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**UNDERSTANDING SUBSTANCE USE DISORDERS AMONG VETERANS***Virtues of the Multitudinous Self Model****Şerife Tekin, Alicia A. Swan, Willie J. Hale, and Mary Jo Pugh*****Introduction**

In 2018, nearly 22 million people ~~million people~~ in the USA aged 18 or older reported substantial enough alcohol or illicit drug usage over the previous year to be categorized as exhibiting a substance use disorder (SUD) or addiction-related problems, including 14.5 million people who had an alcohol use disorder (5.2% of this population) and 7.4 million people who had an illicit drug use disorder (2.7% of this population) (Substance Abuse and Mental Health Services Administration & National Institute on Alcohol Abuse and Alcoholism, 2018).<sup>1</sup> The statistics are even more concerning among veterans. According to the 2013 National Survey on Drug Use and Health, 1.5 million veterans aged 17 or older (6.6% of this population) had a substance use disorder in the past year (Golub et al., 2013). These numbers indicate the urgency to find effective treatment methods given the biological, personal, and interpersonal consequences associated with SUD, such as inability to maintain stable employment, strained relationships with families, and increased risk for other illnesses such as diabetes. The challenge, however, is that there is no consensus in the clinical landscape on how to best describe and treat SUDs. As chapters in this volume indicate, there are multiple frameworks in which SUDs are understood. Our goal in this chapter is to evaluate the empirical

efficacy of a theoretical model that has been previously called the Multitudinous Self Model (S<sup>M</sup>; Tekin, 2019) using a nationwide survey of post-9/11 veterans receiving regular Department of Veterans Affairs (VA) care. We look at what insights we might glean about the landscape of SUDs by using the S<sup>M</sup> in examining these data.

Our analysis arrives at two important conclusions. First, the existence of other mental health problems – such as anxiety, depression, and post-traumatic stress disorder – is associated with SUDs among veterans. Second, better community reintegration after military service is associated with reduced SUD diagnoses, indicating that social connections may be critical predictors of positive outcomes. While it is not possible to extricate whether reduced social support is a vulnerability to or negative consequence of SUD diagnoses, our findings underscore the need to account for social support and context as a matter of standard clinical care. In this sense, models of SUDs that make the social dimensions of these conditions central, such as the S<sup>M</sup>, are likely to guide the systematic development of strategies to generate social support in the treatment of SUDs. This is in comparison to the brain disease model, which does not focus on social determinants of mental health. Enhanced education on or access to social

programs that can bolster emotional, social, and tangible support resources could benefit all veterans, but may particularly aid those struggling with substance use.

The plan for the chapter is as follows. First, we provide the theoretical framework for the  $S^M$  by juxtaposing its main features against the brain disease model, a popular approach to understanding SUDs. After highlighting their fundamental differences, we examine the utility of the  $S^M$  using existing data from a nationwide survey of post-9/11 veterans in Department of Veterans Affairs (VA) care. Finally, we conclude with the strengths and limitations of the  $S^M$  for the understanding of SUDs among veterans.

### Brain disease and the $S^M$ of SUDs

The  $S^M$  considers SUD to be a person-level phenomenon, while the brain disease model construes it as a problem of the brain. This means that, under the  $S^M$ , the development and progression of substance use are understood in relation to an individual's personal history: identity-constituting factors, such as socio-economic status, race, gender, interpersonal relationships, conception of oneself, and the fundamental features of one's biological makeup. In this sense, the  $S^M$  of SUD aims to study the self, characterized as a complex dynamic system of multiple dimensions and properties, in order to develop effective treatments (Tekin et al., 2017; Tekin, 2014, 2019). Consider the five dimensions of the self posited by the  $S^M$ : (i) the ecological, (ii) the intersubjective, (iii) the temporally extended, (iv) the private, and (v) the conceptual aspects of the self (Neisser, 1988; Tekin, 2019). What is key to understand in this model is that the different dimensions of the self connect the individual to themselves and to the physical, social, and cultural environment in which they are situated. SUD both influences and is influenced by the dimensions of the self and their interaction with each other. In contrast, under the brain disease model, the primary unit of analysis to understand SUD is the brain, its structural and chemical composition, and the underlying as well as

