

Biological Psychiatry in Displaced Populations: What We Know, and What We Need to Begin to Learn

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ABSTRACT

Conflict and climate change continue to displace millions of people, who experience unique trauma and stressors as they resettle in host countries. Both children and adults who are forcibly displaced, or choose to migrate, experience posttraumatic stress disorder, anxiety, depression, and other mental health conditions at higher rates than the general population. This may be attributed to severe, cumulative stress and trauma (largely interpersonal traumas); discrimination and harassment in host countries; and structural barriers to accessing and addressing mental health concerns, including clinician availability, language barriers, cultural differences, geographic accessibility, health care access, and stigma. Despite high exposure to and clinical impact of such experiences, and despite representing 1% of the world population, forcibly displaced people are underrepresented in neuroscientific research. The availability of such literature and research findings is significant in understanding the unique genetic and cultural aspects of trauma- and stress-related mental health, advocacy, reducing stigma, informing prevention, and treatment. The present work aimed to explore how the field of neuroscience can address mental health equity for individuals who have been uprooted in relation to land, with a focus on refugee populations. We offer practical suggestions on how to improve research in this area and narrow the gap in knowledge.

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The United Nations High Commissioner for Refugees indicated in its 2020 report that 1% of the world's population, or 1 in 95 people, are forcibly displaced because of persecution and human rights violations, conflict and violence, and climate disasters (1). The United Nations defines 3 categories of forcibly displaced persons: internally displaced people, refugees, and asylum-seekers. Internally displaced people have not crossed a border to find safety. Unlike refugees, they are displaced within their home countries (2). Refugees are people who flee their countries of origin due to conflict or persecution (3). An asylum-seeker is someone who, similarly to a refugee, has left their country in search of safety but has not yet been legally recognized as a refugee (4). Forcibly displaced persons differ from migrants, people who are outside of their countries of origin for purposes of work, study, or family, or to leave poverty, political unrest, violence, or natural disasters (4). As such, while migrants may not fit the definition of forcibly displaced persons, they may still be in danger in their home countries and face a multitude of stressors, and the same may be true for internally displaced people (4).

Many forcibly displaced persons are exposed to traumatic events—war, loss of loved ones, natural disaster, physical or sexual assault, and fires and explosions (5). As a result of these severe, chronic, and cumulative traumas, risk for posttraumatic stress disorder (PTSD), anxiety, depression, and other mental and physical health consequences is increased. Deprivation, displacement, and postmigration difficulties (6)—including

discrimination and harassment—also significantly contribute to outcomes (7). Syrian refugees, for example, may be 10 times more likely to develop PTSD and other trauma-related psychopathology than the general population (8). Across Syrian, Rohingya, Karen, Kosovan, Iraqi, Kurdish, Nepalian, and other refugee cohorts, rates of PTSD, anxiety, and depression range from 13.9% to 83.4%, from 16.7% to 90%, and from 20% to 89%, respectively (5,8–17). Youths who resettle as refugees are similarly affected (18–20). While trauma has often been the main focus of research, refugees are exposed to unique chronic stressors before, during, and after displacement. Lack of access to basic health care, food, safety, and financial resources; detachment from the familiar environment and loved ones; chronic uncertainty about their future during transition; acculturative stress; role transition and changes within the family; and marginalization and exposure to prejudice in host countries are just some of the abundant chronic stressors that refugees endure for years and decades.

El-Khoury *et al.* (21) succinctly define torture as systematic and deliberate infliction of severe pain or suffering on a person over whom the perpetrator holds power or control to generate a desired response from the tortured individual. Regardless of the form of torture, it will affect both physical and mental aspects of health (22). Some of the long-lasting effects include memory impairment, somatic complaints, feelings of humiliation, PTSD, depression, anxiety, pain, incoherent speech, disorientation, and paranoia (21); these outcomes are

worsened by postmigration difficulties and prolonged wait times to receive clinical services (16). Up to 88.3%, 91%, and 94% of people who experience torture may experience PTSD, anxiety, and depression, respectively (16). Torture survivors tend to be less responsive to evidence-based treatments for PTSD compared with other trauma-exposed groups (23), signaling a need to better understand the unique effects of torture to inform more efficacious interventions (24).

