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CHAPTER

1 Introduction to the Field and the Issues

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Abstract

This volume provides a comprehensive overview of the origins, development, and course of substance use as it emerges and unfolds in adolescence, a period where great change at genetic, neurobiological, behavioral, and social-environmental levels is taking place. The volume also provides reviews of clinical symptomatology and the multiple methods for intervention that have developed to address this major set of public health problems. This chapter provides a brief overview of these areas; it includes sections on epidemiology, similarities and differences among the different drugs of abuse, etiology and course, clinical symptomatology and comorbidity, intervention methods, and social policy. These summaries, covering multiple levels of analysis, provide a comprehensive description of a field that is still developing, but that has already achieved a substantial level of maturity.

Key Words: adolescent substance use, development, cross-level effects, substance use variations, mechanistic structures

Adolescence is not just a pass-through interval between childhood and adulthood. It is a time of emergence, of rapid change, of consolidation. It is also a time of awkwardness for some and flowering for others. It is a period of dynamic interaction of the individual with the social world, at the same time as it is one where significant biological change, at multiple levels, is taking place. Reward seeking and reward responsivity are at their height at the same time that rational, evaluative, self-control processes are still maturing (Zucker et al., 2008). Thus, short-term decision making may not be modulated by a broader, longer term consideration of consequences (Spear, 2000). This imbalance drives the development of behaviors that have the potential to create danger to self and others at the same time that they bring pleasure to the adolescent.

Simultaneously, from a sociocultural perspective, adolescence is a time when the privileges of adult status begin to be conferred, albeit with considerable time variation across cultures. One of these privileges is the right to use psychoactive substances. This is an activity that, in substance-using families, has been evident to the child even from the very first years of life (Mennella & Beauchamp, 1998). So as he or she grows older, she or he becomes aware, in a more nuanced way, that this is an activity people sometimes turn to for celebration, for relaxation, and also for escape from the world they live in. It also is an activity that can be seen when negative emotions are strong, at times of anger, and it sometimes also appears at times of loss. For all these reasons, it is not surprising that beginning substance use would be anticipated as the early adolescent youth becomes increasingly tuned in to the world of his or her older peers. And for the reasons just described, it also is a behavior that has the potential to be carried on in a heavier and, and for some, an out-of-control manner, as adolescence proceeds.

This account is all about growing up in families and subcultures that use psychoactive drugs. But not all do so. Approximately 10% of adults in the United States have never used psychoactive substances (Center for Behavioral Health Statistics

and Quality, 2016). The experience of children growing up in such families has an impact in both direct and indirect ways. It is an experience of being a minority in a culture where the dominant pattern is one of use, thus leading to the possibility that these youths may to some degree be estranged from their peers. Conversely, to the extent that there is estrangement between parent and child in circumstances where the family is in conflict, substance use is likely to be an activity that unmonitored youth will encounter in their peers (Fosco et al., 2012; Trucco et al., 2014). Moreover, they may find such activity attractive because it distantiates them from their parents.

Our goal for this Handbook was to address these issues in detail, at a time when there is ever-increasing public sensitivity to the magnitude of substance use problems among youth, and where there is continuing public dialogue about the desirability, or not, of increasing legalized access to marijuana. Our net of chapter content was spread to provide not just a comprehensive overview of the broad field involving adolescent substance use and abuse but also one that delved into the mechanistic underpinnings of the behavior at multiple levels of analysis. Because the causal network of this behavior is so large, and its impact is so powerful, both at the time of use as well as in terms of the long-term outcomes and complications of use, the domains we cover spread from infancy to adulthood, and from molecular genetics to social policy. We saw this as an opportunity to define a new field at a time where there has been an extraordinary growth of interest in it, and a recognition that a great many of the outcomes, social, and personal costs of later years of substance use have their origins from, and are in some instances a derivative of, what takes place during these early years. Although to date there has been a small number of other handbooks focused on this developmental time period, most have had a more specialized focus, either via the lens of a specific discipline such as pharmacology (Pagliaro & Pagliaro, 2012) or adolescent psychiatry (Rosner, 2013), or with a specific functional goal (e.g., to summarize the prevention and/or intervention literature (Leukefeld, Gullotta, & Staton-Tindall, 2009; Scheier, 2015). We are aware of only one considerably shorter volume that has some elements in common with the present work (Liddle & Rowe, 2006), but that collection was published a decade ago and did not have a developmental focus. Authors here all shared this developmental perspective, understanding that the emergence of substance use and abuse during this time interval is a process of unfolding, of a moving target, taking place while a great many other changes are taking place as well. All of the authors similarly reflect and make recommendations about where the science should focus next, and they discuss the major questions the field needs to address.

The present compendium comes at a historically important time in the history of adolescent substance abuse research. It has only been within the past generation that a more conscious awareness has existed, in both clinical and scientific communities, of the critical nature of this developmental period (Masten et al., 2008; Moss, Chen, & Yi, 2014; Substance Abuse and Mental Health Services Administration, 2009), and it has only been within the past decade that the field has embraced a cross-level analytic conceptualization of the phenomenon and produced the data to begin to map the cross-level connections (Steinberg et al., 2006). This is an intriguing albeit daunting playing field to describe, given the ultimate relevance the scientific work on this behavior has on the everyday life of the community. A special effort has been made, both in terms of the selection of Handbook chapter content and also within each chapter, to anchor the work in both arenas. Each of the authors is an authority in the area he or she reviews. Each author's goal is to provide a comprehensive overview, by summarizing and synthesizing the research knowledge base, identifying the critical issues in each area covered, and setting the agenda for future research.

The Handbook is organized into eight sections. It begins with a review of the conceptual framework and background for this era of beginning and early use.

