Poverty and mental health in post-war countries: The case of Uganda and Sierra Leone

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Introduction

The impact of environmental factors on brain development in children and adolescents has become a growing research focus in recent years. Low socioeconomic status (SES) has been linked to adverse health outcomes, mental disorders, and low academic achievements (Katsnelson, 2015) (chapter in this volume by Tomlinson). Studies have demonstrated that living in poor conditions impacts the neurological and behavioral development of children negatively affecting; (1) cognitive abilities, leading to poor academic attainment (Hair, Hanson, Wolfe, & Pollak, 2015; Luby et al., 2013); (2) brain structure, in particular the hippocampus and the amygdala—brain regions associated with memory, emotions, decision making, attention, speech, and motivation (Barch et al., 2016; Brito & Noble, 2014; Jednoróg et al., 2012; Luby et al., 2013; Noble et al., 2015); and (3) overall mental, emotional and behavioral health with potential higher risks of mental disorders and antisocial behavior (Hackman, Farah, & Meaney, 2010; Luby et al., 2013; van Goozen, Fairchild, & Harold, 2008). Another factor investigated with regard to brain development is the effects of exposure to community violence or crime, e.g., physical violence, shootings, use of drugs and stabbings (Fowler, Tompsett, Braciszewski, Jacques-Tiura, & Baltes, 2009; Saxbe et al., 2018). Saxbe et al. (2018) report that community violence exposure leads to (1) deficiency in cognitive and emotional development (Heleniak, King, Monahan, & McLaughlin, 2018; McCoy, Raver, & Sharkey, 2015); (2) low school attainment (Borofsky, Kellerman, Baucom, Oliver, & Margolin, 2013); and (3) post-traumatic stress disorder (PTSD) (Fowler et al., 2009). In their study, they point out that these negative outcomes "are associated with brain structure and function, making community violence a potentially meaningful correlate of neural characteristics" (Saxbe et al., 2018).

Research on the impact of adverse events on brain development has mostly focused on first-world countries like the United States or countries in the Western world. This chapter will focus specifically on two African countries, Uganda and Sierra Leone. These two countries are among the poorest in the world and have been plagued by

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civil wars and political violence. The combination of poverty and violence represents a tremendous challenge in the development of strategies to address the ongoing mental health crisis in Uganda and Sierra Leone. As this chapter outlines, to address the mental health issues in these countries requires not only access to good mental health care services but also interventions at the socioeconomic level, given that determinants of health are multifactorial. The aim of our analysis is twofold: first, we investigate particular mental health needs and challenges in the light of the aftermath of civil unrest, political violence and continuous economic and political difficulties in Uganda and Sierra Leone. Second, we examine how neuroethics can help develop strategies to address the mental health crisis that has not been adequately assessed and addressed in Uganda and Sierra Leone. In particular, we address the question of how to improve access to new neuroscientific knowledge and treatment options relevant to the impact of poverty and violence.

Mental health in the African continent

Mental and behavioral disorders are conditions characterized by alterations in thinking, mood or behavior associated with personal distress and impaired functioning (World Health Organization, 2014). According to the World Health Organization (WHO), mental disorders contribute 14% to the global burden of disease (Whiteford et al., 2013). Globally, the highest proportion (56.7%) of disability-adjusted life-years (DALYs) is attributable to mental disorders (Whiteford et al., 2013) with mental illness accounting for 32.4% of years lived with disability (YLDs) (Vigo, Thornicroft, & Atun, 2016). In addition, there is an imbalance in how research efforts are conducted. It is estimated that 90% of clinical neuroscience research focuses on 10% of the global population living in high income countries—the 90:10 research gap (Henrich, Heine, & Norenzayan, 2010; Saxena, Paraje, Sharan, Karam, & Sadana, 2006). For this reason, there is an urgent need for mental health research in Low- and Middle-Income Countries (LMIC) as these countries have tremendous mental health challenges and needs. To this end, the United Nations set specific goals outlined in the Sustainable Development Goal (SDG) 3 document which aims at a one third reduction in mortality from non-communicable diseases through prevention, treatment and promotion of mental health and wellbeing by 2030 (United Nations, 2016). Similarly, the Common African Position is to reduce the incidence of non-communicable diseases, including mental health disorders, as a priority of the African Union (African-Union, 2014).