resultant physical dynamics. While there have been recent attempts to recognize the social dimension of substance use-related disorders, the work has been limited primarily to animal models and it is unclear how the extrapolation can be made to human cases (e.g., Venniro et al., 2018, 2020). Because the  $S^M$  is developed as an alternative to the brain disease model in the context of human behavior, we provide in what follows a quick overview of both and identify their fundamental differences.

### The brain disease model

According to the brain disease model, substance use disorder is a "chronic and relapsing brain disease that results from the prolonged effects of drugs on the brain" (Leshner, 1997, p. 45; Chapter 2, this volume). Though this has been covered in Section I of this book, it will be useful here to briefly recapitulate the main principles of the brain disease model. SUD is considered a consequence of fundamental changes in brain mechanisms, with the goal of treatment being either to reverse or to compensate for those brain changes through pharmaceuticals or behavioral interventions (Leshner, 1997). Elucidation of the biological mechanisms underlying SUDs is seen as the key to the development of effective treatments, particularly anti-addiction medications. Specifically, addictive drugs are hypothesized to directly or indirectly affect dopamine signaling in the mesolimbocortical pathway. Dopamine, colloquially known as the "feel-good neurotransmitter," is considered to be largely responsible for regulating the way in which we experience pleasure and satisfaction from activities such as eating, engaging in social interaction, or having sex. The mesolimbocortical circuit is a single pathway in the brain that is individualized at structural and functional levels. In terms of brain structure, it connects the limbic system – the mechanism that processes emotions and memory – and the orbitofrontal cortex of the brain – an area involved in the cognitive process of decision-making (Hyman, 1996, 2007; Ortiz et al., 1995). Empirical research indicates that the mesolimbocortical dopamine system is involved in decision-making in light

of the emotions that arise from external rewarding stimuli. In short, it is associated with reward, appetitive motivation, and hedonic processes (Salamone & Correa, 2012; Salamone et al., 2005; Schultz, 2016).

Research on the precise mechanism of the brain's reward system is not yet conclusive, however, and some argue that this mechanism illuminates "the profound disruptions in decision-making ability and emotional balance displayed by persons with drug addiction" (Volkow et al., 2016, p. 364). The predominant view is that interaction between drugs of abuse, such as alcohol, cocaine, etc., and the mesolimbocortical pathway produces substance use related behaviors (Volkow et al., 2016; Chapter 3, this volume). Typically, when individuals engage in social interactions or eating, dopamine is released to signal reward from the pleasurable and satiating activity. According to the brain disease model of SUD, however, drugs of abuse disrupt the mechanism of the mesolimbocortical pathway because they cause sharp increases in dopamine release (Volkow et al., 2016). These "elicit a reward signal that triggers associative learning or conditioning" (Volkow et al., 2012, p. 364). Through classical conditioning, the proponents of the brain disease model argue, "repeated experiences of reward become associated with the environmental stimuli that precede them" (Volkow et al., 2012, p. 364). This, they further suggest, explains why and how individuals associate certain stimuli (e.g., the environment of drug taking, persons with whom it is consumed, etc.) with the drug use and the pleasure associated therewith. Environmental cues may trigger craving for and use of alcohol or drugs. Such conditioned responses become deeply ingrained, often lasting long after active drug use has ceased (Volkow et al., 2012, p. 364). One consequence of repeated drug use, according to this model, is the "desensitization of reward circuits" which weakens the ability to feel pleasure and be motivated to pursue everyday activities (Volkow et al., 2012, p. 363). The "ordinary, healthful rewards," such as eating or social interactions, "lose their former motivational power" and individuals crave drugs to achieve the same pleasure and satisfaction levels (Volkow et al., 2012, p. 366).

