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Towards Neuroecosociality: Mental Health in Adversity

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Abstract

Social theory has much to gain from taking up the challenges of conceptualizing 'mental health'. Such an approach to the stunting of human mental life in conditions of adversity requires us to open up the black box of 'environment', and to develop a vitalist biosocial science, informed by and in conversation with the life sciences and the neurosciences. In this paper we draw on both classical and contemporary social theory to begin this task. We explore human inhabitation – how humans inhabit their 'ecological niches' – and examine a number of conceptual developments that 'deconstruct' the binary distinction between organism and environment. We argue that we must understand the neurological, ecological and social pathways and mechanisms that shape human (mental) life if we are to address the central concerns of our discipline with inequity and injustice as these are inscribed into the bodies and souls of human beings.

Keywords

adversity, affordance, ecosocial theory, mental health, niche, social determinants

Introduction

It is time for those concerned with social theory to re-engage with questions of 'mental health'.[1] Half a century ago, critical analyses of mental health were at the heart of our understandings of the social world – whether in the work of Erving Goffman, Michel Foucault, R.D. Laing,

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Frantz Fanon, Dorothy Smith, Phyllis Chessler, Elaine Showalter, Thomas Scheff. . . . Power and social exclusion, social control and resistance; identity, gender, racialization and stigmatization; self, subjectivity and subjectification; norms, normality and normalization; knowledge and its authority – these were not merely central to our understanding of what had become termed mental illness, not merely crucial for the reform of social practices towards those who were 'different', but fundamental to understanding social injustice. Yet at the very time when 'mental health problems' suffuse popular debate, when social epidemiologists have demonstrated the crucial role of 'social determinants' of mental health, and the neurosciences are postulating novel pathways linking adverse social experience to mental distress, these issues have been marginalized to a disciplinary sub-speciality. A reengagement of social theory with questions of mental health, in critical dialogue with contemporary neurosciences, can not only help us understand the social origins of mental distress but can play a part in 'revitalizing' sociology itself. For want of a more elegant word, we term our approach 'neuroecosociality'.[2]

Beyond Social Determinants

How can one account for the evidence on *The Social Determinants of Mental Health* (World Health Organization, 2014)? Research consistently shows that particular groups are more vulnerable to the development of mental ill health than others, for example people who live in large cities (especially in Northern Europe) (Kirkbride et al., 2018), migrants (Morgan et al., 2019), or more generally those who experience social disadvantage and inequality (Fett et al., 2019; Patel et al., 2018). The diagnoses involved range from schizophrenia, bipolar disorder and other psychoses – 'serious mental illnesses' – to anxiety or depression – the so called 'common mental disorders' that afflict almost all of us at some time in our lives.

Researchers have proposed a range of 'social factors' to explain how social environments lead to mental ill health. Many focus on poor caregiving, stress, trauma, environmental insults and nutritional deficits in the early years and even the pre-conception period (e.g. Gillman, 2005; Felitti et al., 2019). Attention has turned to the 'pathways' through which environmental adversities have their mental and cerebral effects: stress, inflammation, microbiomics, environmental insults and their epigenetic effects on gene expression in the brain or on neuroplasticity. These have now become the topics of popular books (Bullmore, 2018; Yong, 2016), although evidence for their claims is questionable (Dowd and Renson, 2018; Renson et al., 2020). Not only do they usually rely on shaky extrapolations from laboratory experiments, but there is a notable failure

to engage with sociological or anthropological research on the ways in which human beings manage their lives in challenging circumstances.

What we lack, as Nancy Krieger has tirelessly pointed out (Krieger, 2001, 2014), is an 'ecosocial epidemiological theory' that '[...] truly integrates social and biologic understandings of health, disease and well-being' (Krieger, 1994: 894–5). To help develop such a theory, we draw on concepts from the social sciences, life sciences and neurosciences to analyse the ways in which humans create and inhabit, shape and are shaped by their 'ecological niches'.[3] We conceive of niches as 'biological localities' that not only foster certain forms of life, but shape the biological processes of the bodies and the brains of those human beings that inhabit them.[4] These niches are not fixed 'environments': as Kurt Goldstein argues, the environment of an organism is 'by no means something definite and static but is continuously forming commensurably with the development of the organism and its activity [...] the environment emerges from the world through the being or actualization of the organism' (Goldstein, 1995 [1939]: 85). Like Goldstein, our approach is unashamedly 'vitalist'. This is not to invoke an 'elan vital' nor a generalized philosophy of 'becoming' (Fraser et al., 2005; Stengers, 2011).[5] Vitalism, for us, is a persistent reminder that living entails a constant activity oriented towards survival, a dynamic engagement of organism and milieu that takes multiple forms, always threatened by sickness and suffering, always liable to error, mistakes and false paths (Canguilhem, 1965; Osborne, 2016: 194).