In the light of these considerations, this chapter focuses on Uganda and Sierra Leone in an attempt to provide a framework that will help guide the development of strategies to improve mental health. These countries have a history of civil war, political violence, poverty and a lack of health care resources. Taken together, these factors constitute a tremendous challenge and a human tragedy that cannot be ignored.

Uganda

Socio-political context

Uganda experienced two civil wars between 1981 and 2006. A 5-year armed conflict in central Uganda between 1981 and 1986, followed by two decades of war in Northern Uganda lead by the Lord's Resistance Army from 1986 to 2006. Both conflicts involved child soldiers (Amone-P'Olak et al., 2013). These wars were both preceded by several years of political turmoil beginning in 1971. The majority of the population in the war-affected areas was exposed to atrocities and suffered the consequences without access to appropriate resources (Ovuga, Boardman, & Wasserman, 2005). Individuals in these war-torn areas experienced torture, overwhelming fear, helplessness and isolation (Amone P'Olak, 2009; Amone-P'Olak, Garnefski, & Kraaij, 2007). Civilians of northern Uganda faced forced conscription and abduction into armed guerilla groups resulting in psychological trauma (Pham, Vinck, & Stover, 2009). It is well established that the experience of war and its aftermath may have long-term mental health effects with psychosocial outcomes such as depression, anxiety, psychotic symptoms, prosocial behavior, behavioral problems or somatic complaints (Amone-P'Olak et al., 2013).

The burden of mental health

The World Health Organization (WHO) has recognized in the last decade the significant contribution of mental, neurological and substance abuse disorders to the disease burden globally, with at least one in every four persons experiencing some form of mental disorder at some point in their life (World Health Organization, 2001). In addition, evidence suggests a relationship between poverty levels and poor mental health (Flisher et al., 2007). Uganda, a low-income country with one third (31%) of its population (39 million) living below the poverty line (UBOS, 2015), is facing a tremendous challenge as the result of the emergence of social, political and civil strife coupled with the spread of infectious disease such as HIV/AIDS, malaria, diarrheal and respiratory tract infections. Mental disorders have become a major problem post-war, contributing 13% of the disease burden (Ministry of Health, 2011). According to Uganda's Ministry of Health, incident mental health cases account for about 1% of all new outpatient health cases. In this national hospital outpatient survey of healthcare seeking clinic attendees, the highest incident of mental health conditions per 100 outpatients were epilepsy 6 per 100 outpatients and approximately 1 per 100 outpatients for; anxiety disorders; depression; mania; schizophrenia; alcohol or drug abuse and other forms of mental illness (Ministry of Health, 2011). The amplitude of the problem faced by Ugandan mental health services can be summarized by a brief overview of the most prevalent mental disorders affecting the country:

(a) Epilepsy is a disease of the brain characterized by enduring predisposition to epileptic seizures (Fisher, 2017; Fisher et al., 2014). The prevalence of epilepsy is higher in developing countries and Uganda has an estimated epilepsy burden of 3% in the general population (Kaiser, Asaba, Leichsenring, & Kabagambe, 1998; Uganda Ministry of Health, 2010; World Health Organization, 2017). Several risk factors are considered associated with

epilepsy. In infants, a major risk factor is febrile seizures due to conditions such as malaria, bronchopneumonia and measles (Duggan, 2010). Other neglected tropical diseases such as onchocerciasis (eye and skin disease) and neurocysticercosis (infection of the nervous system) are common causes of seizures in certain geographical locations of sub-Saharan Africa including Uganda (Kaiser et al., 1996; Kilian, Kipp, Kasoro, & Burnham, 1994; Ovuga, Kipp, Mungherera, & Kasoro, 1992). Insult to the brain caused by problematic labor during birth, neuroanatomical abnormalities, and genetic makeup are also potential risk factors (WHO, 2004). Low socio-economic status, malnutrition and poor access to healthcare services may contribute to the severity of seizures.

