



Multi-Level Approach to Theories of Addiction: A Critical Review

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Abstract

Policies, in general, determine the approach of interventions in society and, in turn, they are supposed to be influenced by theories. Theories are based on evidence and data; therefore, the methodology used to produce evidence and data plays a decisive influence on the final theory. In the field of addiction, addiction theories rely on the product of studies conducted on different individual, group, and environmental levels. Addiction, however, is a multi-dimensional (biological, psychological, and sociological) phenomenon. In this review article, we argue the pieces of evidence by which we build up a matrix structure in the theoretical model in order to provide a comprehensive understanding of this phenomenon. One axis of the matrix consists of the biological, psychological, and sociological dimensions of addiction, while the other axis, consists of individual, group, and environmental levels. We further discuss how such a multilevel and multi-dimensional approach does not exist in most addiction theories, and each of the theories has only explained single or limited elements of this matrix. This mono-level approach to the phenomenon of addiction can lead to major fallacies in the research and studies of the addiction.

Keywords: Addiction, Drug Use, Theory, Theoretical Model, Policy, Multi-Dimensional, Multi-Level, Fallacy

1. Introduction

Public policy-making in various sectors is always influenced by theories, which have explained the subjects related to that sector. These theories are derived from the information, documentation, and evidence obtained as a result of conducting numerous studies on the subject. As the outcome of policies is to apply intervention with wide effects on the community and its people, it is necessary to conduct holistic studies to develop theories, which can reflect the various dimensions of the subject without bias and reductionism. This holistic investigation of addiction theorizing is also important since reductionism in the theorizing and modeling of this multilevel, multidimensional, and multidisciplinary phenomenon can lead to the adoption of policies, which are far from the complicated reality of this phenomenon, and the interventions based on them result in loss of resource and exacerbated individual and social harms of drug use. In this paper, we review the main paradigms governing addiction theories to clarify the outcomes of mono-level approach in addiction theories based on these studies.

2. What Are the Theory and Theoretical Model?

Various interpretations and definitions have been proposed for theory and theorizing. Weiner's definition is one of the most well-known theories, stating that a theory is a contemplative and rational type of abstract or generalizing thinking or the results of such thinking (1). According to another definition, the theory is a holistic explanation of some aspects of nature presented based on a wide range of evidence and can be comprised of facts, laws, conclusions, and hypotheses tested. In science, theories do not result in reality through the accumulation of evidence, but theories are the endpoint of science. Theories are results of extensive observations, experiences, and creative reflections (2). In addition, a theory is an integrated and substantive explanation of the nature of phenomena or natural processes, consisting of all hypotheses, reliable knowledge, and scientific truths (3). With a positivist approach to science, we can present a syntactic interpretation of theory and view it as a set of sentences presented in a system with first-degree logic. In this approach, the "theoretical model" can also be viewed as a set of semantic rules, expressing abstract calculi and an alternative to some of these calculi.

However, with semantic interpretation, we must consider formal calculi holistically and view our theory as a group of relative models.

In another approach, models are viewed independent of theories in terms of structure and functions, which are not constructed based on theoretical justifications from top to down, but they are constructed based on phenomenological phenomena from down to top, and provide quantitative insight for us (4). Either we consider models as a structure to represent the correctness of a theory or consider it independent of the theory; a scientific model is physical, conceptual, or mathematical representation of a real phenomenon, which is difficult to observe it directly. Scientific models are used to explain and predict the behavior of real subjects or systems (5). Given the definitions presented, we require information, documentation, and evidence related to the subject to develop a theory or theoretical model. In addition, theories and theoretical models specify the approach and methodology of research in this area. Hence, there is a reciprocal relationship and interaction between the theory and studies related to that theory. The important point is that the information and evidence used in the theorizing should encompass all levels and dimensions of the subject of the theory. This holism is more important in multidimensional (bio-psycho-social) and multilevel (individual and social) subjects of drug use and addiction since reductionism approach to this phenomenon not only misguides us on its nature but also makes our interventions in response to it fruitless. This study will reveal that which one of holism or reductionism approaches is the main approach in the addiction studies and theorizing.

3. Theories and Theoretical Models of Drug Use and Addiction

In the academic setting, theories of the various areas of social sciences and psychology have been used in interdisciplinary areas (6). Addiction theorizing, either independently or along with phenomena known by the same theoretician, has no long history and its development historically began with the consequences of the drug use in the contemporary period. In other words, unlike many subjects, which have always been the subject of debate and theorizing for thinkers and philosophers owing to their importance for human communities, the addiction is considered a concern for contemporary humanity and compared with other subjects of a human community, the theories of this phenomenon are more recent.