Regardless of the reason for displacement, these populations have experienced a broad and unique range of trauma and chronic stress at the individual, familial, community, and societal levels (25). In this article, we review how neuroscience and biological psychiatry can address mental health equity for individuals who have been uprooted in relation to land (Indigenous communities, migrant and refugee families, and individuals seeking asylum) with a focus on refugee communities, where our expertise lies. We 1) review what is known about the biological impacts of trauma and stress related to forced displacement, 2) highlight critical gaps in the literature, 3) note the challenges in this field that may contribute to such critical gaps, 4) discuss why overcoming these challenges and addressing these gaps is necessary, and 5) provide a call to action with recommendations to improve biological psychiatry research in this area.

WHAT WE KNOW

There have been abundant advances in our understanding of the neurobiological effects of trauma and stress on the brain and the body in recent decades. Many neuroimaging, genetic and epigenetic, neuroendocrine, and psychophysiological studies have examined the effects of trauma and cumulative stress (26–28). However, most of these studies are in military and Western populations and countries. On the other hand, research on trauma and stress among refugees and migrants has been mostly focused on prevalence of mental illness (specifically PTSD) and the role of environmental stressors on psychopathology. Neuroscience researchers have been less involved in this area, and studies are mostly published in journals with nonbiological foci.

There are a limited number of neuroimaging studies in refugee cohorts. Kim and colleagues stand out, having published findings from traumatized North Korean refugees (29–32). Findings from this team indicated that trauma-exposed North Korean refugees had increased amygdala and hippocampal activation in response to negative pictures compared with non-trauma-exposed South Korean volunteers, and that the refugee group showed greater connectivity between the prefrontal cortex, amygdala, and hippocampus during an emotion regulation task (31). Hippocampal response was positively correlated with PTSD symptoms in the refugee group (31). While the finding regarding amygdala and hippocampal activation in response to negative pictures aligned with the extant literature (33,34), the findings regarding increased connectivity between limbic and emotion regulation regions did not (35,36). The authors attributed this to the possibility of refugees' use of emotion suppression (37) strategies as a coping mechanism given their lived experiences (31). This finding supports hypotheses regarding environmental sources of variances in the neurobiological processes that underlie

psychiatric phenotypes, with clinical implications. Another study of structural variation in trauma-exposed PTSD+, trauma-exposed PTSD–, and non-trauma-exposed Kurdish refugees indicated reduced gray matter volumes in the cingulate and orbitofrontal cortices, wherein the non-trauma-exposed individuals had higher volumes compared with the exposed groups, and volumetric deficits were associated with trauma exposure (38). Refugee-related trauma has been shown to affect not only brain structure and function but also postmigration stress: One study of predominantly Iraqi and Iranian refugees resettled in Australia found that cumulative trauma and postmigration stress were associated with fear-related regional activity and connectivity (39). Interestingly, the authors found that postmigration stress was positively associated with connectivity within facial perception networks (39); such enhanced activation may interrupt interpersonal appraisal (40) and may affect postsettlement adjustment (39). Familial and community-based interventions that foster interpersonal growth may be beneficial in the context of these findings (41,42), and both the finding and its implications may have relevance not only to refugee groups, but also to other migrant and displaced populations. Neuroimaging data from the same time also have indicated that “considering social attachments in refugees could be important to posttrauma recovery, based within changes in key emotion regulation brain systems” (43). In addition to emotion regulation (44), refugees may also exhibit variant reward-related function. In a sample of refugees predominantly from the Middle East/North Africa region, those with PTSD exhibited reduced prefrontal responses to reward compared with healthy volunteers, and this was associated with greater severity of anhedonia (45). These findings highlight reward processing as another potential novel treatment target for refugees who experience PTSD and depression (46,47).

While neuroimaging studies can provide insightful information, the method is costly and less accessible. In recent years, levels of pro- and anti-inflammatory cytokines and acute-phase proteins have been queried as candidate biomarkers of PTSD and other trauma-related disorders (48) in veterans and the general population (48–52). Given that inflammatory markers can be easily and rapidly obtained and measured in blood and saliva samples (53,54), they could potentially inform resource allocation, inform clinical care, and track treatment efficacy in a cost-effective and accessible, objective manner. Indeed, several studies have queried inflammation as an indicator of physical health conditions in refugees (55–60), but fewer have looked at mental health despite evidence of physiological changes—like cortisol dysregulation (61)—in refugees. While much of the literature points toward a positive association between inflammation and severity of symptoms (62,63), some studies indicate a negative or no relation (64,65). Notably, research with Middle Eastern refugee populations from our team and others has failed to identify significant correlations between inflammation and symptoms (66–68); the same was true in a cohort of female refugees from North Korea (69). However, one study did show a significant association between C-reactive protein and both PTSD and depression (70). Another team previously reported lower levels of C-reactive protein and serum amyloid A in Iraqi refugees with PTSD compared with those without (71). Such variation may