(b) Depression: In Uganda, population data on the burden of depression highlights it as a major mental health problem in the country. The WHO estimates the burden of depressive disorders in Uganda at 4.6% (World Health Organization, 2017). For example, data indicates that among school-going adolescents with highly prevalent depressive symptoms (21%), approximately 11% had major depression (Nalugya-Sserunjogi et al., 2016). Over 90% of people who inflict harm to themselves or commit suicide manifest clinical depression (UBOS, 2011). In two rural districts of Uganda (Adjumani and Bugiri), overall prevalence of depression was 17.4%, with a higher level in the Adjumani district where people experienced the armed insurgency from the northern region and live in poor living conditions depending mostly on agriculture for their livelihood. The district of the Adjumani also has a higher refugee populations from armed conflict in neighboring South Sudan and the Democratic Republic of Congo (Ovuga et al., 2005).

(c) Posttraumatic stress disorder (PTSD): two civil wars in the last four decades have affected the mental health of those exposed to atrocities. Several studies conducted in post-conflict northern Uganda revealed that exposure to stressful events during the war or following the experience of war atrocities increased the risk of occurrence of PTSD, in addition to anxiety and depressive symptoms (Pfeiffer & Elbert, 2011; Roberts, Ocaka, Browne, Oyok, & Sondorp, 2008; Weierstall, Schalinski, Crombach, Hecker, & Elbert, 2012). Child victims of the abduction by the Lord's Resistance Army of warlord Joseph Kony in northern Uganda developed symptoms of PTSD (Annan, Blattman, Mazurana, & Carlson, 2011). This disorder was also observed among women (Roberts et al., 2008).

(d) Alcohol and substance abuse: Evidence suggests that societal conflicts may lead to unplanned urbanization (Büscher, Komujuni, & Ashaba, 2018) and may negatively impact behavior (Namagembe et al., 2010; Swahn, Palmier, Kasirye, & Yao, 2012) via increased alcohol consumption and drug use in Uganda (Tumwesigye & Kasirye, 2005; Tumwesigye, Kyomuhendo, Greenfield, & Wanyenze, 2012).

In concluding this brief overview, populations affected by the common mental health conditions and those in need of mental health care are predominantly from lower socioeconomic backgrounds. This reinforces evidence that barriers to accessing health services perpetuates the vicious circle of insecurity, risk or occurrence of civil unrest, poverty and violence (Conti & Burton, 1994; Kigozi, Ssebunnya, Kizza, Cooper, & Ndyanabangi, 2010).

Unique challenges

In addition to the burden of specific mental health conditions, Uganda faces the challenge of a high refugee population. The West Nile region shares international borders with South Sudan and the Democratic Republic of Congo (DRC), two countries that experienced ongoing decades of armed conflict resulting in a large influx of refugees

into Uganda (Bayer, Klasen, & Adam, 2007). Similarly, in the Western and South West regions, refugees have sought safety in Uganda following the Rwanda genocide of 1994 and the subsequent political violence. In the Gulu district, a post-conflict setting in northern Uganda, war abducted adolescents have manifested signs of PTSD, major depression and generalized anxiety (Okello, Onen, & Musisi, 2007). Likewise in the West Nile region, Sudanese refugees have also demonstrated PTSD symptoms (Karunakara et al., 2004; Neuner et al., 2004; Peltzer, 1999).

