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The Multidimensional Developmental Theory of Substance Addiction: Toward Full Recovery through Precision-Guided Treatment

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Abstract

Objective: To develop a comprehensive new theory about the fundamental nature of substance addiction, in the service of significantly improving the low to modest success rates of addiction treatment.

Methods: The resulting "Multidimensional Developmental Theory (MDT)" of substance addiction was developed by the first author via a qualitative, grounded theory methodology. Data analysis consisted of open, axial, and theoretical coding - and gave rise to the constructs of the theory.

Results: The central hypothesis of the MDT is as follows: substance addiction is a multidimensional developmental process that is organized around a particular person-substance relationship - and the unique, evolving manifestation of an individual's addiction is a function of the 7 features of that process. The 7 features - themselves composed of 20 additional hypotheses-form the architecture of the theory and serve as the structure that the central hypothesis rests upon. These 7 features function like variables in an equation, the result of which is an evolving multidimensional developmental "fingerprint" of an individual's addiction. The degree of severity is posited to be a function of the degree of development, and mapped by dimension of development within a multi-spectrum framework. Recovery is posited to be a function of beneficial multidimensional development. To the degree that downward/detrimental developmental trajectories are reversed, one dissolves the very fabric of addiction - and can thus achieve full recovery rather than an interminable remission state of being "in recovery."

Conclusions: The MDT implies that fully individualized, "precision-guided treatment" would follow naturally from analyzing the unique multidimensional developmental "fingerprint" of each individual. Non-abstinence recovery pathways are potentially viable to the extent that they derive from an analysis of an individual's multidimensional developmental process. Further research is needed to evaluate the degree to which the hypotheses and clinical implications of the MDT are valid.

Keywords: Substance addiction; Theory; Model; Developmental psychology; Assessment; Treatment; Recovery

Introduction

What is the fundamental nature of substance addiction? And what explains the great difficulty and widespread lack of success in treating it? If we step back and look at the big picture, it would appear that the problem of drug addiction is not being diminished over time-let alone solved - by our current methods of addiction treatment. We have multibillion-dollar addiction-related health care costs [1], a vast and unceasing illicit narcotics industry [2], thousands of annual deaths [3], and what is increasingly referred to as an "opioid epidemic" within the United States [4]. Our existing modalities have not, by far, led to a society in which high rates of treatment success are typical [5]. While we imagine that relatively few people are impressed with the efficacy of contemporary addiction treatment, we also believe that radical improvements are possible.

Informing our assortment of modestly effective treatment approaches are a number of existing conceptualizations about the nature of substance addiction; attempts to elucidate the core essence of the phenomenon itself. The observation of wide differences between existing conceptualizations of addiction is important to illustrate, to help contextualize the need for a comprehensive new theory. Our aim here is not to explore these conceptualizations in depth nor to assess their merit, but simply to highlight the lack of consensus within the field about the fundamental nature of addiction.

The general theme is that each of the existing conceptualizations appear to give primacy to a particular dimension of an individual as central to, or defining of addiction. The "brain disease" model [6] identifies pathological development in the neurobiological dimension as defining of addiction. The "addictive personality" conceptualization [7] views addiction as resulting primarily from a hereditary predisposition to engage in addictive behavior patterns.

The "learned behavior disorder" [8] and the "disorder of choice" conceptualizations [9] both place maladaptation in the psychoemotional dimension of the individual as central to addiction. Others view addiction as developing in response to childhood trauma, an aspect of the psycho emotional dimension as well [10]. The 12-step program views addiction as a physical and spiritual malady for which growth in the spiritual dimension is the antidote [11]. The "moral model," meanwhile, views addiction as rooted in the absence of healthy ethical development [12].

Family systems theory perspectives [13] propose that addiction is created and/or maintained through the development of dysfunctional dynamics in the relational/interpersonal dimension. The "rat park" study and ensuing conceptualization understands addiction to be the result of unfavorable sociological and environmental factors [14,15]. "Biopsychosocial" models, meanwhile, regard the confluence of a variety of biopsychosocial forces such as genetics, personality, and culture as contributing to addiction [16].

Contemporary treatment is largely informed by the conceptualizations described above, and if these treatments were highly effective there would be little rationale for developing a comprehensive new theory. In a such a scenario our goal might simply be to refine those existing conceptualizations. This is not the case however. Our current methods of treatment have done little to solve the "epidemic" of drug addiction in society and the pressure on us to achieve viable solutions is high.

Taken together, this big-picture state of affairs provided the rationale by which the first author sought a comprehensive new theory of substance addiction. If clarity about the fundamental nature of substance addiction can be achieved, then it would seem likely that treatment based in that clarity could be significantly more effective than is treatment presently. To this end we present the "Multidimensional Developmental Theory (MDT)" of substance addiction.

Method

The central research question of this study asked: What is the fundamental nature of substance addiction? Since existing models of addiction are numerous and often conflicting - and the efficacy of substance addiction treatment relatively low – the first author decided that using quantitative, hypothesis testing methods to validate and/or refine existing conceptualizations would not be optimal.

A qualitative, "grounded theory" methodology offered the opportunity to develop a theory/model of substance addiction that would not be derivative of or based in relation to any other existing conceptualization. Grounded theory methodology is a systematic and rigorous approach to creating new theory and involves analyzing raw data from peoples' lived experiences of change [17,18]. In this present study the first author analyzed the experiences of 30 individuals who had overcome a problematic substance addiction. The theory emerged as the first author made theoretical connections between themes arising from the experiences and observations of these 30 participants.

Participants

To develop a comprehensive theory of addiction, it was considered essential to analyze a sample of people who represented a variety of forms of addiction as well as a variety of recovery pathways. Such diversity could elucidate common intrapersonal and interpersonal processes. "Criterion sampling" [18] was used to recruit participants. The inclusion criteria of the study required that participants be at least 21 years of age, have overcome a problematic substance addiction, and have been free of that or any other problematic addiction for at least one year.

Multiple people were selected, however, who maintained non-problematic substance dependencies (e.g. caffeine, tobacco, buprenorphine) as were multiple people who had chosen various other forms of non-abstinence in the course of their recovery from a problematic addiction. Prior substance use pattern was assessed using DSM-IV [19] criteria for substance dependence. Time free of problematic addiction ranged from 1.5 years to 37 years, with a mean of 11.7 years and a standard deviation of 9.96. Confidentiality was protected via pseudonyms. Please see the supplemental table for participant demographics.

