Antisocial Behavioral Syndromes and Past-Year Physical Health Among Adults in the United States: Results From the National Epidemiologic Survey on Alcohol and Related Conditions

Risë B. Goldstein, Ph.D., M.P.H.; Deborah A. Dawson, Ph.D.; S. Patricia Chou, Ph.D.; W. June Ruan, M.A.; Tulshi D. Saha, Ph.D.; Roger P. Pickering, M.S.; Frederick S. Stinson, Ph.D.; and Bridget F. Grant, Ph.D., Ph.D.

Objective: To describe associations of DSM-IV antisocial personality disorder (ASPD), DSM-IV conduct disorder without progression to ASPD (CD-only), and syndromal antisocial behavior in adulthood without conduct disorder before age 15 years (AABS, not a DSM-IV diagnosis) with past-year physical health status and hospital care utilization in the general U.S. adult population.

Method: This report is based on the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (N = 43,093, response rate = 81%). Respondents were classified according to whether they met criteria for ASPD, AABS, CD-only, or no antisocial syndrome. Associations of antisocial syndromes with physical health status and care utilization were examined using normal theory and logistic regression.

Results: ASPD and AABS were significantly but modestly associated with total past-year medical conditions, coronary heart and gastrointestinal diseases, and numbers of inpatient hospitalizations, inpatient days, emergency department visits, and clinically significant injuries (all $p < .05$). ASPD was also associated with liver disease, arthritis, and lower scores on the Medical Outcomes Study 12-Item Short-Form Health Survey, version 2 (SF-12v2) physical component summary, role physical, and bodily pain scales (all $p < .05$). AABS was associated with noncoronary heart disease, lower scores on the SF-12v2 general health and vitality scales, and, among men, arthritis (all $p < .05$). CD-only was associated with single but not multiple inpatient hospitalizations, emergency department visits, and clinically significant injuries (all $p < .05$).

Conclusions: Estimates of burden related to antisocial behavioral syndromes need to consider associated physical health problems. Prevention and treatment guidelines for injuries and common chronic diseases may need to address comorbid antisociality, and interventions targeting antisociality may need to consider general health status, including prevention and management of injuries and chronic diseases.

(J Clin Psychiatry 2008;69:368–380)

Received June 1, 2007; accepted July 25, 2007. From the Laboratory of Epidemiology and Biometry, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institutes of Health (NIH), Department of Health and Human Services, Bethesda, Md.

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) is funded by the NIAAA with supplemental support from the National Institute on Drug Abuse (NIDA). This research was supported in part by the Intramural Program of the NIH, NIAAA.

The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of sponsoring organizations, agencies, or the U.S. Government.

The authors report no additional financial or other relationships relevant to the subject of this article.

Corresponding author and reprints: Risë B. Goldstein, Ph.D., M.P.H., Laboratory of Epidemiology and Biometry, Room 3068, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, M.S. 9304, 5635 Fishers Ln., Bethesda, MD 20892-9304 (e-mail: goldster@mail.nih.gov).

Antisocial personality disorder (ASPD) affects 3% to 5% of adults in the United States.[1–4] Diagnostic criteria for ASPD specified in the *Diagnostic and Statistical Manual of Mental Disorders,* Third Edition (DSM-III),[5] the *Diagnostic and Statistical Manual of Mental Disorders,* Third Edition, Revised (DSM-III-R),[6] and the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition (DSM-IV),[7] require both conduct disorder with onset before age 15 years and a persistent pattern of aggressive, irresponsible, impulsive, and remorseless behaviors thereafter. ASPD is associated with substantial burden on affected individuals, their families, and society in general, both in its own right and because of its high comorbidity with mood,[2,4,8,9] anxiety,[2,4,8,9] substance use,[1,2,4] and other personality[10] disorders.

Due in part to its comorbidity with other mental disorders, ASPD is also a risk factor for increased morbidity and mortality related to injuries,[11–14] sexually transmitted diseases including human immunodeficiency virus/acquired immunodeficiency syndrome,[15–17] and chronic diseases such as diabetes mellitus and liver disease.[18,19] Of note, however, many of these associations were observed

in samples of patients ascertained from psychiatric settings,[12,18] sexually transmitted disease clinics,[15,16] and transplant clinics,[19] or were based on criteria that predated DSM-IV.[12–14,18,19] Associations of DSM-IV ASPD with common medical conditions other than sexually transmitted diseases and with medical care utilization have not been examined in nonclinical samples.

In both clinical and epidemiologic samples, conduct disorder, even without progression to ASPD (hereinafter, CD-only), is also highly comorbid with mood,[4,20–24] anxiety,[21–23] and substance use[1,21–23,25] disorders. It has been identified as a risk factor for sexually transmitted diseases[25,26] and, among young women, early pregnancy and greater numbers of physical health problems in late adolescence.[25,27] Conduct problems were associated with cardiovascular risk factors, including elevated blood pressure, overweight, and family history of hypertension among younger brothers (aged 6 to 10 years) of adjudicated juvenile delinquents.[28] Moreover, among men in the Dunedin, New Zealand, birth cohort at age 32 years, conduct disorder symptoms—particularly those consistent with the "life course–persistent" trajectory characterized by childhood onset—predicted poorer current self-reported health status, higher C-reactive protein level, and greater past-year prevalences of chronic bronchitis symptoms, herpesvirus type 2, dental decay, gum disease, serious injuries, and inpatient hospitalization, as well as increased numbers of past-year primary care visits.[29] Among a cohort of United States women of low socioeconomic status studied cross-sectionally at a similar mean age, DSM-III conduct disorder symptoms were associated with increases in self-reported long-term disability and chronic health problems,[30] but specific conditions were not examined. Data concerning associations of fully diagnosable DSM-IV conduct disorder with common chronic medical conditions, injuries, and medical care utilization are not available from a representative sample of the general adult population.

As has been documented in both clinical[31–37] and epidemiologic[1,38–40] samples, individuals with syndromal antisocial behavior in adulthood frequently do not report symptomatic behaviors sufficient to meet criteria for conduct disorder before age 15 years (adult antisocial behavioral syndrome [AABS]; not a codable disorder in DSM-IV). Individuals with AABS differ little from those with ASPD on antisocial symptomatology in adulthood and psychiatric comorbidity.[31,35,36,40–43] However, to our knowledge, associations between AABS or antisocial traits specifically with onset after age 15 and general health characteristics or patterns of care utilization have not yet been examined.

Because comparative data concerning associations of DSM-IV ASPD, conduct disorder, and AABS with general medical status are not available from nationally representative epidemiologic samples, it remains unclear whether antisocial syndromes occurring at different points over the life course bear differential associations with physical health status or service utilization in the general population. Differential associations with antisociality based on developmental phases of onset and persistence could indicate a need to tailor prevention and treatment approaches to address antisocial syndromes, as well as chronic diseases and injuries, and to facilitate appropriate medical care utilization. In addition, the prevalences of antisocial behavioral syndromes[1,22] and many general medical conditions, including cardiovascular disease,[44] nonalcoholic fatty liver disease,[45] many types of injuries,[46] and peptic ulcer disease,[47] show male preponderances. Conversely, the prevalences of rheumatoid arthritis[48–51] and most forms of medical care utilization[52] show female preponderances. Specifically with regard to antisocial syndromes, the observed sex differentials in prevalences could reflect real male-female differences in rates of antisocial phenomena. However, questions have been raised about the diagnostic validity of both conduct disorder and ASPD among females. DSM criteria for these conditions rely heavily on overt, notably physically aggressive, behaviors that are far more prevalent in males, while giving much less attention to covert behaviors and relational aggression, which are asserted to be much more typical manifestations of antisociality in women.[53–55] If the diagnostic criteria for conduct disorder and ASPD are biased with respect to sex, then the associations between these syndromes as they are now defined and physical health status, and the implications of these associations for prevention and treatment planning, may also differ importantly by sex.