4. Types of Drug Use and Addiction Classifications and Models

Various categories have been proposed to compare drug use and addiction theories and explanatory models. For example, in an approach, theories are categorized based on the fact that the development of drug use is explained in the relationship of an individual with himself, with other people, with the surrounding community or nature (7). In another approach, they have been classified based on a specific drug, age group, gender, and ethnic group, or for all drugs, age groups, gender, and ethnic groups (7).

In another classification, some addiction theories have focused on processes taken by people to use drugs and the variables, which influence this process at the individual level, and some models have focused on the role of social variables and structures in the use of drugs and the function of drug use at the social level (8). In another approach, addiction theories are categorized based on the fact that these theories have been presented in which area of knowledge and thus these theories have been categorized into biological, sociological or psychological approaches (9). As we aim to review the approach of different disciplines to addiction, we investigate drug addiction theory and theoretical models based on this criterion that they belong to which of the biology, psychology, and sociology areas, or a combination of them.

4.1. Models and Theories with a Biological Approach

Addiction is considered a brain disease in this approach, which is based on empirical studies, especially on animals (10-14). By explaining changes occurring in one's nervous system, it tries to explain processes of the first experience of drug use to gain positive feedback to explain the temptation caused by increasing motivation to use drugs and the degradation of brain function and impairment in self-control ability of the addicted person (8, 15-17). It also aims to explain how sporadic and recreational use of drugs under psychological conditions are affected by biological processes, leading to drug addiction (18). Although this approach relies on experimental observations and even brain imaging (19, 20) that increase the accuracy in explaining some details, it might suffer from some limitations in explaining all conditions related to the addiction as an abnormal condition (21). While the early evidence obtained in this area recognizes the addiction as a brain disease, new documentation has been obtained on the effect of other systems such as endocrine (22, 23) and the immune systems (24, 25) in the development of the addiction process.

Some of the most important theories, which have examined the phenomenon of addiction with the biological approach are neural circuits (26), invalid source specified, metabolic insufficiency (27), chronobiological control theory (28), bioanthropological overview (29), evolutionary theories (30), neuropharmacological addiction (14), somatosensory affectional deprivation (31), and genetic theory (32). The aim of this study in this approach, whether in animal models or in studies conducted on humans, is the person. Some studies have examined the effect of collective life or interpersonal relationships on the physiopathology of addiction in animal models (33) or the role of the social and cultural environment in the physiopathology of mental diseases (and drug use disorder). However, no study has been conducted to examine the role of biological mechanisms of addiction in addicted people and their relationships with others and the social setting, where they are living (34), while there is a long way away to achieve a full understanding of the chain of influence of the macro-social and economic variables on the biological system. This approach has been criticized by different people. For example, it has been stated that disorder in neurological processes cannot be considered equal to brain disease (35). It has been also criticized that the biological approach to drug use is too reductionism (36) or it leads to the medicalization of the phenomenon of addiction (37).

4.2. Models and Theories with a Psychological Approach

The effect of psychosocial factors is apparent even on animals addicted under the laboratory controlled conditions. Human plays a major role in the addiction process (38, 39). Thus the addiction psychology has been the base of many addiction explanatory theories. Five major psychological views are common in contemporary psychology (40), each one criticizes the studies of drug addiction and drug use from its own perspective:

1- The bio-psychosocial view, examining the mechanisms of neurology affecting the various stages of drug use and addiction (41).

2- A behavioral view, including learning theories such as social learning, observational learning, and conditioning theories, examines how positive or negative social (42) or conditional strengthening factors (43) inhibit or trigger the onset or continuation of drug use through punishment or reward.

3- The cognitive view, including self-control theories, which states that any disruption in planned action to change a person's behavior (44) or the person's executive capacity to plan, directly monitors the flexible behaviors that change the conditions (45), predisposing a person to drug use, meanwhile, increases the severity of this disorder and addiction (46). In these conditions, addiction can

be accompanied or caused by disorders such as impulsivity created in brain function (47).

4- The psychoanalytic view: it believes that individuals might use drugs due to their inadequate-personality coping with life problems (48). In other words, drug use is a defensive or adaptive mechanism for those who have an inadequate personality to eliminate the inferiority complex (49).