be due to the types of trauma exposure (28), time since exposure, sex differences, additional environmental exposures, and genetic ancestry (65). Ancestral variation in immune-related genes has been identified in predominantly European and some African ancestry samples. However, the lack of representation of non-European individuals in genome-wide association studies (78% of individuals in genome-wide association studies are of European ancestry; 10% are Asian, 2% are African, and 1% are Hispanic or Latin American, with the least represented groups being of Native American and Middle Eastern ancestry) not only hinders researchers from calculating polygenic risk scores in non-European samples (72), but also presents a gap in the knowledge base of how genetic variation may underlie differences in immune regulation. Similarly, genetic variation may underlie differences in sympathetic, hypothalamic-pituitary-adrenal axis, and hormonal systems that could contribute to differential findings across individuals of different backgrounds—including Indigenous and displaced populations. As can be seen, the lack of representation in genetics research has wide-reaching consequences and leaves a number of scientific questions outstanding. This problem expands beyond the study of displaced populations, and there are several calls—including current ones from the National Institute of Mental Health—to improve this.

Like inflammation, psychophysiological measures may be viable candidate biomarkers worthy of consideration in displaced populations, especially features like acoustic startle response (73), fear-potentiated startle (74–76), and skin conductance response to trauma interview (77,78), as well as those commonly obtained as part of routine clinical care like blood pressure, heart rate (HR), and HR variability. HR is considered one of the most robust physiological indices of PTSD (79–81). One study of Iraqi refugees found higher HR across all refugees regardless of diagnostic status compared with healthy control participants; however, the authors did not observe specificity for PTSD (and it should be noted that all refugees in the study screened positive for at least one mental disorder) (82). A similar finding was observed in a sample of Cambodian refugees; however, in this sample, those with PTSD demonstrated the greatest elevations in HR, and the same sample also exhibited elevations in skin conductance and blood pressure (83). In another study of refugees with PTSD, the acoustic startle response was associated with greater severity of PTSD and lower levels of functioning (84). Finally, an electrophysiology study in trauma+ PTSD+, trauma+ PTSD–, and trauma– PTSD– Iraqi refugees indicated reduced auditory and visual responses in the PTSD+ group compared with non-trauma-exposed control subjects (85). Psychophysiological studies with refugees that have failed to produce significant results (69,84,86) may have been limited by small sample sizes and problems related to the use of self-report measures of psychiatric symptoms for use in non-Western cohorts. Even in studies that have reported preliminary findings, results must be interpreted with caution given insufficiently powered analyses (87). Psychophysiological studies are severely lacking in refugee populations, and displaced populations more broadly, yet psychophysiological biomarkers may be the most accessible and objective indicators of mental health in such a cohort. Current

investigations in this realm are ongoing by the authors at the Stress, Trauma, and Anxiety Research Clinic (STARC lab; <https://www.starclab.org>).

WHAT WE DON'T KNOW

Gene-by-environment interactions largely underlie psychobiological phenotypes associated with mental health disorders (88), yet our current body of research in this realm is biased toward White cohorts in Western industrialized nations (89) and therefore is unable to fully model key genetic and environmental factors, including culture, that underlie mental health (88). Recent advances in the field of cultural neuroscience have shown not only that mental illness presents differently between cultures, but also that the culture itself shapes the brain and affects how information is processed (90). Cumulative research indicates that people raised in different cultures process facial affect (91), contexts and cues (92), and interpersonal interactions (93) differently, all of which are important and integral parts of a displaced person's experience. Chiao and Blizinsky (94) summarized “one of the most robust findings within cultural neuroscience” as prefrontal activity as a function of cultural values. Briefly, those who belong to individualistic cultures have greater prefrontal activity when thinking about themselves in general, while those who belong to collectivistic cultures have greater prefrontal activity when thinking about themselves in a contextual fashion, such as in relation to others (95). So too does the amygdala differentially respond to emotional cues across cultures (96,97), and this variation may change over time owing to prolonged exposure within a different culture (98). Notably, in Chiao and Blizinsky's (94) review of cultural neuroscience, no studies of prefrontal-amygdala circuitry in Middle Eastern, African, South Asian, Latino, or Indigenous populations were cited. There is a clear gap in research across global populations, and especially in regions from which a high number of people migrate or experience the impacts of forced displacement. While an important next step is to begin to learn how cultural and environmental variation in neurobiology contributes to differences in psychopathology, at least in the area of trauma and stress, it will be pivotal to address such differences among displaced populations of diverse backgrounds.