Section I: Conceptual Framework and Background (Chapters 2 and 3)

We have already indicated why a developmental framework is essential in understanding the adolescent period. The two chapters here—by Schuenberg, Maslowsky, Patrick, and Martz (Chapter 2) and Jackson (Chapter 3)—review these issues in detail and developmentally link them not only to their precursors but also to their destinations, the period of emerging adulthood. They also make it very clear that normative pathways of development will only account for a portion of developmental variance; the changing demands of context and individual differences in risk potential—often detectable prior to adolescence—also play a significant role (Hicks et al., 2014). The importance of this multifaceted

perspective as a key to understanding the phenomenon cannot be emphasized enough. It was only a decade ago that this was acknowledged at the National Instittutes of Health level (Li, 2004). And although it is now the underlying framework for virtually all substance abuse research on adolescence, this paradigm is far from common in the adult literature (Zucker, 2000).

Section II: Epidemiology (Chapters 4 and 5)

The two chapters here present summaries of the data on demographic (Patrick & O'Malley) and cultural variation (Delva, Momper, Grinell-Davis, & Padilla) in substance use and abuse. In Chapter 4, Patrick and O'Malley provide the epidemiologic data on magnitude, age, and demographic variation in the frequency of use in the various drugs of abuse; document the significant variations in population preference for the different drugs; provide a concrete picture of the public health burden; and also—again from a developmental perspective, albeit one in historical time—describe how national patterns of use have varied across the years. In Chapter 5, "Cultural Variations and Relevance to Etiology," Delva, Momper, Grinnel-Davis, and Padilla provide a detailed account of the great within-culture as well as across-culture variation in patterns of use and abuse that exists among ethnic minority subpopulations, and they provide a carefully disaggregated description of the role that culture plays in determining population variability. The authors make the point that cultural variation is ultimately an individual phenomenon rather than an attribute of a group, and it is a function of the integration of multiple identities assimilated into an individual identity, crafted from the multiple dimensions of role, pressure, and the presence of within- and between-culture heterogeneity, all of which impinge upon the person. They also note that "cultural identity" involves developmental variation at the individual level, but it also changes with historical change.

Section III: Drugs of Abuse: Similarities and Differences (Chapters 6–10)

This group of chapters articulates how substance use/abuse is only in some ways a unitary entity. But given the large differences in pharmacology, availability, cultural variation in patterns of use, attitudes, and consequences of use among drugs, in other ways it very clearly is not. Chapter 6 on smoking/nicotine dependence (Myers & McPherson), Chapter 7 on alcohol (Chung & Jackson), Chapter 8 on marijuana (Litt, Kilmer, Tapert, & Lee), Chapter 9 on other illicit drugs (Ramo), and Chapter 10 on prescription drug abuse (Arria & Bugbee) provide the detail. All describe patterns of onset and course for each of these drug classes, the likelihood that dependence will or will not rapidly follow, the substantial individual differences among heavier users of the different drug types, the differences in peer association patterns associated with heavy use, and the differences in subcultures of use. And within the constraint that these substances vary in how long there has been a history of use and scientific scrutiny, similarities and differences in the neuropharmacological action of the drugs is also reviewed.

Section IV: Etiology and Course in the Context of Adolescent Development (Chapters 11–17)

The challenge to understanding the etiologic process at the stage where the science is now is that it requires understanding across multiple levels of analysis, and within level, it requires understanding different, albeit to some degree overlapping, mechanistic structures. This section summarizes this work across a diverse set of scientific disciplines, all of which are actively pursuing the question of what models best predict developmental course and the developmental heterogeneity that is known to be very much a part of it. The core domains we have selected for review involve etiology at genetic, neural, behavioral, cognitive, and social contextual levels of analysis.

The section opens with Chapter 11, Spear's overview of current animal models of adolescent substance abuse. Work here, over more than a decade, has been substantial, and in a number of domains it has existed long before human models of were developed. Adolescent laboratory animals share many of the traits of human adolescents, but the time course for their passage from early childhood to adulthood allows the researcher to examine, and test drug effects, and observe life span consequences within a truncated timeline that allows continued revision and hypothesis testing in a manner that would be impossible with human subjects. Spear's review of this work, much of which is her own, has provided a substantial basis for the affirmation that repeated use by adolescents of some of the most common drugs of abuse, in particular alcohol, nicotine, and the cannabinoids, produces alterations in cognitive and social functioning and emotional processing, which appear to have long-term effects

on the neurocircuitry of reward, emotional, social, and cognitive processing (Nigg, 2017). This work has had substantial impact in driving some of the early neuroimaging studies and identifying the most likely targets for substance abuse effects.

In Chapter 12, McGue and Hicks review the evidence for familial aggregation of adolescent substance use as a function of the relative contributions of genetic and environmental influences. They focus on the issue of whether the relative magnitude of their respective effects changes between adolescence and early adulthood. The limited evidence for this variation at the specific gene level is also summarized. Their account indicates a special sensitivity to the fact that all behavior from a developmental standpoint is a moving target, and they observe that the shared environmental influences of adolescence have considerably more of an effect than is true as youth move into early adulthood. Conversely, genetic effects on substance use in adolescence shift qualitatively as well as quantitatively as they transition into early adulthood, becoming stronger but also becoming much more substance specific. The data they review continue to demonstrate the dynamic and unique nature of the adolescent period, as well as the importance of factoring time variation into the etiologic matrix.

Wetherill and Tapert's chapter on neural circuitry and neurocognitive development (Chapter 13) summarizes the changes in composition and structural organization of the brain over the course of later childhood and adolescence. They describe the developmental course of the complex of neural networks that link the different brain regions and allow them to both interact, as well as functionally adapt, over the course of adolescence. They also review the effects of processes operating at other levels of system that have direct impact upon the brain's ability to self-regulate. These are sleep, and sex hormone changes, both of which also have major impact upon the process of regulation/dysregulation and are significantly affected by the physiological and behavioral changes of adolescence that take place during puberty.