A focus on mechanisms and pathways is not a turn from the macrosocial to the molecular. On the contrary, we hope to show that attention to the neuro-bio-ecosocial pathways involved in the co-construction of human vitality in different 'regimes of living' (Collier and Lakoff, 2007) is required to address the central concerns of our discipline with the consequences of inequity and injustice as they are inscribed into our bodies and souls and lived out in the niches we inhabit. As we move towards a world where the majority of the population live in those places we call cities, urban inhabitation, which has been the domain of our own recent research, will be our focus here.

Ecological Niches

How can we grasp the 'causal architecture' (Keyes and Galea, 2017), or the 'mechanisms' (Manning, 2019), through which ecosocial experiences are embodied?[6] We need to go beyond the broad correlations of social epidemiology to focus on the actual experiences of those who live their lives in those adverse circumstances that have been identified as social determinants – poverty, poor housing, pollution, financial stress, domestic abuse, racism, stigma, trauma. These are not raw individual experiences; experience always arises out of encounters in a shared social and

material world suffused by affects, meanings and memories. Nor are they static; for humans, both past and future, are present in the experience of the present. As our argument started from the ecosocial, let us start with one of the foundational concepts of ecology: the ecological niche.

What Is an Ecological Niche?

The idea of a niche long predates ecology and its definition has been much debated.[7] We think of niches as both relational – established in relation to other niches – and substantive, in that a niche implies a certain mode of life of the organism within a specific habitat in an ecological system. A niche is thus a zone of living within a milieu that can be occupied by a particular organism with its mode of existence, diet, temperature range, reproductive requirements and so forth. But rather than thinking of a niche as occupied by a 'species', we focus on the diversity of niches – the multiple habitats – of groups of humans differentiated by age, gender, ethnicity, economic resources, housing situation and more which shape their forms of life as biosocial beings.

Of course, we are not the first to argue for the utility of the idea of a niche for social analysis.[8] Consider, for example, Greg Downey's account of street children in Brazil, which he refers to as 'a limit case showing the challenges of living in the city as an ecological niche' (Downey, 2016: S52).[9] The niche for these children is both pre-shaped for them and requires a constant activity of recreation, encompassing their journeys to and from the favelas, their search for derelict buildings or vacant spaces where they sleep, the places where they work, the traffic ridden streets, road junctions, or pavements where they make a bit of money by begging, watching parked cars, selling sweets on the buses, or by theft. Daily, '[t]hey navigated dangerous traffic, picked their ways through unmapped favelas, evaded police and private security, and organized themselves for personal safety and conflict resolution' (2016: S52). They have devised forms of conduct in this niche which they have collectively co-constructed: they forage for food, visit charity kitchens and meal programmes or find other ways of securing their means of subsistence – for example by procuring meals from restaurant left-overs.

Although most street kids are boys, studies of female street kids in many countries show that while they are 'at maximum risk of being involved in antisocial activities with peers' including sexual exploitation, they are also often 'high on community engagement . . . and resilience' (Sharma and Verma, 2013: 365). Thus this is not a form of life without conflicting morals and mores: while sexual exploitation among these kids may be common, so is food-sharing, and scavenging and stealing are often thought shameful. But over and above their relations with one another, their patterns of interaction with their material and social

milieu means that they are exposed to particular forms of hostile interaction, violence and accidental injury. Their lives in this niche expose them not only to potentially hostile humans, but also to pathogens and parasites, and hence to certain types of diseases such as dysentery and perhaps HIV. Their niche is thus 'bio-ecosocial'. This bio-ecosocial niche protects street kids from the obesity common to many in poverty who are constrained by their obesogenic milieu to a diet of industrialized food high in calories, fats, salt and sugar that wreak a high metabolic toll. But foraging also restricts the diet of street kids, limiting calories and often resulting in malnutrition. It is also clear that their lives are suffused with anxiety, fear and stress: the neuroecosocial experiences whose mechanisms we consider later in this paper,

These street kids do not merely *inhabit* an urban niche, they *construct* it. Indeed the subtitle of Downey's paper is 'phenotypical bias from urban niche construction', referring to 'niche construction theory' in evolutionary biology (Odling-Smee, 1988; Odling-Smee et al., 2013). Richard Lewontin put forward the concept of niche construction in his critique of standard arguments about evolution by natural selection: 'organisms do not adapt to their environments; they construct them out of the bits and pieces of the external world' (Lewontin, 1983: 280). For evolutionary biologists, niche construction is 'the process whereby organisms, through their metabolism, their activities and their choices, modify their own and/or each other's niches' (Odling-Smee et al., 2013: 419).[10] For us, however, the key point is that humans are virtuosos of collective niche construction, co-shaping milieux and forms of life over the long, medium and short durée, often embodying strategies to create desired forms of life but constantly reconfigured through unexpected events – war, natural disaster, pandemics – and remade at every moment through the active bricolage of urban inhabitants.