In this process, executive cognition processes such as "capacities for self-regulation, decision making" (Volkow et al., 2012, p. 366) are also impaired. These result in the person searching for "the more potent release of dopamine produced by the drug and its cues" (Volkow et al., 2012, p. 366). The individual becomes occupied with the search of "environmental stimuli that are repeatedly paired with drug use," such as environments in which a drug has been taken, persons with whom it has been taken, and so on. These environmental stimuli may generate fast surges of dopamine release, triggering craving for the drug, motivating drug-seeking behaviors, and leading to binge use (Volkow et al., 2012). In persons with SUD, "the impaired signaling of dopamine" weakens the ability "to resist strong urges or to follow through on decisions to stop taking the drug" (Volkow et al., 2012, p. 367).

It is important to highlight here that drug-seeking behavior is also motivated by withdrawal avoidance. This is because the withdrawal effects of drug use are so challenging that the individual seeks the drug to manage the symptoms of withdrawal, not to attain euphoria associated with drug use. Such effects, researchers argue, explain why persons with substance use disorders can genuinely want to quit using the drug and yet can be "simultaneously impulsive and unable to follow through on their resolve" (Volkow et al., 2016, p. 367). The brain disease model of addiction (BDMA) is pervasive in the medical and scientific communities, as it is considered by some to be the key to remove the stigma of addiction (Leshner, 1997; Volkow et al., 2012; Volkow, 2018).

### **The Multitudinous Self Model (S<sup>M</sup>)**

The S<sup>M</sup>, on the other hand, focuses on the person experiencing SUD as a complex dynamic organism (Tekin, 2018). Its *first* dimension is the ecological aspect of the self. This refers to the embodiment of self in the physical world, including biological features such as the genetic make-up, eating habits, exercise routines, and objectively observable illness symptoms, such as blood sugar or blood

pressure. These may have even been operationalized as diagnosis codes in medical records. The ecological dimension is specified by the features of an individual's body and its active interaction with and responses to the physical conditions of the environment the individual lives in. Understanding the ecological dimension of the Multitudinous Self is important in making sense of SUDs. Consider the experience of an individual who has alcohol use disorder (AUD). Individuals start imbibing due to the pleasant physical sensations and relaxation associated with drinking, e.g., it may appear to help one to fall asleep. The gradual increase of consumption of alcohol over time and inability to control drinking impact the workings of the central nervous system, brain cells, liver function, etc. For example, research indicates that alcohol use prior to sleep prevents REM, therefore rendering what sleep is obtained to be of reduced quality and restorative property (Thakkar et al., 2015; Ebrahim et al., 2013). Similarly, the individual encounters physical symptoms of withdrawal when they attempt to quit drinking; their hands may shake, they may become more anxious, restless, and irritable. They may wake up in the middle of the night with nausea or wanting to consume alcohol. In some scenarios, the person may experience delirium and hallucinations. Similarly, an individual's existing illnesses, such as diabetes, may get worse as alcohol overuse continues to damage their body. An understanding of the physical mechanism of the ecological aspect of the self can and does facilitate a number of effective (albeit limited) interventions. For example, with the support of medications, people may develop strategies for coping with cravings (Carroll & Onken, 2005).

The *second* dimension of the self is the intersubjective aspect. It supports the capacity to develop "emotional rapport and communication between the self and other people" (Neisser, 1988, p. 387; Bechtel, 2008). Intersubjective relationships of care and concern with others are instrumental in the formation, enrichment, or impoverishment of a person's character and psychological capacities. The quality of a person's relationships are major factors in the development of substance use behavior.

Individuals in unhappy relationships may seek refuge in repeated alcohol consumption. Complex family histories involving trauma or having been subjected to physical or sexual abuse as a child are strongly linked to SUDs (Marcenko et al., 2000; Langeland et al., 2002). SUDs also influence and deteriorate relationships over time, harming not only the self; but others, as well (Graham, 2013). Understanding the intersubjective dimensions of the self may provide explanations of why a person might engage in substance abuse, particularly in situations where drinking and drug usage are an integral part of the culture, as in some parts of the armed forces (Ames et al., 2002, 2004). At the same time, it may facilitate the development of effective interventions. If a particular lifestyle, such as being isolated from one's community of support, is fueling SUDs, interventions could include helping the individual change their social environment. Other forms of interventions include helping them get rid of a relationship causing distress or develop more effective coping strategies.