Accordingly, this report examines associations of antisocial syndromes with respondent-reported common chronic medical conditions diagnosed by a health care provider during the past year, as well as with clinically significant injuries, physical health–related impairment and disability, and hospital inpatient and emergency department utilization, and compares patterns of associations between men and women, using data from Wave 1, conducted in 2001–2002, of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).[3,56] The NESARC is the first major psychiatric epidemiology survey to employ DSM-IV criteria. With a nationally representative sample of 43,093 adult respondents, the NESARC allows precise estimates of measures of general medical status, hospital care utilization, and relevant sociodemographic and clinical correlates—including health insurance coverage; tobacco, alcohol, and drug use and associated disorders; lifetime psychiatric comorbidity; and body mass index—by antisocial syndrome. In addition, the large number of respondents both with and without antisocial syndromes allows examination of sex by antisocial syndrome interactions in associations between antisocial syndromes and general health characteristics.

METHOD

Sample

The entire research protocol, including informed consent procedures, was approved by the institutional review board of the U.S. Bureau of the Census and the U.S. Office of Management and Budget. As described in detail elsewhere,[57,58] the 2001–2002 NESARC was conducted by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and based on a representative sample of the general U.S. population. The NESARC's target population was noninstitutionalized adults, 18 years and older, residing in households and group quarters. All potential respondents who consented to participate after being informed in writing about the nature of the NESARC, the statistical uses of the survey data, the voluntary nature of their participation, and the federal laws that rigorously provide for strict confidentiality of identifiable survey information were interviewed. Face-to-face interviews were conducted with 43,093 respondents, yielding a response rate of 81%. The NESARC oversampled blacks, Hispanics, and young adults 18 to 24 years old; data were adjusted for oversampling and household- and person-level nonresponse. The weighted data were then further adjusted to represent the civilian United States population based on the 2000 Census.

Interviewers and Training

Interviews were conducted by 1800 professional lay interviewers from the U.S. Bureau of the Census with, on average, 5 years of experience administering health-related surveys. All interviewers completed a 5-day self-study course followed by a 5-day in-person training session at one of the Bureau's 12 regional offices. The survey instrument was fully computerized with software that included built-in skip, logic, and consistency checks.

Quality of interviewing was assured by regional supervisors who recontacted a random 10% sample of all respondents by telephone and re-asked a set of questions from different parts of the interview to verify answers. In addition, 2657 respondents were randomly selected for reinterview after completion of their NESARC interviews. Each respondent was readministered 1 to 3 complete sections of the NESARC interview. This served as an additional check on data quality and formed the basis of a further test-retest reliability study.[56]

Assessments

The diagnostic interview utilized in the NESARC was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version (AUDADIS-IV).[59] Developed to advance measurement of substance use and mental disorders in large-scale surveys, the AUDADIS-IV is a fully structured instrument designed for nonclinician interviewers.

Antisocial behavioral syndromes. Antisocial behavioral syndromes were assessed on a lifetime basis. A diagnosis of ASPD required respondents to endorse the specified number of DSM-IV conduct disorder symptoms with onset before, as well as antisocial behaviors since, age 15 years, on the AUDADIS-IV. Consistent with DSM-IV,[7] at least 1 conduct disorder symptom before age 15 years must have caused social, academic, or occupational role impairment. Respondents were classified as having CD-only if they met DSM-IV criteria for conduct disorder but not ASPD. AABS was operationalized as meeting all ASPD criteria except conduct disorder before age 15. Respondents who did not meet criteria for ASPD, AABS, or CD-only were considered to have no antisocial syndrome.

General medical conditions, hospital care utilization, and clinically significant injuries. Respondents were asked whether a physician or other health professional had told them during the past year that they had any of 11 general medical conditions, spanning coronary heart disease (arteriosclerosis, myocardial infarction, or angina pectoris), "other" heart disease (tachycardia or "any other form of heart disease"), and hypertension, and liver (cirrhosis or "any other form of liver disease"), other gastrointestinal (stomach ulcer or gastritis), and arthritic diseases. They were also asked to report, concerning the past year, the number of times they were hospitalized and the number of days they stayed in the hospital as inpatients, excluding admissions for normal childbirth, as well as the number of times they obtained medical care from a hospital emergency department. In addition, they were queried about the number of injuries they experienced during the past year that were of sufficient severity to cause them to seek medical help or restrict their usual activities for more than half a day.

Physical health–related disability and impairment. Past-month physical health–related disability and impairment were assessed using the physical component summary, physical functioning, role physical, bodily pain, general health, and vitality scales of the Medical Outcomes Study 12-Item Short-Form Health Survey, version 2 (SF-12v2), a reliable and valid measure of disability and impairment used in general population surveys.[60] Lower scores indicate higher impairment in each domain.

Covariates.

1. Mood and anxiety disorders. As described in detail elsewhere,[61] lifetime anxiety disorder (panic disorder with and without agoraphobia, social and specific phobias, and generalized anxiety disorder) and mood disorder (major depressive disorder, dysthymic disorder, and bipolar I and II disorders) diagnoses in this report are DSM-IV primary, or independent, diagnoses. In DSM-IV, *primary* excludes mental disorders that are substance induced or due to a general medical condi-

tion.[7(p192)] All mood and anxiety disorders met the DSM-IV clinical significance criterion; major depressive disorder diagnoses also ruled out bereavement.

2. Drug and alcohol use disorder diagnoses. AUDADIS-IV questions operationalize DSM-IV criteria for drug-specific abuse and dependence for 10 drug classes that are aggregated in this report, as well as alcohol use disorders and nicotine dependence. Consistent with DSM-IV, lifetime AUDADIS-IV diagnoses of drug abuse required 1 or more of the 4 abuse criteria either in the 12 months preceding the interview or previously. AUDADIS-IV drug dependence diagnoses required 3 or more of the 7 DSM-IV dependence criteria to be met for the same specific drug class during the past year or prior. For prior diagnoses of drug dependence, 3 or more criteria must have occurred in association with the same drug class within a 1-year period, following DSM-IV. Alcohol abuse and dependence and nicotine dependence diagnoses followed the same algorithms.

3. Tobacco, alcohol, and drug consumption. Because the vast majority of nicotine in the United States is consumed as cigarettes,[62] tobacco use was estimated as the number of cigarettes per day during the past year for current smokers, and for ex-smokers' most recent year of smoking. Alcohol consumption during the period of heaviest lifetime drinking was assessed as the average daily volume of ethanol ingested during that period. For respondents who never drank more heavily than in the past year, past-year consumption measures reflected their heaviest drinking. For both the past year and the period of heaviest drinking, respondents were asked to indicate their overall frequency of drinking, their typical and largest numbers of drinks per day, the frequency with which they drank their largest number of drinks, and the frequency of drinking 5 or more drinks in a day, considering all beverage types together. For the past year, comparable series of questions, with the inclusion of drink size and main brand consumed, were asked for each individual beverage type (coolers, beer, wine, or spirits); for period of heaviest drinking, respondents were asked an additional question on the main type of beverage they drank during that period. Average daily volume of ethanol intake was estimated on the basis of quantity, frequency, and drink size for all beverages combined, incorporating information for atypically heavy drinking days. For individuals whose heaviest consumption was in the past year, drink size (ounces of beverage times the ethanol content by volume of the main brand consumed) was estimated as a weighted function of the drink sizes for the individual beverage types. For those whose heaviest consumption was not in the past year, the drink size for their main beverage type was used if available from past-year information, or otherwise, a standard drink size was assumed. Drug use was quantified as the frequency in days per year of use of the drug that respondents reported they used most frequently, during the period of heaviest lifetime consumption.