In the behavioral arena (Chapters 14 and 15), research summaries are presented for behavioral undercontrol (Windle) and internalizing symptomatology (Hussong and colleagues) the two most common, non-drug-specific behavioral pathways that have strong etiologic linkages to substance use onset and course. Because they are so well known and have such a large amount of research focused upon them, it is feasible to present a multilayered view of their pathways' component structures. Each of these chapters does so, albeit focusing upon different issues. Windle's review (Chapter 14) emphasizes the multiple levels of analysis that are embedded within the undercontrol construct and challenges the reader to disaggregate the etiology into a set of parallel, albeit linked systems, whose interaction needs to be much better understood.

In contrast, the etiologic linkage between internalizing symptomatology and substance use/abuse has been a much more contested one, and the challenge is to explain why some studies have established an unequivocal connection and others have not. This conundrum has led many to posit that the relationship does not exist, in spite of considerable evidence of a robust connection, albeit often later than adolescence (Hussong et al., 2011; Meier et al., 2013; Zucker, 1994). In Chapter 15, Hussong and colleagues address this problem by focusing on the developmental linkages between risk and social experience. They make the point that, in contrast to the more unitary linkage between externalizing behavior and substance use, a cascade of threatening or fear-arousing social interactions is commonly part of the early high-risk etiologic picture. With repeated exposure to such circumstances, the ability to dampen the negative affective response is impaired, and a propensity for more intense experience of the stress develops. Over time this results in a greater sensitivity to experience negative emotionality without the ability to dampen it or move on into other affective states when the arousal experience subsides. Although there are undoubtedly some individuals who have a genetic vulnerability for this sensitivity, a considerable proportion of those with the symptomatology in youth and thereafter develop it by way of risk aggregation.

Donovan's chapter on Socialization (Chapter 16) reviews the voluminous literature on the role of the proximal (family, peers) and distal (media) social environments in prompting, shaping, and directing the emergence of substance use and abuse. At least superficially these essential etiologic elements appear to operate solely at the behavioral level. The literature clearly indicates some nesting effects are operating, in the sense that parental use is linked to poor parenting, which in turn is linked to low parental monitoring, leading to greater freedom from parental supervision, more opportunity to make contact with peers from similar social backgrounds, a greater opportunity to obtain access to drugs, and

a greater opportunity to utilize drugs without the interference of parental discipline. In other words, heavier use is embedded in a social network that progressively leads into use, with a low probability of curbing. The association between self-use and sibling use is simply another facet in this network. However, the organizing analytic model that Donovan presents shows that what at first glance is a behavioral process is in fact a network of social influence processes involving bonding (between parent and child as well as within the social network of peers) and social control, which shapes the internal process of identification that leads to modeling and solidification of use. Social media effects appear to be largely independent of the proximal influencing structure, but the fact that they are social influences suggests there is a similar underlying mechanistic structure responsible for their effect.

The utilization of substances of abuse involves both cognitive processing and action (i.e., behavior). In a carefully thought out and mechanistically detailed account of the scientific work underlying the theory of action, Peterson and Smith (Chapter 17) summarize the role of these cognitions—known as expectancies—in developing, sustaining, and/or changing the course of substance use. Although expectancies are not frequently discussed as motivational concepts, they share a similar structure (Reich & Goldman, 2015). It involves awareness of the object and awareness of the object's functional significance; the latter invariably has an emotional valence attached to it. Expectancies conceptualize the action sequence linking the cognition with an action component involving a propensity toward or away from the object. The linkage of object to action is a function of the kinds of rewards (or punishments) anticipated when the action is fulfilled. Thus, expectancies serve as implicit guiders and directors of pathways to or away from action, and they are an essential component of adaptive behavior.

Expectancy research has a long history of linkage with basic research on the theory of behavior, which in turn provides the means to deconstruct action sequences into component pieces whose operations are closer to the mechanistic structure underlying the action. Expectancy constructs such as reward, avoidance, memory, appetitive valence and strength, and attentional focus are all significantly closer to neurobehavioral operations than are concepts such as knowing, wishing, and craving. This provides a more straightforward linkage between behavioral function and neural substrate than is the case with more molar behavioral concepts. Furthermore, at the behavioral level of analysis, evidence indicates that expectancies mediate the relationship between knowledge/familiarity with drugs and awareness and action (Goldman et al., 2006; Reich et al., 2010; Wiers & Stacy, 2006). They have the advantage, therefore, as behavioral targets, of being more discrete elements to manipulate in the development of new prevention and treatment programming. Although this is only a hypothesis at this point, it offers a set of concrete next-step operations that can be tested.

Section V: Developmental Tasks and Substance Abuse (Chapters 18–23)

The five chapters in this section focus on some of the core processes and experiences of adolescence, within an organizational framework that acknowledges the multiple levels of input that shape course, and takes account of the potential for different rates of change in different experiential domains. The domains we have selected for review are those most often associated with the adolescent experience, albeit at different levels of analysis. These include Peer Relationships, Sexual Relationships, Driving, and the changing capacity for Self-Regulation. The last two chapters in this section address the relationship between Self and Environment albeit in significantly different ways; one is the course of Identity Development. The other addresses the issue of Resilience, the challenging question of what the processes are that lead one who is subject to a high-risk heritage to develop in a way that escapes that heritage.

Peer Relationships

The arguably most common exhortation that youth become involved in drugs because of their involvement with substance-using peers is also a simplistic one. In a well-documented and carefully reasoned chapter on the development of peer influences across adolescence and the linkage of this process with the use of substances of abuse, in Chapter 18, Rulison, Patrick, and Maggs make the point that the peer influence construct is in fact a set of multiple operations. These operations take place both interpersonally *and* intrapersonally, and it is through these multiple processes that "social" influence creates its effect on use. Modeling, that is, imitating the behavior of another, is one such example. Normative regulation, the individual's creation of perceived social norms, is another. In

addition, at the interpersonal level, peers structure the opportunities in which substance use can occur, and they also stimulate social motives to engage in a shared activity. Selection processes also shape network dynamics and lead youth to move in cohorts that differ in patterns of use. All of these processes are operating, albeit some are more common at one developmental way point than at another.