The *third* dimension of the S<sup>M</sup> is the temporally extended dimension of the self. It tracks an individual's experience over time: how the memories of events past may structure expectations for the future, or how certain experiences have an effect on an individual's choices in the future. There is a trajectory to the development of SUD. A drug is first sampled, either out of desire to enjoy its psycho-sensory effects or to cope with undesired emotions. Initially, there may be little to no fear of its addictive nature and associated harms. It is found to be enjoyable, invites further consumption, and becomes increasingly frequent. At some point, the individual may notice the behavior is harmful. Understanding the temporal dimension of the self may facilitate an understanding of how and why people develop SUD, e.g., what kind of developmental environment contributes to the development of substance use behavior, such as existing mental health problems. The study of this aspect of the self may facilitate the development of effective interventions; for example, addressing the mental health problem that instigated drug use is an important step to address the SUD.

The *fourth* dimension of the self is called the private dimension. It specifies conscious awareness of felt experiences. SUD can be understood in relation to this dimension, including the felt experience of desiring the drug, cravings for the drug, the distress of not using it when consumption is delayed, and regrets about consuming it despite resolutions to the contrary. As we better understand this aspect of the self, we will better understand what addiction is and what successful interventions may look like.

The *fifth* aspect of the  $S^M$  is the conceptual dimension of the self, which enables the representation of the self to the self.<sup>2</sup> These representations are the products of the dynamic interaction of the other four aspects of the self with the external social and cultural environment. Self-concepts include ideas about our physical bodies (ecological aspect), interpersonal experiences (intersubjective aspect), the kinds of things we have done in the past and are likely to do in the future (temporally extended aspect), and the quality and meaning of our thoughts and feelings (private aspect) (Jopling, 2000; Neisser, 1988; Bechtel, 2008; Tekin, 2019). For instance, an individual's self-concept as a "dedicated father" is the product of the intersubjective aspect of selfhood and the norms of being a dedicated parent in the culture. In turn, self-concepts inform and shape the other aspects of the self because they are action-guiding (Tekin, 2014, 2015). They inform how individuals behave and can motivate them to change. In the context of SUD, the formation or alteration of self-concepts will influence future actions. Hopelessness in the face of repeated relapses and self-concepts such as being weak-willed may diminish a person's ability to quit substance use behavior. Alternatively, the person may express conflict and distress because of a strong resolution to quit drinking, and this may help them to redefine who they are and enumerate new behavioral goals. They may take a step toward change by tapping a conception of themselves as resilient, thus stabilizing a new behavior pattern. Because of their malleable nature, self-concepts offer great opportunities for successful clinical interventions. Clinicians may work toward helping individuals develop more

positive and resourceful self-concepts, strengthen their self-esteem, and behave in certain ways that expand their possibilities for action (Tekin, 2011, 2014, 2015; Jopling, 2000).

The brain disease model focuses on the brain while the  $S^M$  recognizes and focuses on the complexity and multidimensionality of the lives of individuals with SUD. Instead of construing the brain as the most important and useful level of analysis for understanding and treating addiction, it acknowledges and explicitly examines how drug use emerges in the context of an individual's history, interpersonal relationships, socio-economic status, etc. This means, for the purposes of this chapter, that while the brain disease model assumes successful treatments to be efficacious predominantly through brain mechanism-targeting medications, the  $S^M$  requires consideration of all the five dimensions of the self in treating SUDs. In short, the personal, social, and cultural context of addiction is equally important as the neurobiology that may underpin addiction and the brain disease model does not easily lend itself to the study of the former. Despite the general recognition of the importance of these factors, the conceptual and empirical frameworks for studying addiction through the brain disease model continue to target brain mechanisms at the expense of a conceptual and empirical framework that benefits from person-level understanding, using resources, say, from clinical psychology, cognitive psychology, sociology, anthropology, etc. A plethora of treatment strategies that go beyond drug-related interventions thus remain under-explored.