4. Other personality disorders. AUDADIS-IV assessments of DSM-IV personality disorders have been presented previously.[3,8,10] In addition to ASPD, these include avoidant, dependent, obsessive-compulsive, paranoid, schizoid, and histrionic personality disorders. DSM-IV personality disorder diagnoses require evaluation of long-term patterns of functioning. AUDADIS-IV personality disorder diagnoses were made accordingly. Respondents were asked a series of 64 personality disorder symptom questions about how they felt or acted most of the time, throughout their lives, regardless of the situation or whom they were with, and were instructed not to include symptoms occurring only when they were depressed, manic, anxious, drinking heavily, using medicines or drugs, experiencing withdrawal symptoms, or physically ill. Respondents were also queried to ascertain whether they experienced distress or social or occupational dysfunction resulting from each reported symptom.

To receive a DSM-IV personality disorder diagnosis, respondents needed to endorse the required number of DSM-IV symptoms for the specific personality disorder, with 1 symptom or more causing distress or social or occupational impairment. Borderline, schizotypal, and narcissistic personality disorders were included in Wave 2.

5. Health insurance coverage. Respondents were classified as having public, private, or no insurance on the basis of whether they reported being currently covered by 4 categories of health insurance: Medicare; Medicaid; Civilian Health and Medical Program of the Uniformed Services, Civilian Health and Medical Program of the Department of Veterans Affairs, the Veterans Affairs system, or other military health care; and health insurance obtained by the respondent, a spouse, or a family member privately or through a current or former employer or union. Respondents reporting both public (Medicare, Medicaid, or military sources) and private coverage were coded as privately insured.

6. Body mass index. Respondents were asked to report their current height and weight. The propensity of individuals to underestimate their weight by self-report has been well documented, with clear trends toward greater underestimation with increasing weight. However, the extent of underestimation is unrelated to height in both men and women. Self-reported weight is robustly correlated with measured weight ($r \geq 0.9$) in general population samples.[63,64] Conversely, individuals tend to overestimate their height, to a greater extent among shorter than among taller men, among heavier than among lighter women, and among older than among younger respondents of both sexes.[63] Nevertheless, recent evidence has documented that self-reported body mass index data are valid for identifying associations in epidemiologic studies.[63–67]

Reliability and validity of AUDADIS-IV diagnoses and tobacco, alcohol, and drug consumption measures. As reported in detail elsewhere,[56,61] reliability and validity were good to excellent for all substance use disorders[1,57,68–75] and fair to good for mood, anxiety, and personality disorders, including ASPD.* Measures of tobacco, alcohol, and drug use utilized in this study also displayed good to excellent reliability.[57,70–72,78,79]

Statistical Analyses

Standard contingency table approaches were used to examine bivariate associations of antisocial syndromes with categorical health status measures in the total sample and in analyses stratified by sex.[80] Associations of antisocial syndromes with continuous measures were examined and sex by antisocial syndrome interactions tested using normal theory analyses of variance. Counts of hospitalizations, inpatient days, emergency department visits, and clinically significant injuries were converted into categorical variables on the basis of their observed distributions, with categories defined according to cutpoints chosen to balance variability with subgroup sizes adequate to permit meaningful analyses.

Multivariable regression analyses were used to examine associations of antisocial syndromes with measures of physical health status, adjusted for the potentially confounding effects of age; sex; race/ethnicity; marital status; education; past-year income; current health insurance coverage; region and urbanicity of residence; comorbid Axis I and II psychiatric diagnoses; and tobacco, alcohol, and drug consumption.[81] Normal theory models were used for continuous measures, and binary or multinomial logistic models were used, as appropriate to the number of levels of the response variables, for categorical measures. The referent category of antisocial syndrome was the group with no lifetime antisocial syndrome, and the referent groups for polytomous response variables were always the lowest levels. The β coefficients from the logistic models were exponentiated to yield odds ratios, and 95% confidence intervals were estimated. Sex by antisocial syndrome interactions were tested in the regression models by incorporating a product term that cross-classified all of the antisocial syndrome categories against sex. The odds ratios or regression coefficients obtained from these interaction models compared women with each antisocial syndrome with the referent group of women with no lifetime history of syndromal antisociality, and compared men with each antisocial syndrome with the referent group of men with none.[81] The α to stay for the interaction terms was .05. All analyses were conducted using SUDAAN,[82] a software program that uses Taylor series linearization to make adjustments for the NESARC's complex sampling design.

RESULTS

Antisocial Syndromes, Sociodemographic Correlates, and Lifetime Psychiatric Comorbidity

As reported in detail by Compton et al.,[1] the overall prevalence ± standard error in the NESARC sample of ASPD was 3.6% ± 0.15, 5.5% ± 0.25 among men and 1.9% ± 0.11 among women. For AABS, prevalences were 12.3% ± 0.38 overall, 16.5% ± 0.53 among men and 8.5% ± 0.32 among women. CD-only was diagnosed in 1.1% ± 0.07 of the total sample, 1.5% ± 0.12 of men and 0.7% ± 0.06 of women. As described in detail elsewhere,[1] significant associations were observed between antisocial syndromes and all examined sociodemographic variables, including sex, age, race/ethnicity, marital status, education, past-year employment status and income, and region and urbanicity of residence. In brief, respondents with ASPD were most likely and those with no antisocial syndrome were least likely to be male, in the 3 youngest age groups (18–29, 30–44, and 45–64 years), of Native American race/ethnicity, with a high school education or less, and with past-year income less than $35,000. Conversely, respondents with no antisocial syndrome were most likely to be female; at least 65 years old; married or cohabiting or widowed, separated, or divorced; and residing in the Northeast or South. Consistent with their older age and female preponderance, respondents without any antisocial syndrome were also least likely to have been employed in the past year. Respondents with CD-only were least likely to be non-Hispanic white but most likely to be Hispanic, and reported the highest past-year personal income; they were most likely to live in the Midwest and in urban areas.

Antisocial syndromes were also significantly ($p < .0001$) associated with medical insurance coverage. Respondents with ASPD were least likely to be privately insured (53.8% ± 1.71) and most likely to report either public (17.5% ± 1.27) or no (28.8% ± 1.59) coverage. Conversely, respondents with no antisocial syndrome were most likely to report private medical insurance (69.3% ± 0.84, with 12.7% ± 0.35 publicly insured and 18.0% ± 0.67 uninsured), and those with CD-only were least likely to report public insurance coverage (12.0% ± 1.71, with 63.7% ± 3.07 reporting private and 24.3% ± 2.79 reporting no insurance).