What makes this field even more complicated are the genetic differences in people of diverse ancestries. There has been enormous investment in recent years in understanding of the genetic and epigenetic characteristics of risk and resilience to mental illness. The Psychiatric Genomics Consortium has been one of several important initiatives that have attempted to include a diverse array of populations of different ancestries in a large dataset (99). However, there seems to be limited access to such data from displaced populations. For instance, to our understanding, the only sample of individuals of Middle Eastern ancestry included in the Psychiatric Genomics Consortium for PTSD comes from our group. The inclusion of people of different ancestries and diverse traumatic experiences in such research is vital in light of inclusivity and what we know from cultural neuroscience research about the role of genetic variation in the neurobiology of culture (97). An example is genetic distance, which indicates that geographic clusters may affect allele frequency (100). Here, not only does

modeling the variation across populations become important for the environmental aspect of the gene-by-environment interaction (as described above), but also the relevance of conducting genetic studies across geographic regions becomes essential to fully understand the biological underpinnings of psychiatric disease (88).

CHALLENGES IN THE FIELD

There are a number of factors that may contribute to the paucity of research at the intersection of neurobiology and displaced populations. Primarily, as an intrinsic function of their migratory status, some displaced populations may be difficult to access. While refugees and internally displaced persons may be more readily accessible when based at resettlement camps (101), postsettlement—largely in cities—it may be more difficult to meet such populations without close partnerships with representatives of and from displaced communities (102). Migration out of camps to resettlement contexts not only may complicate efforts to longitudinally track health, but also can result in a lack of uniform health services and disrupted access thereto (103). This also adds a layer of complexity in controlling for changes in the environment and additive environmental stressors in longitudinal studies and care. Additionally, both camps and other protracted displacement contexts are largely found in poor and unstable regions (104). This means that 1) infrastructure to meet both the research goals of investigators (e.g., there are no magnetic resonance imaging scanners in resettlement camps, inadequate funding) and the clinical needs of displaced persons may not be sufficient, and 2) relational, community, and societal-level factors may add additional burdens of discrimination, and lack of access to resources, education, and jobs, potentially furthering stress and psychopathology.

Once connected, building trust with displaced persons and ethical considerations are additional critical issues to consider. There may be social and legal concerns of participants that may deter participation for fear of retaliation, loss of services, or shame; may result in underreporting; or may put an individual at risk should privacy or confidentiality be breached (105,106). The ability to freely make informed consent may also be hindered, especially when conducting research in camps at which individual freedom and choice may have largely been curtailed (105) and in situations in which individuals may be illiterate and hence unable to read and sign a consent form (106). Individuals may feel as though they are required to participate, or they may perceive research opportunities as their only option to contact a medical expert, given the striking provider shortages not only in conflict zones and resettlement camps, but also in host countries. Research with displaced populations must therefore be well focused and conducted, at least in part, by members from the beneficiary community—those who share not only the language, but also the culture and experiences (106), and who have a direct benefit for the target community. Community-based participatory research models offer a guiding framework to meet these goals (107).

Researchers and clinicians who intend to work with beneficiary communities of which they are not a part of should engage in cultural competency training, and teams should include members who originate from the beneficiary community (108).

Existing data should be leveraged to the fullest extent and when necessary additional data collection be conducted in partnership with a strong local organization that works with beneficiary communities by individuals belonging to the beneficiary community (105). Adaptation of local mental health expressions and idioms into interventions and using locally derived measures is another potential solution (109). Here, there is an opportunity for novel research to generate the evidence base for participatory community-based approaches and psychometric studies of adapted versions (e.g., translations, culturally appropriate modifications) of standardized measures for assessing mental health and psychopathology (109).

WHY IS IT IMPORTANT?