5- The existentialist or humanist view suggests that there are normal states of awareness, which are different from usual consciousness and they help the person adapt to various situations. Some people may have less ability to achieve this awareness due to anxiety or other pathological states and they use the drug as a means to achieve normal conditions. Drug-dependent people have defects in sensory awareness of pleasant activities such as sex and use drugs to compensate it (50).

Social psychology, as an interdisciplinary knowledge, studies the way of the development of people's mental processes and behavior scientifically as a result of the real or perceived presence of others (40). This knowledge has also been based on various models and theories to explain addiction and addictive behaviors. Some of these theories (problem behavior proneness) emphasize the unconventionality of drug users compared with non-users, and believe that as unconventionality is greater, the person will be more likely exposed to drug use and its complications (51, 52).

In contrast, theories such as rational choice theories explain the outcomes of a set of rational and purposeful behaviors of actors, rational in the sense that they calculate the set of values, beliefs, and preferences of costs and benefits derived from possible behaviors and choose the one that gives the highest benefit to them (53). Studies focusing on the behavioral economy also have addressed the choice of drug use based on the short-term and long-term benefits as a justifiable economic behavior (54). Although the influence of biological and social factors on the psychological processes related to drug use is investigated in these views, social variables- mainly at the level of interpersonal interactions- are finally considered in terms of the effect, which they have on the person and it is not discussed that these interactions occur at macro level by which context, process, and social-economic determinants.

4.3. Models and Theories with the Sociological Approach

Sociology has investigated addiction from several distinct theoretical perspectives.

1- The anomy theory believes that group values and norms lose their meaning in anomic conditions, and individual and social principles do not match and/or social

ethics and obligation to the law are diminished, and it finally leads to isolation, confusion, and an agent for his/her anomic suicide (55).

Thus the use of drugs as an abnormal behavior will probably be more prevalent in an anomic community. Following anomie theory, strain theory states that those who believe it is impossible to achieve social goals or disagree with those goals and the ways to achieve them will more likely commit delinquent actions such as illegal trade of drugs (innovation) to achieve legitimate goals such as gaining wealth or use drugs to achieve the goals that are in conflict with public ideas (isolationism)(56). Another view states that addicted people do not oppose the adoption of illegal tools to achieve legal cultural goals, but they are not able to use this tool to provide social benefits, meaning that they are isolated when they fail in this double failure game (attempt to use legal tools and then using illegal practices). The drug use not only excludes an individual from the main social stream but also deprives him of delinquency subculture (57).

2- Adaptation model: In this model, drug dependence is viewed as an attempt to cope with failure (in obtaining social approval, competence, self-confidence, self-independence as the minimum expectation of himself and the community). A person accepts and prefers suffering from problems and the stigma of the addiction. In fact, he prefers to be known as “addicted person” rather than a “person with no identity”. From this perspective, one who is in conformity with the social structure and other people in the community is not at risk of drug dependence, but it is the strategy of isolation-seeking people in competitive situations in which they have no chance of success. Addiction is formed in disrupted communities and it is a tool to compensate for a person’s failure to conform to the community (58).

3- Social control theory: It answers the question of why only a part of community members commit deviance or abusive behaviors such as drug use. This theory believes that the level of a person’s link to the community is involved in abusive behaviors (59). Self-control theory, proposed following the social strain theory in explaining abusive behaviors, including drug use, believes that individuals behave normally based on their own benefits and interests, and socialization and education to restrict these benefits by creating self-control are essential (60).

4- The subculture and cultural deviance theory: It states that in the drug subculture, the core value is euphoria with use of drugs, and the behavioral norm is a definite desire or an attempt to use drugs in order to achieve euphoria (61). Based on this theory, the drug use originates from the dialectic between the dominant culture (especially the drug subcultures of) and the evolutionary course

of individual identity. Drug use is a personal decision, but dominant drug subcultures and the status of an individual related them have a greater effect on the behavior. Individual decisions to adopt or reject different aspects of dominant subcultures lead to the development of old subcultures into new sub-cultures (62).

5- Symbolic social interaction: It considers the drug use to be a behavior resulting from relationships among individuals. These relationships learn the way of using drug and different views that consider drug a pleasurable element (63).

6- The conflict theory: It seeks to explain how inequalities in social class, race, gender, and other factors influence the use of drugs, drug use pattern, and outcomes of drug use and other issues related to drugs (63).