Associations between antisocial syndromes and comorbid lifetime psychiatric disorders were statistically significant ($p < .0001$ in all instances) and striking, with the lowest prevalences of each disorder observed among respondents with no antisocial syndrome and the highest observed among respondents with ASPD. In the total sample, lifetime prevalences of any mood disorder ranged

*References 1, 3, 8, 10, 57, 58, 61, 68, 69, 76, 77.

from 15.0% ± 0.34 to 52.3% ± 1.63. Lifetime prevalences of any anxiety disorder ranged from 14.2% ± 0.40 to 40.4% ± 1.53. For alcohol use disorders, the corresponding range was from 22.0% ± 0.62 to 76.1% ± 1.40 and for drug use disorders, from 4.7% ± 0.16 to 52.1% ± 1.88. Nicotine dependence was diagnosed in 12.3% ± 0.38 to 54.7% ± 1.82, pathological gambling in 0.2% ± 0.03 to 2.l7% ± 0.54, and at least 1 additional personality disorder in 8.8% ± 0.24 to 44.7% ± 1.66 of the respondent sample. Women in all 4 antisocial syndrome-defined groups demonstrated markedly higher prevalences of lifetime mood, anxiety, and, to a lesser extent, additional personality disorders than their respective male counterparts, while men, particularly those with no antisocial syndrome, were diagnosed more often than their respective female counterparts with lifetime alcohol use disorders. Prevalences of lifetime drug use disorders and pathological gambling were modestly greater among men than among women, while nicotine dependence was modestly more frequent among women, within antisocial syndrome categories.

Associations of Antisocial Syndrome With Physical Health Measures

Unadjusted. As shown in Table 1, antisocial syndromes were significantly associated with all examined physical health status measures. Respondents with ASPD reported the highest total number of past-year provider-diagnosed medical conditions, as well as the highest prevalences of coronary and other heart, liver, gastrointestinal, and arthritic diseases. In addition, respondents with ASPD reported the largest numbers of inpatient admissions, days hospitalized, emergency department visits, and clinically significant injuries and scored lowest on all of the SF-12v2 scales. Conversely, respondents with no antisocial syndrome had the lowest prevalences of other heart disease, reported the fewest inpatient hospitalizations and clinically significant injuries, and scored highest on the SF-12v2 bodily pain, general health, and vitality scales. Respondents with CD-only reported the smallest number of past-year medical conditions and the lowest prevalences of coronary heart disease and arthritis and scored highest on the SF-12v2 physical functioning and role physical scales.

Statistically significant sex by antisocial syndrome interactions were observed for total number of past-year conditions, hypertension, and arthritis, as well as SF-12v2 vitality scale score and number of past-year emergency department visits. Women reported higher numbers of past-year medical conditions than men in all groups, but the differences were most pronounced for no conditions in the groups with ASPD and no antisocial syndrome, for a single condition in the group with ASPD, and for 3 or more conditions in the groups with AABS, CD-only, and with no antisocial syndrome. Women with ASPD and AABS reported lower prevalences but women with CD-only reported higher prevalences of hypertension, whereas women with ASPD, AABS, and no antisocial syndrome reported higher prevalences but women with CD-only reported lower prevalences of arthritis, than their respective male counterparts. Women in all groups reported lower scores than their male counterparts on the SF-12v2 vitality scale, but the sexes diverged most markedly in the ASPD group. Conversely, women in all groups reported more emergency department visits than their male counterparts, but least strikingly so among those with no antisocial syndrome.

Adjusted. Table 2 depicts adjusted associations of antisocial syndromes with measures of physical health status and care utilization. ASPD and AABS were significantly but modestly associated with total number of past-year conditions, coronary heart and gastrointestinal diseases, inpatient hospitalizations, inpatient days, emergency department visits, and clinically significant injuries. ASPD was also significantly associated with liver disease and lower scores on the SF-12v2 physical component summary, role physical, and bodily pain scales, whereas AABS was significantly associated with other heart disease and lower scores on the SF-12v2 general health and vitality scales. A slight gradient was observed indicating increasingly strong associations of ASPD and AABS with increasing numbers of past-year emergency department visits. Conversely, except for single occurrences of inpatient hospitalizations, emergency department visits, and clinically significant injuries, CD-only was not significantly associated with physical health status.

A statistically significant sex by antisocial syndrome interaction was observed only for arthritis. Associations with ASPD were significant among both men and women, but weaker among women, whereas the association with AABS was significant only among men. Arthritis was not associated with CD-only in either sex.

DISCUSSION

Our findings replicate and extend to the general adult U.S. population those of previous clinical[12,18] and epidemiologic[11,13,14] studies indicating significant associations of ASPD with selected chronic diseases and injuries. This study also extends the results of previous work by identifying similarity in directions and magnitudes of associations with health conditions (total past-year conditions, coronary heart and gastrointestinal diseases, and clinically significant injuries) and care utilization (hospitalizations, inpatient days, and emergency department visits) between ASPD and AABS. In addition, the present findings suggest, for the first time, sex specificity of adjusted associations between antisocial syndromes in adulthood and arthritis but not other health conditions or measures of utilization.

Table 1. Past-Year Physician-Diagnosed Chronic Medical Conditions and Respondent-Reported Injuries, Physical Health-Related Impairment and Disability, and Hospital Care Utilization by Antisocial Behavioral Syndrome[a]