Organization of mental health services

The Government of Uganda, through its Ministry of Health is mandated with policy formulation, planning, resource mobilization, standard setting, capacity building and coordination of interventions to address mental health conditions (MoH, 2015). Through private-public partnerships, there are several interventions implemented that are intended to address the high burden of mental health problems in Uganda (Molodynski, Cusack, & Nixon, 2017). This includes the integration of mental health care into HIV care and treatment and primary health care (Mugisha, Ssebunnya, & Kigozi, 2016). A community strategy, which includes health education and promotion to increase community awareness, was developed to increase access to primary and referral mental health services. Increasing the total number of functional mental health units is aimed at improving community access to and provision of essential mental healthcare.

Despite government efforts to alleviate psychosocial needs in war-torn northern Uganda, current health service delivery is still inadequate. The National Health Policy is comprised of the Uganda Minimum Healthcare Package (UMHCP) which includes mental health service provision (Kirunga Tashobya, Ssengooba, & Oliveira Cruz, 2006; MoH, 2015; Uganda Ministry of Health, 2014). Specifically, mental health services are provided through a decentralized referral health system organized in terms of catchment and general out- and in-patient health service areas at regional and district levels (World Health Organization, 2006). The financing is disproportionately allocated to the National Mental Hospital (Butabika) and regional referral hospitals with mental health units which also provide access to no-cost medication for mental health conditions (MoH, 2016). The country comprises only one National Mental Hospital and few public regional referral hospitals (Ministry of Health, 2011); these are resourced by a variety of mental health professionals including psychiatrists, general practitioners, clinical officers, clinical psychologists, nurses, social workers and occupational therapists (MoH, 2016). Policy efforts in Uganda to make access more equitable, has seen mental health being incorporated into primary health care. However, evidence from one survey in rural Uganda shows that such integration has not been effectively implemented (Kigozi et al., 2010).

Sierra Leone

Socio-political context

Over the course of the 11 years of civil war (1991–2002) in Sierra Leone, Human Rights Watch reported in 2004 that an estimated 50,000 people were murdered, and

over 20,000 children and adolescents were involved with armed groups as perpetrators and/or victims of violent atrocities (Human Rights Watch, 2004). Women and children experienced posttraumatic stress as a result of having witnessed torture, killings, maiming or public rape during the war and from the loss of loved ones and family members to the scourge of Ebola. In addition, the combination of the civil war, the Ebola epidemic and poor economic outlook resulted in high level of youth unemployment (46%) in West Africa (Human Rights Watch, 2004); this is reflected in Sierra Leone's ranking (180 out of 182) in the Human Poverty Report with a Human Poverty Index of 47.7 (UN Development Program, 2009). Overall, the convergence of these factors affects existing peace and security, and health outcomes. Studies suggest that the 10-year civil war, the recent Ebola crisis and daily socioeconomic stressors such as poverty and high rates of unemployment represent major contributors to the increased prevalence of mental disorders (Akinsulure-Smith & Conteh, 2018). A recent WHO survey in 2012 revealed that the most predominant mental conditions in Sierra Leone included severe depression (4%); psychosis (2%); substance abuse (4%); mental retardation (1%); and epilepsy (1%) (Alemu et al., 2012). These findings led the WHO to advocate for the creation of community based mental health services in the country (Asare & Jones, 2005).

The burden of mental health

The effects of the civil war and Ebola remain key risk factors for anxiety, depression, and posttraumatic stress disorder in Sierra Leone (Helleringer & Noymer, 2015). During the war, civilians were used as protective shields, were abducted or enslaved, tortured and raped (De Jong, Mulhern, Ford, Van Der Kam, & Kleber, 2000). Both the war and the Ebola epidemic stimulated fear and anxiety among the population, due to witnessing of gross human right violations (Shultz, Baingana, & Neria, 2015). In 2008, it was estimated that about 90% of admissions to the Sierra Leone psychiatric hospital were drug-related; this reflects the high level of alcohol consumption and substance abuse (WHO, 2004). According to the United Nations, the production of illicit drugs such as marijuana (locally called "jamba") occurs locally and is transnationally organized for its shipment and sale in other countries. "Highway 10," a West African transit zone, is used by organized criminals to transit large quantities of cocaine from South America to Europe and West Africa. Additionally, studies by WHO reveal that alcohol also represents a significant public health concern in Sierra Leone, with Sierra Leoneans consuming on average 9.7 L of alcohol per capita in 2005, in contrast to 6.2 L per capita for the rest of the African region. Another major issue to consider is the cultural interpretation of mental illnesses, which is commonly considered spiritual or supernatural in nature, and which is associated with help-seeking from traditional healers and/or religious societies. However, this comes with stigmatization and social exclusion for the mentally ill.

