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978-0-521-81447-8 - Cannabis Dependence: Its Nature, Consequences, and Treatment

Edited by Roger A. Roffman and Robert S. Stephens

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CANNABIS DEPENDENCE

Its Nature, Consequences, and Treatment

Cannabis dependence is controversial. Does it occur or is it a myth put forth by those who oppose legalization? What are the signs of cannabis dependence? How many people are affected? What are the health and behavioral risks of becoming cannabis dependent? What counseling approaches have been tested with adults and adolescents, and how effective are they? What are the arguments for legalization, regulation, or prohibition? Looking back and toward the future, what do we know and what do we need to learn?

This state of the science review sets out to answer all those questions, beginning with an historical examination and moving into diagnosis, classification, epidemiology, public health, policy, issues relating to regulation and prohibition, and evidence-based interventions.

ROGER A. ROFFMAN is a Professor of Social Work at the University of Washington. Along with Robert Stephens he has conducted a series of controlled trials to investigate the efficacy of behavioral interventions with adult and adolescent cannabis users. His research also focuses on HIV prevention with several populations and early intervention with perpetrators of domestic violence.

ROBERT S. STEPHENS is an Associate Professor of Psychology at Virginia Tech. His work includes collaborations with Roger A. Roffman on the treatment of cannabis dependence, research on social cognitive determinants of drinking and drug use, and behavioral interventions to improve substance abuse treatment aftercare attendance.

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Its Nature, Consequences, and Treatment

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Dedication

To my wife, Cheryl Richey, for her love, friendship, and support.

R.A.R.

To my wife, Amy Forsyth-Stephens, for endless amounts of patience and support,
and for always believing in me.

R.S.S.

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The old orchid hunter lay back on his pillow, his body limp with the effort of talking so long. He coughed and a ripple of pain ran through the wasted length of him beneath the covers. Still his eyes burned unwaveringly bright with the memory of the places he had seen and the things he had done, bright with an unquenchable passion for the life he would never suffer or enjoy again.

“You’ll curse the insects,” he said at last, “and you’ll curse the natives. Your lips will crack and you’ll lick them and taste the salt of your own sweat. The sun will burn you by day and the cold will shrivel you by night. You’ll be racked by fever and tormented by a hundred discomforts, but you’ll go on. For when a man falls in love with orchids, he’ll do anything to possess the one he wants. It’s like chasing a green-eyed woman or taking cocaine. A sort of madness....”

Prologue to:

Norman MacDonald
The Orchid Hunters: A Jungle Adventure
New York: Farrar & Rinehart
1939

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We have many to thank for the contributions they have made to our research on cannabis dependence and to the preparation of this volume. Professors Tom Babor and Wayne Hall offered invaluable advice as we began to plan the book's purposes and consider its potential audience. Professor Griffith Edwards, editor of the IRMA series, warmly welcomed our inquiry about the prospect of a book with this theme and then helped us to refine our early ideas concerning its contents. We benefited greatly by Professor Edwards' tutelage and encouragement.

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The contributors to this volume, leaders in cannabis studies in their respective disciplines, willingly trekked with us by preparing brief concept pieces concerning their chapters, moving from concept to outline, attending to our feedback, completing initial drafts, and again being responsive to our requests and suggestions in preparing the final manuscripts. We appreciate the quality of their scholarship and their patience with us as co-editors.

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Our colleague and friend, Professor Alan Marlatt, was gracious in agreeing to read the book and offer his reflections in the Foreword. As is true for many

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who study addictive disorders, we have been inspired by Alan's creativity and enormously influential work.

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Executive Summary

At the time of this volume's completion in 2005, important advances had been made in understanding the etiology and epidemiology of cannabis dependence, describing its neuropharmacology and the physiology of the endocannabinoid system, identifying associated consequences that impact health and behavior, and developing and evaluating the relative effectiveness of a variety of counseling interventions for adults and adolescents with cannabis abuse disorders. Many of these advances built on recent progress in the neuroscience of the endogenous cannabinoid system, in more precise classification and diagnostic paradigms for drug use disorders, and in the development and testing of theories of human behavior change.