	Men (N = 18,518)				Women (N = 24,575)				Total (N = 43,093)				p Values	
Characteristic	ASPD (N = 949)	AABS (N = 2916)	CD-Only (N = 258)	No Antisocial Syndrome (N = 14,395)	ASPD (N = 473)	AABS (N = 2102)	CD-Only (N = 157)	No Antisocial Syndrome (N = 21,843)	ASPD (N = 1422)	AABS (N = 5018)	CD-Only (N = 415)	No Antisocial Syndrome (N = 36,238)	Antisocial Syndrome	Sex by Antisocial Syndrome Interaction
No. of health care provider-diagnosed medical conditions													.0054	.0218
None	65.4 (2.02)	67.6 (1.04)	71.7 (3.15)	71.8 (0.79)	60.7 (2.79)	64.5 (1.31)	70.3 (3.94)	63.9 (0.68)	64.1 (1.66)	66.5 (0.86)	71.2 (2.50)	67.4 (0.66)		
1	17.4 (1.66)	20.8 (0.86)	15.9 (2.59)	17.6 (0.53)	22.5 (2.58)	20.6 (1.14)	17.3 (3.41)	20.3 (0.41)	18.8 (1.38)	20.8 (0.66)	16.3 (2.13)	19.1 (0.38)		
2	10.0 (1.31)	6.7 (0.57)	9.8 (2.51)	6.6 (0.28)	8.3 (1.55)	7.7 (0.68)	7.0 (2.23)	9.8 (0.30)	9.5 (0.99)	7.1 (0.45)	8.9 (1.85)	8.4 (0.24)		
≥ 3	7.3 (1.02)	4.9 (0.47)	2.7 (1.12)	4.0 (0.23)	8.6 (1.37)	7.2 (0.72)	5.4 (1.84)	6.1 (0.23)	7.7 (0.80)	5.7 (0.42)	3.5 (0.98)	5.2 (0.19)		
Coronary heart disease[b]	8.1 (1.27)	4.9 (0.49)	3.6 (1.35)	4.6 (0.25)	6.5 (1.23)	6.1 (0.65)	3.6 (1.64)	5.0 (0.21)	7.7 (0.99)	5.3 (0.40)	3.6 (1.02)	4.8 (0.17)	.0378	.5266
Other heart disease[c]	7.9 (1.01)	5.1 (0.48)	6.4 (2.01)	4.6 (0.23)	8.5 (1.42)	8.4 (0.79)	6.6 (2.16)	6.4 (0.25)	8.1 (0.82)	6.2 (0.45)	6.4 (1.64)	5.6 (0.19)	.0165	.1916
Hypertension	15.1 (1.41)	17.1 (0.81)	16.1 (2.80)	17.3 (0.55)	14.4 (2.03)	15.1 (1.00)	17.0 (3.53)	20.4 (0.45)	14.9 (1.14)	16.4 (0.63)	16.3 (2.23)	19.0 (0.43)	< .0001	.0128
Liver disease	3.8 (0.85)	1.4 (0.21)	0.9 (0.88)	0.5 (0.08)	1.7 (0.59)	0.8 (0.20)	0.0 (0.00)	0.5 (0.05)	3.3 (0.64)	1.2 (0.16)	0.6 (0.60)	0.5 (0.05)	< .0001	.1950
Gastrointestinal disease[d]	8.8 (1.14)	6.4 (0.55)	3.4 (1.38)	3.7 (0.20)	14.9 (2.00)	9.9 (0.78)	8.6 (2.35)	6.3 (0.23)	10.5 (1.10)	7.7 (0.46)	5.1 (1.24)	5.1 (0.16)	< .0001	.8202
Arthritis	18.2 (1.49)	14.2 (0.87)	12.6 (2.77)	12.4 (0.48)	22.6 (2.49)	18.5 (1.12)	11.0 (2.66)	21.0 (0.55)	19.4 (1.22)	15.8 (0.74)	12.0 (2.11)	17.2 (0.47)	.0059	.0008
SF-12 scores														
PCS	49.5 (0.47)	51.0 (0.23)	50.9 (0.72)	51.3 (0.13)	49.4 (0.72)	50.3 (0.30)	50.4 (0.77)	50.0 (0.13)	49.4 (0.40)	50.7 (0.20)	50.7 (0.57)	50.6 (0.12)	.0288	.1519
Physical functioning	51.1 (0.42)	52.3 (0.20)	52.2 (0.66)	52.4 (0.11)	48.3 (0.64)	50.3 (0.26)	51.1 (0.79)	50.6 (0.12)	50.3 (0.38)	51.6 (0.17)	51.9 (0.52)	51.4 (0.10)	.0205	.5423
Role physical	49.7 (0.48)	51.5 (0.23)	52.2 (0.60)	52.1 (0.13)	47.9 (0.67)	49.8 (0.27)	49.9 (0.83)	50.5 (0.12)	49.2 (0.42)	50.9 (0.18)	51.4 (0.49)	51.2 (0.11)	< .0001	.9052
Bodily pain	47.6 (0.54)	50.0 (0.27)	50.7 (0.69)	51.3 (0.13)	46.4 (0.75)	47.9 (0.32)	48.7 (1.07)	49.6 (0.12)	47.3 (0.44)	49.2 (0.21)	50.1 (0.60)	50.3 (0.10)	< .0001	.7399
General health	48.0 (0.50)	49.9 (0.26)	49.5 (0.94)	51.5 (0.16)	45.9 (0.71)	48.2 (0.33)	47.4 (1.18)	50.3 (0.16)	47.5 (0.41)	49.3 (0.23)	48.8 (0.79)	50.8 (0.14)	< .0001	.4698
Vitality	52.3 (0.46)	53.4 (0.23)	54.2 (0.77)	55.7 (0.14)	47.5 (0.66)	50.1 (0.25)	51.0 (0.97)	53.2 (0.13)	51.0 (0.38)	52.2 (0.18)	53.2 (0.63)	54.3 (0.12)	< .0001	.0100
No. of inpatient hospitalizations[e]													.0054	.5877
None	87.9 (1.25)	90.0 (0.70)	89.5 (1.89)	91.4 (0.34)	81.3 (2.19)	87.7 (0.90)	89.8 (2.88)	89.4 (0.25)	86.1 (1.10)	89.2 (0.55)	89.6 (1.63)	90.3 (0.22)		
1	8.6 (1.07)	7.2 (0.61)	9.1 (1.90)	6.1 (0.28)	12.1 (1.89)	8.2 (0.74)	8.1 (2.64)	7.5 (0.23)	9.5 (0.95)	7.6 (0.48)	8.8 (1.59)	6.9 (0.18)		
≥ 2	3.5 (0.69)	2.8 (0.34)	1.4 (0.62)	2.5 (0.15)	6.6 (1.29)	4.1 (0.57)	2.1 (1.25)	3.0 (0.13)	4.4 (0.60)	3.3 (0.30)	1.6 (0.57)	2.8 (0.10)		
Total inpatient length of stay, d[e]													.0031	.7292
None	88.2 (1.23)	90.2 (0.69)	89.5 (1.89)	91.5 (0.34)	81.4 (2.20)	87.8 (0.90)	90.0 (2.87)	89.6 (0.25)	86.3 (1.10)	89.3 (0.54)	89.7 (1.63)	90.4 (0.21)		
1–2	3.3 (0.62)	3.9 (0.48)	4.8 (1.53)	3.4 (0.20)	5.4 (1.24)	4.8 (0.58)	5.7 (2.08)	4.1 (0.16)	3.9 (0.56)	4.2 (0.38)	5.1 (1.24)	3.8 (0.12)		
≥ 3	8.5 (1.07)	5.9 (0.49)	5.7 (1.39)	5.0 (0.24)	13.3 (1.84)	7.4 (0.70)	4.3 (2.11)	6.4 (0.20)	9.8 (0.92)	6.4 (0.39)	5.2 (1.25)	5.8 (0.17)		
No. of emergency department visits													< .0001	.0181
None	69.7 (1.88)	74.4 (0.98)	77.3 (3.37)	83.3 (0.48)	56.3 (2.72)	67.6 (1.37)	72.0 (4.37)	81.2 (0.40)	66.0 (1.57)	72.0 (0.81)	75.6 (2.76)	82.1 (0.38)		
1	17.5 (1.54)	17.9 (0.85)	18.9 (2.96)	12.2 (0.41)	23.1 (2.42)	18.0 (0.97)	21.1 (4.26)	12.9 (0.34)	19.0 (1.33)	17.9 (0.67)	19.6 (2.62)	12.6 (0.31)		
≥ 2	12.8 (1.47)	7.7 (0.61)	3.8 (1.28)	4.5 (0.21)	20.6 (2.35)	14.3 (0.98)	6.9 (2.36)	5.8 (0.22)	14.9 (1.29)	10.1 (0.55)	4.8 (1.22)	5.3 (0.16)		
No. of clinically significant injuries[f]													< .0001	.6384
None	66.9 (1.90)	70.9 (1.08)	77.0 (2.98)	84.8 (0.45)	72.9 (2.51)	74.5 (1.19)	75.2 (3.98)	86.2 (0.36)	68.5 (1.52)	72.2 (0.74)	76.5 (2.57)	85.6 (0.34)		
1	23.3 (1.77)	21.0 (0.89)	19.8 (2.91)	12.0 (0.39)	18.1 (2.28)	17.5 (0.99)	20.2 (3.68)	10.9 (0.33)	21.9 (1.42)	19.7 (0.64)	20.0 (2.55)	11.4 (0.30)		
≥ 2	9.8 (1.22)	8.2 (0.64)	3.1 (1.22)	3.3 (0.19)	9.0 (1.71)	8.1 (0.77)	4.6 (2.02)	2.9 (0.14)	9.6 (1.00)	8.1 (0.46)	3.6 (1.03)	3.1 (0.12)		

[a]Values are expressed as % (SE), except for SF-12 scores, which are expressed as mean (SE).
[b]Coronary heart disease: arteriosclerosis, angina pectoris, or myocardial infarction.
[c]Other heart disease: tachycardia or "any other heart disease."
[d]Gastrointestinal disease: stomach ulcer or gastritis.
[e]Excludes admissions for normal delivery of liveborn infants.
[f]Clinically significant injuries: injuries that caused respondents to seek medical help or cut down their usual activities for more than half a day.
Abbreviations: AABS = adult antisocial behavior without conduct disorder before age 15 years, ASPD = antisocial personality disorder, CD-only = conduct disorder without adult antisocial behavior, PCS = physical component summary, SF-12 = 12-item Short-Form Health Survey.