Affordances

A niche *affords* certain ways of acting. We draw the notion of affordances from the work of James Gibson; it refers to the inseparable interconnections between sentient, meaning-making, intentional organisms and their environment (J.J. Gibson, 1979: 127):

> The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, the noun affordance is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment.

Certain features of a niche engage with those humans co-present, making particular ways of acting possible (or impossible). Barry Smith puts it well (Smith, 2009: 125–6):

> Each type of organism is tuned in its perception and action . . . to objects ('affordances') which . . . together form what Gibson calls the organism's 'ecological niche'. [A niche] embraces not only things of different sorts but also shapes, textures, boundaries (surfaces, edges), all of which are organized in such a way as to enjoy affordance-character for the animal in question in the sense that they are relevant to its survival. The given features motivate the organism; they are such as to intrude upon its life, to stimulate the organism in a range of different ways.

Affordances thus 'attune' those who inhabit certain locales to a particular socio-cultural world. Gibson gives the example of the post-box which affords the mailing of letters (J.J. Gibson, 1979: 138), but we can use the telephone box or phone booth. From about the start of the 20th century, such boxes afforded certain types of conversation in many city streets. But, in the age of the mobile phone, they no longer do so. This was not a matter of human beings once superimposing a specific 'meaning' onto the phone box and now ceasing; values and meaning suffuse certain physical objects only in the form of life made possible by inhabiting a particular human niche (Costall, 1995). To quote Smith again (Smith, 2009: 125):

> In perception, as in action . . . we are caught up with the very things themselves in the surrounding world, and not with 'sense data' or 'representations' . . . [but a] direct linkage between the perceiving organism and its environment which grows out of the fact that, in its active looking, touching, tasting, feeling, the organism as purposeful creature is bound up with those very objects . . . which are relevant to its life and to its tasks of the moment.

Gibson thus sidesteps Cartesian dichotomies: it is not a question of whether that which is external to an organism exists or does not exist: the 'external world' for any organism, is dependent on its perceptual capacities, its array of saliences, and – note the vitalism here – the ways in which it seeks to fulfil its needs and aspirations.

No doubt for some creatures – ticks, worms, fishes – the attunement between the organism and its environment is fixed by evolution.[11] But for many sentient beings, saliences are not fixed but shaped by neural inscriptions or memories suffused with affects of joy, fear, and expectation – the dog and its bowl or lead, the horse and its saddle, bridle and rider – each is inscribed with a certain impulse to action – to drink, to trot

– which can be reinforced by rewards and training (see, for example, Wolfe, 2003). For the human, and no doubt for other creatures too, con-specifics are included in the field of affordances, and so many features of those others – from their posture and gestures, to their facial expressions, to their behaviour more broadly – can 'afford' particular kinds of responses. These are shaped by language, meaning and symbols, each infused with affects, even though many saliences relevant to tasks of the moment are so habitual that sociologists might not class the behaviour that results as action at all (Camic, 1986). And the ways that humans give meaning to the world – the forms of knowledge they draw upon, the connotations of signs and symbols, the things they believe to be true – are not individual but shaped by the collective thought worlds they occupy.

For that master-describer of the social life of small urban spaces, William H. Whyte, walls and steps in city squares, in addition to their planned function, afford office workers and tourists spaces for sitting and eating lunch; different designs of shop doorways somewhat accidentally afford certain types of meeting; pavements of certain dimensions afford some types of gathering and conversing and so forth (Whyte, 1980, 1988). But affordances for humans are highly segmented by forms of life. Even thinking in simplistic categories about Whyte's city squares, for example in a Brazilian city like São Paulo, we can see these inequities for men and women, old and young, rich and poor, dark or light skinned, working or unemployed, tourists, Bolivian migrants, street boys, street girls, or favela dwellers. For those Brazilian street children who inhabit São Paulo, the pavements in Avenue Paulista may afford sleeping, the pockets of window shopping tourists may afford pick-pocketing, the dumpsters outside restaurants may afford scavenging and so forth. But for wealthy Paulista women, who live much of their lives in gated communities, they afford none of these things, and when they venture out, roads under bridges and pavements often afford little except the possibility of being robbed or assaulted; many are suffused with anxiety and vulnerability and are best avoided altogether. Affordances are thus always infused with affects that co-constitute and delimit a niche. And affordances only become such within a particular form of life, as it is lived by a particular 'kind' of person (Rietveld and Kiverstein, 2014).[12]

