

Transdisciplinary Integrative Ecology Provides a Holistic Framework for Addressing COVID-19 and other Complex Problems

Karl J. Maier, Ph.D.
Salisbury University
U.S.A.

Presented on 12/3/2020 at: *Pursuing Health Equity in the Context of COVID-19: The Essential Role of Psychosomatic Science*. Scientific Conference of the American Psychosomatic Society.

Transdisciplinary Integrative Ecology

Transdisciplinary Integrative Ecology (TIE) is introduced here as a meta-paradigm for convergence research that can be operationalized and applied to support research and policy in addressing pandemic infectious diseases, like COVID-19, and other complex problems

Concept

TIE Principles of LLIFE (Maier, 2020)

Convergence Research

LARGE:

In scope - spanning disciplines

LEVELED:

All scales of analysis considered

INTEGRATIVE:

Interconnected levels & domains

FRAMEWORK:

Explicit, dynamic structure

ECOLOGY:

Assumes interaction of all living & non-living things

“Thinking ecologically means synthesizing the many fields of human knowledge into a coherent world view” (Keller & Golley, 2000)



Applied

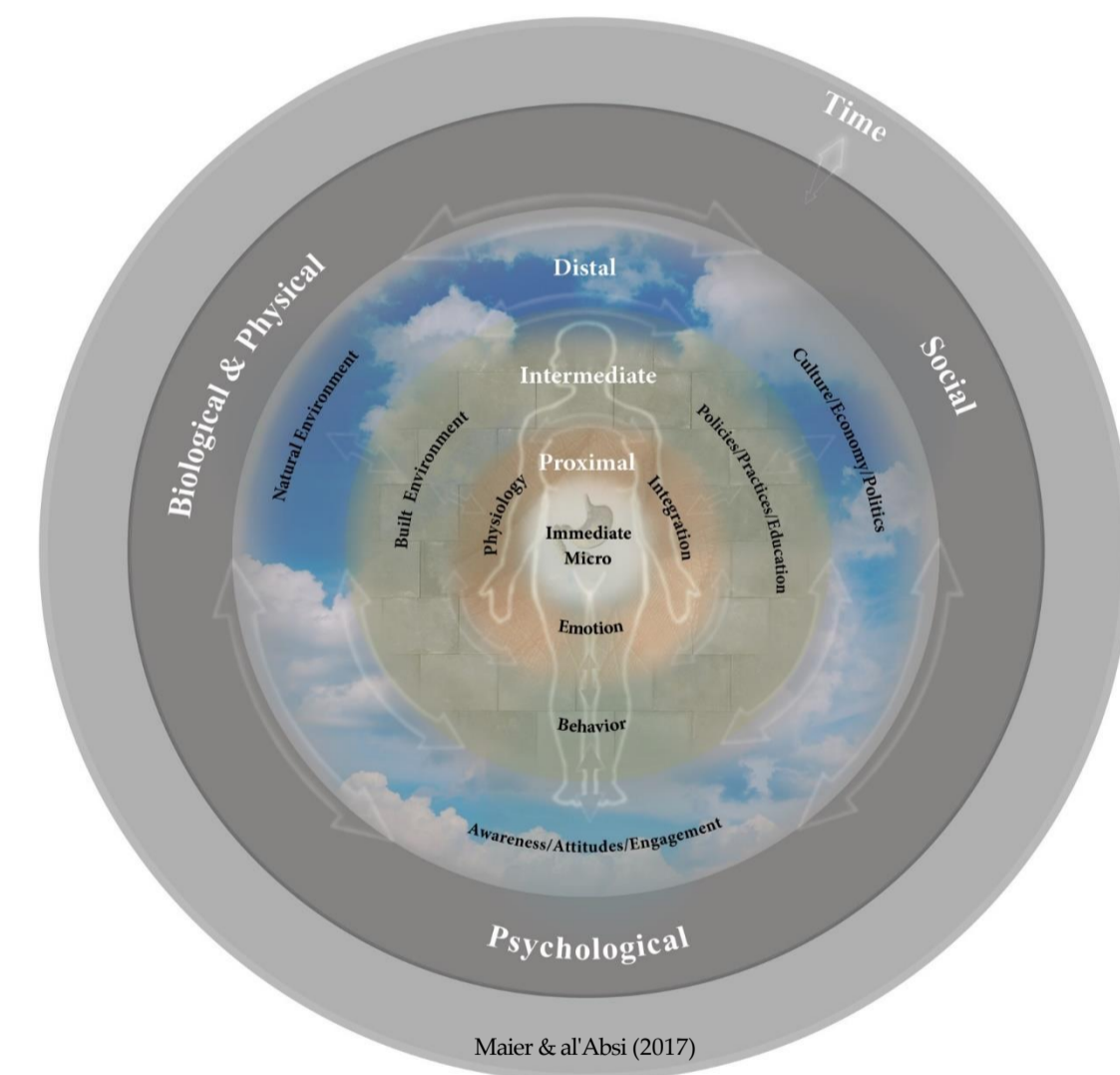
Operationalized

Biopsychosocial Ecological Framework of Health

Figure 1

Draft Biopsychosocial Ecological Framework applying Principles of LLIFE to COVID-19			
BIOPSYCHOSOCIAL DOMAINS			
	Biological/ Physical	Psychological/ Behavioral	Social
LEVELS	<i>(natural environment)</i>	<i>(awareness, attitudes, engagement)</i>	<i>(culture, economy, politics)</i>
Distal	<ul style="list-style-type: none"> Biodiversity – animal & microbial Climate & geographic influences on pathogen emergence & mutation Air pollution (e.g., particulate) +/- impacts of pandemic response 	<ul style="list-style-type: none"> Risk perception & awareness Vigilance for symptoms Prejudice & xenophobia Misinformation & conspiracy theory Philanthropy & volunteerism Engagement in community efforts & social media 	<ul style="list-style-type: none"> Economic impacts on env & society Demographic disparities Env justice, structural “_isms” Sociopolitical & socioeconomic disruption, unemployment Social/cultural/geographic stigma Funding for preparedness & mgmt. Leadership
Intermediate	<i>(built environment)</i>	<i>(behavior)</i>	<i>(education, policies, practices)</i>