Pseudonym	Sex	Age range	Ethnicity	Occupation	Sexual orientation	Problem Drug	Time free of problem addiction
Babaji	Male	55-64	Caucasian	Train conductor	Heterosexual	Heroin, Alcohol	23 years
Vin	Male	35-44	Asian	Fish biologist	Heterosexual	Heroin, Oxycodone	2.75 years
Olivia	Female	18-24	Latina	Student, Healer	Heterosexual	Alcohol, Cocaine, Tobacco	9 years
Janis	Female	55-64	Caucasian	Clinical social worker-LCSW	Heterosexual	Chocolate	1.5 years
Terence	Male	25-34	Caucasian	Cross-fit trainer	Heterosexual	Heroin, Oxycodone	4 years
Linh	Female	25-34	Asian	Student, MFT intern	Heterosexual	Opiates, Cocaine, Cannabis, Alcohol	8 years
Dreya	Female	55-64	Caucasian	Designer, MFT	Heterosexual	Cocaine, Alcohol	28 years
Gabriel	Male	55-64	Caucasian	Musician	Heterosexual	Heroin, Cocaine	37 years
Colin	Male	25-34	Caucasian	Heavy equipment operator	Heterosexual	Opiates	2 years
Yuri	Male	35-44	Caucasian	Psychologist	Heterosexual	Meth	12 years
Jennifer	Female	25-34	Caucasian	Unemployed	Heterosexual	Opiates	2 years

Elena	Female	55-64	Caucasian	Yoga teacher, Recovery coach, Shamanic energy healer	Heterosexual	Alcohol	16 years
Diego	Male	35-44	Greek, Turkish, Dutch, Latino	Student, Motivational speaker	Homosexual	Meth, Cocaine, Heroin	13 years
Rodrigo	Male	45-54	Columbian	Holistic educator	Heterosexual	Crack, Cocaine, Quaaludes, Alcohol	30 years
Aluna	Female	25-34	Caucasian& Cuban	Sales manager, MFT Intern	Bisexual	Meth	8.75 years
Philip	Male	25-34	Caucasian	Self-employed	Heterosexual	Heroin, Cocaine, Meth, Benzos	2 years
Jasmine	Female	55-64	Caucasian	Decorator	Heterosexual	Meth, Cocaine, Alcohol, Tobacco	15 years
Sadie	Female	55-64	Caucasian	Drug treatment specialist	Homosexual	Meth, Alcohol, Opiates, Benzos	22 years
Dennis	Male	45-54	Caucasian	Treatment center owner	Heterosexual	Opiates	11 years
Sarah	Female	45-54	Caucasian	Treatment center owner	Heterosexual	Cocaine, Alcohol	6 years
Micah	Male	65 and older	Caucasian	Treatment center owner	Heterosexual	Alcohol, Quaaludes, Tobacco	30 years
Claudia	Female	45-54	Caucasian	Attorney	Heterosexual	Alcohol	16 years
Sean	Male	45-54	Caucasian	Software consultant	Homosexual	Alcohol, Cannabis	3 years
Barbara	Female	65 and older	Caucasian	Writer	Heterosexual	Alcohol	8 years
Tyler	Male	25-34	Caucasian	Student, Substance Abuse counselor intern	Heterosexual	Heroin, Oxycodone, Fentanyl	4 years
Michael	Male	45-54	Caucasian	Office manager (Social services agency)	Heterosexual	Meth	4 years
Violet	Female	18-24	Caucasian	Retail- Whole foods	Bisexual	Alcohol, Cannabis	2 years
Ethan	Male	35-44	Caucasian	Consultant	Heterosexual	Crack Cocaine	11 years
Maria	Female	35-44	Caucasian	None	Heterosexual	Heroin, Cocaine	11 years
Kevin	Male	35-44	Caucasian	Business owner	Heterosexual	Alcohol, Amphetamines	2.5 years

Table 1: Participant demographic chart.

Procedures

Data used in this study was 100% original and took the form of the transcribed participant interviews and the first author's field notes. The first author conducted semi-structured verbal interviews, averaging about 80 minutes, with all 30 participants. These interviews explored how each participant experienced and conceptualized the primary features of their own addiction and the phenomenon in general. The first author conducted follow-up interviews, either by verbal or electronic means with 16 participants to clarify emerging aspects of the theory. The follow-up verbal interviews ranged from 45 to 70 minutes long. Examples of interview questions included: "Which areas of your life were most impacted by addiction?" "How were you different when you were addicted to your problem substance('s) than you are now?" Interviews typically began with the first author inviting the participant to share a historical account of his or her own experience of addiction.

Data analysis took the form of open, axial, and theoretical coding, per classic grounded theory methodology [17]. "Open coding" involved the first author creating written summaries for each section of all 895 pages of transcribed interview text that contained a distinct idea or concept. These summaries constitute the open coding [17]. These summaries/open codes were then organized by their relevance within the broader central research question and sub-questions of the study. That process constitutes the "axial coding" [17]. Upon completion of axial coding, "theoretical coding" in grounded theory methodology involves postulating themes and connections between the axial codes [17]. These theoretical codes took the form of the first author's hypotheses, which he refined and organized within various versions of the broader, emerging theory. The first author then distilled certain theoretical constructs into heuristic formulae and designed images to represent these formulae. The images are intended to assist in the reader's understanding of the emergent theory as well as offering a "gestalt" experience of the theory.

The central hypothesis (MDT hypothesis #1) of this theory is labeled as such at the beginning of the Results section. Additional hypotheses - which form the architecture of the theory - are then labeled numerically and italicized. The "Multidimensional Developmental Theory (MDT)" of substance addiction is composed of a total of 21 hypotheses. All aspects of the theory - including the individual hypotheses, model predictions, and clinical/research implications - were formulated by the first author.

The emerging theory was shared with the second author throughout the data analysis and theory development process. The second author evaluated the content, clarity, and logical consistency of the theoretical constructs as well as their relationship to the participant data. The second author also provided methodological expertise and oversight, seeking to ensure that this theory building project was accomplished in a systematic and rigorous manner according to established grounded theory protocol.

In grounded theory research "credibility" and "applicability" are frequently viewed as the two essential components of a quality study [17]. This pragmatist approach proposes that results should make sense, provide insight and understanding, and have the potential to bring about beneficial change. The "applicability" of this theory is described in the clinical implications section of this manuscript.

The credibility of this theory was bolstered by a number of quality enhancement strategies. In grounded theory research the process of "reflexivity"-reflecting upon oneself and one's relationship to the research process – is considered essential [18]. To this end, "bracketing" involved the first author - prior to the data collection and analysis - exploring and documenting his own experiences with, biases toward, and pre-existing hypotheses about multiple aspects of the topic of inquiry. This served to minimize the degree to which the first author's inherent subjectivity shaped the process of data collection and analysis.

"Peer debriefing," meanwhile, provided an external check on the process of inquiry. This was accomplished by having additional people analyze the same data set [20]. Both peer debriefers employed were knowledgeable about the open coding process and were not affiliated with the study. A high level of consensus was found between the first author's open codes and those of the peer debriefers. "Member-checking" [17] was also conducted and involved emailing the open-coding of a participant's transcribed interview and the transcription itself to that participant for review. There was a high level of consensus between the 12 participants who responded and the first author regarding the accuracy of the summaries/open codes. "Transferability" [17] has also been bolstered by recruiting a large sample for this study - relative to what is typical for grounded theory [17] - and by providing participant quotations and summaries of their sentiments. Our hope is that sufficient detail has been provided that the reader can decide for themselves if the hypotheses of the theory are indeed grounded in the data.

Results

The result of the data analysis is what the first author has termed the "Multidimensional Developmental Theory" (MDT) of substance addiction. We first provide a general overview and then go on explain the features of this theory. The central hypothesis (MDT hypothesis #1) of the MDT is as follows:

MDT Hypothesis #1: *Substance addiction is a multidimensional developmental process that is organized around a particular person-substance relationship - and the unique, evolving manifestation of an individual's addiction is a function of the 7 features of that process.*

The multidimensional developmental process can be described by 7 features, which are each structured as one or more hypotheses. There are 21 hypothesis total: the central hypothesis (MDT hypothesis #1) and then 20 additional hypotheses. The constellation of the 7 features, composed of 20 additional hypotheses, forms the architecture of this theory and serves as the structure that the central hypothesis rests upon. The basic format of this manuscript will be presenting a hypothesis of the theory and then providing data from the study participants to support that hypothesis. We will start by previewing the 7 features of the posited multidimensional developmental process, and then go on to explaining each feature in depth.