In summary, the government of Sierra Leone has recognized that mental health is largely a neglected problem with a high socio-economic burden. However, it is estimated that among the 715,000 people presently suffering from mental illnesses only 2000 receive medical treatment (Alemu et al., 2012).

Systemic challenges to improve access

Although Sierra Leone is moving toward restoring its public health infrastructure (including mental health delivery systems) after the decade-long civil war and Ebola crisis, there are systemic barriers to access to mental health services. The political violence Sierra Leone experienced left its health care system largely dysfunctional with limited resources for providing mental healthcare (Alemu et al., 2012). With a population of over 7,000,000 people, Sierra Leone has only two psychiatrists, two clinical psychologists, and 19 mental health nurses, and only four nurses have a specialty in child and adolescent mental health (WHO, 2005). Sierra Leone has an estimated mental health treatment gap of about 99%, that is to say, formal mental health services are inadequate or inappropriate for the majority of Sierra Leoneans (Yoder, Tol, Reis, & de Jong, 2016). However, little attention has been paid to the potential relationships between trauma and mental health in Sierra Leone's post-war recovery.

Since the end of the civil war, there have been several policy and programmatic initiatives to address the social determinants of mental health and treatment gap in Sierra Leone. The WHO is working with the Sierra Leone Ministry of Health and Sanitation to reduce the treatment gap and to provide quality mental health care at all levels (primary, secondary and tertiary). As a result, a few initiatives have ensued. In 2002, the first "Systematic Needs Assessment on Mental Health and Substance Abuse Survey" took place under the direction of the Ministry of Health and Sanitation (WHO, 2006); this in turn led to the WHO Country Cooperation Strategy (CCS) Sierra Leone (2004–08) which recognized mental health as a priority area. Subsequently, in 2012 a Mental Health Steering Committee was launched under the Ministry of Health and Sanitation and produced a National Mental Health Policy and Plan.

These initiatives led to the establishment of the National Mental Health Coalition, the first national mental health conference (Yoder et al., 2016), the National Mental Health Strategic Plan (2010–15), and the establishment of the Mental Health Users and Families' Association. It is also worth mentioning that the push for better mental health includes a new psychiatric nurse training course at University of Sierra Leone-College of Medicine and the creation of a new program, the Mental Health Leadership and Advocacy Programme launched in 2012, with mental health stakeholders receiving training in public mental health and service development. These various initiatives are good steps in the right direction, but at this point no data is available as to whether there has been a noticeable improvement in mental health outcomes in Sierra Leone.

Neuroethics and the challenge of global mental health

Setting a global agenda

As the previous sections demonstrate, addressing the challenges of mental health in Uganda and Sierra Leone is not just an issue of improving access to mental health services but also a (bio)political one. How and what health care resources should be allocated to mental health presupposes a set of values (political, cultural and moral) shaping the development of policies and guidelines that will affect brain research and

clinical interventions. In addition, as future research on the impact of poverty and violence on child brain development takes place, it is essential to examine carefully how this type of research can be used ethically in various socio-cultural settings, including in developing countries plagued by civil war, poverty, and political violence. There are issues related to disparities in research, the 90:10 research gap (90% of clinical research focuses on only 10% of the global population, mostly from high income countries), but also questions concerning where mental health ranks in the order of priorities in health care despite the increasing global burden of mental disorders—according to the WHO, 20% of the people are affected by a mental disorder in their life and 3 out 4 people suffering from a severe mental disorder do not receive treatment (WHO, 2013).