This volume is organized into four sections. Part I focuses on the nature of cannabis dependence, with chapters devoted to the history of the concept, diagnosis and classification, pharmacology and physiology, epidemiology, and adverse health and behavioral consequences. Part II discusses intervention trials based on several theoretical frameworks with cannabis-dependent adults. Therapeutic interventions with adolescents and young probation-referred adults, again drawing from similar theories of behavior change, are the focus of Part III. Policy considerations vis-à-vis cannabis dependence are the focus of Part IV, and the volume concludes in Part V with commentary that offers a summary and synthesis of what is currently known about dependence on cannabis. Below we have listed some of the primary conclusions that can be drawn from each of the chapters in these areas.

Part I: The Nature of Cannabis Dependence

Our understanding of the existence and nature of cannabis dependence has long been shaped by social and political forces that have polarized opinions and policies. The explosion of scientific research on the phenomena in recent years is

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starting to build a consensus that a small but significant subset of cannabis users develops a dependence syndrome, many of whom need treatment.

Standard nomenclatures and classification systems, such as ICD and DSM, provide reliable and valid operational criteria for cannabis dependence. With these tools it has become possible to characterize participants in clinical research and to obtain population estimates of cannabis use disorders.

The elucidation of the structure of delta-9-tetrahydrocannabinol, the discovery of anandamide and cannabinoid receptors, and the synthesis of cannabinoid agonists and antagonists support the existence of an endocannabinoid system in the central nervous system that is believed to modulate cannabis dependence.

There is considerable evidence from animal and human models that physical dependence on cannabis, as identified by tolerance and withdrawal phenomena, can be induced via prolonged exposure.

Current research is focused on which regions of the brain mediate physical dependence and the nature of the underlying cellular mechanisms of action. Research focusing on the CB₁ receptor and the action of antagonists such as SR141716A in precipitating withdrawal has potential relevance to the eventual development of pharmacotherapies for the treatment of cannabis dependence.

In the USA, within the first 24 months of cannabis use initiation, 2–4% of users (or 50–80 people each day) progress to cannabis dependence. Annually, that amounts to 20,000–30,000 individuals. Cannabis dependence occurs in 1 in 9 to 11 individuals who have ever used the drug, and 11–16% (1.6–2.3 million individuals) of the 14 million current users.

Converging evidence from the USA, Australia, and New Zealand, although limited due to sample differences, supports an estimate that 1 in 6 or 7 adolescents and young adult cannabis users become cannabis dependent by their early to mid-twenties: *USA*: 1 in 6–7 (16%); *New Zealand*: 1 in 7 or 7.5 (13–14%); *Australia*: 1 in 6 (16.7%). It is uncertain why a lower risk is reflected in data from Germany: 1 in 20–25 (4–5%).

More than 90% of cannabis dependence cases in the USA occur between the ages of 15 and 35 years, typically within the first 10 years of use. Male cannabis users have more commonly become dependent on the drug, although the gender gap has lessened. With reference to race and ethnicity, Native Americans disproportionately report persistent cannabis use, and there is some evidence that young African Americans and young Hispanic males had disproportionately greater increases in the prevalence of cannabis use disorders in the 1990s.

Risk factors for cannabis dependence may include mood disorders, residing in neighborhoods with greater magnitudes of daily users, and having a history

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of alcohol use disorder. Common vulnerability traits that contribute to cannabis dependence, as well as other disorders, may result from either genetic or environmental factors or their interaction. In the future, it is likely that studies of community and family contextual effects, when examined along with individual-level risk factors, will further our understanding of the etiology of cannabis dependence.

The Adverse Health and Psychological Consequences of Cannabis Dependence

Understanding of the health consequences of cannabis dependence is based on studies with heavy users rather than with the more specific population of those who are cannabis dependent.