	<ul style="list-style-type: none"> Urban density & pollution Green space availability/access Infrastructure: food/supplies production & transport Medical facility capacities Building HVAC, traffic flow, & resistant/cleanable surfaces 	<ul style="list-style-type: none"> Media & social media consumption Adopting protective behaviors (masking, handwashing, vaccination) Symptom self-monitoring Adherence to guidelines Hoarding behavior Substance use Discriminatory, persecutory, & marginalizing behavior 	<ul style="list-style-type: none"> Prevention education Information: trust & dissemination Govt & Institutional responses Funding for prevention & response Policies affecting pollution & mortality risk Policy-level decision making; treatment provision Occupational risk disparities Local/regional conflict
Proximal (person)	<i>(physiology)</i>	<i>(emotion & cognition)</i>	<i>(social support & relationships)</i>
	<ul style="list-style-type: none"> Inflammation Allostatic load of chronic stress Existing health conditions Physical effects of lockdown (e.g., inactivity, undernutrition) Impacts on disease prevention & treatment due to less access to care 	<ul style="list-style-type: none"> Stress, fear, hope, & coping Mental health of front-line & essential workers Mental health vulnerabilities & outcomes related to stress/isolation Sleep disruption 	<ul style="list-style-type: none"> Personal & social drivers of physical distancing, isolation, & quarantine. Personal & social impacts of physical distancing, isolation, & quarantine Domestic/interpersonal violence Social media (information & support) Marginalized identities, ostracism
Micro	<i>(pathogens, microbiome, genes, metabolome, etc)</i>		
	<ul style="list-style-type: none"> Pathophysiology Prophylactics, vaccines & treatments Genes, microbiome & vulnerability/resistance 	<ul style="list-style-type: none"> Psychoneuroimmunology (stress, emotion, & immune function) Cognitive & emotional effects of infection & disease 	<ul style="list-style-type: none"> Social disruption/isolation & host resistance Virulence & morphology associated with mode of social transmission

Note: General concepts for understanding COVID-19 & other pandemic infectious disease within a biopsychosocial ecological framework
Factors most relevant to understanding disparities in COVID-19 risk & outcomes for socioeconomic, race, ethnic, and marginalized groups



Questions? Feedback?