7- Social influence theory: It views the drug use pattern as a function of the social influence of a group to which the person belongs, and drug use pattern, in turn, is an important factor in giving an identity to the subculture of that group (64). The influence of media on the formation of audiences’ belief in drug has been also viewed from the perspective of this theory (65).

8- Ecological view and social disorganization theory: It suggests that the influence of wealth on the status of different city neighborhoods is higher on crimes and types of deviations (including drug use) compared with factors such as religion and race (66), and unusual conditions of these neighborhoods result from macro factors available in environment and neighborhood such as movement of local residents, neighborhood decay, poverty, ethnic heterogeneity, and population density (67).

Nowadays, the idea is markedly expanding that one-dimensional models are not able to explain all the realities of addiction and drug abuse phenomenon (68), and newer theories try to explain various biological, psychological, and sociological aspects of this phenomenon and the interaction among these dimensions in a complex image using a holistic approach and multidimensional models (68-70). Some of these models have focused on finding common (physical, psychological, and social) characteristics between drug addiction and other addictive behaviors (such as gambling, sex, internet, computer games, eating, and shopping) (70-72).

By integrating physical, psychological, and social factors affecting drug use (73, 74) or by presenting combination of at least two different models (dual model) (75, 76) or several different theoretical approaches, some models have tried to explain why and how the various factors inhibit drug use or trigger the onset of drug use and its continuation (77), and finally addiction (69). Theorists who have used the theory systems to explain the phenomenon of addiction (78-81) have tried to explain the in-

teraction among the components of addiction and explain how a change created by other components is compensated, eliminated, or reinforced (8). While these theories have a holistic approach to addiction, they do not evaluate drug use as an independent phenomenon but also as a cause for other factors, which may not be in other equilibrium conditions. Not only the content but also the form and methodological approach of these theories and models to the phenomenon of addiction have had a determining influence on our perception of the concept of addiction and the response to it. Thus addiction theories can be criticized and analyzed in different aspects:

- Mono-disciplinary and reductionist approach to the multidimensional phenomenon of the addiction.

- It views drug use as pathological, abnormal or at least abnormal behavior, in spite of much anthropological and archeological evidence on uncomplicated use of drugs in human communities, indicating very diverse patterns in drug use throughout history in different geographical areas.

- The bias of the theories due to juxtaposing of the phenomenon of addiction with other pathological behaviors (physical disease, psychological deviation, and crime), rather than the explanation of the addiction as an independent phenomenon in conditions, where the applying a disease, anomaly, or a crime is essentially a formal subject.

- However, in this paper, we focus on the influence of the mono-level approach of addiction theories in the sense that these theories, without considering the knowledge domain of them, have mainly explained drug use and addiction, only at the individual or group level, leading to a reductionist perception of the addiction phenomenon and the bias of studies and theories.

4.4. Mono-Level Approach in Addiction Studies

The information, documentation, and evidence required for theorizing in the area of health and human sciences are the result of studies conducted with different methodologies on the individual, the group to which he/she belongs, and the context in which he/she is living. The focus of these studies is on the individual or on the group or on both of them (82). Another class is epidemiological studies with an ecological approach. These studies are conducted to understand the effect of context, for example, the health of individuals and population groups through responses such as selection, distribution, interaction, and conformity (83). Other studies have also investigated the influence of contextual macro factors on the formation of individual behavior (84). Accordingly, the types of bias and fallacy can occur in the process of designing and analyzing these studies and influence the theory resulting from it.

5. Discussion

Addiction theories have generally focused on the influence of one or a combination of several biological, psychological, and sociological factors on the “individual” on drug use (Figure 1). These theories describe the state of the individual in relation to drug use (such as the drug use pattern, impulsivity, tendency to unusual behaviors, and the need to relieve stress) or the mechanisms creating these characteristics in an individual or characteristics creating a strong tendency for his/her involvement in addictive behaviors (8, 9). Therefore, even when the social variables influencing the drug use, whether group variables (such as group pressure) or the contextual variables (such as the neoprene) are studied, the subject of the study is still the reasons and the process in which these variables influence the “individuals” (8). Although some studies have focused on the anthropology of drug use in some particular tribes or subcultures or groups and social classes with particular specifications (85, 86), less attention has been paid to this issue that how and in which social and economic conditions, communities at macro-level are prone to drug use and the addiction. It seems that one of the reasons for reductionism of the phenomenon of addiction to the individual level to be the methodology of the studies, which these theories have been developed based on them, so theories resulting from the result of these studies failed to explain this phenomenon since:

When the study focuses on “a group of individuals” instead of “an individual”, some characteristics are achieved at the collective level, which these characteristics are not the sum of the characteristics of individual members of that group. Thus by relying on the findings of a study conducted on an individual level or group level, one cannot predict its characteristics and the study should be conducted both on the individuals and the groups consisting of those individuals. A mistake occurs when we want to induct from micro levels such as molecules, genes, cells, tissues, and organs to macro levels such as individuals, groups, or generations (or the reverse of this path) and generalize our findings at one level to other levels (83). Many of addiction theories have been presented based on the study on drug addicted people.

