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**Neuropsychiatric genetics in developing countries: Current challenges**

Forero DA *et al*. Neuropsychiatric genetics in developing countries

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**Abstract**

Neuropsychiatric disorders (NPDs) constitute a heavy burden on public health systems around the world and studies have demonstrated that the negative impact of NPDs is larger in Low and Middle Income Countries (LMICs). In recent decades, several studies have come to the understanding that genetic factors play a major role in the risk for a large number of NPDs. However, few neuropsychiatric genetics studies have been published from LMICs. In this Editorial, we discuss important issues impinging on advances in neuropsychiatric genetics research in LMICs. It is essential that scientists educate policymakers and officials of funding agencies on the importance of providing adequate funding for research in these areas. Development of local well-supported research programs focused on NPD genetics should be an important asset to develop; it would facilitate the establishment of sustainable research efforts that could lead to appropriate diagnosis and specific, affordable and feasible interventions in LMICs. It is important to point out that research into the biological basis of human NPDs is not only an academic effort reserved for a few elite institutions in economically developed countries, but it is vitally important for the mental health of people around the world.

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**Key words:** Neurogenetics; Psychiatric genetics; Mental health; Neurosciences; Public health

**Core tip:** Neuropsychiatric Disorders (NPDs) constitute a heavy burden on public health systems around the world. Studies have demonstrated that the negative impact of NPDs is larger in Low and Middle Income Countries (LMICs). However, few neuropsychiatric genetics studies have been published from LMICs. In this Editorial, we discuss important issues impinging on advances in neuropsychiatric genetics research in LMICs. It is essential that scientists educate policymakers and officials of funding agencies on the importance of providing adequate funding for research in these areas. Development of local research programs focused on NPD genetics should be an important asset to develop in LMICs.

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**IMPORTANCE OF NEUROPSYCHIATRIC GENETICS IN DEVELOPING COUNTRIES**

Neuropsychiatric Disorders (NPDs) constitute a heavy burden on public health systems around the world, as they represent around 30% of the disability-adjusted life-years associated to non-communicable diseases[[1](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Considering the severity and chronicity of some of these disorders, such as major depression or substance abuse, the annual costs of NPDs can be estimated at several trillion dollars around the world[[2](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl),[3](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Furthermore, studies have demonstrated that the negative impact of NPDs is substantially greater in Low and Middle Income Countries (LMICs), also called developing countries, given their particular demographic, cultural and economic conditions[[1](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl),[4](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Until recently, the negative effect of some NPDs on LMICs was underestimated due to a historical emphasis on the study of infectious diseases.

 In recent decades, the understanding that genetic factors play a major role in the risk for a large number of NPDs has increased[[5](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Heritability ranges from 40 % to 80% for several major NPDs and hundreds of studies have been published exploring genetic factors for NPDs, mainly in populations of European descent[[5](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl),[6](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. However, few neuropsychiatric genetics studies have been published from LMICs[[7](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. In this Editorial, we discuss important issues impinging on advances in neuropsychiatric genetics research in LMICs.

 Why is basic genetic research necessary in LMICs? Why not extrapolate findings from existing studies from the rest of the world? Populations differ in their susceptibility to diseases while disease prevalence differs across populations. Replicability of genetic findings is notoriously difficult and replicability across populations is needed to identify ‘genuine’ genetic associations[[7](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Few examples of genetic studies of NPDs and related endophenotypes in LIMCs are found, in a global perspective; some led by local scientists and others led by researchers from developed countries[[8-16](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)].

 Research in mental health is a challenging task in LMICs[[17](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)] due to lack of resources and trained personnel. The relative lack of local research infrastructure in many LMICs arises due to cultural and economic factors (poor funding sources, internal conflicts, general poverty or massive external debt) and political aspects (lack of vision about the importance of public funding of research and innovation, for example). There is also a scarcity of local human resources, which is more evident in neuropsychiatric genetics: in addition to the need for personnel with adequate formal clinical training and experience, there is a crying need for scientific personnel with adequate research training and experience.

 Research into biological basis of mental disorders is a relatively recent scientific effort, in comparison to other biomedical areas[[18](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Lack of awareness about its importance is exacerbated in LMICs because of specific cultural and educational factors, especially stigma[[19](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. So, it is important that laboratory-based researchers educate health professionals, and the general public, on the relevance of basic biomedical research into NPDs and the underlying basic concepts[[20](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. Clinicians should understand that basic research is a crucial way to understand mechanisms of NPDs that could lead to discoveries for better treatments and diagnosis strategies in the future. Well-planned and organized collaborations between geneticists, psychiatrists, neurologists and psychologists are vital[[21](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)], to select those pathologies to be studied, based on criteria such as prevalence, severity and heredability. This is more important in LIMCs because the knowledge gained through genetic research may help health professionals provide better care, given the difficulty of patient access to advanced healthcare facilities. It is also essential that scientists educate policymakers, officials of funding agencies and advocacy groups, on the importance of providing adequate funding for research on these areas[[20](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. When results from research are available, policymakers should create the mechanisms to improve the identification of patients at genetic risk for suffering NPDs and establish the means for consultation and management once the symptoms appear.

 It must be kept in mind that genetic epidemiology of NPDs is not equal in all regions of the world, so scientists should insist on having their own data. Development of local well-supported research programs focused on NPD genetics should be an important asset to develop; it would facilitate the establishment of sustainable research efforts that could lead to appropriate diagnosis and specific, affordable and feasible interventions in LMICs. Given that there is an international bias toward research into genetics of specific disorders[[7](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)], researchers from LIMCs should be able to study those NPDs of high importance in their regions[[22](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)]. In addition to the participation of scientists from LMICs in research networks led by institutions in developed countries, a consolidation of the collaborations between groups from different LMICs would lead to additional advantages[[23](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)], such as establishment of international research consortia that could lead to studies with larger samples sizes. Advances in genomics of NPDs will benefit the entire humanity rather than one or other population group.

 Finally, we suggest that scientists in developed countries, especially those acting as peer reviewers of grant applications and journals, should try to understand the constant challenges that scientists in LIMCs face to carry out their research. It is important to point out that research into the biological basis of human NPDs[[1](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl),[18](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl),[24](file:///C%3A%5CUsers%5Cgenetica%5CGoogle%20Drive%5CGenomPsych%5CCurrently%5CNPG-Editorial-WJP%5CRevised%5Cl)] is not only an academic effort reserved for a few elite institutions in economically developed countries, but it is vitally important for the mental health of people around the world.

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