Umwelt

We have suggested that we can understand the niche of Brazilian street children in terms of the specific affordances that it offers to them. But how do they experience the world, what do they see, sense, feel, what is salient to them and in what ways? If we are to develop a neuroecosocial approach to mental distress we need to attend to that world of experience, because we need to understand those experiences that seize upon some and not others: the anxieties, worries and intrusive thoughts and

voices which suffuse their particular niches. To do so, it is helpful to start with Jakob von Uexküll's notion of the *Umwelt* (Von Uexküll, 1930, 2010 [1934]).[13]

What is an *Umwelt*? As is well known, Von Uexküll used this common German word to argue that there is no one 'environment' common to all species. What the tick or the dog sees, hears, smells, tastes, reacts to is what is salient to it. Its sensory capacities have co-evolved in such a way that the creature is attuned to its ecological niche – to things that form its prey or its sustenance, or are required for its reproductive activities, or which might predate on it and so forth. The animal lives in a world made up of those sensory inputs – Von Uexküll refers to them as various types of 'signs' – that evoke the behaviours that enable it to live, survive and reproduce.

For Von Uexküll, each member of a species dwelt in a unique phenomenal world 'embracing each individual like a ''soap bubble'' which it is always actively creating in relation to its *Bauplan* – its own needs and designs' (Rüting, 2004: 50). Such individualism is misplaced: even for ticks or dogs, the parameters of configuration of its *Umwelt* are coevolved between the species and its niche. And for humans, those relations are less co-evolved than co-constructed in a certain form of life. Nonetheless, for our purposes, we can take something quite simple from Von Uexküll's arguments when extended to human beings: our human habitat is not composed of an array of signs that are salient to our species because of our evolution but comprises visual, auditory, sensory experiences saturated with historically, socially, culturally and biographically shaped meaning. For humans, such experiences fuse apperception and interpretation even where they shape actions that are habitual rather than the result of conscious deliberation.[14] Some of these sign/meaning/action complexes are indeed 'fixed action patterns' embodied by the co-evolution of humans and their niches, for example, those evoked in the 'visual cliff' experiment in babies (E.J. Gibson and Walk, 1960). Others are historically and culturally variable, but shared across members of a particular society, embedded in their languages, forms of social organization and the material organization of space and time. Still others are differentiated by age, gender, ethnicity, locality, and, for example, will differ for migrants and refugees: they are constructed within the niches of particular communities and their affordances. Humans are enmeshed in multiple *Umwelten*, then, but these are collectively constructed and maintained.

As will have been evident, we think it is erroneous to conceive of human organisms as closed systems, demarcated from their milieu by the barrier of their skin. A growing body of neuroscientific research confirms a view long held by many social scientists: that human bodies, minds and brains are inextricably enmeshed in the world. Mental states[15] are not the product of 'the brain'. Human capacities to

think and feel are only possible because of coupling with all manner of resources outside the boundaries of what Andy Clark has (somewhat dismissively!) termed our 'skinbag' (Clark, 2008; Clark and Chalmers, 1998). This is not a matter of 'cognition' in the sense of a faculty of knowing: at least for a human, there is no knowing or thinking without feeling and willing (Damasio, 1995). Our own approach to our world of signs is thus indebted less to Saussure (1959 [1916]) than to Roland Barthes (2015): objects, places, images, and indeed animals and persons, are freighted with connotations, with meanings and memories. As in Barthes' *Mythologies,* each carries an affective charge. Yet these affects are not individualized psychological emotions. For example, grief at the death of a loved one is embedded in a niche that consists of artefacts, materials and the comportment and attire of other persons; from the rituals of the funeral service itself to keepsakes for remembrance of the deceased, grief is realized only through 'instances of organism-environment couplings' (Colombetti and Krueger, 2014: 1160; see also Brinkmann and Kofod, 2018: 167).

Indeed much of our human urban *Umwelt* is constructed with the aim of evoking affects to manage conduct: thus monumental buildings, prisons, parks and public places adorned with statues sought to inculcate civility and civic pride, while the mundane organization of city streets or housing estates often sought to manage different sectors of the population (for examples of this process in major Brazilian cities see Brandão, 2006; Caldeira, 2000; Holston, 1989; Sandler, 2007). Not, of course, that they produce the effects that the planners imagine; while strategies for the government of conduct are eternally optimistic, their schemes are congenitally failing (Miller and Rose, 1990: 10).