Some drug use theories were based on the study of addicted people, while only a part of drug users reaches to addiction stage. What is crucial in this regard is the individual (physical, psychological) and social factors affecting the drug users with a very diverse combination. If the base of our theory is observing a strong correlation between some of these variables and an individual's addiction, we cannot necessarily generalize this correlation to all drug users and present a holistic theory for drug use, but the

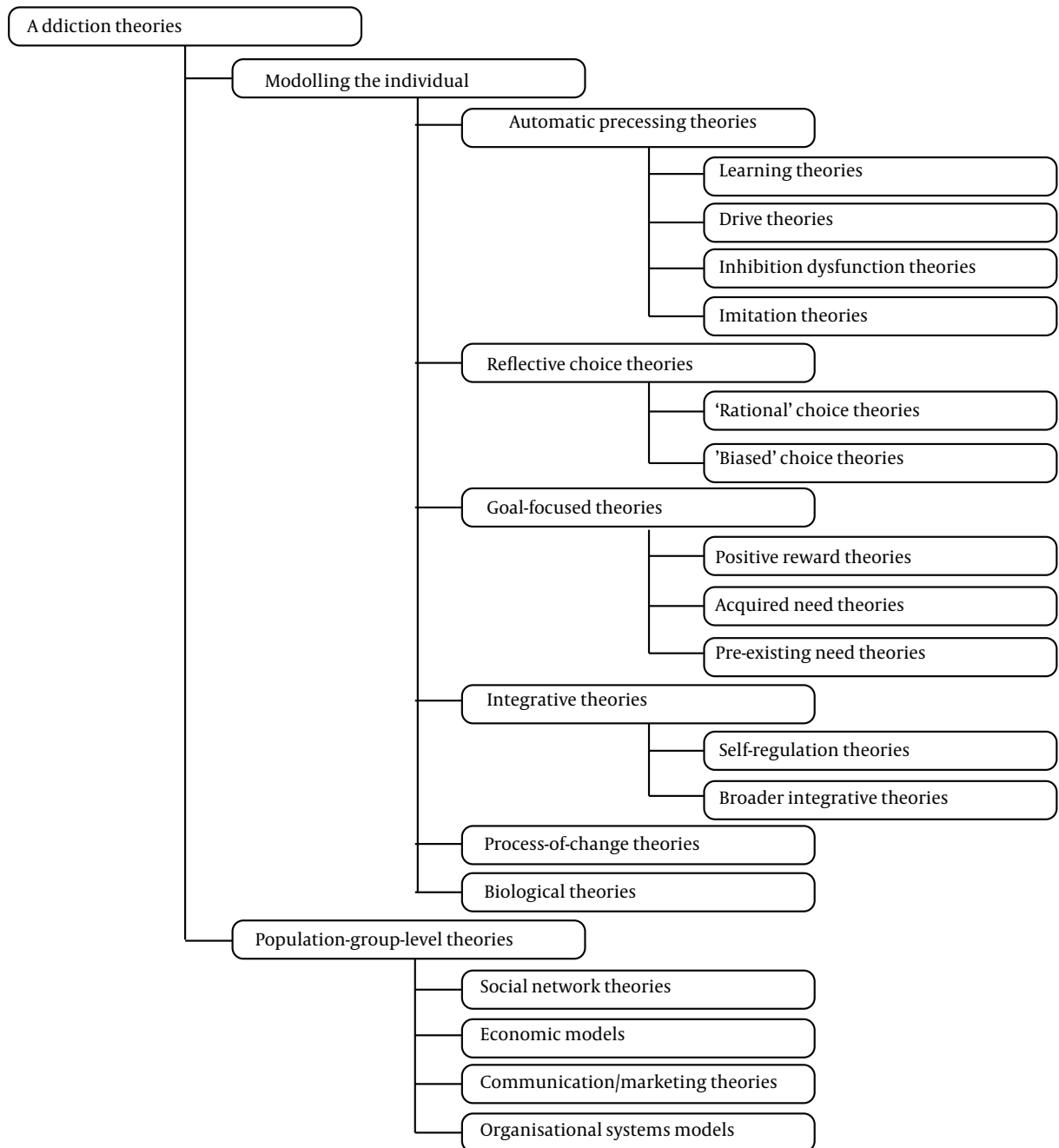


Figure 1. The classification of models of the addiction

suggested model should be limited to drug-addicted people.