Increased risk of chronic bronchitis and histopathological changes in the respiratory system that may precede malignancy are related to the method of administration (smoking). There is some evidence that heavy cannabis smokers are at greater risk for infectious diseases such as pneumonia. Clarification of the relationship between cannabis smoking and cancer risk will necessitate larger cohort studies and larger case control studies.

Some research supports the existence of subtle types of cognitive impairment (attention; memory; and impaired verbal learning, retention, and retrieval) in long-term heavy cannabis users. Competing explanations for these findings include residual effects from recent use, residues of the drug that are stored in the body after abstinence is attained, and the nervous system's re-adaptation to abstinence following chronic exposure. Research on the recovery of cognitive functioning following cessation is needed. Functional brain imaging studies will be important in future investigations of cannabis-related cognitive deficits.

The risk of cannabis dependence appears to be increased in those who initiate use at earlier ages. Early use also has been shown to be associated with earlier withdrawal from school, earlier sexual activity, pregnancy during adolescence, unemployment, and leaving the family home early. Adolescents who smoke cannabis heavily appear to be at increased risk of using "harder drugs." The causal relationship of cannabis use to these outcomes is not well established because young users often have multiple risk factors.

Subgroups of cannabis-dependent persons at increased health risk include:

- adults with cardiovascular disease who may precipitate myocardial infarctions by smoking cannabis;
- adolescents whose school performance and psychosocial development may be adversely affected and who may be at increased risk of using other illicit drugs;

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- persons with schizophrenia and other psychoses whose illnesses may be exacerbated by continued use of cannabis;
- persons with a family history of psychoses in whom regular cannabis use may precipitate the onset of a psychosis.

Part II: Interventions with Cannabis-Dependent Adults

A variety of treatments for cannabis-dependent adults have been tested in randomized controlled trials. All are adaptations of therapeutic models that have shown efficacy in the treatment of alcohol, tobacco, or other drug problems. Chapters in this and the following section present the theoretical background, treatment techniques, and issues in the adaptation and implementation of these approaches with cannabis-dependent adults, as well as the results of treatment-outcome studies completed to date.

Motivational enhancement therapy (MET) and cognitive-behavioral therapy (CBT) have received the most research attention and have often been combined with MET strategies used in early sessions and CBT strategies in later sessions. Results have been uniformly positive in showing reduced marijuana use and associated problems following treatment, but long-term abstinence rates are typically less than 20% and relapse is common.

There is little evidence that either MET or CBT is superior to the other and both are effective in either group or individual formats.

In several trials, very brief (2–4 sessions) MET interventions produced significant reductions in cannabis use but there is some evidence that longer (9–14 sessions) MET/CBT interventions yield better outcomes.

Contingency management (CM), involving the delivery of monetary incentives for urine-verified abstinence, showed promise in increasing rates of continuous abstinence during treatment, but longer-term outcomes after the incentives are discontinued are not yet known. Other novel adaptations of the CM approach are being studied.

A Marijuana Check-Up (MCU) designed to appeal to adult cannabis users who were ambivalent about change or treatment attracted a sample of daily users. They differed little from treatment seekers with the exception of less readiness to change and somewhat fewer self-reported negative consequences. The two-session MET intervention resulted in a greater reduction in the frequency of cannabis use during the follow-up period compared to control conditions. Reductions in use were small in absolute terms, but the approach showed promise in reaching another segment of cannabis-dependent adults who may benefit from treatment.

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Supportive–Expressive (SE) psychotherapy, emphasizing the importance of effective interpersonal relationships in overcoming addiction, led to greater rates of abstinence than a single session of advice. Process data indicated that SE led to changes in interpersonal effectiveness that at least partially accounted for the greater abstinence.

Part III: Interventions with Cannabis-Dependent Adolescents and Young Adults

There is a dearth of controlled treatment–outcome studies with adolescent or young adult cannabis abusers. These groups are at different stages of development and pose different treatment issues compared to adults. Most are coerced into treatment rather than seeking it voluntarily.