Taking these fundamental differences as a starting point, we have evaluated the existing VA data to see how efficacious the  $S^M$  is in making sense of the landscape of SUDs among veterans, and what insights it offers for successful interventions.

### **Making sense of SUDs among post 9/11 veterans**

Leveraging a nationwide survey of post-9/11 veterans receiving regular VA care, we examined the explanative resourcefulness of the  $S^M$  developed

by Tekin (2019) in predicting substance use disorder diagnosis status. Using existing survey and medical record data curated from the Trajectories of Resilience and Comorbidity Clusters in Operations Enduring Freedom and Iraqi Freedom Veterans (TRACC OEF-OIF), this preliminary secondary analysis captured each of the five domains of the S<sup>M</sup>, as described in Table 40.1. SUD diagnoses were identified using diagnosis codes assigned during clinical care; only cases in which one inpatient or two outpatient SUD diagnoses documented at least seven days apart were included, in order to conservatively identify SUD diagnoses.

In its own right, each domain of the S<sup>M</sup> significantly predicted SUD diagnoses when entered into separate univariate models (each  $p < 0.01$ ). For the ecological domain, each mental and physical diagnosis was associated with greater odds for SUD diagnoses. In particular, mental health diagnoses (i.e., post-traumatic stress disorder [PTSD], depression, and anxiety) had the strongest statistical association with SUD diagnoses. As a representative of the intersubjective domain, difficulty with

community reintegration, as measured using the Military to Civilian Questionnaire,<sup>3</sup> demonstrated greater odds for SUD diagnoses. In the temporally extended domain, veterans who indicated their emotional health had declined in the preceding year were more likely to have had a qualifying SUD diagnosis in the VA medical record. From the conceptual domain, confidence in one's self-efficacy to complete developmentally appropriate life tasks, as indicated by responding on the SELT, was associated with diminished frequency of SUD diagnoses. Finally, veterans who reported more somatic symptoms on the PHQ-15 were significantly more likely to have qualifying SUD diagnoses while in VA care. These findings indicate that each of the facets of the S<sup>M</sup> are associated with the development and maintenance of SUD.

However, when all these factors were simultaneously entered into a logistic regression model predicting SUD diagnoses, only the conceptual, intersubjective, and private domains remained significant predictors. More specifically, veterans with diagnoses of PTSD, depression, and anxiety were 2.7, 2.0,

**Table 40.1** Description of the data elements from the nationwide, post-9/11 veterans survey and dataset relative to the Multitudinous Self Model domain that each represents

<b>Multitudinous Self Model domain</b>	<b>Measure used</b>	<b>Description</b>
<b>Ecological (embodied features of the person)</b>	Diagnosis codes for mental and physical health conditions	Indicates presence of a post-traumatic stress disorder (PTSD), depression, anxiety, insomnia, pain, or hypertension/high blood pressure diagnosis in the medical record
<b>Intersubjective (qualities of person's relationship and their community)</b>	Military to Civilian Questionnaire (M2CQ)	Measures difficulty with post-deployment community reintegration following separation from military service.
<b>Temporally extended (person's perceptions of health trajectory over time)</b>	Question regarding emotional health over time	A single question that asks the respondent to compare emotional health now compared to one year ago
<b>Private (person's sense of their experiences)</b>	Patient Health Questionnaire, 15-item version (PHQ-15)	Measures severity of common somatic symptoms reported in clinical care
<b>Conceptual (person's self-perception)</b>	Self-Efficacy for Life Tasks (SELT)	Measures perceived confidence in one's ability to complete developmentally appropriate life tasks (e.g., hold down a job, take care of family)