While most biological psychiatry research on trauma and cumulative stress is focused on military and urban civilian populations and those affected by poverty, there is much less known about the displaced populations with the combined experience of the aforementioned groups. Refugees and survivors of torture are civilians without military training or protection, who are uniquely exposed to 1) various levels of military trauma, 2) civilian interpersonal trauma, 3) poverty and environmental stress, and 4) often urban trauma and cumulative stress in the host countries. This is a unique population in that the experiences of displaced persons do not align with those of traumatized military or civilian groups. On the other hand, there are shared features between refugees and other traumatized groups, meaning that research on displaced persons could bring additional insight to research on other traumatized populations. Given that almost 1% of the world population has been forcibly displaced, dedication of research resources to understanding potential unique neurobiological impacts of trauma and stress in refugees is important from an equity and inclusiveness standpoint, and for our understanding of the neurobiology of trauma and stress in general. Additionally, eliminating health disparities that affect not only displaced persons, but also other underrepresented and marginalized groups could save the U.S. economy more than \$1 trillion (about \$3100 per person in the United States) (110,111). Rigorous neuroscientific research in refugee populations could give rise to increased resource allocation, focused preventative interventions, and efficacious culturally adapted treatments. In the realm of health disparities, migratory groups are unique in that they may have experienced disparities attributed to different root causes across various contexts. Upon resettlement, they may experience health disparities owing not only to being a migrant population (88), but also to acculturative stress (112).

Another motivator to fill this knowledge gap is the importance of neurobiological findings in fighting stigma and in advocacy. Recently, the first author (AJ) participated in a documentary about Sudanese refugees as a refugee trauma expert. As part of this work, the producers aimed to show their audience that trauma affects the brain of a refugee, as it does a first responder, a veteran, and a civilian with PTSD, to allow the public the opportunity to understand the universality of trauma including in refugees. For that purpose, they asked for sample brain images of Middle Eastern or African refugee participants with PTSD. Unfortunately, there was not much of

such data available in the literature. Availability of such information about neurobiology of trauma is helpful not only to the public, but also to the individuals who experience trauma and mental illness, to develop insight into what happens in a traumatized and stressed brain. Having a knowledge base about the biological bases of mental illness can help to overcome stigma by contextualizing mental illness as being the same as any other illness of the body, which would not be met with such stigmatization, and can contribute to public education on these matters. This is specifically important because such stigma often contributes to initial resistance in seeking and accepting treatment (113–117). This could also help in acceptance of medical treatments such as pharmacotherapy. Of course, there is conflicting evidence that neurobiologically based educational interventions might actually increase stigma (118); social contact–based interventions may offer an alternative in this case to beneficially reduce stigma in mental health (119).

Finally, and related to the previous topic, it is important to not lose sight of a primary goal of research in biological psychiatry: to inform prevention and treatment. A key aspect of personalized treatment in recent years has been determining biomarkers of etiology, course, and severity of psychiatric symptoms (48,64,120,121) for prevention, focused intervention, and neurobiological determinants of treatment effects (122). From a clinical standpoint, cultural differences in the conceptualization of mental health as an illness, language barriers, and the unique traumas and stressors experienced by displaced persons necessitate rethinking treatment and customizing treatments that are more acceptable, feasible, and effective in these populations. What biological psychiatry can contribute to this field is the expansion of biomarker research in displaced populations. Furthermore, large-scale clinical trials of pharmacological interventions for stress- and trauma-related disorders and depression often do not include participants with ancestries and cultures of many of the refugee and immigrant populations. Mollica (123) wrote that “special attention must be given to the proper dosing of psychotropic drugs in culturally diverse populations.” Genetic and metabolic differences in these populations might lead to different response, tolerance, and side effect profiles for medications commonly used in Western medicine (124,125), which is corroborated by peer-reviewed research on cultural factors related to the use of psychotropic medications (126,127). More research is needed here to parse out the genetic, metabolic, cultural, and psychological contributors to variance in response to medication in diverse populations.

CALL TO ACTION: HOW TO GET THERE

War, natural disasters, persecution, and migration (forced or voluntary) have continued to mark human history. This has resulted in increased rates of PTSD and other mental health conditions in forcibly displaced persons compared with those of the general population. Refugees and migrants have unique experiences and cultural, environmental, and genetic backgrounds, and they are affected by health disparities that may distinguish them from populations traditionally featured in neuroscientific studies—namely, WEIRD (Western, educated, industrialized, rich, and democratic) samples (89,128,129).