Sexual Relations

The relationship between romance and substance use, and in particular with alcohol, has a long history. Given that the onset of both sexual activity and substance use normatively takes place in adolescence, the romantic connection, or some variant thereof, is clearly of developmentally long standing, However, this association is a far from innocent one; it takes place at a developmental interval where both of the activities are regarded as illicit, hence requiring a certain amount of secrecy and/or privacy in order for them to occur. Although much work remains to be done, a good deal of evidence supports the view that the relationship between substance use and sexual involvement is bidirectional. Use tends to precede sexual initiation, with heavier users being more likely to initiate sex earlier. They also are more likely to engage in risky sex (more frequent, more often casual, more often without condom use), and rates of unplanned pregnancy are higher. From the other direction, the use of substances, in particular alcohol, is more likely to continue and even increase among those actively dating, while substance use drops off among those in committed relationships or those not seeking any relationship at all. Studies have suggested there are expectancy effects here, in part driven by media messages, that lead youth to believe that substance use is more likely to be arousing, and also simply that use is more likely to lead to sexual involvement, both of which tend to drive consumption. At the same time, as Norman and colleagues point out in Chapter 19, despite these myriad associations, the field still lacks an overarching model that would account for the diversity of findings documented by a large number of relatively narrowly focused studies. The chapter effectively summarizes this large array of work, and the authors begin to work toward an integrative framework that can be useful both as an organizing framework for the diversity and also can be useful in the development of preventive intervention strategies to alleviate the problems.

Driving

Although driving and substance use are not what one would typically call developmental tasks of adolescence, the fact is that they are viewed as indicators of transitioning into adulthood. Moreover, the significant parallelism between risky driving and the problem use of alcohol and/or other drugs is more than a passing one. Both are emergent phenomena that reflect the risky part of the developmental transition away from the home and into a network of relationships and activities that are developmentally associated with the broader challenge of creating an adult identity. To engage in either is to affirm one's changed status. These connections are articulated and reviewed in Chapter 20 by McCarty and McCarthy.

The authors' data very clearly indicate that the differences in patterning of substance use are reflective of historical trends (e.g., recent greater prevalence of marijuana-impaired driving than alcohol-impaired driving) and also cultural variations (e.g., differences in joint occurrence of these behaviors as a function of gender, ethnic group membership, etc.). Their review also provides information on the socialization forces that the family exerts on this learning—forces that influence both substance use and driving misbehavior. Their review additionally outlines the individual differences that exist in the adolescent-to-adult transition for ethnic and gender subgroups. This transition is not the same experience for all adolescents, a fact that is a sine qua non of the developmental challenge involved in moving toward adulthood; it is also a fact that is rarely considered applicable for these two very practical skill sets.

In the latter part of their chapter the authors also review the types and effectiveness of safeguards that society has put into place to shape the behavior taking place during this risky developmental stage. For substance abuse, this involves setting a minimum legal drinking age, as well as enforcing laws about the utilization of illicit drugs. For driving, a graded set of experiences is required, which hopefully will create a successful and accident-free transition to fully licensed driver status. In a way, the content of this chapter is more clearly illustrative than any of the other chapters in this volume about the tension that exists between activity focused solely on scientific understanding of the mechanistic basis

for behavior, and activity seeking to provide a developmentally relevant guide to society in the practical negotiation of a critical and sometimes perilous developmental life stage.

Self-Regulation and Decision Making

In Chapter 21, Anderson and Briggs present a highly detailed and step-by-step account of the development of the multiple cognitive control systems responsible for both self-regulation and decision making over the course of adolescence. The challenge for youth, in terms of making rational decisions that will not lead them into trouble, is that they are moving through a period of time when social relationships increase in involvement, which in turn frequently provides a strong push toward the use of alcohol and other drugs. Decision making on the basis of feelings (i.e., hot decision making) is also more likely to take place. Other factors in adolescence (e.g., lack of sleep, increasing awareness of positive expectancies about alcohol and other drug use, increasing autonomy) tend to make self-regulation a more difficult task, and they also make it more likely that choices will be driven by short-term reward motivations without consideration of the longer term consequences of the actions. Their careful detailing of the multiple processes involved in developing self-regulatory capacity also provides the background for some suggestions for more cognitively focused intervention strategies that might be effective in reducing risk for poor substance use decision making during this period.

Identity Development

In Chapter 22, Wills, Sussman, and McGurk focus on the internal experience of self that changes and emerges during the critical period of adolescence. The authors make the important distinction between self-concept and identity, the former being a cognitive schema of the different attributes of self (e.g., intelligence, social competence, physical appearance), the latter being a superordinate construct integrating a number of more differentiated facets, including cultural values, peer group identification, ethnic and religious identity, and gender identity, as well as self-concept. They note the importance of understanding that identity content changes as development proceeds, and also that the salience of substance use and the direction of influence are not the same across all facets. The most direct influences are those involving religious and ethnic identity, which typically have specific strictures about use and level of use, and thus play a causal role even to the extent of influencing whether onset is appropriate, and if it is, how early in adolescence use is considered to be appropriate Peer group identification also plays a powerful role at a mechanistically quite different level, involving proximal social influence processes, size, and quality of peer networks that drive the youth into or away from involvement with some peers and not others. These influences sometimes operate protectively, by way of the norms and activities fostered by the group, and sometimes create greater risk, as a function of their different norms and activities.

One issue that is far from settled is the extent to which substance use itself has an impact on identity; or, conversely, is the direction of impact primarily the other way? One line of research indicates that level of self-esteem (low) may drive one into heavier use. Other research indicates the obverse, that substance use itself can become an identify facet, in which case it may be harder to change. It is likely that both of these mechanisms operate, but the circumstances where each of these processes might operate remains to be articulated (Hicks et al., 2014; Schulenberg & Maggs, 2002).

