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Common liability to drug addictions: Theory, research, practice

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The etiology of drug addiction is an intensively studied field. Researchers seek to understand the mechanisms of the development of this debilitating and socially destructive disorder in order to formulate effective prevention and treatment intervention. The complexity of the disorder hinders achievement of this elusive goal. A theory that could organize and reduce this complexity to guide research and practice could help these, often dissociated, areas to coalesce. Such a role has been assigned to the "gateway theory", also known as "gateway hypothesis "(GH) (Kandel, 2003), -without competing theories. The GH posits a developmental process underlying involvement with the variety of drugs, both licit and illicit (Kandel, 1975). Importantly, as recently as in 2002 (RAND News Release, December 2), it was noted that most policy makers' beliefs are grounded in the GH, in spite of findings contradicting GH's prime assertion that marijuana's use after initiation of using tobacco and alcohol, followed by other illicit drugs, comprise consecutive progressive stages of drug use initiation. Equally important to note is that GH does not extend beyond initiation, to drug use disorders.

There is, however, an alternative theory that parsimoniously explains not only this temporal order but also additional developmental characteristics of drug use disorders, their co-occurrence, and comorbidities. This theory is based on (a) a well established human genetics concept of liability to disorder (Falconer, 1965) and (b) on the established commonality of liability mechanisms across abusable drugs (rev. in Vanyukov et al., 2003). Several prior publications critically addressed various aspects of these alternatives. To our knowledge, however, there has not yet been a systematic discussion covering the range of relevant issues, from genetic variability to phenotypic measurement to policy implications. This special issue presents theoretic and empirical support for common (general, non-drug-specific) liability to addictions (substance use disorders) (CLA), findings related to its mechanisms, and considerations pertaining to its significance for practice and policy.

Accordingly, the issue is subdivided into three main sections. The sections focus on (1) theoretical and empirical foundations of the notion of CLA as juxtaposed with the GH, and specification of liability conceptually and in statistical terms, (2) biological mechanisms underlying common liability, and (3) practical implications of CLA for guiding intervention and policy development.

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Both authors contributed to and have approved the final manuscript.

Conflict of interest

No conflict declared.

Theoretical foundation

The introductory paper by Vanyukov et al. reviews the GH in comparison with the concept of common (non-drug-specific) liability to addictions, a latent (unobservable) trait accounting for a large proportion in the variation in the risk for addictive disorders related to specific drugs of abuse. The discussion of the GH finds it lacking in explanatory power, empirical support and utility. The discussion of CLA approaches addiction from an evolutionary biopsychosocial perspective, ranging from genetic variation to socialization, and providing a background for both specific and non-specific addiction risk mechanisms related to drugs' legality. The second paper, by Hicks et al., presents results of a twin study validating the measurement approach from the quantitative genetic standpoint. The third paper, by Palmer et al., explores the potential substructure of common liability in its connections with other psychopathology (such as comorbidity).

Liability mechanisms

The first paper in the second section, by Nielsen et al., reviews the results of molecular genetic and epigenetic studies in opiate and other addictions, employing a variety of approaches and supporting commonality of biological mechanisms underlying addictions. The second paper, by Chen et al., addresses findings indicating specificity of associations of the risk for nicotine dependence with nicotinic receptor genes, as may be expected from the mechanisms pertaining to specific receptor-ligand interactions. Germane to nonspecific liability, the paper by Zeiger et al. provides evidence that the relationship between subjective effects of alcohol, tobacco and marijuana are consistent with common underlying sensitivity. Concluding this section, a paper by Sweitzer et al. presents results of neuroimaging genomics research identifying molecular signaling pathways potentially underlying the CLA.

Translating research results

The paper by Tarter et al. tests the implications of the "gateway" and the reverse sequence of drug use initiation for the development of SUD. The paper by Kirisci et al. discuses the measurement of the CLA and different approaches to such measurement in applied settings, particularly using application of computer adaptive testing (CAT). The paper by Ridenour et al. bridges the areas of mechanistic research based on the CLA model and prevention by delineating the need for and the basis for approaches to targeted intervention. This view on the ontogenesis of liability to addiction indicates a paradigmatic shift in intervention and policy approaches that should parallel conceptual changes from the GH to the CLA perspective.

The paper by Anthony, concluding the issue, summarizes its content.

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