Atmospheres and Biological Localities

The notion of 'atmosphere' has become fashionable in human geography: the idea that each city, each part of each city, even each building, has its mixture of affects and emotions, of feelings of calmness or excitement, of melancholy or joy, holiness or eroticism (Anderson, 2009; Gandy, 2017). Teresa Brennan has explored the significance of these ecologies of the senses – the smells, sounds, pheromones of excitement, aggression or fear that transfer feelings and emotions among individuals, blurring the boundaries of bodies and environments, of physiology and materiality (Brennan, 2004). While she considered these ways of thinking to be at odds with contemporary biology, this no longer is the case. We may smile knowingly at the 19th-century conception of miasma, which combined the moral character of a place with the smells, vapours, and noxious emanations that pervaded it. But both biological and social scientists are beginning to recognize that each niche does indeed have a specific and unique sensory environment that enmeshes and constitutes

those who inhabit it psychologically, physiologically, materially, neurobiologically – a 'sensorium' which may be elusive but is real in its consequences.

A niche, that is to say, is a 'biological locality'. We adapt this idea from Margaret Lock's concept of 'local biologies' (Lock, 1994) that 'reflect the very different social and physical conditions of women's lives from one society to another' (Lock and Kaufert, 2001: 494).[16] Our focus on biological localities moves the analysis from societies to niches, to local neuro-biologies shaped by the niches we inhabit, the affordances they offer, the *Umwelten* we dwell within, and the meanings that we give to our experiences as they unfold over space and time.[17] Atmospheres in these niches are composed of more than sensations, meanings and affects. The niches inhabited by Brazilian street children are toxic, not just because of the daily struggle to acquire the necessities of life against a pervasive threat of violence from other people, but because their vitality is constantly under threat from exposures to the pathogens and parasites with which they share their lives (for a brief overview, see Furlow, 2016).

We are beginning to grasp the neuro-biosocial pathways through which this shapes their corporeal and cerebral existence. The concept of the exposome is helpful here. The exposome is 'composed of every exposure to which an individual is subjected from conception to death- . . . the extensive range of specific external exposures which include radiation, infectious agents, chemical contaminants and environmental pollutants, diet, lifestyle factors (e.g. tobacco, alcohol), occupation and medical interventions' (Wild, 2012: 24). As Wild and his colleagues demonstrate, evidence suggests that exposures to pollutants 'have specific ''omics'' profiles'; that is to say exposure results in distinct patterns of gene activation and transcription, and hence of the patterns of interaction among the very molecular constituents of their molecular phenotype or 'metabolome' (Wild et al., 2013: 480). There is growing evidence of the implications of differently configured metabolomes for physical and mental health (Gomez-Casati et al., 2016). It is daunting to measure exposomes: despite the availability of some instruments such as sensors and geographic information systems, a full accounting is 'at present not feasible and may never be fully realized' (DeBord et al., 2016). But while pathways to mental health are still under exploration, there is evidence that one route is through the microbiome, which is acutely sensitive to changes in the internal and external milieu, which shapes development and affects both health and disease, not least through the gut-brain axis (Dowd and Renson, 2018; Human Microbiome Project Consortium, 2012; Lucas, 2018; Mayer et al., 2015).

We can thus begin to give greater empirical density to ideas such as 'atmosphere' through studying these pathways which inextricably entangle biology and milieu across the trajectory of the lives of those who

inhabit specific niches. But we need to approach the current candidates with considerable caution. Many social scientists have been excited by the promises of epigenetics, especially that sense of this term that refers to processes of gene activation and de-activation across an individual's life in response to inputs from the milieu (Lock, 2013, 2015). But while there is exciting research on environmental epigenetics (Landecker and Panofsky, 2013), many of the key studies have been carried out on animal models in laboratory environments, and extrapolations to humans is unwise (Dowd and Renson, 2018) and evidence for genetic transmission of epigenetic changes across generations remains the subject of dispute (Perez and Lehner, 2019). Work on social determinants has come to focus on stress through the action of perceived stressors on the hypothalamic–pituitary–adrenal axis (HPA axis) that regulates reactions to external stressors including the immune system, mood and emotions (World Health Organization, 2014). However, as one of the authors of this paper has pointed out, there are innumerable problems with the ways that stress and stressors are defined and the extrapolation from laboratory experiments using highly artificial stressing techniques to the nature and effects of stress in real life situations (Birk, 2020, see also Manning, 2019).