Please note that the MDT uses the concept of "development" in a straightforward and transtheoretical manner, rather than aligning itself with a specific theory of human development. We define "development" simply as a process of change or growth over time, be it upward/beneficial or downward/detrimental. It is widely accepted that diseases can develop in the body and that humans can develop in various other dimensions, both in childhood and throughout the lifespan. It is largely synonymous to think of the MDT's posited "multidimensional developmental process" as a "multidimensional change process."

The Seven Features of the Multidimensional Developmental Process of Substance Addiction

The architecture of the posited multidimensional developmental process (and thus the MDT) consists of 7 features, structured as a set of hypotheses. We will sometimes capitalize and offer abbreviations for these 7 features in the text of this document. We do this to highlight and reinforce their existence as distinct theoretical constructs, and also because they function as variables in heuristic formulae and images to be presented further on. We hope that the capitalization and abbreviation help make this theory more readily understandable to the reader.

The seven features that compose the multidimensional developmental process are as follows: 1) Dimensions of Development (DoD), 2) Degree of Development (D^d), 3) Rate of Development (D^r), 4) Linearity of Development (D^l), 5) Biopsychosocial Forces (BPS), 6) Dynamic Interplay (DI), and 7) Weighted Significance (^{S}). The features Degree of Development, Rate of Development and Linearity of Development constitute what we term the "properties of development." The Dimensions of Development (DoD) feature describes the locations and forms of development, while the "properties of development" describe the characteristics of the developmental movement itself. While we describe specific "Dimensions of Development," these 3 properties also constitute dimensionality and help compose the broader "multidimensional" nature of this theory. We now go on to explaining each feature of the MDT.

Dimensions of development (DoD)

MDT hypothesis #2: *Substance addiction is fundamentally composed of movement in multiple dimensions of development (DoD), and the precise multidimensional developmental form this takes will vary between individuals. The dimensions are delineated in*

this theory as physiological, psychoemotional, relational, spiritual, occupational, recreational, and the person-substance relationship (PSR).

Development in a given dimension can take a variety of forms; there are multiple aspects or domains within each dimension. Within the psychoemotional dimension, for instance, the development of a sense of identity is a distinct aspect from the development of chronically depressed mood or the development of a pessimistic worldview. These are examples of three different forms of development in the same dimension.

For 100% of the participants in this study, substance addiction appeared to consist of movement in multiple Dimensions of Development (DoD). While all participants experienced multidimensional development, no participant experienced the exact same forms of development in all dimensions as another participant. Below we describe forms this multidimensional development took for participants, devoting a sub-section to each dimension of development.

Please note that the way the first author chose to delineate these Dimensions of Development is not particularly important. One may argue, for instance, that the spiritual dimension is subsumed by the psychoemotional dimension. If so, delineating it that way would have no bearing on the structural integrity or essential content of the MDT.

Physiological dimension of development: Seventeen participants (57%) described what appeared to be forms of development in the physiological dimension, and such development was inferred by the first author from the data provided by all other participants. The physiological dimension includes changes in physical health and fitness. Claudia, for instance, described becoming "exceedingly fragile" over time, Elena became "physically unhealthy," and Yuri described "weight loss and general health decline from nutritional and sleep deficits." We include developing addiction by way of using drugs for the management of physical pain in this dimension as well.

The physiological dimension includes apparent neurobiological changes such as tolerance and withdrawal. All neurobiological changes characteristic of the "brain disease model" are subsumed by this dimension. If we assume that the presence of tolerance, withdrawal, reorganized motivational hierarchies, and compulsion to use substances present among all the participants involved neurobiological changes, then we can conclude that physiological development occurred for all participants.

Psychoemotional dimension of development: All 30 participants described addiction as involving what appeared to be forms of development in the psychoemotional dimension. This included development in the domains of managing emotional states; identity formation; meaning and purpose in life; belief structures and cognitive schemas; and values/morals.

Jennifer, Kevin, Ethan, and Olivia each described the way addiction became a method to "escape" or "suppress" aspects of their psychoemotional world. Sarah described becoming increasingly "in denial" and "delusional" about the poor state of her life and about the seriousness of her drinking problem. Jasmine, meanwhile, became increasingly "paranoid" during her meth addiction. Micah described addiction as "an affect regulation coping skill that went awry." Both Dreya and Phillip described the development of a preferred new sense of identity as drug users within a sub-culture of other users, and this preferred identity itself appeared instrumental in maintaining the drug-using behavior.

Other participants experienced downward/detrimental development in their values and morals. Linh described the denigration of her values as follows: "I was so hurtful and harmful toward myself and others – self-centered, reckless, not compassionate, not self-loving, manipulative."

Relational dimension of development: Twenty-six participants (87%) described addiction as involving what appeared to be forms of development in the relational dimension. This included development in the domains of interpersonal style and effectiveness; quantity or quality of certain relationships; perceived importance of certain relationships; immersion in subcultures; and the manner in which relationships were developed.

Micah talked about the way his family of origin relationships did not change much, whereas the relationship he had with his wife at the time deteriorated substantially. In contrast, Maria described profound deterioration in multiple friend and family relationships: "All relationships were impacted. Friends from before saw me as a shell of my former self and slowly but surely, all left my life. Friends within my addict world were not real friends. My family relationships suffered the most."

For some participants downward relational development was also characterized by a progressive lack of meaningful relationships. Isolation became a hallmark of Jennifer's opiate addiction and Sean described the way his drinking problem oriented him away from interest in, and concern for others in his life. Olivia described having been "isolated and alone" and Yuri described the way, "it was nearly impossible to create any meaningful bonds during my drug use days."

Other participants described changes in their relational style; the manner in which they experienced and engaged with others. Janis found that her communication toward others had become significantly more "aggressive" and "irritable" over the course of her chocolate addiction. Sadie felt that methamphetamine use lent her a form of "mind control" over others, which she used in manipulative fashion. Barbara said that she "got into conflicts with people at work," an issue that she only later realized was a feature of her drug addiction.

Spiritual dimension of development: Eleven participants (37%) described addiction as involving what appeared to be forms of development in the spiritual dimension. For some this was characterized by the loss or diminishment of desirable spiritual beliefs, qualities, and practices. Both Sadie and Sarah described a process of becoming "spiritually bankrupt," Babaji experienced addiction as a "spiritual malady," and Violet described an increasingly "skewed perspective on spirituality." Some participants related addiction to a metaphysical process that involved their "soul" or "energy body." Phillip experienced addiction as "something that masks your soul," Diego said that addiction "robs you of your soul," and Dennis described it as "soul sickness."

Occupational dimension of development: Twelve participants (40%) described addiction as involving what appeared to be forms of development in the occupational dimension. For some participants this was characterized by a deteriorating interest in employment and/or the ability to obtain it. Deteriorating job performance also occurred for some of those who were employed during their addiction. Colin described a significant reduction in occupational functionality and Micah experienced the eventual failure of his architecture career.

Ethan described the way he used crack cocaine to sabotage his acting career. He realized, in retrospect, that crack use became a vehicle for manifesting his "fear of success."

In some cases, substance use initially provided participants with improved functioning in their occupational life or was involved in the development of a particular occupational skillset. Aluna became a meth dealer during addiction and described the development of occupational skills that are now valuable to her current occupation as a sales manager and psychotherapist: "I can actually attribute a lot of my current success to the time that I spent dealing crystal meth." Diego, who was kidnapped into a prostitution ring as a teenager, found that heroin and meth were essential tools that enabled him to perform the degrading and unpleasant nature of that work.

