



RESEARCH HIGHLIGHT

Comment on Heilig et al.: The centrality of the brain and the fuzzy line of addiction

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In reaffirming and updating the conceptualization of drug addiction as a brain disease Heilig et al. [1] should be commended for efforts to dismantle some of the weakest but most enduring arguments against it while acknowledging its strongest criticisms. Welcome nuances in the review include acknowledgement that behavioral responses can be probabilistic, and that people have capacities for resilience and recovery. In reinforcing calls for neuroscience to better model social-environmental conditions as causes and consequences of neurobiological change, Heilig and colleagues establish a stronger foothold for addiction as a brain disease to be studied with greater interdisciplinary collaboration, including with input from people with lived experiences. Rather than recapitulate these strengths, we focus on two potential challenges: (1) whether a brain disease model is the most functional approach for studying and addressing disordered substance use, or if other frameworks (e.g., bio-psycho-social models) can create equally rigorous but more productive communication among diverse stakeholders for the complex sets of solutions needed, and (2) the authors' characterization of addiction as distinct from substance use disorder (SUD)—a distinction that subverts the provided rationale for continued emphasis on “brain disease” terminology.

Heilig et al. [1] emphasize that the brain is the underlying biological substrate of both addiction and capacity for change: it is the material upon which drugs and social-environmental conditions impinge, and the ultimate organ of response. We could not agree more. Yet, while the brain may be the material substrate upon which bio-psycho-social factors eventually act, this does not necessitate that we frame or operationalize complex states, traits, behavior, and culture *primarily* at the level of the brain [2, 3]. We can acknowledge that the brain is the organ through which the world changes us while also acknowledging that we can change the world through emergent properties of brain function. Put differently, we can be quiet determinists without being noisy reductionists.

When we laud the brain as the central lens through which we view addiction, whether explicitly, or implicitly through the labels we use to talk about its complex bio-psycho-social behaviors, we must ask what we could unintentionally dilute, overlook, or dismiss. Take Heilig and colleagues' example of compulsive use and needle-sharing despite HIV/HCV risk: we could consider this decision first and focally as a “pathology of brain circuits that, through probabilistic shifts, promotes the likelihood of maladaptive choices” [1]. In doing so, we may forget to ask a simple question of whether one with a severe SUD has access to sterile

needles to begin with and fail to arrive at a solution (one of many) of syringe-exchange program implementation as readily [4]. We also must consider how a term like “brain disease,” even if used with a new infusion of nuance in some scientific circles, may continue to be confusing for lay persons and non-expert clinicians and researchers. Given the toxic influence that adverse social-environmental conditions have on the brain and health [5, 6], similar criteria could be applied in a slippery, but logically consistent, manner to argue that “poverty” or “disempowerment” are brain diseases insofar as these states can result in brain-mediated maladaptive behaviors (and that the brain is the biological substrate from which suffering and capacity for change arises). We are being Swiftian here: injudicious use of a “brain disease” label creates unnecessarily narrow frameworks that can misdirect attention away from sociocultural and structural solutions. And while a “brain disease” label for a mental-health condition like SUD can reduce attributions of moral failure, it can also introduce stigmas of its own—marginalization or reduced self-efficacy—especially when presented in a reductionist manner [7].

Shortcomings of clinical nosology reflect difficulties in drawing hard lines and underscore the fuzziness of the one drawn regarding addiction. Heilig et al. [1], in a brief but crucial statement (and Venn diagram), depict addiction as only a subset of SUD, with a blurred line demarcating the two. It is true that this distinction is coyly endorsed by commentary text (not criteria) in the DSM-5 [8]. But whenever we have encountered the terms SUD and addiction in the same place, whether in lay or professional usage, SUD criteria are either overtly or tacitly treated as an operationalization of addiction; there is no daylight between them. When Heilig and colleagues say that addiction (but not necessarily SUD) is a brain disease, they are acknowledging (and we would agree) that *the heterogeneous entity referred to by most people as “addiction” (and diagnosed in the United States as SUD) is sometimes a brain disease, sometimes not.*

Asking where severe SUD ends and addiction begins may be the wrong question or a red-herring with no meaningful answer. If we could sharpen this blurry line, what changes in practice? Would we want to diagnose, treat, and exculpate people falling only on one side of the line? Likely not. And if such distinctions were possible and used to justify improved medical access, where would this leave effective (often underused) interventions like contingency management [9]? People responsive to contingency management might be examples of SUD without the disease of addiction: their brains respond adaptively to altered

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environmental contingencies. Should their disorder-without-disease not be reimbursed in the same way? The proposed SUD/addiction distinction can therefore be questioned as clinically unsatisfying and confusing for most patients and clinicians. A more productive approach may be to avoid overreliance on brain-focused explanations as justifications for treatment access: wherever a person falls along the fuzzily bordered continuum in this SUD/addiction Venn diagram, the person deserves access to scientifically informed treatment if they want it and should not be stigmatized—goals we know that Heilig and colleagues, we, and others agree upon.

Heilig and colleagues [1] conclude with a much needed call for integration and concision, and with a summary of the ways in which neurobiological, psychological, and public health perspectives can inform solutions in a bottom-up manner. Rather than dissent from that, we are adding a reminder of the strengths provided by top-down integration in support of the ultimate goals of universal understanding and cross-disciplinary solutions.

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AUTHOR CONTRIBUTIONS

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ADDITIONAL INFORMATION

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