Resilience

Although less often a focus among researchers interested in the development of the pathology of abuse, the individual, social, and community processes that lead to the dilution of risk and those that independently foster a successful social adaptation are also essential components of the etiologic matrix. To the extent these positive features are present, they create a challenge to the view that risk, if in place long enough, is tantamount to damaged outcome. Moreover, the considerably heavier emphasis in the resilience literature on development as a transactional process that takes place between individual, proximal social environment, and community is a reminder that the developmental field in which the organism is unfolding is an essential component of the etiologic process, and that resilience processes are as important to document and understand as are risk factors. In Chapter 23, Hurd and Zimmerman address these issues, and the chapter is included here explicitly because this is an essential—albeit typically ignored—component of etiology. In a very comprehensive and broad-ranging review, Hurd and Zimmerman describe existing findings at each of the three levels of operation. In contrast to some of the other areas reviewed in this Handbook, the work in this area is heavily theory based, and investigators are conscious of what

domains of influence they have not examined along with describing the effects in those they have. At the individual level, work has focused on enhancement of positive behaviors that are individual strength enhancing/asset building at the same time as they operate to negate whatever negative forces the youth is subject to. These include building positive mood, enhancing academic achievement goals, enhancing competence skills, and strengthening racial identity, to name just a few. At the proximal social level, most of the work has been done on functioning within the family, at a significant number of content foci involving enhancement of family attachment, parental involvement, social supports, and effective family functioning. At the community level, recent work has focused on the development of positive role models in the community and the fostering of adult/neighbor mentoring of youth with whom they have some contact. The development of increased community resources for youth and their families is another modality that has also received attention.

Section VI: Comorbidity in Adolescent Substance Abuse: Chapters 24–27

All of the chapters in this section address a common theme, namely, that there is a high rate of comorbidity between drug and alcohol abuse/dependence and other mental disorders, and that adolescence is the time of greatest co-occurrence. In Chapter 24, Wilson and Janoff provide an overview of most of the multiple behavioral/psychiatric comorbidities associated with alcohol and drug use. Antisocial/delinquent "comorbidity," the topic of Chapter 25, by White, Cronley, and Iyer, focuses on the most highly concurrent relationship between substance abuse and other behavior, and one that is also the source of the greatest damage to self and to others. The visibility, impact, and long-term individual and social cost of this comorbidity warrant a chapter of their own. Chapter 26, by Schizer, Weitzman, and Levy, provides an overview of the common linkages between substance use and the medical/physical health issues of adolescence, as they show up in primary care. The chapter also describes the special role and opportunity for the primary care provider to make contact with and help substance-abusing youth who would not otherwise receive the benefits of contact with a knowledgeable and caring health professional. A separate chapter has been devoted to sleep impairment (Chapter 27) and its linkages to substance use. Sleep impairment is the one health issue for which the entire population is potentially at risk. It also has high prevalence and can become manifest very early in development and at any point thereafter. When it does, its effects are visible (and sometimes intrusive) to the family, and the impairment itself has major ramifications in many areas of youth behavior. It is especially an issue among youth at risk for substance use (Wong et al., 2004, 2009). The obverse is also true: Persons with sleep difficulties are also more likely to have alcohol and other drug problems (Brower et al., 2001). Chapter 26, by Cohen-Zion and Svirsky, is specifically devoted to a review of these linkages. Each of the chapters also addresses the issue of treatment/intervention, given that those with these comorbidities are typically more difficult to engage at the same time that they are more likely to need treatment.

Comorbidity in Adolescent Substance Abuse and Disorder

In their well-documented chapter (Chapter 24), Wilson and Janoff provide a comprehensive clinical review of the many comorbid disorders associated with substance abuse/disorder in adolescence. In parallel with the etiologic literature, they note that the two major clusters of co-occurrence involve externalizing symptomatology (e.g., conduct disorder, oppositional defiant disorder, and attention-deficit disorders) and internalizing symptomatology (e.g., major depressive disorder, posttraumatic stress disorder, and anxiety disorder). They also make the point that comorbidity is more common among those with substance use and disorder in adolescence than it is with those in adulthood, indicating the special vulnerability of adolescence to negative outcomes. This is a risk that parents tend largely to be unaware of. And as is true in etiologic studies, the pathway of effect is most commonly from the comorbidity to the substance use and disorder. But particularly for those with a clinical level of symptomatology, the direction of effect is not always that way. For example, an extensive literature has documented how marijuana use is precursive to psychosis as well as subsyndromal symptomatology.

Wilson and Janoff also articulate many of the treatment challenges of adolescents with co-occurring disorders, of which the first is simply recognizing that such a situation exists. They advocate always for the construction of an integrated treatment plan that addresses both disorders, and they review a rich literature on the complexities of formulating such a plan. Their constant use of clinical examples will make their account valuable to the practicing clinician, while at the same time

they outline for researchers the many treatment-regimen-related questions still requiring answers.