Recreational dimension of development: Sixteen participants (53%) described addiction as involving what appeared to be forms of development in the recreational dimension. For some this involved the cessation of, or diminished interest and participation in activities that used to be enjoyable. Maria reported becoming a person whose "recreational activities completely stopped." Sean, meanwhile, talked about the way he eventually had "no desire" to drink socially; he wanted simply to be in "his own world" while getting intoxicated.

In other cases addiction involved the development of new recreational pursuits which were contingent upon use of the problem drug. The recreational piece was paramount for Vin, who said: "I didn't have any family problems or deeper issues or pain that I was using opiates to mask. Honestly it just started with recreational opiate use. Eventually it became everyday use, and went downhill from that point." All of Vin's recreational activities came to revolve around and require opiate use.

Person-substance relationship (PSR) dimension of development

MDT hypothesis #3: *The multidimensional developmental process of substance addiction is organized around a particular person-substance relationship (PSR), itself a dimension of development.*

The first author defines the person-substance relationship (PSR) dimension as the individual's direct psychoemotional and behavioral relationship to a psychotropic substance. All 30 participants described addiction as involving what appeared to be forms of development in the person- substance relationship (PSR) dimension.

The person-substance relationship can be thought of as the gravitational center of the multidimensional developmental process. Essentially, there would be no multidimensional developmental process of substance addiction without the use of the addictive substance and the attachment that forms to it. We have assigned an abbreviation (PSR) to this particular dimension of development due to its unique and central role in the broader multidimensional developmental process. Aspects of the PSR, structured as hypotheses, will be discussed below.

MDT hypothesis #4: *The person-substance relationship (PSR) involves, for each individual, varying degrees of hedonic attachment to a particular substance.*

In one form or another hedonic (i.e., pleasure-based) attachment to the addictive substance appears to have been present among all participants in this study. Eleven participants (37%) explicitly identified the relatively straightforward pursuit of pleasure and avoidance of pain as a key component of their substance use. In some cases this hedonic attachment was based in experiencing the pleasurable states of mind and body that the substance provided. Michael, for example, described his meth use as driven by the pursuit of sexual enjoyment among a sub-culture of gay men:

"I started to realize 'okay, I'm not compensating for something, for some problem in my past.' I'd started to do sex parties - like a lot of people - and did ecstasy and crystal, and the crystal just rewired my brain. It was kind of like 'this is a great feeling.' And then it's hard to stop".

Hedonic attachment also manifested as avoiding pain from withdrawal symptoms. This appeared to be a key driver of continued substance use for many participants and served to deepen their attachment to that substance. Kevin, for example, talked about how amphetamine addiction involved "the highs and the lows of always coming down, crashing and then also not being able to sleep."

MDT hypothesis #5: *The person-substance relationship (PSR) involves, for each individual, varying degrees of behavioral self-control over that substance.*

Increasing hedonic attachment to a particular substance appeared to be directly related to a reduction in ability to control any or all of the following: when the substance was used; the length of use; the quantity of use; and/or that the substance was used at all. This phenomenon appears to have occurred in all 30 participants and took a variety of forms. Barbara summarized this concept by describing that, during addiction she perpetually suffered from "this insane feeling of 'I can't get through the night without a drink.'" Other participants experienced a pattern of binge use in which they could control when they initiated substance use but did not perceive that they could control the quantity once begun. Sarah, for instance, described the way that: "'I'm just going to go have two drinks.' It never happened. When I put any amount of alcohol in my body I'm going to close the place - I don't care if it's 8 a.m." Diminishing behavioral self-control is understood to be a form of downward development in the PSR.

MDT hypothesis #6: *Substance addiction is a developmental process - rather than a fixed identity state or permanent condition - and is organized around the relationship a particular person has with a particular substance('s), rather than with all substances.*

In the MDT the individual is not defined as "an addict" at some fundamental or core level and nor is addiction simply a condition that they "have." Rather, the MDT presents the individual as engaged in a process of multidimensional development; the manifestation of the addiction is actively created by the individual.

Additionally, this process is organized around an individual's relationship with the *particular* substance. As such, use of substances subsequent to the problem addiction may or may not produce additional problems with addiction. This hypothesis is evidenced in the way that all 30 participants use or have used one or more psychotropic substances (e.g., tobacco, caffeine, cannabis, SSRI's, peyote) in a healthy or non-problematic way in their post-problem addiction lives. Most participants had also used various substances during the course of developing an addiction to the eventual problem substance without becoming addicted to those other substances as well.

MDT hypothesis #7: *In the event that an individual has an addiction to 2 or more substances, each constitutes its own separate multidimensional developmental process describable by all 7 features of that process.*

Following from the hypothesis that addiction is a multidimensional developmental process organized around a *particular* substance, is the additional hypothesis that 2 or more such processes occur in the event of "polysubstance addiction."

An analysis of the 7 features of each multidimensional developmental process will reveal the similarities and differences between them as well as differences in the overall magnitude of each. For some participants the 2 or more separate multidimensional developmental processes appeared to be substantially different. Babaji, for instance, used heroin to help with daily functioning and management of emotions, while his alcohol consumption was less frequent and often involved pursuing short-term sexual relationships. In other cases, the 2 or more separate multidimensional developmental processes were very similar. The use of methamphetamine and heroin by Diego, for instance, both served primarily to numb the emotional pain of prostitution while also enabling him to go through with the odious acts characteristic thereof.

The overall magnitude of each multidimensional developmental process may vary widely. Multiple participants in this study, for instance, had a caffeine or tobacco addiction that co-occurred with their "problematic addiction." The overall magnitude of the multidimensional developmental process constituting their caffeine or tobacco addiction was vastly smaller than that which constituted their addiction to the problem substance. The forthcoming "Degree of Development" feature will describe the way severity manifests in this theory and will thus detail exactly how one can assess the magnitude of a given substance addiction.

MDT hypothesis #8: *Two or more separate multidimensional developmental processes composing the architecture of addiction to 2 or more substances – can interact with each other to mutually shape each process's evolution.*

This hypothesis implies a great deal of potential complexity with regard to an analysis of polysubstance addiction. There was less data for this hypothesis than others in this theory, though it was apparent that the relationship a participant had with one substance influenced, in some form and to some degree, their relationship with another substance. The first author inferred, for instance, that caffeine dependence may have been amplified among participants who had alcohol addiction. The alcohol use involved downward development in the physiological dimension (e.g., hangovers, weakness, poorer overall health). The downward physiological development appeared to drive an increasing attachment to caffeine for its compensatory qualities, helping the participant to function adequately in daily life. Likewise, the anxiogenic effects of caffeine may have amplified the attachment to alcohol for its anxiolytic effects and/or created a need for higher alcohol dose to counteract those anxiogenic and otherwise stimulating effects of the caffeine.

Properties of development

We now go on to explaining the remaining six features of the posited multidimensional developmental process. Three of these features constitute what we term the "properties of development:" Degree of Development (D^d), Rate of Development (D^r), and Linearity of Development (D^l). It is not only the Dimensions of Development construct that make this theory "multidimensional." The three properties elucidate the additional dimensionality with which movement in each Dimension of Development occurs.