Social scientists have been particularly attracted by the idea of 'plasticity'. Advocates for the significance of plasticity in the human brain focus on the evidence that neural circuits are not 'hard wired' but are shaped and reconfigured across the life course, both in structure and function, in response to experiences, together with evidence that neurogenesis in some regions of the mammalian brain continues throughout life and is modulated by activities and exposures (Leuner et al., 2010; Opendak et al., 2016). Once again, though, caution is required. There is considerable controversy about both the evidence for, and the implications of, neurogenesis in the adult human brain (Kempermann et al., 2018). As for the exposome, there is good evidence for the effects of air pollution on neural development (Friedrich, 2018; UNICEF, 2018), but critical analysis from social scientists remains scarce (Garnett, 2017). Claims about the role of the human microbiome in maintaining physical and mental health have suffered from over-hyping (Valencia et al., 2017) often linked to attempts at commercial exploitation through the sale of microbiome inspired diets and food products. The same is true of claims about the role of 'inflammation' in depression and other psychiatric conditions. Research does suggest pathways that do not respect the boundaries of skull and skin, and demonstrates the constitutive embeddedness of neural processes in their material milieu (Alam et al., 2017; Borsini et al., 2015; Pariante, 2017). Yet popularization precedes full evaluation of the evidence (Bullmore, 2018).

This is not the place for a full evaluation of these arguments. Our point is straightforward: if a neuroecosocial approach is to go beyond rhetoric, we need to bring the growing socio-theoretical literature on embodiment

and materiality into contact with critically evaluated neuroscientific research on pathways and processes. This, we believe, is one of the key challenges for vitalist social theory today.

Towards a Neuroecosocial Understanding of Mental Health in Adversity

Is it possible, then, to find ways of grasping empirically these diverse human neuroecosocial niches in a way that helps us negotiate a path between rhetorical gestures to the ecosocial on the one hand, and the 'everything matters' approach of some biosocial ethnographers?[18] We know that humans are very specific kinds of organism, with a particular array of biosocial potentials, striving to make their lives in force fields structured by history and politics, shaped by atmospheres and memories, suffused by vectors that do not recognize the boundaries of our 'skin-bags', many of which operate outside consciousness, shaping patterns of action and interaction. How, beyond such generalities, can we trace these processes in the embodied lives of individuals and collectivities, as they both offer and constrain the ways that we can make lives for ourselves? And, to return to our initial question, how can we describe and analyse the pathways through which adversity impacts upon mental health, and the consequences in the everyday lives of individuals? How should we move on from sketching potential pathways which constitutively enmesh the mental health of human beings in their milieux, to connect these pathways into our historical sociological and ethnographic evidence about the ways in which human corporeality is culturally shaped, trained and habituated to certain modes of action and interaction, and inhabits material spaces and interactions with others filled with meanings, shaped by customs and rituals?

We must begin by tracing out, empirically, the niches in which those experiencing mental distress strive to make a life for themselves, their (our) continuously recreated trajectories through a world of persons, places and objects rich with meanings, memories and affects, that affords certain ways of living and delimits others. 'The Berlin group' of Jörg Niewöhner, Milena Bister, Patrick Bieler, Martina Klausner and colleagues seek to grasp this with the concept of 'niching' (Bieler and Klausner, 2019; Bister et al., 2016).[19] For example, Bieler and Klausner, in examining the effects of transformations in the Berlin housing market on community psychiatric care, use ethnographic methods to describe the ways that

> people with a psychiatric diagnosis develop specific capabilities to navigate the city. They avoid certain terrains and places in their neighbourhood or in the city more generally because of the corresponding physical affordances, the unavoidability of social

> interactions or the availability of resources. [. . .] They render the city habitable for themselves [. . .] if only momentarily . . . [the] never-finished ambivalent processes of creating a precarious comfort zone in urban space. (Bieler and Klausner, 2019: 203)

Our own research on mental health, migration and megacities in Shanghai experiments with a similar approach, using ethnographic methods to study the ways that different generations of migrants actively create liveable niches – not just particular locations, but also practices of small-scale sociality and self-techniques to manage their stresses and sustain their aspirations, despite the inescapable precariousness of their situations (Amin and Richaud, 2020; Fitzgerald et al., 2019; Li et al., 2019; Richaud and Amin, 2019, 2020). We can use mental mapping techniques such as those developed by Stanley Milgram (1992) to map the saliences, meanings and affects evoked in individuals' daily trajectories, and in their 'situations' – their life circumstances and relations to their material and interpersonal surroundings. We can draw upon smartphone-based 'ecological momentary assessment' apps that poll individuals several times a day over two or more weeks for their assessment of their mood, and link that to their experience of their human, material and natural environment to capture the flows of affects as they are experiences across space and time (Bakolis et al., 2018). We can use the spatial observational techniques used by William Whyte (1980, 1988), or deep ethnographic approaches such as those used by Suzanne Hall in her study of one street in Peckham (Hall, 2013). We can chart at least some elements of exposures and exposome in particular biological localities, perhaps modifying the methods developed for capturing exposures to chemicals and other pollutants (Wambaugh et al., 2019). We can find a way to operationalize our critical approach to 'stress' to develop a finer grained, ethnographic analysis of the subjective experiences that constitute stress in situations of adversity – poverty, exclusion, isolation, racism and violence, noise, smell, microbes and pollutants perceived as stressful as a result of individual biography and culturally-shaped meanings (Manning, 2019).

