plasticity underlies the mechanism of action of enriched environment on cognitive abilities. In schizophrenia, in contrast to other conditions mentioned above, the very process of neural plasticity is compromised [18]. However, in the light of the fact that enriched environment enhances the process of plasticity [19], this approach to remedy cognitive deficits may be worth pursuing through systematic research.

Scheduling of daily activities, supported education, vocational rehabilitation through vocational training, supported employment and sheltered workshops, art therapy, music therapy, etc. form integral part of rehabilitation of persons with chronic schizophrenia. It is apparent that all these modalities of interventions have elements of enriched environment, typically involving both inanimate and social stimulations. It makes intuitive sense that at least part of the benefits that patients gain from these interventions may be attributable to improvement in cognitive functions secondary to elements of enriched environment. Preliminary evidence is clearly indicative of this. For instance, a Brazilian study showed that patients who received support for employment showed better cognitive abilities than those who did not receive such support—neither group received any interventions specifically targeting cognition [20].

Replacing Unhealthy EE with Healthy EE

In the process of rehabilitation of persons with schizophrenia, there is need to replace unhealthy EE (expressed emotions) with potentially healthier EE (enriched environment). An overwhelming majority of individuals with schizophrenia live with their

families in most parts of the world. If there are no systematic efforts to engage such individuals with constructive activities, there is scope for adverse consequences on both stakeholders—potential adverse effects of negative expressed emotions on individuals with schizophrenia and enhanced burden of care on the family caregivers. On the contrary, systems that provide opportunities to engage individuals with schizophrenia in suitable activities may serve the dual purpose of replacing the unhealthy EE with healthy EE—they would reduce the exposure of patients to environments with high negative expressed emotions, while exposing them to potentially enriched environments, which could putatively enhance their cognitive abilities.

As mentioned in the beginning paragraphs, conventional approaches to address family expressed emotions and cognitive deficits experienced by a large number of patients living in the community are fraught with nearly unsurmountable challenges. There is little hope, in the near future, for millions of individuals with schizophrenia who need these services in resource-poor settings. Getting patients to engage in activities outside their homes can potentially solve both problems in a single stroke. As of now, over 160 countries have signed the United Nations' Convention on Rights of Persons with Disabilities (UN CRPD) [21]. The CRPD asserts, "...States Parties shall organize, strengthen and extend comprehensive habilitation and rehabilitation services and programmes, particularly in the areas of health, employment, education and social services...". The governments of these countries are thus committed to organizing comprehensive rehabilitation programmes for all persons with disabilities, including those disabled because of mental health conditions. From a public health perspective, arguably the best method of organizing such rehabilitative services is through the World Health Organization's optimal mix of mental health services [22], which advocates for community-based interventions for a large proportion of individuals who need rehabilitation. Importantly, interventions that require highly qualified human resources are to be reserved for a miniscule proportion.

Community-based rehabilitation typically involves a comprehensive set of programmes addressing the domains of health, education, livelihood, social and empowerment. These include activities that are predominantly done outside of their homes. This could

result in reduction of face-to face contact with family caregivers, which, in turn, is known to reduce the adverse impact of unhealthy expressed emotions. Services addressing these domains would facilitate the participation of individuals with disabilities in activities that have components of enriched environment. Models of community-based rehabilitation, particularly in low-resource countries, include group activities to promote social and vocational skills, enhancement of social networks and provision of access to social benefits [23, 24], all of which may contribute to enrichment of their environments. While there is evidence that these help in reduction of symptoms and improvement in functioning, there is need to systematically study if participating in these activities has additional benefits of alleviation of cognitive deficits. Such studies have potential to open entirely new vistas for addressing two of the vexing challenges of rehabilitation of individuals with schizophrenia in the community.

Certain caveats are to be considered in the context of this proposition of replacing an unhealthy EE with a healthier one. First, there is substantial difference between enriched environment experiments conducted in the laboratories and the range of rehabilitation inputs provided to individuals with schizophrenia. Even in the laboratory setting, contribution of different aspects of enriched environment to neuronal plasticity is unclear. Studying specific components of potential ‘environmental enrichments’ in rehabilitative settings would be highly challenging. Second, it is likely that there is an optimal ‘dose’ of enriched environment [10]—while at some level it is helpful for cognitive development, beyond a certain level, it may have detrimental effect on cognitive abilities. Finally, it is important to consider the fact that one size does not fit all—individuals with schizophrenia would have diverse interests and challenges. Unlike animal models, among adult humans, what constitutes enriched environment to one may not do to for another. Programmes that propose to use the paradigm of enriched environments to rehabilitate individuals with schizophrenia should be personalized. There is research to support this intuitive argument—in a study on the effect of music on visual attention training for patients with schizophrenia [17], those who listened to their choice of music performed better than those who listened to random music. While such tailor-made interventions are ideal in practice, it

would make research in this topic highly complex and challenging.

Conventionally, cognitive deficits in schizophrenia were considered as impediment to reintegration into the mainstream. Their remediation would pave way for better community functioning. Given the fact that conventional method of cognitive remediation is unavailable for a vast majority of patients, a question that begs answers is, “Has the time come for examining the effect of putting the cart before the horses?”

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Compliance with Ethical Standards

Conflict of interest None.

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