Properties of development – Degree of development (D^d)

MDT hypothesis #9*: The MDT hypothesis #9 posits that substance addiction is not a binary phenomenon but instead occurs to a matter of degree and can be accurately expressed via the following heuristic formula: The degree (^{d}) of substance addiction (SA) is a function (f) of the degree (^{d}) of development (D).* This formula is abbreviated as follows:

$$SA^d = fD^d$$

Please note that this formula is heuristic and as such is neither mathematical nor intended to function as a precise measure.

While the Dimensions of Development (DoD) feature describes the locations of development, Degree of Development (D^d) describes the extent to which development occurs in those locations. The data from the Dimensions of Development section functions dually to support the existence of Degree of Development; development in each dimension necessarily occurred to a matter of degree. Some participants also explicitly identified addiction as a spectrum phenomenon occurring in multiple areas of a person's life. Micah, a treatment provider, observed that:

"Absolutely - it's on a spectrum of severity, but the severity isn't always around, exclusively, the substance. It's also, do they have a life? Do they have a relationship? Can they keep a job? All these things interact and make the pharmacological severity or the psychological severity dramatically worse."

MDT hypothesis #10*: Building on MDT hypotheses #9, MDT hypothesis #10 posits that movement in each Dimension of Development can either be upward/beneficial or downward/detrimental.*

While addiction is generally associated with deterioration, participant data indicated that this is not always the case. Six participants described upward development in psychological resilience during their otherwise problematic addiction. Additionally, a number of participants continue to maintain some degree of addiction to substances (e.g. caffeine, buprenorphine, kratom, or cannabis) that they feel have a beneficial role in specific Dimensions of Development. Terence, for instance, credits daily cannabis smoking with considerable psychoemotional and spiritual development: managing ADHD symptoms; directing him away from opioid use; providing mental clarity; and deepening his meditation/prayer practice.

Downward/detrimental movement describes various degrees what is commonly termed "severity." It was evident in the data that downward development in specific dimensions composed the essence of what made all 30 participants' addiction problematic for them.

MDT hypothesis #11: *Hypothesis #11 posits that the degree of severity is a function of the degree of downward/detrimental development.*

Building on the preceding hypotheses we arrive at a salient feature of the MDT: the multi-spectrum map.

MDT hypothesis #12: *MDT hypothesis #12 posits that, when we combine hypotheses #2 through #11 we attain a multi-spectrum that can accurately describe the developmental form and degree of an individual's addiction. This allows the severity/detriment and/or benefit of the addiction – understood as a function of development – to be mapped by dimension.*

Figure 1 below depicts this multi-spectrum map. Note the centrality of the "Person-Substance Relationship" (PSR) dimension. Please note also that an actual clinical assessment would create sub-spectrums within each dimension to map the various forms of development occurring in that dimension.

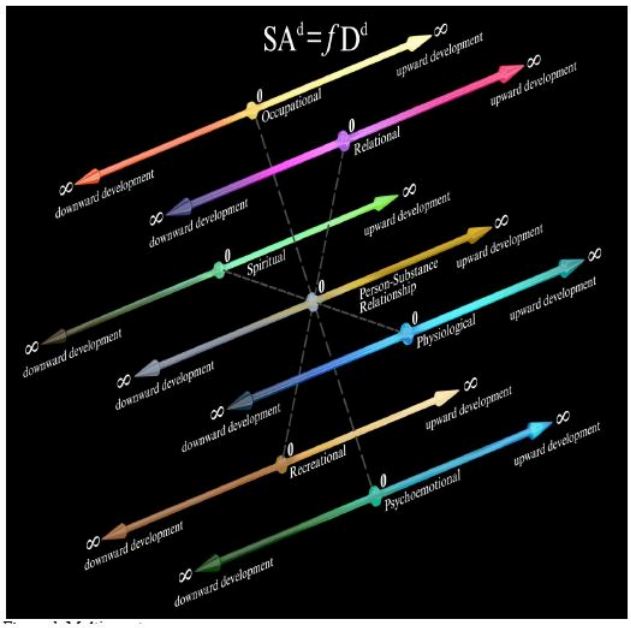

Figure 1: Multi-spectrum.

MDT hypothesis #13: *The individual spectrums of the multi-spectrum can be quantified and then aggregated to describe an individual's addiction in terms of either "degree of overall severity" or "degree of overall benefit," depending on whether the aggregate reveals overall downward/detrimental or overall upward/beneficial developmental movement* (Figure 2).

Please note that hypothesis #13 is presenting the outline of this concept, rather than specific details about how exactly the quantification and aggregation would occur. To be precise, the process of quantifying and then aggregating the individual spectrums would, in theory, occur via some process of assigning each individual spectrum a specific Weighted Significance. Weighted Significance (described in detail further on) indicates how important each form and degree of development - i.e. each individual spectrum - is to that individual's overall process of addiction.

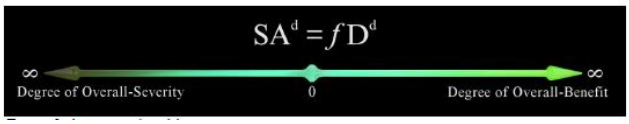

Figure 2: Aggregated multi-spectrum.

All participants asked about this reported that they have experienced and observed the varying overall severity of addiction between individuals. Maria's addiction was severe to the degree that she spent a long period of her life homeless and prostituting herself to obtain crack-cocaine and heroin. She described the spectrum of severity in addiction as follows:

"Some people may find the early stages so traumatic that it's enough for them. There are so many different types of addiction. The various levels of rock bottom are infinite. One man's rock bottom can be another man's Wednesday afternoon!".

Participant data also supports the existence of "degree of overall benefit." As mentioned above, six participants described their ongoing addiction to substances such as kratom, cannabis, caffeine, tobacco or buprenorphine to be of overall benefit to them. Tyler, for instance, experiences no drawbacks to his daily use of buprenorphine while finding it has allowed him to live free of heroin addiction and progress in multiple other Dimensions of Development. Sarah finds similar benefit in her daily use of kratom, which she says enables her to abstain from prescription opiates.

Rather than a binary phenomenon where a clear line exists between an addicted and a non-addicted person, the MDT posits that the process of addiction begins as soon as a relationship with a particular substance forms - and then evolves along multidimensional developmental continuums. In theory, the multi-spectrum map describes the nascent, potentially imperceptible movement along multidimensional developmental trajectories that begins from the very first time an individual uses a substance and thereafter seeks to use it again. That which we label addiction may constitute, ultimately, a "thoughtfully arbitrary" zone within the multi-spectrum and/or aggregated spectrum; an agreed upon demarcation along a continuum of experience.

In developing this theory the first author found that existing binary terminology (e.g. "addict" vs. "non-addict") was not sufficient to describe the wide range and complexity of person-substance relationships present among the participants, particularly in their post-problem addiction lives. Person-substance relationships in which there is daily use, a strong hedonic attachment, and even difficulty quitting - but that are beneficial in the aggregate - may be better described by a term such as "pseudo-addictions." The term "addiction" has negative connotations and as such may be ill-suited to describe overall beneficial person-substance relationships. Another term still may be appropriate to describe a pattern of psychedelic substance use in which there are no classic markers of addiction and also significant overall benefit.

In light of the complex landscape of person-substance relationships describable within the multi-spectrum and aggregated spectrum, the MDT may function to explain the nature of human substance use more broadly than that which pertains specifically to addiction. The multi spectrum map describes, in theory, all types of person-substance relationships that may develop after that first use, from the high functioning daily tea drinker to the homeless heroin addict to the occasional user of psychedelics. While this possibility extends beyond the initial purpose of this theory, it nevertheless arises as an inevitable implication of the hypotheses which form the multi-spectrum and aggregated spectrum maps.