The Cannabis Youth Treatment study, a large multi-site investigation, compared five interventions of different durations and intensities. Therapeutic models included various combinations of MET, CBT, and family therapy. Although there were few differences in outcomes between treatments, overall results indicated substantial reductions in cannabis use and problems during the 12 months of follow-up. Analyses addressed issues of comorbidity, retention in treatment, differential response to treatment, and cost-effectiveness.

Two adaptations of the “check-up” model as a method for reaching teenage cannabis users on a voluntary basis were tested in the USA and Australia. The respective projects used somewhat different methods of recruiting participants, but both delivered a two-session MET intervention. Results from these uncontrolled studies showed substantial reductions in cannabis use and positive perceptions of the interventions supporting further development and testing.

An intervention combining MET with monetary incentives for attending treatment sessions increased treatment attendance in young adults referred by probation departments relative to MET alone. Greater reductions in marijuana use were not observed as a consequence, however.

Part IV: Policy

The Policy Implications of Cannabis Dependence

Public education of the risks of cannabis dependence must present credible consequences of heavy use in order to avoid being rejected.

Prevention efforts should include opportunistic (e.g., primary care) and targeted screening and brief interventions in vulnerable populations. Delivery

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of more extensive treatment services to meet the needs of cannabis-dependent individuals with comorbid substance abuse or mental health disorders in specialized treatment agencies would provide a more complete continuum of care.

Studies of decriminalization in several countries yield conflicting conclusions regarding effects on rates of cannabis use and do not address effects on heavy use or dependence.

The prevalence of cannabis dependence may increase if legal sanctions for use were decreased or eliminated because lower price and greater availability would result in more people using cannabis regularly and for longer periods in their lives. Greater numbers of individuals, therefore, may experience health and psychological problems, including cannabis dependence.

However legalization would allow for a regulated cannabis market that would permit more widespread harm minimization educational activities and the development of social norms favoring moderation and stigmatizing excess. Adequate data do not exist to predict the net result of such changes in policy.

Part V: Conclusion

Cannabis dependence exists and is associated with negative consequences that affect millions of users. Many of these individuals need and want help in overcoming dependence.

Despite the apparent validity of a dependence syndrome, the negative consequences of cannabis dependence may not be as severe as for many other drug dependencies. This relative lack of negative consequences may fuel low motivation for change and undermine the effectiveness of treatment interventions.

More research on the nature and consequences of cannabis dependence is needed to inform policy decisions that can prevent its occurrence. More research is also needed on treatment approaches that build and sustain motivation for change.

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Marijuana continues to be a hot topic in the news. At the time of this writing (July, 2005), The Seattle Times has published numerous stories about the “green plant” and controversies surrounding its use and potential for abuse. Many featured articles described the debate about medical marijuana and the US Supreme Court’s recent decision that federal drug charges can be applied to users and distributors of marijuana even in those states that passed local laws approving cannabis use as a treatment for several disorders (e.g., reduction of nausea associated with chemotherapy, appetite enhancement in the treatment of AIDS, lowering intra-ocular pressure in the treatment of glaucoma, and so on). As Washington is one of the states that voted to approve the medical use of marijuana, press coverage has been sympathetic to the plight of patients who may now be denied access to the healing herb. Based on this press coverage, most readers (as judged by letters to the Editor of the Seattle Times) were outraged by the Supreme Court decision, given the evidence that so many patients reported beneficial effects from smoking pot.