Understanding the unique experiences of these individuals and their communities within the greater society is critical to ensuring their representation in scientific research and identifying mechanisms of intervention across all levels of the ecological systems model (25). The paucity of data here limits the ability to fully understand the neurobiological processes underlying mental health in displaced populations, which extends to a diminished ability to develop and evaluate focused prevention and treatment. To begin to achieve this goal, we provide recommendations herein.

Researchers in this field should consider focused research questions regarding displaced populations. As noted above, most research in migrant and refugee populations is focused on epidemiological and environmental questions, while neuroscience research is lacking. The inclusion of such populations in biological psychiatry can be encouraged by 1) education on these groups and the significance of this research; 2) targeted funding allocated to such research by the National Institutes of Health, National Science Foundation, and others; and 3) focus on displaced populations at national and international conferences, as well as in related high-impact journals. This may include inviting those involved in refugee and migrant research to these venues and connecting them with neuroscience and biological researchers, specifically in areas of trauma and stress. Many research collaborations start in such contexts.

Related to the previous point, there is a need for providing resources and expertise in regions that host larger numbers of refugees. For instance, while most Syrian and Iraqi refugees are resettled in neighboring countries in the Middle East, neurobiological research resources are not as available and expansive in these countries as they are in the United States, for example. Efforts to connect research teams across the globe will not only help fill these gaps in resources and skills, but also strengthen and expedite research for all involved via merging forces and resources. This may be fostered by funding opportunities from the Fogarty International Center at the National Institutes of Health, the Fulbright Scholar Program, and other major funding centers with capability and involvement in international research.

Neuroscientific research in host countries should use assessment tools for measuring stress and mental health concerns that have been adapted, validated, and found to be reliable and feasible across cultures. There should be special attention paid to cultural sensitivities. For instance, our experience suggests that a person’s cultural background might affect their level of comfort or acceptance with questions about their history of sexual experiences or trauma. Researchers should also assess stress and trauma related to displacement and discrimination to capture the unique experiences of displaced populations. Mixed methods approaches may be especially useful here. Cultural neuroscience studies can consider differences among persons from geographically proximal locations: Despite proximity and even shared ethnicity, communities may have variant cultural practices. Research in one displaced population might not necessarily generalize to others. Neuroscientific research with forcibly displaced populations should be framed within community-based participatory action research models. This must begin with building a trusting rapport with members of

the target community and their trusted leaders, and inclusion of members of the community as equal members of the research team. The research should be informed by the needs of community members, and the results of the research should be available to community members for their knowledge, feeling of being truly included, and advocacy. Integrating stakeholders into the research team can ensure adequate recruitment and full representation and bolster success. Our team's research has enormously benefited from these strategies of working with the community and using the help of those trusted by the refugee communities. The inclusion of people who share the same background with the target population in the research team is also of vital significance. Our projects have benefited immensely from the inclusion of research team members who are refugees or first-generation immigrants themselves.

Researchers working with displaced populations should also consider how to execute rigorous science across diverse settings: Structural barriers including geographic distance, transportation, Wi-Fi, and access to communication devices may limit participation for displaced persons. The use of mobile technologies for data collection in nonlaboratory environments can further the inclusion of broader populations.

Finally, given the ongoing nature of the trauma and stress among the refugee and migrant population, research in these groups not only has to consider the variety of environmental and cultural factors of risk and resilience, but also should consider a longitudinal approach to understanding the neurobiology of stress and trauma in them. The traditional approach of seeing PTSD as a dichotomous variable, in which individuals either have or do not have a certain condition, in cross-sectional studies might not be as informative in all populations, specifically in displaced persons. Based on their current level of environmental stress and trauma, the same person might pass the full diagnostic criteria for PTSD at one time point (and in a simplistic approach be considered as traumatized PTSD) and not at another time point (and be considered trauma-exposed resilient). For this reason, and for a better understanding of the most important predictors of risk and resilience and biological and environmental targets of intervention, longitudinal studies in refugee and migrant populations are of vital significance (130).

Despite the chronic and cumulative stressors and traumas faced by displaced populations, these communities are incredibly resilient. Capturing facets of resilience in such groups will be informative for the treatment of those more affected by trauma and stress. While there is much more work to be done, efforts toward modeling the experiences of diverse populations continue to expand and will prove to be transformative to the field of biological psychiatry.

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