Individual studies not only ignore the group effects on the phenomenon studied, but also do not examine the fact that these individuals belong to which groups and classes (with varying characteristics) of the studied population.

In such a situation, the correlation observed among the individuals within a group and the variables studied can be different (and more diverse) compared to that among the groups. For example, when the effect of group pressure on drug use in adolescents is examined, if the target group is not stratified properly or possible inflectional fac-

tors (such as education level of parents or socio-economic status of the family based on variables such as family size) are controlled, our conclusion will guide us to a non-generalizable theory.

It should be noted that many of the variables known as “independent individual variables” and affect the drug use (as dependent variables) can be intermediate variables of macro-ecological and field factors, which their effects cannot be identified directly. For example, when the educational level of or an individual's life skills or paternal skills as independent variables are the base for explaining one's tendency to use drugs and these factors can be broadly affected by macro variables such as GDP or educational per capita, or the traditional function of tribal culture in a country that forms the base of theorizing; hence, it cannot be expected that two persons with common individual characteristics, but one belongs to an African country, and another one belongs to a country in Western Europe, experience a common destiny facing with the phenomenon of drug use and the addiction.

While it has been revealed that individual independent variables, such as the one's level of education and his positive experience of school can be a protecting factor for high-risk and non-healthy behaviors such as drug use (87, 88), the direct or indirect effect of an independent group variable, such as the total education level of the community, on the prevalence of drug use is not fully determined. In addition, both of these independent individual- and group variables (the level of education and the average education of community or the group to which he belongs) are influenced by the contextual and macro variables affecting the education process and they are not considered in usual studies. In other words, two persons with similar levels of education living in two communities with a different average of education might show different proneness for drug use (under the effect of these group and contextual variables). Hence, without conducting multi-level extensive studies in a variety of social areas, it is impossible to specify the status of the education variable in the theoretical and explanatory model of the addiction.

Even in theories analyzing the drug use at macro and higher level (such as conflict theories, social control, social influence, ecological view, and social disorganization theory), these classes of communities show tendency for drug use and the addiction under the influence of subcultures and “specific social groups” when they have different (known abnormal) coordinates of the surrounding community. With this methodology, it is not possible to generalize the results to explain the use of drug in all communities or populations in different situations since the relationships of variables can vary when people are studied in general and when they are grouped in specific categories,

thus it is wrong to think that the presence of relationship at one level of a population group can be deduced from other levels of that population.

As stated above, it should be noted that when the addiction study is performed at the group or subculture level using independent group variables, that group itself is influenced by macro and contextual variables and may directly affect the person. For example, if we want to examine the relationship between one's belonging to a minority ethnic or racial group and drug use, we should note that these conditions may be considered risk factors in a community, but ineffective or even protective factors in another one.

Therefore, if a theory aims to be developed based on the characteristics of a specific group or subculture in a community, it can be generalized to other people in that community when are compared with similar groups or subcultures in different contexts. Therefore, any theory can only explain the onset and the continuation of drug use of a part of users of various drugs and generalizing it to all users is a fallacy. At the same time, it should be noted that the cultural context of the community, where the study group is living plays a key role. For example, when we want to study the drug use in adolescents, if it is conducted in a Western community, we will see that drug use is one of the challenges of adolescence, which is influenced by the adolescent's situation for seeking identity and social role, while the situation may not be found for an adolescent living in a community with different culture. Therefore, we need to conduct cross-cultural studies in order to present a generalizable theory (89).

It should be noted that the study of specific groups of the population is subjected to specification bias. Thus when we examine the drug use and addiction in groups such as marginalized groups or refugees, we should note that a variable such as poverty (in the sense of deprivation of a variety of resources) will directly influence drug use and the conditions of marginalized groups and or refugees. Hence, determining the relationship between the variable of poverty and the drug use will be crucial to explaining the relationship of these groups with drug use. This fallacy is common at the individual level. We should note that when we want to examine the effect of weakness in one's psychological skills in his tendency to use drugs, it may show the relationship with drug use in contextual conditions, and these contextual variables can be a factor for both drug use and skill weakness.