To address this challenge the WHO established a comprehensive Mental Health Action Plan 2013–20 that outlines four objectives: (1) "strengthen effective leadership and governance for mental health"; (2) "provide comprehensive, integrated and responsive mental health and social care services in community-based settings"; (3) "implement strategies for promotion and prevention in mental health"; and (4) "strengthen information systems, evidence and research for mental health" (WHO, 2013). These four objectives constitute a multidisciplinary approach and reflect the complexity of mental health research and clinical care. When these objectives are considered in the context of Uganda and Sierra Leone, for instance, issues of leadership and governance demand an understanding of the historical, socio-cultural and political backdrop against which mental health should be examined and discussed. Furthermore, a community-based approach can only take place when there is buy-in from the community and a correct appreciation of the culture(s) under consideration. Thus, the successful implementation of interventions to promote healthy mental health practices and preventative measures requires adaptation to the local context. As mentioned previously, for some segments of the population, a mental illness is understood in spiritual or supernatural terms. How neuroscientific knowledge is translated and explained to individuals is key for good community work. Last but not least, neuroscience research and the implementation of novel neurotechnologies (if and when available considering the context of Uganda and Sierra Leone) should reflect the highest standards of responsible conduct of research and clinical practice.

The current refugee crisis in Europe and North America will pose a tremendous challenge to European countries like Germany, Spain, Sweden or Italy and the United States to address the mental health needs of individuals fleeing poverty, physical and mental abuse and political violence. European countries and the United States are equipped and prepared (or at least better equipped and prepared) to handle such situations but Uganda is unlikely able to deal with its increasing refugee population and the mental health issues associated with such flux of persons. The development of strategies to address such crisis on African soil should carefully contextualize the nature of these interventions. Such contextualization should always be assessed in relation to the potential of stigmatization. So while recognizing how living in poverty and/or being exposed to political, physical or psychological violence may affect overall mental health and brain development, it does not mean that necessarily imply that such individuals have a "diseased brain" or have acquired an irreversible neurological deficit (Lipina & Evers, 2017).

The contribution of neuroethics

Neuroethics is often depicted as a field of investigation that analyses the implications of brain research and neurotechnology for ethics and policy (Jotterand & Ienca, 2017). In what follows we argue that the biopolitical dimension of neuroethics must be carefully analyzed in order to make a contribution to global mental health in contexts such as Uganda and Sierra Leone. To this end, it is worth briefly defining biopolitics and its implications for neuroethics before we make the connection with global mental health.

The term biopolitics, popularized by philosopher Michel Foucault in his book *The History of Sexuality, Vol.1* (1980), refers to how political power is used to manage human life. In his work, he refers to biopower to designate the change in thinking and practice regarding political power that happened in the 18th century. Biopolitics signifies that humans as biological entities are managed as political entities, so undermining the mastery of one's body to create the space for interventions at the social level for the regulation of populations and their biological bodies. This paradigm shift established two important points: first, the state has become the ruler over (human) life and an agent of control over populations, and second, human beings are dependent upon particular goals set by political entities. For instance, some neurotechnologies enable the collection, storage and reuse of data that could potentially be used to monitor and control "human social and biological processes" (Jotterand & Ienca, 2017). Recognizing the hypothetical nature of this scenario but also the realities of political divisions, ethnic tensions in countries like Uganda and Sierra Leone, it wouldn't be improbable that these neurotechnologies could be exploited for political gain.