Properties of development -Rate of development (D^r)

The next "property of development" we discuss is Rate of Development (D^r).

MDT hypothesis #14: *The rate at which movement occurs – both within and between Dimensions of development - can vary during the process of addiction.*

Varying Rate of Development (D^r) appeared to describe developmental movement for all participants. Babaji dropped out of school and experienced DUIs, automobile accidents, and incarceration well before ego-dystonic psychoemotional changes occurred. In contrast, Dennis experienced a relatively quick downward development in the psychoemotional dimension while the deterioration in the occupational dimension was much slower. Aluna described the way the relational dimension of addiction developed more quickly than did physical dependency on the substance itself: "I was like 'oh see, I'm accepted, finally I'm accepted. I fit in somewhere. This feels good, I feel good, I don't care what the repercussions are, I feel good right now.'" The rapid rate at which Aluna developed drug-related friendships was key in furthering the overall process of her addiction.

Properties of development – Linearity of development (D^l)

MDT hypothesis #15*: Movement within a specific Dimension of Development can occur with varying degrees of linearity.*

Forty percent of the participants described varying Linearity of Development (D^l) in one or more Dimensions of Development and varying linearity can be inferred from most of the others' data.

Many participants experienced non-linearity regarding their ability to manage their substance use. For certain periods of time these participants were able to control their use, while at other times the lack of behavioral self-control over the substance dominated their lives. Varying Linearity of Development took other forms as well. Diego and Bruce, for instance, both experienced a precipitous drop in physical health (physiological dimension) after a longer period of slow decline. Gabriel, meanwhile, described the way moral/ethical development (psychoemotional and spiritual dimension) took an abrupt downward turn during a business trip toward the end of his addiction: "I did a lot of bad things there, ripping people off and drug deals and stuff."

Biopsychosocial forces (BPS)

Having explained the Dimensions of Development and the 3 properties (Degree, Rate, and Linearity) we now go on to the Biopsychosocial Forces (BPS).

MDT hypothesis #16*: The developmental process of substance addiction occurs in a reciprocal fashion with biological, psychological, and social reality; biopsychosocial forces (BPS) influence the manifestation of the multidimensional developmental process, and the manifestation of the multidimensional developmental process generates new biopsychosocial forces.*

Participant data indicated that the type and significance of BPS varied widely, but in one form or another helped shape the multidimensional developmental process of all 30 participants. Examples of physiological, psychoemotional and social forces included: genetic predisposition to addiction; a shy personality; existing cognitive schemas; repressed core psychological issues; legal problems; childhood trauma; family upbringing; the death of a relative; or the presence of certain friends and sub-culture. In some cases the BPS preceded the addiction and shaped its initial development, while in other cases the BPS were generated by the developmental processes.

In Violet's case the biopsychosocial force of pre-existing, partially repressed core psychological issues functioned in a symbiotic manner with the drug use. The painful core issues influenced her to use alcohol addictively, and the alcohol use assisted with continued repression of the core issues:

"It was my way of numbing myself from what was really going on. There was just all of these repressed things that I just kept burying deeper and deeper and deeper. The longer I used alcohol the longer I forgot about it, and the more buried under surface problems it became."

Dynamic interplay (DI)

MDT hypothesis #17: *Any or all features of the multidimensional developmental process can, potentially, interact in dynamic fashion with any or all other features of the multidimensional developmental process.*

Dynamic Interplay (DI) describes the interaction between the previously described Dimensions of Development, their properties (Degree of Development, Rate of Development, Linearity of Development), and the Biopsychosocial Forces. This feature of Dynamic Interplay speaks to the complexity of the posited multidimensional developmental process of substance addiction and, we suggest, its inevitable heterogeneity of individual manifestations.

Dynamic Interplay appeared to function, in various forms, for all participants in this study. The most abundant example was the way in which downward development in one Dimension of Development would shape downward development in another. Dreya described a complex process of Dynamic Interplay:

"I remember things spiraling downward cumulatively. My inability to be present meant that my relationships were non-existent if not based on substance abuse. And therefore, I was isolated and alone, which created more motivation and space to be self-destructive and to want to escape through use of substances".

For multiple participants it appeared that the downward development in each of these dimensions also affected the Degree of Development, Rate of Development, and Linearity of Development with which the downward development occurred in other Dimensions of Development. Multiple participants, for example, described the way the loss of a family member, job, or the dissolution of a relationship led to an abrupt (Linearity), rapid (Rate), and extensive (Degree) increase in the development of attachment to the problem drug.

Weighted significance (^{S})

The final feature of this multidimensional developmental architecture is Weighted Significance (^{S}).

MDT hypothesis #18*: Each of the preceding features of the multidimensional developmental process - Dimensions of Development, Degree of Development, Rate of Development, Linearity of Development, Biopsychosocial Forces, and Dynamic Interplay - function with differential degrees of Weighted Significance to an individual's overall process during substance addiction, and for each feature this Weighted Significance (^{S}) can vary over time.*

While the other features of the MDT suggest a great deal of potential complexity for each individual's addictive process, Weighted Significance allows us to organize in hierarchical fashion the values for each feature of that process. In doing so Weighted Significance keeps

us from "getting lost" in the complexity and instead clarifies our understanding of a particular individual's addiction in terms of the features and aspects of each feature that are most relevant to his or her overall process.

This feature of Weighted Significance appeared to apply to the process of all 30 participants' addiction. Participant data indicated, for example, that the Degree of Development in one Dimension of Development was sometimes more or less significant than the Degree of Development in another Dimension of Development. Several spiritually-inclined participants found that downward spiritual development was more significant to their overall deterioration than downward movement in other dimensions of their development. A number of participants also experienced a dramatically worsened state of overall well-being and/or functionality when a Dimension of Development either abruptly declined (Linearity of Development) or declined at a rapid rate (Rate of Development).

Manifestation of Addiction as a Function of the Multidimensional Developmental Process

The 7 features described above compose the multidimensional developmental process of substance addiction. This section summarizes the way those 7 features synergize to explain the unique manifestation of an individual's addiction. Hypotheses #19 and #20 clarify aspects of the central hypothesis (hypothesis #1) of the MDT, while hypothesis #21 pertains to recovery from addiction.

MDT hypothesis #19: *MDT hypothesis #19 posits that the observable and subjectively experienced manifestation of an individual's substance addiction is, at every moment in time, a function of the 7 features of the multidimensional developmental process.*

These 7 features can be organized into a heuristic formula/equation, the result of which expresses what we term the "fingerprint" of an individual's addiction. The formula is as follows: the manifestation of substance addiction (mSA) is a function (*f*) of the Dynamic Interplay (DI) of all Dimensions of Development (DoD), the properties of developmental movement - Degree of Development (D^d), Rate of Development (D^r), Linearity of Development (D^l) - and the influencing Biopsychosocial Forces (BPS), both within and between DoD. This process is organized around the Person-Substance Relationship (PSR). All components have Weighted Significance (^{S}) to the overall process. The abbreviated formula is as follows:

$$mSA = fDI^{S}\frac{DoD^{S}[D^{dS}, D^{rS}, D^{IS}) (BPS^{S})]}{PSR^{S}}$$

Please note that this is a heuristic formula and as such is not mathematical, nor intended to function as a precise measure. The way the abbreviated formula/equation is currently written is also relatively unimportant – likely indeed there are more elegant or effective ways to depict it. This formula/equation is represented abstractly in Figure 3. Figure 4 is a legend which explains the way the components of the abstract image represent the variables of the formula/equation.

