

sedentary individuals should incorporate both energy-restricted diets low in saturated fat and high in fiber and aerobic exercise training. Finally, we agree that better strategies must be developed and implemented to maintain weight loss and regular participation in exercise activities.

Leslie I. Katzel, MD, PhD
Andrew P. Goldberg, MD
University of Maryland School of Medicine
Baltimore

1. Dattilo AM, Kris-Etherton PM. Effects of weight reduction on blood lipids and lipoproteins: a meta-analysis. *Am J Clin Nutr*. 1992;56:320-328.
2. Andres R. Mortality and obesity: the rationale for age-specific height-weight tables. In: Hazzard WR, Bierman EL, Blass JP, Ettinger WH, Halter JB, eds. *Principles of Geriatric Medicine and Gerontology*. 3rd ed. New York, NY: McGraw-Hill; 1994:844-854.
3. Williams PT, Krauss RM, Vranizan KM, Wood PDS. Changes in lipoprotein subfractions during diet-induced and exercise-induced weight loss in moderately overweight men. *Circulation*. 1990;81:1293-1304.
4. Tran ZV, Weltman A, Glass GV, Mood DP. The effects of exercise on blood lipids and lipoproteins: a meta-analysis of studies. *Med Sci Sports Exerc*. 1983;15:393-402.
5. Wood PD, Stefanick ML, Dreon DM, et al. Changes in plasma lipids and lipoproteins in overweight men during weight loss through dieting as compared with exercise. *N Engl J Med*. 1988;319:1173-1179.

Cognitive Effects of Marijuana

To the Editor.—The report by Drs Pope and Yurgelun-Todd¹ on residual cognitive effects of heavy marijuana use highlights the importance of recognizing that chronic and abusive use of psychotropic compounds such as marijuana may have serious negative sequelae. However, the strength of these conclusions are not without methodological caution. Perhaps the most important of these concerns drawing inferences from research based on short-term clinical trials.

Deficits in intellectual and neuropsychological functioning may represent antecedents, concomitants, or consequences of chronic drug (ie, marijuana) use. The short-term nature of their study prohibits teasing apart these temporal and often confounding relationships. Comparison with matched controls represents a potentially effective means of statistically controlling for underlying differences (ie, premorbid psychopathology). However, there are a number of psychosocial conditions that cannot be statistically corrected through the use of matched controls. Studies of adolescents have consistently found that low self-esteem, poor social (eg, assertive) skills, and personal competence (eg, problem-solving) skills are both causally linked to the initiation and early stages of drug abuse² and consequences of drug abuse.³ Failure to assess and account for factors identified in previous studies as antecedents and/or consequences seriously limits the inferences about the consequences of marijuana use that can be drawn from cross-sectional or short-term studies.

In our own longitudinal research,³ we have examined the consequences of drug use on cognitive functioning by tracking a cohort of adolescents for 5 years through a critical and formative period of development. Findings from our study show that early adolescent drug use had significant long-term effects on later cognitive functioning (decreasing implementation of cognitive self-management strategies). We also report moderately strong inverse contemporaneous association between later drug use and multiple facets of cognitive performance. Despite the strength of these associations, these data suggest that among a small subset of the sample the protracted nature of drug use in concert with early behavioral and psychological deficits had the most damaging effects on subsequent cognitive performance. If we drew on this select sample for the purposes of using them as potential candidates in the study by Pope and Yurgelun-Todd, we would draw incorrect inferences to their marijuana (or other drug) use. In fact, deficits in cognitive efficacy may have preceded their drug use and actually may have been the key motivational in-

redient for their protracted drug use. Persistent drug abuse may arise from chronic neuropsychological and behavioral deficits, supporting the notion that drug use is a form of palliative coping for individuals lacking other internal coping resources.

Based on our own findings, we are inclined to believe that the subjects in the study by Pope and Yurgelun-Todd are not "truly matched" on the myriad psychosocial conditions that foster continued marijuana use, and these primary early-stage deficits in psychosocial functioning may be instrumentally responsible for the pronounced deficits in neuropsychological performance observed in chronic marijuana users. Additional studies are needed to rule out such confounders and more clearly establish the presence and nature of neuropsychological performance deficits deriving from chronic marijuana use.

L. M. Scheier, PhD
Gilbert J. Botvin, PhD
Cornell University Medical College
New York, NY

1. Pope HG Jr, Yurgelun-Todd D. The residual cognitive effects of heavy marijuana use in college students. *JAMA*. 1996;275:521-527.
2. Botvin GJ, Botvin EM. School-based and community-based prevention approaches. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2nd ed. Baltimore, Md: Williams & Williams; 1992:910-927.
3. Scheier LM, Botvin GJ. Effects of early adolescent drug use on cognitive efficacy in early-late adolescence: a developmental structural model. *J Subst Abuse*. 1995;7:379-404.

In Reply.—We certainly agree with Drs Scheier and Botvin that heavy marijuana users might have antecedent neuropsychological and behavioral deficits to a greater degree than occasional marijuana users and that this phenomenon could account for the differences observed in our study. In fact, we address this question in detail in our article. However, our analyses controlling for verbal IQ and reported Scholastic Aptitude Test scores both suggested that premorbid deficits were unlikely to account for the differences in cognitive functioning observed. Further, we were unable to detect clear differences between even the heaviest and the lightest marijuana users on a number of psychological and behavioral measures.¹ Similarly, in the other large recent study of the residual cognitive effect of marijuana,² an analysis using test scores obtained years earlier, prior to marijuana use, also suggested that premorbid deficits could not account for the findings. Thus, the burden of proof remains with those who suggest that impaired cognitive functioning in heavy marijuana users might be attributable to impaired premorbid function.

All this aside, we agree that this issue still requires further study. However, it is difficult to conceive of specific additional studies that would fully resolve the question, since one can never match subjects on all possible measures of premorbid function or control for all such confounders in a retrospective statistical analysis. The only definitive study would be a prospective design in which subjects were randomized by the investigators to heavy marijuana use vs placebo for several years, and ethics would preclude this.

Harrison G. Pope, Jr, MD
Deborah Yurgelun-Todd, PhD
McLean Hospital
Belmont, Mass

1. Kouri E, Pope HG Jr, Yurgelun-Todd D, Gruber S. Attributes of heavy vs occasional marijuana smokers in a college population. *Biol Psychiatry*. 1995;38:475-481.
2. Block RI, Ghoneim MM. Effects of chronic marijuana use on human cognition. *Psychopharmacology*. 1993;110:219-228.

Minorities in Medicine: the Flexner Report

To the Editor.—As the article by Drs Nickens and Cohen¹ suggested, it is difficult to discuss the issues facing minorities