Risks for Delinquent Behavior

The Child Behavior Checklist and its adolescent Youth Self-Report Form (Achenbach, 1991) are two of the most commonly used child and adolescent behavioral assessment instruments. One of the major components of psychopathology that they measure is the broadband Externalizing Behavior domain. The externalizing construct, also sometimes referred to as behavioral undercontrol (Zucker, Heitzeg, & Nigg, 2011), involves disinhibitory, impulsive, and sensation-seeking behavior, as well as rule breaking. Some elements of extraversive behavioral style are also present. The construct is highly predictive of both substance use onset and substance abuse, and it is recognized as one of the strongest precursive risk factors in the development of both of these behaviors (Zucker et al., 2011). Its relationship with substance use/abuse is extensively reviewed by Windle in Chapter 14. From a psychometric standpoint, the externalizing broadband scale is a dimensional measure that incorporates two narrow band subscales, delinquent behavior and aggressive behavior. Delinquent behavior is related to, but by no means identical with, the delinquency subscale component of the externalizing/behavioral undercontrol construct. It is differentiated in several ways: (a) The delinquency subscale/component is both a personality/temperament dimension and a dimension of clinical symptomatology. (b) In contrast, delinquent behavior is an action that is a social behavior, that always involves rule breaking, also always has some negative consequence(s) associated with it. Intentions are not part of the domain. (c) Furthermore, delinquent behavior does or does not take place. It is not scalar; therefore, a high score simply indicates a high likelihood that such behavior will occur, but a low score is not the obverse. It is simply a low propensity for delinquent activity. In short, the arena of activity covered here is a separate and differentiated, albeit related construct to the behavioral undercontrol domain. The coassociation of alcohol and other drug use with delinquent behavior in adolescence is a large one. Moreover, although the prevalence of delinquent activity at this developmental period does not equal that of substance use, it is still a significant problem in its own right. Utilizing the community sample of the Pittsburgh Youth Study (Loeber et al., 2008), and weighting sample characteristics to approximate those in the community at large, estimates are that 54% of boys between 12 and 18 had committed minor theft (stealing less than $5, or shoplifting), half had been involved in larceny or dealing in stolen property, and 18% had committed serious theft (burglary or motor vehicle theft). The urban nature of the Pittsburgh sample as well as some other demographic restrictions would suggest these figures are probably a bit higher than in the overall US population; but they nonetheless indicate that in the adolescent era, delinquent activity—like substance abuse—is a far from rare occurrence. Thus, the question of what the causal relationship is between these two behaviors is an important one for the community at large, especially if the evidence suggests there is a synergy between these two domains. In their in-depth review (Chapter 25), White and colleagues consider this issue in detail. They note the substantial acute and longer term developmental associations between the two behaviors, and they examine the issue of whether this relationship is causal (and, if so, in which direction) or simply correlational. They also probe the issue of whether these relationships are the same across all levels, or whether they might be different at higher levels of use and delinquent activity. They also summarize the work examining whether the coassociations are the same across all drugs of abuse or not (e.g., between alcohol and marijuana, etc.). In many instances they are, but in some specific areas, involving the use of marijuana versus alcohol, they are not. The authors close their review with some observations about the multiple influences that enhance risk for delinquency and for substance abuse, both individually and jointly, and also make some suggestions about the matrix of domains that needs to be addressed in order to have impact on this highly problematic set of behaviors.

Medical Issues and Role of the Primary Care Physician

Substance use in adolescence is not always detected by parents. The primary health care system is another pass-through point for large numbers of adolescents, where the opportunity also exists to notice and respond to the problems that alcohol and other drug use provides. This is especially so for young adolescents, who may have gone far out of their way to keep their use, and the contexts in which it is occurring, out of the purview of their family. In Chapter 26, Schizer, Weitzman, and Levy provide an exceptionally detailed and erudite as well as practical guide to contact with adolescents where substance use problems are (or should be) a

significant part of the encounter. Because so many youths encounter health care providers as part of their life experience, the primary care physician has the potential to prevent, delay, early detect, reduce harm, refer, and diagnose important, nonpsychiatric comorbid conditions that would be especially vulnerable to the effects of alcohol and other drugs. They also have the potential to help parents in negotiating the delicate conversation that may need to take place with their child about the child's use. Their special role, as neutral confidante, also has the potential to open up a dialogue with their adolescent patients about the level of risk they may be incurring by using or by hanging out with friends who are significant users. And last, they are the gentle entry point for referral for more expert assessment and/or treatment when it becomes clear that the level of use is of sufficient magnitude to be of diagnostic significance. In addition to discussing the different conditions of such an encounter, the chapter extensively reviews the guidelines for next-step action. These include protocols for screening, advice giving, brief intervention, and follow-up. As such, it is likely to be useful to primary care physicians, pediatricians, and other caregivers who have a professional/helping relationship with adolescents.

Sleep

Sleep is an essential component in the maintenance of health, and its disruption creates health and behavioral difficulties in a variety of domains. It shows up as a significant component in the development of attentional problems and impulsivity, as well as the development of substance use and substance use problems in adolescence (Wong et al., 2004, 2009). In each of these areas it contributes independent variance to the problem behavior. Within the specific context of the present volume, Cohen-Zion and Svirsky (Chapter 27) review the recent work addressing the ways that sleep operates in the development of substance use, as well as the ways that substance abuse contributes to the development of the sleep difficulties.

As the authors document in a number of different studies, one of the significant dilemmas relating to these effects is that they occur during a time where the social structural demands of early school start time and late night peer group activity have an impact on an organism that is going through developmental changes in the sleep cycle that call for increased rather than decreased sleep time. The environmental demands make it more difficult to satisfy the biologically driven need for more sleep, even though increased sleep would operate as a reparative process facilitating the maturation of the sleep regulatory system (Crowley, Acebo, & Carskadon, 2007; Taylor, Jenni, Acebo, & Carskadon, 2005). The unfortunate consequence of this is increased difficulty in mood regulation and greater proneness to risk-taking behavior, including a greater likelihood of involvement with alcohol, marijuana, and other drugs of abuse. The risk proneness and mood regulation difficulty, in turn, would be anticipated to facilitate the movement into substance problems instead of facilitating a judgement call of desistance, or at least careful and moderated use.

The evidence for these effects is substantial, and it utilizes both objective physiological measures of sleep as well as self-report. The authors also document how these invasive processes appear to heighten use of both alcohol and marijuana, although the long-term negative consequences are different, and even the negative consequences following cessation vary. Chapter 27 closes with a brief review of the effectiveness of the currently quite small number of intervention/prevention programs, and it calls for considerably more work to address this significant and highly visible set of developmental/social issues.

Section VII: Assessment and Intervention (Chapters 28–34)

The seven chapters in this section review the literature on assessment and intervention methods at multiple levels of system, ranging from the individual to the cultural/sociopolitical. They also illustrate that intervention at different developmental waypoints in the evolution of substance abuse requires attention at different levels of system, with attention focused more on macro-level systems of operation earlier in the development of patterns of use/abuse, and with focus more on individual behavior as problems become more entrenched and damaging to self and others in later phases.