The multidimensional developmental process can be thought of as operating like a perpetual equation, with the Dynamic Interplay of the individual Dimensions of Development, their properties (Degree, Rate, Linearity), the Biopsychosocial Forces, and the Weighted Significances functioning as the variables in that equation. The first author hypothesizes that the result of this formula expresses throughout time the precise manifestation of a particular individual's substance addiction. The experiences of the 30 participants – which initially appeared highly diverse - are thus unified as individual manifestations of the posited multidimensional developmental process.

MDT hypothesis #20: *MDT hypothesis #20 posits, then, that at every moment in time there exists a unique multidimensional developmental "fingerprint" of an individual's addiction, and this fingerprint evolves as the values for each feature of the multidimensional developmental process evolve.*

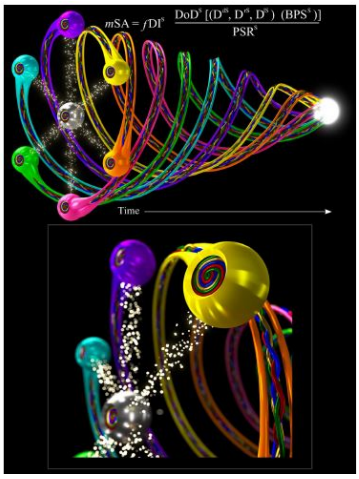

Figure 3: The "multidimensional developmental theory (MDT)" of substance addiction.

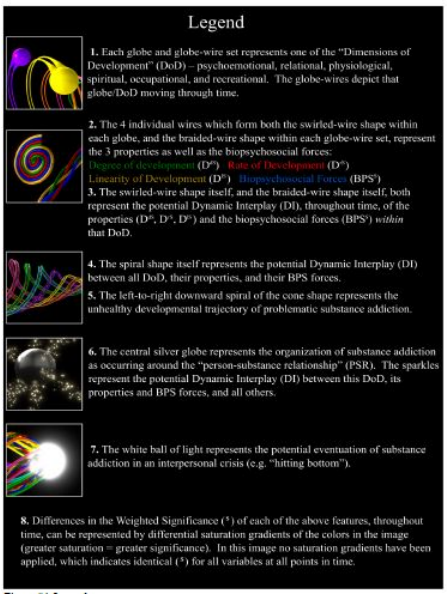

Figure 4: Legend of symbol explanations for figure 3.

It follows naturally from this conceptualization of addiction that recovery from addiction would occur as a function of altering developmental trajectories. If the essential structure of addiction *is* multidimensional development, then reversing the developmental

trajectories would in theory disintegrate the very fabric of its existence. Indeed, 80% of the participants described themselves as "fully recovered" rather than "in recovery," and described upward multidimensional development that appeared to have fully reversed (and in many cases extended well beyond) the downward developmental trajectories which occurred during their addiction. These participants had in some cases been free of any addictive substance use for many years, and in other cases had learned to moderate or substitute other substances while enjoying a relatively healthy and contented life. While this data does not prove that such people had indeed fully recovered, we think the much harder case to make is that they had not.

MDT hypothesis #21: *Thus, MDT hypothesis #21 posits that full recovery from addiction is, for a specific individual, possible to the degree that upward/beneficial development is attained in those dimensions that developed downward/detrimentally during addiction.*

Recovery from addiction, then, is hypothesized to be a function of upward/beneficial multidimensional development.

Discussion

The aim of this grounded theory methodology was to create a comprehensive theory of addiction, one that was derived entirely from, and would fully explain the diverse forms and severities of addiction present among the sample set. From our vantage, the theory appears to have accomplished this, with its hypotheses appearing to fully describe all aspects of all 30 participants' addictions. In order to understand the degree to which this theory can be generalized to other addicted people, however, further qualitative and quantitative research is needed.

Legitimate scientific theories take the form of clear, testable hypotheses, and then make predictions about reality by which those hypotheses can be validated or falsified. In structuring the MDT in the form of clear, numbered hypotheses, we provide an abundance of opportunities for the theory to be tested. We also use the term "predict" throughout this discussion section, and the use of that term signifies both a theory prediction and a research implication. Our hope is that, between the numerous predictions presented here and the formal hypotheses, researchers find many opportunities to test the validity of the MDT.

Clinical Implications and Theory Predictions

Positing that the essence of an individual's addiction *is* multidimensional development constitutes a fundamental shift from simply looking at the way addiction *impacts* a person. It is widely accepted that addiction frequently impacts multiple dimensions of a person's life. Indeed, here in the USA a popular assessment to that end is the ASAM "Multidimensional Assessment," which looks at the negative *effects* of addiction on different areas of a person's life, as well as factors such as legal problems and treatment readiness [21]. In this assessment and others like it, however, addiction is still regarded as a disorder/affliction/disease that is *impacting upon* the individual. The MDT, in contrast, presents the individual as *engaged in* a developmental process across multiple dimensions of her or his existence; the "invisible architecture" of the addiction being fundamentally composed of the development itself.

We predict that a longitudinal analysis of an individual's problematic addiction will show that downward development across various dimensions is positively correlated with other, more traditional markers of addiction such as problems with employment, the legal system, relationships, and psychoemotional or physical well-being. We also predict a significant positive correlation between the degree to which such downward development occurs and the magnitude of these other problems. We predict that such downward development will be positively correlated with an increased hedonic attachment to the problem substance and/or increased problems with managing use of that substance. We likewise predict that a longitudinal analysis of individuals engaged in a successful recovery process will show a significant positive correlation between upward/healthy development in these same dimensions, and more traditional markers of recovery such as improved occupational, relational, physical, or psychoemotional well-being.

Our vision is that the MDT creates the potential for a highly sophisticated assessment process as part of fully individualized, "precision-guided" treatment. We suggest that the 7 features of the MDT allow us to understand the architecture of an individual's addiction to a level of detail and accuracy that potentially far exceeds that which is attainable by our current assessment processes. What form do the developmental trajectories take and to what degree? How have these developmental trajectories interacted to shape each others' course? How was the attachment to the problem substance formed in relation to those trajectories and how has it evolved over time? What is the Weighted Significance of each developmental trajectory to the overall magnitude and problematicity of the addiction? Questions like these help elucidate the multidimensional developmental "fingerprint" unique to a particular individual. This fingerprint then serves as a potential roadmap to that individual's ideal treatment pathway.

The MDT's multi-spectrum map and its operational definition of severity is of particular relevance to treatment planning. The MDT hypothesizes the degree of severity to be a function of the degree of development - and this degree of development is mapped by dimension. The resulting multi-spectrum allows treatment providers to map the potentially complex, textured way in which an individual's substance addiction is composed of multidimensional development, and how exactly the severity of the problem manifests. There are thus treatment indications that go along with not only *how* severe an individual's addiction is but *what* developmental form that severity takes.

While a spectrum of severity has been recognized by some biopsychosocial models [22] as well as by clinical observations [23], it is only the latest version of the DSM-5 which has delineated a "mild" to "severe" spectrum [24]. We suggest that such efforts, while moving in the right direction, are presenting an overly simplistic, unrefined conceptualization of severity that is embedded within an inaccurate core perspective of addiction as a binary disease/disorder state. We suggest that the MDT's multi-spectrum map can offer a great deal more depth and accuracy of insight into an individual's addictive process than the prevailing view that one is simply "an addict" whose addiction is simply more or less severe.