From this perspective we can analyse the ways that events, such as the Covid-19 pandemic, and sociopolitical policies, such as those which increase precarity through conditionality in welfare, are lived by those impacted by them, and are experienced and managed in everyday lives.[20] Research conducted along these lines would also be better able to identify what within urban life mitigates against stress, and to advise policy-makers in the light of this, perhaps by redrawing mental maps of the city, and reshaping ecological niches through cafes and corner shops, informal friendships or forms of collective organization (as, for example, shown in Hall, 2013). A knowledge of the ways that humans with different abilities and capacities inhabit their niches could inform strategies to create 'healthy, safe and sustainable cities' through architecture and

urban design, housing, and the management of mobilities – something already achieved to some extent, and in some places (Guxens et al., 2018), for those 'differently abled' in their bodies or senses (Buffel and Phillipson, 2016; Hamraie, 2017).[21] To a degree, such concerns are already motivating strategies for the management of biophysical environments from microbes to air quality, although seldom for the most disadvantaged.[22] In developing this approach, we suggest, we would transform questions such as urban justice or the 'right to the city' by bringing them into connection with the consequences of the unequal niches which contour and constrain the vital existence of those who inhabit them (Rose and Fitzgerald, 2021).

To return to the challenge with which we opened this paper, such a neuroecosocial research programme can show us how and why a theoretical reengagement with mental life and mental health should no longer be the concern of an isolated subdiscipline of the sociology of health. On the contrary, it requires us to rethink the central issues of social theory concerning the social shaping of subjectivity, and indeed the ways in which we theorize sociality itself. We can certainly build upon recent theoretical work on embodiment, affect – especially as this engages with a longer tradition of atmospheres – and environmental politics. We can link this with an emerging theoretical re-engagement with the non-conscious habitual management of techniques of the body, and some themes from older 'interactionist' understandings of bodily encounters and the capillary forms of power, knowledge, sentiment and passion that inhere in routine social practices. We can seek to theorize the mechanisms implied in these approaches, using the openings offered by the post-dualist developments in the life sciences that we have sketched here. But we should do so, not in the form of abstracted theories or manifestoes but in an engagement with one of the central concerns of our time – the moulding and marring of mental life in conditions of precarity and adversity, and the socio-political strategies necessary to build the capabilities that can enable human beings individually and collectively to make lives for themselves within the fluctuating circumstances in which they live.

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Notes

1. The phrase 'poor mental health' implies that mental distress is a matter of health, in the same way that 'mental illness' places mental distress among the families of disease, and 'mental disorder' suggests that there is a normative 'mental order' that is disturbed. To discuss the problems associated with terminology would require another paper (Rose, 2018).
2. It will become clear later why we use the term 'neuroecosocial' rather than 'psycho-ecosocial'. This paper is a contribution to our broader wish to contribute to a revitalized relationship between the social sciences and the life sciences (Fitzgerald et al., 2016; Rose and Fitzgerald, 2021).
3. Recent contributions from human geography have also sought to identify the spatial characteristics that shape mental health (McGeachan and Philo, 2017) but there is a tendency to be somewhat uncritical of scientific hypotheses, such as 'the exposome' (Prior et al., 2019).
4. As we outline later, we are deliberately reworking Margaret Lock's conception of local biologies here (Lock and Kaufert, 2001; Niewöhner and Lock, 2018).
5. George Simmel's classic essay on the metropolis and mental life (Simmel, 2002 [1903]) embodies a certain vitalism which also animated work on mental health in the city up to the mid-20th century (see Rose and Fitzgerald, 2021). A concern with vitality can be found in other theorists concerned with the analytics of space and time, as in Henri Lefebvre's analytics of vitality in *Rhythmanalysis* (Lefebvre, 2004) or Doreen Massey's *For Space* (Massey, 2005). Some cultural geographers, notably Bruce Braun, have used concepts from Deleuze to develop an approach that resonates with our own vitalism (Braun, 2007, 2014). Understandably, none of these authors engage directly with the empirical vitalism hesitantly emerging in the life sciences themselves as researchers come to realize the limits of what Carl Woese terms 'metaphysical reductionism' (Woese, 2004).
6. We base our conception of a causal pathway upon Williamson and Illari's definition of a mechanism: 'entities and activities organized in such a way

that they are responsible for the phenomenon' (Illari and Williamson, 2012: 132, quoted in Manning, 2019: 4).