Winters and colleagues' chapter on assessing adolescent alcohol and other drug abuse (Chapter 28) is a comprehensive and thoughtful review of some of the most important issues needing consideration when a clinical assessment measure is being selected. These go well beyond the obvious concern with psychometric characteristics; they include the need to evaluate the measure's capacity to cover short-term as compared to longer term patterns of intake and problems, the justification for and validity of self-report as compared to other measures of use (e.g.,

biological samples, observer reports, information from collaterals, etc.), the difference between assessment of treatment outcome parameters and more summative indicators of use and problems, and so on. In the process, commentary is offered about the usefulness of different measures and about the content parameters likely to be most important for different clinical assessment needs. Within these multiple evaluation contexts, 21 different assessment measures are reviewed. The chapter is likely to be highly useful as a first step for any investigator with a need to assess substance use and misuse in adolescence, and it should be equally helpful for clinicians seeking to develop a new screening or clinical evaluation battery.

D'Amico and Feldstein-Ewing, in their chapter on prevention and intervention (Chapter 29), embrace a broad framework within which to review and understand the early problem use of substances of abuse in adolescence, and they relate that to the design of differentiated intervention programming. Their review very much embraces the framework within which this Handbook was conceived; they take special pains to differentiate the settings in which prevention and early intervention activity take place, they emphasize the essential point that all programming needs to take account of the particular neurodevelopmental stage within which it is targeted, be aware of the embeddedness of substance-using behavior in its particular cultural and community context, and understand the constraints and freedoms that will be present for both youth and the community that will affect the likelihood of success for the intervention program being offered. They illustrate the special tailoring that the best programs have designed to take these factors into account, take note of the success such tailoring produces in terms of intervention outcomes, and more generally advocate for this as a standard for the field. Their take-away message is that all youthful substance use needs to be understood as an activity that is part of a developmental process that is an embedded manifestation of individual culture, lifestyle, and community reinforcers and constraints. Intervention—whether it be preventive in focus, early screening, or treatment after problem use has begun—needs to take account of this. This would produce a significant increase in the availability of focused programs, utilizing individualized methods that recognize the variety of forms that adolescent substance abuse can take. The empirical studies support this perspective, and in fact, the most successful ones form the backdrop for the propositions the authors articulate.

Targeted Prevention Approaches

It would be unheard of for a patient to visit a physician's office showing a well-demarcated symptom pattern and then be offered a nonspecific cure-all treatment. Yet that is the situation for the vast majority of school- and community-based intervention programs, and for the pronouncements that pediatric primary care providers offer their adolescent and young adult patients. At the same time, in Chapter 30, Wagner and Lewis show in considerable detail that a significant evidence base now exists for the effectiveness of two different kinds of targeted programs that are the antithesis of "one size fits all." They have different target populations and use different methodologies because of their goals, and they form the basis for an empirically validated strategy to impact substance use during the developmental interval when it is emerging, and where it is presenting the largest public health challenge of any segment of the life cycle.

Their review focuses on two different kinds of targeted prevention: one is message tailoring in health campaigns. This programming works to influence trends in health improvement information by identifying specific, high-risk target populations, thus creating the potential for greater information impact. The challenge is developing the methodology to create increasingly more well-defined audience segmentation, which in turn allows for the creation of messaging that resonates by way of its very specific appeal. The other body of work is developing specialized intervention programming to impact selected higher risk individuals. Such differentiated selectivity allows for fine-tuning based on traits/characteristics known to be present in the high-risk subgroup. This model has the potential to be more clinically effective at the same time that it becomes more cost effective. As the authors note, the next step work in both of these areas is to continue the fine-tuning and develop better understanding of the mechanistic substructure of the work.

Family-Based Treatments

As our earlier commentary has already made clear, despite the temptation to view the consumption of substances with abuse potential as individual acts, the reality is that they are very much behaviors embedded within a set of multiple overlapping systems. Intervention programming that has impact

upon these structures is therefore more likely to be effective both in the near term and over time. Boustani, Henderson, and Liddle, in Chapter 31 on family-based treatment, provide an exhaustive summary of this increasingly burgeoning field, describing 36 randomized trials and providing an extraordinarily detailed account of what works and what doesn't, as well as a commentary on the putative underlying mechanisms producing the effects. It thus provides a detailed reference and guide to the evidence-based family treatment literature. It will serve as a major summarization resource of this field for some time to come. It will also serve as a go-to guide for clinicians who want to ascertain the usefulness of particular components of their own work, and a first-step resource for researchers interested in designing next-step studies of the mechanistic structures underlying treatment effectiveness.

Adolescent Cultural Contexts for Substance Abuse

One of the major influences of culture upon daily life is the manner in which it influences day-to-day patterns of living. Some of these patterns simply reflect lifestyle variation, but some are the direct outcome of differences in access to the opportunity structure of the larger culture, which, as an end result, create disparities in education, in wealth, and even in health status. Chapter 32 on cultural contexts by Schwartz, Des Rosiers, Unger, and Szapocznik focuses specially on the issue of health disparities, and although substance abuse is one set of behaviors where such disparity is evident, they focus their discourse at a more general level—on how to understand the health disparities that exist across cultures. Thereafter, they move to the specific level of how to create intervention programming that will effectively address these disparities.

Drawing upon research on Hispanics for concrete examples, their exposition notes that population-level data on health status across cultural groups have repeatedly documented the existence of disparities in health prevalence that are not explainable by individual- and even neighborhood-level variation. One must turn to population-level processes, in particular those relating to differences in social dominance between cultures, along with system-level justifications, for the disparity, as the active elements leading to unequal allocation of social resources. They therefore advocate for interventions to combat the social/cultural differences that operate at all these levels. Without the addition of population-level, probably policy-level activity, effects produced at the lower levels will at best be modest and, at worst, will simply wash out over time. Although it remains unsaid, the authors' exposition is clear: Culture operates not only to produce health disparity, but by way of internalized norms and values, it also operates to sustain disparity within the group or groups that are free from the social burden.