The root of the fallacy is cross-level bias and it can be the result of an atomistic fallacy. It occurs when the observation stops at the individual level and the group effects are not considered and specification bias occurs when the occurrence of this bias is highly probable in the statistical analysis at the individual level (83). Hence, in a

study on drug users, when it is seen that micro crimes caused by drug use or drug-seeking behaviors are more in drug users, we cannot conclude that in communities where these crimes are more common, drug use is also necessarily more common and thus we cannot consider the roots of drug use and committing a crime as the same in theory developed based on this information. In addition, the independent variables paving the way to commit a crime in some drug users should be identified and included in the theoretical model, otherwise, the results of a limited study will be generalized to users of a variety of drugs.

The fallacy may also occur when the results of the addiction study conducted on people belonging to specific social groups, age, job, and ethnic groups or subcultures are generalized to other populations and even the entire community of people. This evidence cannot be the base for a holistic theory since people belonging to the studied groups may be exposed to different contextual and integral variables.

It seems that some of the theories using environmental variables to explain the phenomenon of addiction suffer from the ecological fallacy since they create a causal relationship between group characteristics and drug use at the individual level by generalizing the characteristics of a group to individual members of the group, including those using drugs. However, that group characteristic (in spite of statistical correlation) may be due to a common contextual factor, which has been ignored. Therefore, based on an epidemiological study, if we realize that drug use is associated with some psychological states, we are not allowed to claim in the theoretical model that anyone who is in a mental state considered in this epidemiological study is necessarily at higher risk for addiction unless we conduct adequate studies at the individual level to assess the etiology effect of that psychological state on the addiction.

When measures of individual characteristics refer to contextual conditions (such as social class and education), they can reflect the characteristics of the group to which he belongs. Special time conditions are neglected when the mean figures hide the differences among the individuals. In contrast, the lack of individual measures can suppress the occurrence of relationships found at the group level. For example, in the subculture theory of drug use, both behaviors inconsistent with the governing values in the community and drug use can be attributed to psychological factors (such as personality), which separately make a person and the conditions in which the person is located (either direct or indirect) prone to drug use. It is possible that both of these conditions to be influenced by the contextual and macro variables.

Another challenge is to distinguish between the effects of environmental variables on individual outcomes and changing environmental conditions affected by the person's state and situation. For example, when a drug user does not have the minimum social and economic resources, he/she more likely shows the addictive high-risk behaviors and will suffer from more physical and psychosocial outcomes of the addiction with higher severity and more quickly (such as social class change), resulting in more deprivation of supportive resources. However, a person with minimum socio-economic resources can possess a completely different destiny. As stated, group variables may impose more effects on person state. In the same example, if a person belongs to a minority group, he may experience higher deprivation. However, the degree of deprivation in a minority (for example, a religious, racial or ethnic minority) varies from one country to another. Thus the demographic conditions (age or gender) or the literacy or job capability of a person belonging to a minority group can change its proneness to use drugs as they affect his socio-economic factors such as his socialization level.

Similarly, the study group might make its members prone to drug use due to conditions, which are not necessarily related to drug use. For example, if access to drugs (or similar risk factors) is high due to the poor performance of the police in marginalized areas, people living in those neighborhoods will be normally more prone to drug use. Accordingly, the effect of various types of common stressors in these neighborhoods or the type of relationships and the social network governing on neighborhoods with specific conditions can be examined. As the effect of physical, psychosocial, and social factors is not only applied directly, but in the form of causal network, it is necessary to pay attention to the role and dynamics of the relationship between a variety of factors at the onset of drug use, continuation of use, drug dependence, drug addiction, and the occurrence of a variety of addictive behaviors, and ignoring them will lead to the presentation of reductionism theoretical models. Generally, it can be stated that the factors influencing the onset of drug use are different for those who are influenced by persistent drug use, drug addiction, and outcomes of drug use and we cannot explain all of them in a theory limited to a number of individual or social variables.

The issue becomes more complicated when "users' pattern" is introduced as an important variable to theoretical equations. In practice, the correlation of relationships is larger when the study subjects are population groups when they are studied at the individual level since the groups containing humans have higher homogeneity and covariance than when individuals are randomly selected. In addition, valid studies try to eliminate the extraneous

variations as much as possible to explain a larger share of variations by studying the variables (84).