Table 2. Adjusted Associations of Antisocial Behavioral Syndromes With Past-Year General Medical Status

Characteristic	Odds Ratios or Regression Coefficients (95% Confidence Intervals)[a,b]		
	ASPD Versus No Antisocial Syndrome	AABS Versus No Antisocial Syndrome	CD-Only Versus No Antisocial Syndrome
No. of health care provider-diagnosed medical conditions			
None	1.0 (referent)	1.0 (referent)	1.0 (referent)
1	1.3 (1.02 to 1.59)	1.3 (1.17 to 1.49)	1.0 (0.66 to 1.39)
2	2.1 (1.53 to 2.85)	1.3 (1.08 to 1.58)	1.4 (0.74 to 2.55)
≥ 3	2.0 (1.43 to 2.68)	1.6 (1.33 to 2.01)	0.8 (0.38 to 1.59)
Coronary heart disease[c]	1.5 (1.05 to 2.22)	1.3 (1.03 to 1.55)	0.7 (0.37 to 1.46)
Other heart disease[d]	1.4 (0.98 to 1.86)	1.3 (1.03 to 1.53)	1.4 (0.78 to 2.67)
Hypertension	1.0 (0.80 to 1.35)	1.1 (0.99 to 1.27)	1.1 (0.76 to 1.71)
Liver disease	2.9 (1.65 to 5.18)	1.4 (0.96 to 2.08)	1.2 (0.15 to 9.01)
Gastrointestinal disease[e]	1.5 (1.16 to 2.05)	1.4 (1.15 to 1.61)	0.8 (0.46 to 1.53)
Arthritis			
Men	2.2 (1.69 to 2.76)	1.4 (1.20 to 1.73)	1.3 (0.66 to 2.34)
Women	1.4 (1.03 to 1.96)	1.2 (0.95 to 1.42)	0.5 (0.26 to 1.04)
SF-12 scores, per point			
Physical component summary	–0.8 (–1.59 to –0.03)	–0.4 (–0.76 to 0.01)	–0.3 (–1.24 to 0.65)
Physical functioning	–0.5 (–1.16 to 0.18)	–0.1 (–0.49 to 0.25)	0.1 (–0.83 to 1.00)
Role physical	–0.9 (–1.61 to –0.08)	–0.2 (–0.59 to 0.14)	0.3 (–0.70 to 1.20)
Bodily pain	–1.0 (–1.92 to –0.08)	–0.3 (–0.77 to 0.13)	0.4 (–0.71 to 1.48)
General health	–0.8 (–1.62 to 0.08)	–0.8 (–1.22 to –0.30)	–1.5 (–3.06 to 0.02)
Vitality	–0.6 (–1.43 to 0.19)	–0.6 (–0.99 to –0.18)	–0.3 (–1.61 to 0.93)
No. of inpatient hospitalizations[f]			
None	1.0 (referent)	1.0 (referent)	1.0 (referent)
1	1.6 (1.20 to 2.11)	1.3 (1.09 to 1.50)	1.6 (1.01 to 2.37)
≥ 2	1.6 (1.09 to 2.26)	1.4 (1.05 to 1.76)	0.7 (0.28 to 1.51)
Total inpatient length of stay, d[f]			
None	1.0 (referent)	1.0 (referent)	1.0 (referent)
1–2	1.2 (0.83 to 1.77)	1.3 (1.05 to 1.58)	1.6 (0.94 to 2.78)
≥ 3	1.9 (1.44 to 2.56)	1.3 (1.10 to 1.59)	1.1 (0.60 to 1.86)
No. of emergency department visits			
None	1.0 (referent)	1.0 (referent)	1.0 (referent)
1	1.3 (1.07 to 1.61)	1.3 (1.15 to 1.48)	1.5 (1.01 to 2.08)
≥ 2	2.2 (1.75 to 2.86)	1.7 (1.47 to 2.06)	0.8 (0.41 to 1.39)
No. of clinically significant injuries[g]			
None	1.0 (referent)	1.0 (referent)	1.0 (referent)
1	1.6 (1.32 to 1.99)	1.5 (1.38 to 1.73)	1.6 (1.15 to 2.19)
≥ 2	2.0 (1.46 to 2.64)	2.0 (1.66 to 2.37)	0.8 (0.38 to 1.47)

[a]Odds ratios estimating associations with categorical response variables are based on binary logistic regression models for dichotomous, and multinomial logistic regression models for polytomous, response variables. Regression coefficients estimating associations with continuous variables are based on normal theory regression models.
[b]All models control for age, sex, race/ethnicity, marital status, education, past-year personal income, health insurance coverage, region and urbanicity of respondent residence, body mass index, comorbid lifetime diagnoses of nicotine dependence and any mood, any anxiety, any alcohol use, any drug use, pathological gambling, and any additional personality disorders, average daily ounces of ethanol during period of heaviest lifetime drinking, frequency of use of most frequently used drug during period of heaviest lifetime use, and number of cigarettes smoked per day during most recent year of smoking.
[c]Coronary heart disease: arteriosclerosis, angina pectoris, or myocardial infarction.
[d]Other heart disease: tachycardia or "any other heart disease."
[e]Gastrointestinal disease: stomach ulcer or gastritis.
[f]Excludes admissions for normal delivery of liveborn infants.
[g]Clinically significant injuries: injuries that caused respondents to seek medical help or cut down their usual activities for more than half a day.
Abbreviations: AABS = adult antisocial behavior without conduct disorder before age 15, ASPD = antisocial personality disorder, CD-Only = conduct disorder without adult antisocial behavior, SF-12 = 12-item Short-Form Health Survey.

In the ASPD group, the small increase in coronary heart disease was not unexpected given previously observed[28,29] associations of childhood and adolescent conduct disorder symptoms with adverse cardiovascular risk profiles. Whether the development of AABS, which by definition excludes conduct disorder before age 15 years, is preceded or accompanied by similar patterns of cardiovascular risk, is not known and warrants further study. Of note, hypertension was not associated in the adjusted analyses with antisocial syndrome. However, the associations of ASPD and AABS with coronary heart disease could reflect excesses in these 2 groups of other risk factors, such as C-reactive protein,[29] diabetes mellitus, dyslipidemias, and deleterious dietary or physical activity habits. Further research that includes collection of biological specimens from which to measure blood glucose, lipids, and markers of inflammation, as well as assessment of respondents' dietary and exercise practices, appears

warranted to test these potential explanations. Other risk factors for cardiovascular disease include negative affects, such as anger, depression, anxiety, and hostility,[83] that are associated with antisociality[4,8,9,22,24,28,84,85]; despite our adjustment for comorbid mood, anxiety, and personality disorders, the elevated odds of coronary heart disease could also reflect residual confounding by these characteristics.