Twelve-Step Approaches

Twelve-step approaches, both professionally led and peer led, are an important and effective part of the adult treatment armamentarium. The more than 80-year existence of Alcoholic Anonymous as a peer organization, to say nothing of related programs (e.g., Narcotics Anonymous) that have proliferated over these years, attests to the effectiveness of this method. It is, therefore, a logical extension to consider that the method would also be effective in helping younger patients conquer their addiction. In Chapter 33, Kelly, Worley, and Yeteraian, in their extensive review of 12-step approaches for adolescents, detail the ways that such programs have an effect but also describe the many issues that make the method more difficult to implement with this age group. For one, the depth of the addiction tends to be less severe among adolescents, so they may be more likely to see some of the 12-step life-change-focused principles as less relevant. For another, to the extent that connections are made to ongoing groups, youth may discover that the issues members discuss do not fit with their own struggles with addiction because members are older, and the particular actions needed to maintain sobriety are often different. Another impediment is that 12-step groups vary in their level of "youth friendliness." For these and other reasons, adolescents tend not to continue as long in their 12-step involvement. Relatedly, given the greater substance use of youth in later adolescence and early adulthood, involvement with more sobriety-focused peers is a more difficult locational task so that the adolescent's social experiences can be more conflictual than is the case for adult 12-step users.

Despite these impediments, the weight of empirical evidence indicates that more 12-step involvement is consistently related to better long-term outcomes. The challenge for the field is therefore to articulate those practices that will facilitate that outcome, and that at the same time are user-friendly to the rest of the adolescent's life. The authors describe more recent practices that satisfy these criteria and that appear to be clinically effective, but research is

needed to validate their utility. Given the importance of early intervention in arresting long-term trajectories of abuse, this is clearly a high-priority item for the adolescent clinical research agenda.

Inpatient and Outpatient Models

Historically, the only interventions existing to treat substance use disorder in adolescence were offshoots of adult treatment programming, were primarily based in adult treatment settings, and were largely inpatient in structure. Attention to less severe forms of problem use was relegated to counselors, often based within the educational system. The formal education system was also utilized as a setting in which opinions about use could ostensibly be changed. The focus was on nonuse as the only appropriate stance, with a heavy emphasis on awareness of prevention of damage to self and others. Formal intervention was relegated to those youth who made contact with the juvenile justice system, or as noted earlier, had symptomatology sufficiently severe that they needed a secure structure in order to be able to address their difficulties in a sustained way.

As the earlier chapters in this section indicate, in more recent years a number of effective earlier stage interventions have emerged, with the focus on prevention, early identification of problem behavior, and rapid attention to problem use as it emerges. At the same time, the more formal substance abuse treatment community has developed differentiated programming, both outpatient and inpatient, for adolescents with the more severe problems that the first line interventions did not remediate. In some instances, these formal programs are also the first therapeutic encounters for youth who have systematically denied any need for the help these earlier intervention programs might offer. In other, more economically compromised communities where preventive health-focused programs provided by the educational system or the community are lacking, formal outpatient or inpatient substance abuse treatment may also be the point of first therapeutic contact. In Chapter 34, Knight and colleagues set the context for these interventions by reviewing the developmental variations that exist in the way substance use disorder displays itself. They are also very explicit in noting that—in contrast to earlier practices where youth treatment took place in primarily adult treatment programs—age specialization of care during this period is essential because of the differences in developmental needs of younger as compared to older adolescents, and they discuss the variations in inpatient and outpatient intervention that are called for by this. The remainder of the chapter provides (a) a review of the evidence-based outcome literature for both outpatient and inpatient programming (the literature indicates clear, albeit small to moderate effect sizes, across both modalities) and (b) a discussion of what the essential components should be for a good adolescent treatment program. On both these counts, the chapter serves an eminently practical function, by providing guidance for professionals who are reviewing the effectiveness of their own programs, and by providing aid for lay persons, whether family or other professionals, about what they need to look for when searching out an appropriate referral for a family member or a patient of theirs.

Section VIII: Social Policy

Public Health Policy and Prevention

Holder and Green's chapter on public policy and prevention (Chapter 35) presents an exhaustive review of the multilevel structure of policy and prevention efforts, and the research studies evaluating these efforts. They note a reality that is often ignored by behavioral and neuroscientists, namely, that legal and public health policy is a major, demonstrably effective strategy for the reduction of youth substance use and problems, even though its formulations are not at the individual level. Their review is organized by type of drug (alcohol, tobacco, other drugs) because public policy and preventive programming operate at that drug-specific level. It also pays special attention to the specific qualities of adolescence and how they may be differentially affected by policy. To give but one example, it is essential for effectiveness with adolescents that tobacco control efforts be interdependent and synergistic across modalities. Thus, the mass media need to provide a backdrop of content that is consistent with prevention/nonuse messages received in school education programs and/or from parents. The policy-level programming does not work well when glamorous depictions of smokers or heavy drinkers—in the movies—are inconsistent with the messages the teenager receives at school or at home. These inconsistencies across modalities are much more likely to be noticed by youth and exploited as an example that "there are really no right or wrong policies here; it's just your opinion." More generally, the evidence is clear, across drugs of abuse, that policy actions need to be multifaceted to have significant impact, operating at the levels of government regulation of availability (and imposition of penalties when that

is transgressed), to media messaging, to education and monitoring/regulation at the community and family levels.

The highly focused nature of Holder and Green's review does not easily provide a place to address the basic question of where policy-level activity fits into a multilevel mechanistic model of substance use. At this juncture, however, as we conclude this summary of the multiple facets involved in the etiology, development, and control of adolescent substance use and abuse, it is appropriate to ask that question. The obvious answer is that policy-level interventions change the social control structure; they are a distal set of social context characteristics that have the capability to elicit penalties if policy is transgressed.

They operate at another level as well. Although they are distal from the individual, they operate at the individual level by way of their modification of the availability of environmental cues. Given the importance of cueing presence to substance use, they affect cognitions about use. When policy changes availability, such cognitions will not be triggered. In that sense also, they have an indirect effect upon drug use expectancies. Without the visible social presence of a drug, expectancies about use are less likely to be formed (Zucker et al., 1995).

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