and 1.5 times more likely to also have a SUD diagnosis, respectively, even after controlling for all other domains of the model. Importantly, this highlights that co-occurring mental health diagnoses – otherwise termed comorbid – could present compounding risk for SUD diagnoses. Interestingly, veterans who reported greater difficulty with reintegration into their communities following military service, representative of the intersubjective domain, were significantly more likely to have a SUD diagnosis in the fully adjusted model than those who experienced a smooth reintegration. This reveals that, even when controlling for the aforementioned profound influence of mental health diagnoses, difficulty with community reintegration is a substantial explanative factor in SUD diagnoses among post-9/11 veterans. Lastly, the private domain, as captured using patient self-report of common somatic complaints using the Patient Health Questionnaire, 15-item version (PHQ-15),<sup>4</sup> was also significantly associated with SUD diagnosis status. Patients who reported greater distress from common physical health symptoms were likewise more frequently diagnosed with SUD, even after accounting for diagnoses representative of the conceptual domain. This finding illuminates the importance of subjective experience as an important facet in SUD diagnoses.

These findings confirm that mental health is substantially associated with substance use problems. Moreover, this work highlights the unique and distinct importance of social support, even after accounting for mental health diagnoses. In this context, it is possible that difficulty with community reintegration is associated with PTSD status, and these difficulties are further associated with depression and anxiety. While it is not possible to determine whether reduced social support is a vulnerability to or negative consequence of SUD diagnoses in the present data, these findings underscore the complexity among the components of the multitudinous self and the need to account for social support as a matter of standard clinical care. It also suggests there may be enhanced education about or access to social programs that can bolster emotional, social, and tangible support resources that

could benefit all veterans but may particularly aid those struggling with substance use.

## Conclusion

Our goal in this chapter was to examine what insights we might glean about the landscape of substance use disorders (SUDs) by using the Multitudinous Self Model ( $S^M$ ) – an alternative to the brain disease model of SUDs – in examining the data on substance use disorders among veterans. Our analysis resulted in two important conclusions. First, SUDs among veterans are highly associated with the existence of other mental health problems, such as anxiety, depression, and post-traumatic stress disorders. Second, better community reintegration after military service is associated with reduced SUD diagnoses, indicating that social connections may be critical factors in positive outcomes. Moreover, these data suggest that there may be causal pathways among each of the multitudinous self components that must be addressed in assessment and treatment for SUD. Failure to use a multimodal assessment may lead to gaps in context, which diminishes successful discontinuation of substance use and relapse. In fact, it is possible that lack of attention to these critical features is part of the high relapse rate for SUD. For instance, models of SUDs that make the social dimensions of these conditions central, such as the  $S^M$ , are likely to guide the systematic development of strategies to generate social support in the treatment of SUDs, in comparison to the brain disease model, which does not focus on social determinants of mental health. Enhanced education on or access to social programs that can bolster emotional, social, and tangible support resources could benefit all veterans, but may particularly aid those struggling with substance use.

## Notes

- 1 Throughout the chapter, unlike many chapters in the book, we generally use the term “substance use disorder (SUD)” instead of “addiction.” The reason is pragmatic; the medical and diagnostic frameworks we appeal to in our chapter, such as the DSM-5 and the ICD-10, use “substance use disorder,” whereas neither

documents use “addiction” to individuate the phenomena we are investigating.

- 2 For other work on the relationship between identity and addiction, see, for example, Best and colleagues (2015). More generally, see Kearney and colleagues (2003).
- 3 It can be found here: <https://onlinelibrary.wiley.com/doi/abs/10.1002/jts.20706>
- 4 It can be found here: [https://journals.lww.com/psychosomaticmedicine/Abstract/2002/03000/The\\_PHQ\\_15\\_\\_Validity\\_of\\_a\\_New\\_Measure\\_for.8.aspx](https://journals.lww.com/psychosomaticmedicine/Abstract/2002/03000/The_PHQ_15__Validity_of_a_New_Measure_for.8.aspx)

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