By contrast, the association of liver disease with ASPD, independent of known risk factors including alcohol use disorders, average daily ethanol consumption during respondents' heaviest lifetime drinking, and body mass index, was unexpected. Because respondents with ASPD reported greater prevalences of selected other conditions as well, the elevated odds of liver disease could simply reflect an increased likelihood that individuals already in care for 1 or more medical conditions will have additional problems identified. Alternatively, the use of respondents' average daily ethanol volume during heaviest lifetime drinking as our alcohol consumption measure may have masked the deleterious effects of recurrent "spikes" in intake,[86,87] with residual confounding leading to a spurious association. Therefore, we fit 3 ancillary models to determine whether alternative approaches to controlling for the potentially confounding effects of ethanol consumption could explain this association. Each model included both average daily ethanol intake and 1 additional measure of lifetime alcohol consumption referring to the period of respondents' heaviest lifetime drinking: frequency of drinking largest number of drinks per day, frequency of drinking 5 or more drinks in 1 day, and largest quantity of drinks consumed in 1 day. Associations with AABS (ORs = 1.5, 1.5, and 1.5, respectively) remained similar; those with CD-only (ORs = 1.6, 1.4, and 1.6, respectively) changed modestly across these models and remained nonsignificant. Associations with ASPD increased moderately when frequency of drinking largest number of drinks (OR = 3.5) and largest quantity of drinks (OR = 3.5) were included, although less so with frequency of 5 or more drinks in 1 day (OR = 3.2) as the second consumption measure. This robust association with ASPD could reflect variations in other risk factors for both alcoholic and nonalcoholic liver disease, e.g., nutritional status, insulin resistance, and diabetes,[88–94] by antisocial syndrome in ways not fully accounted for by control for body mass index. Because we only queried respondents about diabetes mellitus in Wave 2 and did not assess their dietary habits, we cannot examine the plausibility of this explanation. The elevated prevalence of liver disease among respondents with ASPD could also be accounted for by viral hepatitis, particularly hepatitis C, which can be transmitted both by injection drug use and, to a lesser extent, via risky sexual behaviors, as well as through transfusions of blood from infected donors.[95] Of note, however, less than 1% of the sample reported any history of injection drug use, including only 1 respondent with CD-only.

Our findings concerning injuries are consistent with the prominence of impulsive, reckless, and aggressive behavior in the clinical presentations of both ASPD and AABS.[35,36,40–42] Conversely, associations of antisociality in adulthood with arthritis have not previously been reported. We did not ask whether respondents were diagnosed with rheumatoid, osteo-, or other types of arthritis. However, joint injury is a risk factor for osteoarthritis.[96,97] Thus, if a substantial proportion of respondents with arthritis, especially among those with ASPD, had osteoarthritis, the observed associations could reflect injuries related to reckless or aggressive behavior. That women with ASPD displayed a smaller excess than men, and women with AABS did not demonstrate a significant elevation in odds whereas men with AABS did, is of interest given the lower prevalences of both ASPD and AABS among women, and the higher prevalences of arthritis among women in the groups with ASPD, AABS, and no antisocial syndrome. Both incidence and prevalence of osteoarthritis are greater among men than among women before age 50 years, but the reverse is true after age 50[97]; conversely, both incidence and prevalence of rheumatoid arthritis are higher in women,[49] although female:male incidence ratios decrease in late life due to increasing incidence among men and plateauing incidence among women.[50,51] Thus, the sex-specific variation in patterns of association could reflect both heterogeneity in types of arthritis across antisocial syndromes, and perhaps a smaller contribution of antisociality to prevalence among women than among men. Further investigations that examine types of arthritis separately by sex and age are needed to clarify the nature, magnitude, and mechanisms of sex-specific associations with antisocial syndromes.

The elevated odds of inpatient hospitalizations, more inpatient days, and more emergency department visits among respondents with both ASPD and AABS could reflect their increased morbidity. However, their greater hospital utilization might also reflect impairment by antisociality of their ability to form effective working relationships with care providers and resultant interference with successful outpatient management of chronic diseases, risk factors, and injuries. Poor patient-provider relations could involve stigmatization or therapeutic nihilism by providers, suboptimal adherence to prescribed regimens or attendance at medical appointments by patients, or both. Concern about poor patient-provider rapport has been explicitly raised to date only regarding fully diagnosable ASPD,[16,98,99] but increasing evidence of the strong similarity between individuals with AABS and those with ASPD[31,36,37,41–43] suggests that AABS may also be associated with challenging patient-provider interactions.

That CD-only was associated with single but not multiple past-year occurrences of hospitalization, emergency department utilization, and clinically significant injury,

and with no chronic diseases or dimensions of physical health–related impairment as measured by the SF-12v2, suggests that it may carry limited adverse impact on current physical health status in adults. We advance this assertion cautiously, however, because our findings are at variance with those from both cross-sectional and birth cohort studies that indicated significant associations of conduct disorder and conduct problems with cardiovascular risk factors[28,29] and chronic medical conditions[25,30] in late adolescence and early to middle adulthood. Both recall and social desirability biases may have led to underreporting of conduct disorder behaviors, particularly among respondents whose symptoms ceased long before they were interviewed and whose current behavior therefore differed considerably from their past behavior.[100] Relatedly, we did not query respondents who endorsed conduct disorder behaviors about whether they completely ceased those behaviors, but only asked if the behaviors occurred since age 15. Some who acknowledged conduct problems since age 15 may have remitted long before their NESARC interviews. Nock et al.[22] showed remitted conduct disorder to be associated with less risk than active conduct disorder for persistence from the lifetime to the past-year time frame of comorbid substance use and other mental disorders. However, whether this is also true for general medical conditions has not been examined.

Limitations

In addition to the issues raised previously in relation to specific findings, this study's limitations include the NESARC's reliance on self-reported data. Respondents' comprehension of their medical diagnoses may have been inaccurate and differential by antisocial syndrome. Almost 1 in 4 respondents with ASPD and CD-only and 1 in 8 with AABS did not complete high school and thus may have been at high risk for limited health-related literacy. A further consideration is that lying, scamming, and conning for secondary gain are among the defining features of antisocial syndromes. However, we can identify no obvious source of secondary gain, or alternatively of differential stigma, for respondents on the basis of whether or not they reported past-year medical conditions, injuries, hospitalizations, or other indices of poor health status, particularly given the rigorous guarantees of confidentiality in the survey.

Additional limitations include the cross-sectional nature of our data, which precludes inferences about the temporality and causality of the associations we observed. Longitudinal data are needed to address these points and to identify mechanisms underlying the associations. Wave 2 of the NESARC, which was recently completed, will yield important longitudinal data that bear on some of these questions, as we inquired for a second time about past-year diagnoses of conditions first queried in Wave 1 and readministered the SF-12v2. In addition, we asked respondents to report past-year diagnoses of diabetes, hypercholesterolemia, human immunodeficiency virus/acquired immunodeficiency syndrome and other sexually transmitted diseases, and stroke, as well as current risk factors including patterns of physical activity. Finally, we note that the NESARC's target population was, by design, the general adult population residing in civilian households and group quarters. It did not include incarcerated individuals; similarly, despite the inclusion of a group quarters sampling frame, it may also have underrepresented homeless adults. The sampling design of the NESARC eliminates selection biases that could result from ascertainment of respondents in institutional settings, including prisons, where prevalences and severity of antisocial syndromes, other psychiatric disorders and general medical conditions, and comparative associations between antisocial syndromes and both psychiatric and general medical comorbidity, may differ substantially from those observed in the general population.[101] However, the extent to which the findings of the present study would resemble or differ from those obtained in institutional samples is unclear.

Implications

Our findings suggest that assessments of burden related to antisocial behavioral syndromes, particularly ASPD and AABS, need to include consideration of comorbidity with selected chronic diseases and injuries. While the associations of these conditions with antisocial syndromes were small, the conditions are sufficiently prevalent in the general population, and associated with sufficient morbidity, mortality, and cost,[47,89,97,102–106] that any increases associated with antisociality may be important from clinical, public health, and economic perspectives. The prominence of impulsivity, recklessness, and disregard for norms and rules in both syndromes may pose challenges to the successful management, particularly in outpatient settings, of common chronic diseases such as coronary heart disease and associated risk factors, in which disciplined self-regulation of diet, physical activity, and medication adherence figure prominently.[99,107] Similarly, the impulsivity, recklessness, and aggressiveness commonly seen among antisocial adults may pose challenges to injury prevention and management. Therefore, our findings indicate the need to improve identification by clinicians of antisocial behavioral syndromes and to increase the availability of effective treatments for them, as well as for comorbid medical conditions.