Other stories about marijuana that have been covered in the local press express criticism and concern over its use. Here in the Pacific Northwest, public officials have expressed outrage about the distribution of potent marijuana that has been smuggled into Washington and adjoining states from our Canadian neighbors to the north. Known as “B.C. bud,” this strong variety of marijuana is highly sought after by local smokers. Recently, several B.C. residents were arrested after they were discovered smuggling large quantities of B.C. bud through a sophisticated 360-foot tunnel buried under the Canada–USA border near Langley, B.C. The three men arrested were monitored in the underground pathway carrying hockey bags and garbage sacks containing 93 pounds of B.C. bud. Political tension between the two countries has also been exacerbated by the recent announcement by the mayor of Vancouver, B.C. that efforts would soon be made to decriminalize marijuana sales in the province and to

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provide additional tax revenues as a result. Marijuana sales would be regulated in the same manner as tobacco and alcohol, according to the mayor. Public opinion sways back and forth on both sides of the border. Is marijuana use helpful (as a medicine) or harmful (as an addictive drug)? Confusion and debate continue about the potential for abuse and dependence among marijuana smokers. Some see it as a relatively benign substance compared to other drugs of abuse, while others see it as a “stepping stone” that leads to further illegal drug use.

Despite the continuing controversy and public ambivalence, one fact stands out clearly: marijuana is the most commonly used illicit drug in the world. In “A Closing Note” at the conclusion of Chapter 1 of the current volume, the authors cite a United Nations report issued in 2004 indicating that cannabis is the most widely used illicit drug worldwide “with an estimated 146.2 million people having consumed cannabis at least once in the previous 12-month period. Although this report suggested that the spread of drug abuse is losing momentum globally, the one notable exception was cannabis which was described as spreading at an accelerated pace.” According to a recent Research Report on Marijuana Abuse published by the National Institute on Drug Abuse (July, 2005), marijuana is also the most commonly used illicit drug in the US. The report concludes that more than 94 million Americans (40% of the population) aged 12 years and older have tried marijuana at least once. Data from the 2004 Monitoring the Future Survey, summarized in the NIDA report, indicated that 46% of high-school seniors had tried marijuana at some time and that 20% were current users. A study conducted by the National Institute of Justice’s Arrestee Drug Abuse Monitoring Program (also cited in the NIDA report) found that 57% of juvenile male and 32% of juvenile female arrestees tested positive for marijuana. The NIDA report also summarized findings from the 2003 National Survey on Drug Use and Health, indicating that an estimated 21.6 million Americans aged 12 or older were classified with substance dependence or abuse (9.1% of the total population); of the estimated 6.9 million Americans classified with abuse or dependence on illicit drugs, 4.2 million were dependent on or abused marijuana. In 2002, 15% of people entering drug abuse treatment programs reported that marijuana was their primary drug of abuse, according to the NIDA report. Epidemiological data described in the current book also indicates that many users are at risk for developing a diagnosis of cannabis dependence. Among current users (i.e., used at least once in the prior month), roughly 11–16% (1.6–2.3 million individuals) qualify for the diagnosis of cannabis dependence, as reported in Chapter 1.

Although marijuana may be less harmful in terms of health consequences and addiction potential compared to other illicit drugs (such as heroin or crystal meth) or licit substances (alcohol and tobacco), the information reported on the

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high rates of use and associated risks for marijuana dependency represents a major public health challenge for health professionals. Surprisingly little information currently exists regarding treatment approaches for cannabis dependence. In response to this growing need, the present volume is both timely and relevant. As a colleague and friend of both Roger Roffman and Robert Stephens for many years, I congratulate them for their excellent work in co-editing this new book on cannabis dependence. They are both pioneers in the field of marijuana research and associated treatment and intervention programs. Together, they have invited an impressive list of authors to contribute their expertise and clinical experience to further our understanding of this important topic. As a result, they have brought together a wealth of information and insight that readers will find invaluable.