The implication for neuroethics is that the object of neuroscience research (the brain) has become a potential entity for socio-political control. This point has been very well articulated by Stuart Henry and Dena Plemmons who recognize the socio-political context of science. They note that "the politics of conflicting and ideologically shaped interests mediate the outcome of public policies based on scientific research, often with negative impacts on society's most vulnerable populations. Neuroscience and, therefore, neuroethics, are inherently political" (Henry & Plemmons, 2012). What Henry and Plemmons rightly discern is that neuroethics is biopolitical in nature and that the development of public health policies related to mental health can potentially be manipulated to achieve particular ends set by political agents. This is exemplified by bio-political tensions in research involving nodding syndrome, a neurological disorder of childhood onset with no known cause and treatment to date (Anguzu et al., 2018; Colebunders, Suykerbuyk, Jacob, & van Oijen, 2017; Idro et al., 2016; Bemmel, 2016). Policies and public discourse surrounding this mysterious neurological disease in Northern Uganda (Vogel, 2012) have to some extent strained research efforts potentially due to tensions between affected families (Buchmann, 2015), neuroscientists, neuro-practitioners (Musisi, Akena, Nakimuli-Mpungu, Abbo, & Okello, 2013) and political actors, so negatively affecting the national response (Deogratius, David, & Christopher, 2015; Schmutzhard & Winkler, 2015). This point become even more salient when we consider the state of needs and the past political turmoil of countries like Uganda and Sierra Leone. In 2010, a 5-year Mental Health Policy was enacted by the Government of Sierra Leone which sets clear directions for the development of

mental health services and the promotion of mental health in the country (Shackman & Price, 2013). However, the implementation of this policy was challenged by myths, based on cultural and religious beliefs common among the indigenous population in Sierra Leone (Alemu et al., 2012). Even with such policy, mental health in Sierra Leone has received little attention and efforts to alleviate issues in the nation's health care systems (Palmer, 2013). Hence, for a long time, the people of Sierra Leone have been accustomed to myths surrounding mental health which negatively impact effective policy implementation. In addition to scarce resources for mental health due to the civil war, such myths are perpetuated by the traditional methods of mental health care which are perceived as solutions to mental health problems in the country (Yoldi, 2012). Neuroscience research has a lot to contribute in addressing these underlying issues by providing mental health capacity building, including knowledge regarding culturally appropriate assessment and treatment of mental illness, advocacy for changes in national mental health policy, and guidelines for funding and training of health professionals and lay individuals (Shackman & Price, 2013).

Now that the biopolitical dimension of neuroethics has been established, we need to demonstrate how neuroethics can contribute to global mental health. In this chapter global health is understood as:

> *an area for study, research, and practice that places a priority on improving health and achieving equity in health for all people worldwide. Global health emphasises transnational health issues, determinants, and solutions; involves many disciplines within and beyond the health sciences and promotes interdisciplinary collaboration; and is a synthesis of population-based prevention with individual-level clinical care.*
> *(Koplan et al., 2009, p. 1995)*

In particular there is an emphasis on issues such as the protection of human rights; addressing extreme poverty and associated problems such as corruption, malnutrition, and human trafficking (Levy & Sidel, 2013). Global mental health is the application to these principles in the context of addressing neurological and psychological disorders.

Concerns related to vulnerable populations, public policies, justice, and moral guidance, have been addressed by scholars in public health and bioethics so one could make the case that there is no need, in principle, to have a specific "neuroethics" angle. We want to challenge this assumption and argue that neuroethics has a special contribution to make to global mental health. Neuroethics is distinct from bioethics or global health. Its focus is specifically on the implications of progress in neuroscience and neurotechnology, and their implications for brain research and the treatment of neurological disorders. Neuroscience research is increasing our ability to diagnose, treat, and prevent neurological and mental disorders but by the same token challenges human self-understanding and raises ethical and policy issues that requires a distinct and careful analysis, which neuroethics can provide. There is enough evidence to establish a correlation between poverty or SES, community violence and brain structure and function. However, the interpretation of these neuroscientific findings and its implications for the care of this patient population raise its own set of challenges as outlined below.