Suggestions?

Kjmaier@Salisbury.edu



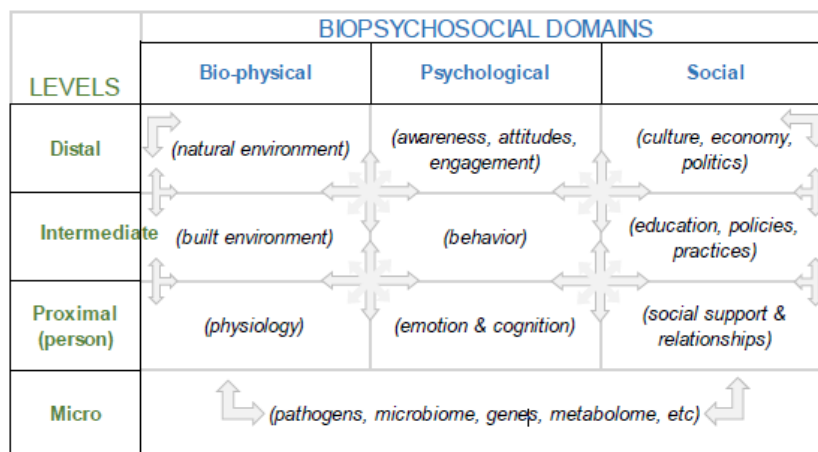
Presented on 12/3/2020 at: Pursuing Health Equity in the Context of COVID-19: The Essential Role of Psychosomatic Science. Scientific Conference of the American Psychosomatic Society. <https://psychosomatic.org/meetings/past-meetings>

Title

Transdisciplinary Integrative Ecology Provides a Holistic Framework for Addressing COVID-19 and other Complex Problems

Abstract

Convergence research is a relatively new label for collaborative efforts that bring together multiple disciplines to address complex problems. Such an integrated approach has long been represented in the holistic foundations of psychosomatic medicine and the biopsychosocial approach, and is necessary to effectively address pandemic infectious diseases. Emerging from the biopsychosocial concept, Transdisciplinary Integrative Ecology (TIE) is introduced here as a meta-paradigm for convergence research that can be operationalized and applied to support research and policy in addressing COVID-19. Generic TIE principles reflect integration across all relevant disciplines and levels of analysis within a loosely structured framework reflecting the superordinate principle of ecology—that all things are interconnected. These principles can be applied in various ways, but are well operationalized using a biopsychosocial ecological framework that specifies bio-physical, psychological/behavioral, and social domains of influence that are integrated across multiple levels of analysis (Figure 1). In application, the disproportionate global impact of COVID-19 among many non-white, economically poor communities can be understood through distal socioeconomic factors that drive long-standing health disparities and differential exposure to degraded natural environments. At the intermediate level, greater COVID-19 transmission and severe outcomes are seen in densely populated urban areas characterized by unhealthy built environments and limited access to education/information, healthcare, and nutrition. At the person and intermediate levels, residents of such areas often are at high risk, for example, from pre-existing health conditions and risk exposure as essential workers. Psychosocial stress associated with the experience of chronic discrimination and the totality of these living conditions may interact with more distal environmental factors such as high levels of airborne particulate matter to synergistically impact inflammatory and immune mechanisms that are increasingly understood as critical pathways of severe COVID-19 disease. TIE principles support contextual frameworks that can illuminate pathways of complex problems such as COVID-19, enhancing communication among stakeholders, identifying novel collaborative opportunities, and guiding funding/policy priorities.



Adapted from Maier, K. J. & al'Absi, M. (2017). Toward a biopsychosocial ecology of the human microbiome, brain-gut axis, and health. *Psychosomatic Medicine*, 79, 947-957. doi: 10.1097/PSY.0000000000000515

Suggested Citation: Maier, K. J. (2020). Transdisciplinary Integrative Ecology Provides a Holistic Framework for Addressing COVID-19 and other Complex Problems. *Psychosomatic Medicine*, Supplement, <https://psychosomatic.org/meetings/past-meetings>