"Precision-guided treatment" in the MDT means custom tailoring interventions to target the aspects of each dimension that developed in a downward/unhealthy way during addiction. If indeed multidimensional development is the fundamental fabric/architecture of addiction, then the implications for the nature of recovery from addiction are profound. The MDT posits that by reversing the downward developmental trajectories one can, in theory, dissolve the multidimensional developmental architecture of the addiction and

thus fully recover. One can think of this as incrementally disintegrating that which gives the addiction its existence.

Viewing recovery in this way holds any proposed treatment intervention to the question of, "how would it facilitate beneficial forms of development in a particular dimension?" We predict that measurements of multidimensional development can thus function as reliable measurements of treatment efficacy and can chart the helpfulness of treatment while it is still ongoing. We contrast this possibility to the present method of classifying treatment as successful or not in binary terms - based simply on if it was completed or not and/or if sobriety was maintained or not.

We suggest that the approach outlined above lifts virtually all restrictions off the ways in which the concept of "individualized treatment" can be optimized. Both the Substance Abuse and Mental Health Services Administration [25] and The National Institute on Drug Abuse [26] have stated that matching treatment settings and interventions to an individual's unique needs is important to treatment success. Indeed, a recent meta-analysis [27] found that matching treatment approaches to an individual's needs resulted in improved outcomes. With rare exception, however, truly individualized treatment is not what we find here in the USA. "Rehabs" typically offer a set schedule that employs some form of educational groups, 12-step participation, individual therapy or counseling, and required abstinence from non-prescribed substances, illicit substances, and alcohol [28]. The paradigm that such elements are – in one form or another - fundamental to each individual's treatment necessarily precludes treatment that is fully individualized. The implication of the MDT is that virtually nothing about an individual's treatment is presumed ahead of time. Instead, the elements of treatment are configured to match the implications of the multidimensional developmental "fingerprint" that results from the initial assessment process.

Naturally arising from the MDT's ethos of fully individualized treatment is consideration of non-abstinence recovery pathways as potentially viable. We observe both in the data the first author collected, a review of the literature [5], and our own clinical experiences the relative ineffectiveness of approaches which simply categorize people as either "addicts" or "non-addicts" and then mandate the former group to lifelong abstinence from all substances. This mandate to lifelong abstinence is met with unyielding resistance by a great many problem users, who sometimes have very good reasons for believing they can successfully manage some form of substance use.

The MDT, in contrast, does not position the treatment provider in this very common and frequently futile role of trying to convince all addicted clients that they need to quit all substances forever. In defining addiction as a developmental process organized around a particular person-substance relationship, it is also posited that an individual is not "an addict" at some core level or as a fixed identity state. It follows from this that an individual could beneficially develop in such a way that moderation and/or non-problematic use of additional substances is possible.

Rather than the common, presumptive view that "addicts need to quit all substances forever," treatment based in the MDT would make decisions about abstinence vs. non-abstinence on an individual basis. These decisions would not be presumptive but would instead derive from an empirical analysis of each individual's multidimensional developmental "fingerprint" of addiction and its implications for their overall recovery process.

The 7 features of the MDT offer the opportunity to arrive at a highly textured explanation for why an individual became addicted to a certain substance and how exactly that substance use shaped and was shaped by the various dimensions of their existence. What is the specific role the problem substance plays in the downward developmental trajectories associated with its use? If some dimensions did not develop downward and/or developed upward, why was that? How will moderation and/or the use of an additional proposed substance('s) shape the unique multidimensional development that is characteristic of the individual's recovery process? Questions like these lead to clarity about the feasibility and desirability of a particular non-abstinence recovery pathway for a particular individual.

For some people lifelong abstinence from all substances (including treatment community normative substances like caffeine, nicotine, or antidepressants) may indeed be the ideal course of treatment. For others, some form of substance use may be compatible with or even conducive of the desired upward developmental trajectories characteristic of his or her recovery process. For others still, complete abstinence may be indicated, but only for a period of time until certain multidimensional developmental goals have been achieved. We predict that this combination of openness toward non-abstinence pathways - coupled with a sophisticated method for determining the appropriateness of such pathways - will be associated with significantly lower resistance among clients in comparison to abstinence-only approaches. The importance of decreasing resistance cannot be overstated as such resistance may be the greatest enemy to treatment success [29].

We certainly see empirical support for moderation approaches in the case of alcohol [30] as well as approaches such as "opioid replacement therapy" which substitute one addictive drug for another [31]. There is also a rapidly expanding body of empirical data showing that some psychedelic substances are not only non-addictive, but are potentially effective treatments for addiction and for other psychoemotional problems [32-35]. Our suggestion that non-abstinence pathways may be appropriate for some people appears, then, to have considerable support from a growing body of empirical research.

Broadly, we predict that tailoring treatment to the implications of an individual's multidimensional development fingerprint of addiction will be associated with significantly higher rates of recovery than is treatment-as-usual. We also predict that treatment based on the MDT will be significantly more agreeable to clients than are existing approaches. Addiction, as understood in multidimensional developmental terms, becomes a process that one is engaged in rather than a disease or affliction that one simply has. Personal agency is thus amplified rather than diminished. We predict that clients will see treatment based in this paradigm as more rational, realistic, and hopeful than treatment based in the "addict" vs. "non-addict" paradigm. We hope indeed that many such people will be liberated from that binary categorization and its attendant one-size-fits-all prescriptions. We predict that the MDT's paradigm of full recovery will be associated with significantly more hope, optimism, and motivation for treatment than is the paradigm that maintaining an "in recovery" remission state is the highest achievement possible. We envision that "resistance" might eventually become an archaic term in the lexicon of addiction treatment (as far-fetched a notion as that might seem at present). We predict that the MDT will, compared to the

existing paradigm, produce significantly higher levels of inspiration and hope to clinicians as well. We envision that the complexity of the MDT allows the development of true "mastery" to be attained by clinicians with regard to evaluating the architecture of peoples' addictions and then designing treatment in a creative and highly effective manner. We hope that the MDT is an invitation for clients to fully recover and for treatment providers to excel, and suggest that it offers a roadmap to those ends.

Limitations

From a theoretical standpoint there remains the question of how the hypothesized multidimensional developmental process of substance addiction manifests with regard to broader "development throughout the lifespan" processes. Numerous models of both child and adult development exist and it seems clear that people can develop in various ways – psychoemotionally, spiritually, physically – throughout the lifespan. Does the multidimensional developmental process of addiction replace, modify, usurp, or exist alongside other developmental processes? The MDT is presently limited in that it does not address these questions. From a conceptual standpoint, it is also not clear how the MDT is situated in the landscape of other models and conceptualizations of addiction.

The ability to generalize the MDT to the general population of addicted individuals is limited by a relatively small, non-representative, mostly USA-based and mostly Caucasian sample. The MDT is also inherently limited by the potential fallibility of the study participants with regard to the data they provided. Retrospective bias and/or inaccurate autobiographical memory are potential factors. We are indeed presenting this theory, composed of its 21 hypotheses, as a theory that now needs to be tested – rather than a statement of fact. While we include numerous theory predictions in this section, additional theory predictions are needed to thoroughly and precisely test each hypothesis of the MDT. To implement and realize the clinical potential of this theory, assessment measures specific to these constructs will also need to be developed. Our hope is that this theory inspires interest to the degree that the validity of its hypotheses and clinical implications can be fully evaluated by other researchers, clinicians, and the general population.

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