To press this point further, let's consider an important distinction made by philosopher and neuroscientist, Adina Roskies, concerning neuroethics. She divides neuroethics into *the ethics of neuroscience* and *the neuroscience of ethics* (Roskies, 2002). The former examines the ethical implications raised by the use of neurotechnologies for intervention in the brain in the clinical and social context. The latter is an examination, using the tools of neuroscience and philosophical inquiry, of the nature of moral agency, responsibility, free will, personal identity, etc. The neuroscience of poverty or the neuroscience of community violence are not limited to the ethics of neuroscience, which is, to a certain extent, an extension of research ethics. Issues related to vulnerable population, justice, cost effectiveness, the development of ethical guidelines to influence public policies are, and have already been explored. The implications of community and political violence or war on brain development, however, are relatively new areas of concerns in brain research. As pointed out, some studies have demonstrated that children from lower SES have a higher risk of mental disorders and antisocial behavior (Lipina & Evers, 2017; Luby et al., 2013; van Goozen et al., 2008). Another study showed that exposure to community violence affects areas of the brain involved in cognitive and emotional development in adolescents (Saxbe et al., 2018). It is likely that governments might be interested in using this new knowledge to address social and mental health problems and gain access to neurotechnologies—while countries like Uganda and Sierra Leone are poor it is always perplexing to see how sophisticated weapons are present in conflicts; it is not improbable to think that governments could access neurotechnologies to monitor "human social and neurobiological processes." In addition, political divisions and ethnic tensions could contribute to their misuse. Neuroethics can provide a framework on how these findings can translate into policies and interventions implemented ethically and without stigmatizing individuals or pathologizing poverty as a disease. In addition, as the development of neurotechnological tools follows its course, the nature and boundaries of brain interventions will need to be clearly determined even in the absence of political tensions. Risks and benefits need to be assessed before implementation and vulnerable populations protected from abuse, manipulation or coercion. Finally, questions of how first world countries, where these technologies are developed and becoming increasingly accessible, should have a moral obligation to make them available to countries plagued by poverty, and social and political unrest must be addressed in the geopolitical realities of these countries. These important matters cannot be examined fully in this chapter, but they demonstrate that neuroethics can make a substantive contribution to global mental health through the development of collaborative initiatives (research, scholarship, etc.) and programs between countries from the African continent and first world countries. In addition, as cognitive neuroscientist Martha Farah explains, neuroscience may be uniquely positioned to help develop strategies for people of low SES. She points out that there is "a substantial body of research has revealed association between SES and brain structure and function… neuroscience can be expected to illuminate the processes by which SES become associated with a wide range to important life outcomes and to suggest ways of improving outcomes for people of low SES" (Farah, 2017, p. 62). However, she also stresses that it is too early to make generalizations about "a brain signature and SES or poverty" (Farah, 2017).

Concluding remarks

In conclusion, we would like to offer some recommendations as a way to stimulate further reflections concerning how to improve mental health and access to mental health services in Uganda and Sierra Leone, while recognizing the challenge to meet these needs. As we outline in this chapter, factors such as low socioeconomic status, violence and political unrest contribute to mental disorders and affect brain structure and function. In both countries, children, adolescents and young adults are the most vulnerable and efforts should focus on a prioritization of youth needs, culturally sensitive interventions and capacity building to foster income-generating activities to reduce poverty and its associated mental health risks. In additional, increasing funding should be allocated to support further research initiatives focusing on the long-term impact of poverty and violence on the mental health of the people of Uganda and Sierra Leone as well as the facilitation of access to medications and mental health facilities. Two other important areas in need of improvement should be included: (1) policy development that puts in place robust mental health initiatives that reflect the socio-cultural identity and needs of each country; and (2) the training of current and future mental health professionals. Both countries have a shortage of mental health professionals and therefore efforts should be made to create opportunities for training and continuing education.

The fulfillment of these recommendations will require considerable resources Uganda and Sierra Leone currently do not have. The development of dialogue between global mental health and neuroethics can be a fruitful opportunity to raise awareness initially of the issues surrounding the neuroscience of poverty. The challenge, though, will be how best to improve the mental health of the people of Uganda and Sierra Leone.

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