Drugs were directly used for pleasure or for the relief of physical and psychological sufferings in the past, but different population groups are nowadays using drugs for completely different reasons. Hence, a single theory used to explain drug use by a young woman to lose weight (to gain social acceptability) cannot be used to explain the use of stimulants to focus more on studying for university exams or getting more energy to work harder or getting deeper feelings during an artistic activity or get into a trance to gain spiritual experience in a group ritual. When these people are studied together in a target group, the statistical results will be very misleading.

The use pattern can also be another determining factor in our theoretical model since the tendency to use different drugs (hard-soft) can result in different socio-economic analyses with different outcomes, which influence other variables. For example, one uses injectable heroin is more likely to suffer from unemployment, social exclusion, and a variety of physical and psychological harms than one who uses marijuana sporadically for fun. Thus it is necessary to obtain knowledge on the use pattern of people included in the theoretical model as drug users. It will help us develop multiple theories for different drugs and drug users.

Another effective factor, which has not been considered in the addiction theorizing is the effect of the prevalence of drug use in terms of the acceptability of drug use in general or a specific drug in the study population. It means that when the use of a drug is more common in a community or even a country (for example, a coca leaf in South American countries or a marijuana in many Western or Khat in Arab countries), no longer only people with special characteristics show a tendency for drug use to consider these characteristics as base of explanatory model of drug use. People often use different types of drugs in communities with different socio-economic conditions. Thus socio-economic variables influence the type of drug used by individuals within a community (90). Therefore, various theories can be presented to explain the use of different types of drug in different communities.

In contrast, it can be expected that, as we see in high-risk behaviors, making people prone to HIV (91), when the use of drug in general or a specific drug is unaccepted or had low prevalence in a given community (for example, the use of alcohol in Islamic countries), the odds ratio of drug use will be higher in people who are prone to show a risky behavior. The beliefs of various communities and groups in viewing drug use normal or abnormal and the status of drug use or its non-use in the social capital of people belonging to these groups and communities can also in-

fluence the characteristics of groups and people prone or tend to use drugs (or do not reject it). Thus if only their individual proneness is considered to be the etiology of drug use, and the influence of sociological and epidemiological factors is ignored, the theory will not present proper explanation and it will remain limited to the population studied.

Hence, the effects of factors such as the criminalization or decriminalization of drug use in different countries on the level of drug use can be added to this equation. Thus it is more likely that, in a community where drug use has been criminalized based on the laws and even penalties have been specified it, those people use drugs who have a higher tendency to break the law or risky behaviors compared to a community, larger number of people are prone to use drugs due to toleration to use drugs. Consequently, mono-level theoretical models based on epidemiological information (and even demographic information since women have a lower tendency to break the law in all communities) will certainly have significant differences in these two communities.

6. Conclusions

It should be noted that in order to specify the prevalence of addiction in a population, it is not proper to categorize people into addicted and non-addicted people. The more accurate approach is that the addiction should be specified in people and the addiction status should be assessed in a community based on the fact that people are addicted in varying degrees and severity (8). Theories based on this viewpoint clarify how environmental and social factors directly related to the person facilitate drug use and addictive behaviors or prevent it. Although the role of dynamism governing intra-group relationships in the phenomenon of addiction has been considered by these theories, especially social learning theory, this approach does not focus on the effect of macro socio-economic contextual factors on the psychological state and its related behaviors. Hence, it can be concluded that drug use and the addiction are not only influenced by a complex network of factors but also even the effect of the quantitative and qualitative changes in any of these factors on the interactions within this causal network will not be linear (for example, the relationship between the Gini coefficient, the level of education, the mental state of the person, and drugs used by him/her may follow a logarithmic function rather than a linear equation).

To gain a holistic and accurate understanding of the multi-dimensional (bio-psycho-social) and multilevel (individual and social) phenomena of drug use and addiction requires multidimensional studies in individual, group,

contextual, and macro dimensions. Thus the theories developed based on these studies will be able to predict the influence of change in the types of factors on the addiction and drug use, and they will be used as a base for the design of interventions, which will guide us towards realistic goals. Theorizing with this approach requires a multidisciplinary and cross-disciplinary view, which avoids the reduction of this phenomenon to one of the level or dimensions and does not deprive itself of any data. Analysis of such big data has not been common in addiction studies and its theoretical modeling and its products will certainly reveal many unknown dimensions of human in addition to the addiction.

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Footnotes

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