The fifteen chapters in this book are divided into five parts. Part I contains five chapters devoted to describing the nature of cannabis dependence. Chapter 1 (Roffman, Schwartz, and Stephens) provides a history of cannabis dependence themes that have appeared in the past and that continue to have influence on how this concept will be defined in the future. In Chapter 2, Babor provides an incisive overview of the diagnostic criteria for cannabis dependence, including its etiology, course, and natural history. The pharmacology and physiology of this dependency is presented in Chapter 3 (Lichtman and Martin), based on results from both animal and human studies that indicate a reciprocal relationship between cannabinoid and opioid systems in drug dependence. The epidemiology and etiology of cannabis dependence are reviewed in Chapter 4 by James Anthony, with a focus on recent evidence from field studies. In Chapter 5, the final chapter in this section, Hall and Solowij provide a review of evidence related to the adverse health and psychological consequences, with an emphasis on studies of long-term daily cannabis users.

Part II consists of five chapters devoted to treatment interventions for cannabis-dependent adults. Given the need for more information on evidence-based treatment approaches, the authors are to be commended for their cutting-edge empirical work and the presentation of treatment-outcome data in many of the chapters. Chapter 6 (Stephens, Roffman, Copeland and Swift) provides an overview of both cognitive-behavioral (e.g., relapse prevention) and motivational enhancement (e.g., motivational interviewing) treatment approaches, both of which have been relatively effective and well received by adult clients. Another promising intervention, contingency management, is described in Chapter 7 (Budney, Moore, Signon and Higgins) and has been found effective in enhancing initial abstinence rates in treatment-outcome studies. For adult marijuana users who have questions or concerns about their use, the “Marijuana Check-up”

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described in Chapter 8 by Stephens and Roffman is highly recommended, consisting of a brief two-session assessment and feedback intervention patterned after the “Drinkers’ Check-up” designed to promote change in alcohol users who are unlikely to seek formal treatment. Another treatment approach first developed for use with problem drinkers and now modified as a brief motivational intervention for cannabis abuse is guided self-change, described in Chapter 9 (Sobell, Sobell, Wagner, Agrawal and Ellingstad). This intervention may be particularly helpful for cannabis users with less severe problems or who are ambivalent about treatment goals (reduced use versus abstinence). In Chapter 10, Grenyer and Solowij describe supportive–expressive psychotherapy, a dynamic approach that emphasizes the importance of effective interpersonal relationships as an important mediating factor in treatment outcome.

Three chapters are presented in Part III, each describing promising interventions for adolescents and young adults. Chapter 11 (Diamond, Leckrone, Dennis and Godley) provides preliminary findings from the Cannabis Youth Treatment Study that evaluated the impact of five brief intervention programs, including various combinations of cognitive-behavioral, motivational enhancement, family support networks, a community reinforcement approach, and multidimensional family therapy in the outpatient treatment of adolescents with marijuana problems. Preliminary results indicate that these brief interventions can be helpful for many adolescent clients; treatment was found to be effective overall (although few differences were reported across the different treatment conditions), showing good retention rates and lower costs. The “Teen Cannabis Check-Up” program for adolescent clients, similar in content and format to the check-up program for adult users, is described in Chapter 12 (Berghuis, Swift, Roffman, Stephens and Copeland), with encouraging results in terms of reduced cannabis use among teens studied in both Australia and the USA. The final chapter (Chapter 13) in this section presents promising findings in the treatment of young probation-referred marijuana-abusing individuals (Carroll, Sinha, and Easton), in which motivational enhancement therapy and contingency management were evaluated.

Part IV consists of a single chapter (Chapter 14) outlining the public policy implications of cannabis dependence, and discussing implications for both the public health sector and the specialized treatment arena. Hall and Swift also discuss additional hot policy topics, including cannabis decriminalization. Part V concludes the book with a final wrap-up chapter by the editors (Chapter 15 by Stephens and Roffman), integrating the treatment findings presented in the preceding chapters and discussing implications for future research. Although they conclude that reductions in cannabis use resulting from treatment were often substantial (consistent with a harm-reduction approach), long-term abstinence

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rates remain relatively low (80% relapse rate). Clearly there is still a room for improvement in our treatment approaches for cannabis dependence, but the material presented throughout this valuable text should pave the way for future advances in the field. Hats-off and thumbs-up to Roger Roffman and Robert Stephens for opening up the highway!

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