7. The *Oxford English Dictionary* defines a niche as: 'The actual or potential position of an organism within a particular ecosystem, as determined by its biological role together with the set of environmental conditions under which it lives.'
8. Ian Hacking used it to characterize the set of conditions in France that underlay the emergence of the condition known as fugue (Hacking, 1998). Matthew Kearns and Simon Reid Henry use the term in a way similar to our own in their excellent paper on vital geographies (Kearns and Reid-Henry, 2009). The term has become popular in socio-cultural anthropology since the 1970s, though seldom with detailed conceptual considerations, despite the hopes of Thomas Love (1977). As we shall see, some link the idea of the niche with arguments about human evolution (Fuentes, 2016),
9. We have drawn on Downey's excellent description, but do not agree with his speculations on potential evolutionary conditions and consequences of the urban niches that humans have constructed.
10. E.g. 'animals manufacturing nests, burrows, webs, and pupal cases; plants changing levels of atmospheric gases and modifying nutrient cycles' (Laland and O'Brien, 2010: 303). Downey postulates that urban niches have evolutionary consequences as they select for certain phenotypic characteristics (Downey, 2016: S61) and others argue for an alliance between niche construction theory and human cultural anthropology (Fuentes, 2016).
11. We are learning more about the active niche construction activities of creatures whose behaviour was previously thought to arise from evolutionarily fixed action patterns, but this is not the place to debate at what point in the evolutionary chain we begin to see inventiveness in animals.
12. We use 'kind' here in the sense developed by Ian Hacking (1995).
13. Many have commented on the potential relationship between Gibson's 'realism' and Von Uexküll's 'subjectivism', for example Fultot and Turvey (2019). We argue that that they should both be considered 'irrealists' (Goodman, 1978) in that neither denies the existence or significance of a world outside thought, but both sidestep the Cartesian dualism that distinguishes these a priori and then troubles itself about their relations.
14. Sociologists in the second half of the 20th century turned away from habit to take willed action as their object of study (Camic, 1986), but we are now beginning to recognize the crucial role of the habitual in everyday life: habits embody all manner of cultural norms about subjectivity, authority, power and privilege (see, for a few examples, Bissell, 2011; Pedwell, 2017; Shove et al., 2012; Wood, 2016)
15. We are unhappy with the words available to describe processes of mental activity: terms like mind or mental imply a kind of awareness of the self of its thoughts, feelings, volition and so forth, while many of these activities occur outside awareness. But to avoid further complexity, we will use these terms to encompass thought, feeling, volition, emotion, decision-making and much else that humans are capable of, without implying that they are present to the actor – indeed they seldom 'come to mind'.

16. See also Lock's more recent formulation, this time writing with Jörg Niewöhner on 'the co-constitutional processes of matter and meaning and of human and environment' (Niewöhner and Lock, 2018a: 692)
17. Matthew Wolf-Meyer has suggested something similar in his proposal for an historically and culturally shaped 'biology of everyday life', developed in the argument that 'the expression of sleep needs vary within and between societies and are shaped primarily not by innate biological drives but cultural norms embedded in the institutions that comprise the infrastructure of everyday life' (Wolf-Meyer, 2019: 338)
18. The 'guide' to doing 'bioethnography' by Elizabeth Roberts and Camilo Sanz (Roberts and Sanz, 2018) demonstrates the wisdom of Krieger's message that theoretical approaches are the only ways to make practicable sense of these multiplicities. Without theories and concepts to guide us, it becomes almost impossibly complex to combine ethnographic and biological data to grasp the multiplicity of material exposures, local experiences and political forces that shape health inequalities, let alone to analyse the biosocial pathways through which they have their effects.
19. We are indebted to exchanges of ideas and papers with this group. Laurence Kirmayer and his colleagues have also called for an 'ecosocial psychiatry' (Kirmayer, 2019; Kirmayer et al., 2017): a 'multilevel ecosocial view' of psychiatric disorders in which mind, brain and body are 'co-constituted in health and illness' (Kirmayer and Gómez-Carrillo, 2019: 169).
20. This is precisely what the authors are seeking to do in their research within the Centre for Society and Mental Health at King's College London.
21. Our favourite example is the widespread adoption of 'dropped kerbs' to facilitate mobility for wheelchair users, which also gives advantages to many others. There is, of course, much work on creating 'age friendly cities' (Buffel and Phillipson, 2016; World Health Organization, 2007).
22. See the work of Nick Fox (Fox and Alldred, 2016), and the special issue of the journal *Health* on society, environment and health (MacBride-Stewart et al., 2019). For a terrific study of the management of the internal environment of buildings in the name of health, see Michele Murphy's study of sick building syndrome (Murphy, 2006).

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