Among affected adults, comorbid mental disorders are more likely than ASPD to result in clinical attention[4]; this is likely to be true in AABS as well. Our findings therefore give further support for careful assessment of both antisocial behavior histories and general medical status in mental health treatment settings. Time and resource con-

straints may complicate the assessment of antisociality in general medical settings. Nevertheless, the results of this study argue for inquiry into antisocial behavior histories among medical patients, particularly those with coronary heart, liver, gastrointestinal, or arthritic diseases or with injuries, as well as those who repeatedly require hospital care. These findings also underscore the need for appropriate referrals to and from, and collaborations between, general medical and mental health care providers to optimize the management of this challenging patient population.

ASPD has responded poorly to available treatments.[108] While AABS is more prevalent than ASPD and CD-only among adults in the general U.S. population,[1] interventions targeting AABS have not been described, perhaps because AABS is not currently a diagnosable DSM disorder. Moreover, it remains unclear whether specific antisocial symptoms, e.g., violent behavior or impulsivity, may be more amenable to targeted interventions, such as stress and anger management, than the broader syndromes. The findings of this study provide further evidence of the need to develop effective, developmentally and culturally appropriate interventions for antisocial syndromes over the life course, including attention within their framework to the identification and management of co-occurring medical conditions and risk factors. Pending the availability of effective interventions, our results further suggest the potential value of identifying strategies to optimize successful partnerships between antisocial patients and medical care providers, perhaps by allowing them to "work around" the adverse impacts of antisociality. Because of their manipulative tendencies and disregard for norms and rules, strict limit setting has been identified as an essential feature of clinical management of patients with ASPD.[99] Other possible strategies warranting investigation might include focusing on ways for antisocial patients to maximize near-term gratification through outcomes valued by them that also promote improvements in clinical status.

In addition to evaluating overall effectiveness and acceptability, it will be important to assess variations in outcomes of the management of comorbidity between antisocial syndromes and common medical conditions across clinically relevant subgroups. Subgroups potentially of interest include those defined by sociodemographic characteristics; age at onset, persistence, and symptom predominance (e.g., overt aggression versus covert behaviors like irresponsibility in work or financial matters) of antisocial syndromes; ages at onsets of associated medical conditions; presence versus absence of specific comorbid substance use and other mental disorders; and family histories of antisocial syndromes and specific medical conditions. Appropriate prioritization, timing, and sequencing of clinical interventions in these subgroups of patients should also be investigated.

REFERENCES

1. Compton WM, Conway KP, Stinson FS, et al. Prevalence, correlates, and comorbidity of DSM-IV antisocial personality syndromes and alcohol and specific drug use disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 2005;66:677–685
2. Goodwin RD, Hamilton SP. Lifetime comorbidity of antisocial personality disorder and anxiety disorders among adults in the community. Psychiatry Res 2003;117:159–166
3. Grant BF, Stinson FS, Dawson DA, et al. Co-occurrence of 12-month alcohol and drug use disorders and personality disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry 2004;61:361–368
4. Robins LN, Tipp J, Przybeck T. Antisocial personality. In: Robins LN, Regier DA, eds. Psychiatric Disorders in America: The Epidemiologic Catchment Area Study. New York, NY: The Free Press; 1991:258–290
5. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Third Edition. Washington, DC: American Psychiatric Association; 1980
6. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised. Washington, DC: American Psychiatric Association; 1987
7. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. Washington, DC: American Psychiatric Association; 1994
8. Grant BF, Hasin DS, Stinson FS, et al. Co-occurrence of 12-month mood and anxiety disorders and personality disorders in the US: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Psychiatr Res 2005;39:1–9
9. Sareen J, Stein MB, Cox BJ, et al. Understanding comorbidity of anxiety disorders with antisocial behavior: findings from two large community surveys. J Nerv Ment Dis 2004;192:178–186
10. Grant BF, Hasin DS, Stinson FS, et al. Co-occurrence of DSM-IV personality disorders in the US: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Compr Psychiatry 2005; 46:1–5
11. Hills AL, Cox BJ, McWilliams LA, et al. Suicide attempts and externalizing psychopathology in a nationally representative sample. Compr Psychiatry 2005;46:334–339
12. Martin RL, Cloninger CR, Guze SB, et al. Mortality in a follow-up of 500 psychiatric outpatients, pt 2: cause-specific mortality. Arch Gen Psychiatry 1985;42:58–66
13. Nordstrom DL, Zwerling C, Stromquist AM, et al. Epidemiology of unintentional adult injury in a rural population. J Trauma 2001;51: 758–766
14. Shepherd J, Farrington D, Potts J. Impact of antisocial lifestyle on health. J Public Health (Oxf) 2004;26:347–352
15. Ellis D, Collis I, King M. Personality disorder and sexual risk taking among homosexually active and heterosexually active men attending a genito-urinary medicine clinic. J Psychosom Res 1995;39:901–910
16. Erbelding EJ, Hutton HE, Zenilman JM, et al. The prevalence of psychiatric disorders in sexually transmitted disease clinic patients and their association with sexually transmitted disease risk. Sex Transm Dis 2004;31:8–12
17. Ramrakha S, Caspi A, Dickson N, et al. Psychiatric disorders and risky sexual behaviour in young adulthood: cross sectional study in birth cohort. BMJ 2000;321:263–266
18. Black DW, Baumgard CH, Bell SE, et al. Death rates in 71 men with antisocial personality disorder: a comparison with general population mortality. Psychosomatics 1996;37:131–136
19. Popkin MK, Callies AL, Lentz RD, et al. Prevalence of major depression, simple phobia, and other psychiatric disorders in patients with long-standing type I diabetes mellitus. Arch Gen Psychiatry 1988;45:64–68
20. Angold A, Costello EJ. Depressive comorbidity in children and adolescents: empirical, theoretical, and methodological issues. Am J Psychiatry 1993;150:1779–1791
21. Loeber R, Green SM, Lahey BB, et al. Findings on disruptive behavior disorders from the first decade of the Developmental Trends Study. Clin Child Fam Psychol Rev 2000;3:37–60
22. Nock MK, Kazdin AE, Hiripi E, et al. Prevalence, subtypes, and correlates of DSM-IV conduct disorder in the National Comorbidity Survey Replication. Psychol Med 2006;36:699–710

23. Robins LN, Price RK. Adult disorders predicted by childhood conduct problems: results from the NIMH Epidemiologic Catchment Area project. Psychiatry 1991;54:116–132
24. Wolff JC, Ollendick TH. The comorbidity of conduct problems and depression in childhood and adolescence. Clin Child Fam Psychol Rev 2006;9:201–220
25. Bardone AM, Moffitt TE, Caspi A, et al. Adult physical health outcomes of adolescent girls with conduct disorder, depression, and anxiety. J Am Acad Child Adolesc Psychiatry 1998;37:594–601
26. Tubman JG, Gil AG, Wagner EF, et al. Patterns of sexual risk behaviors and psychiatric disorders in a community sample of young adults. J Behav Med 2003;26:473–500
27. Pajer KA. What happens to "bad" girls? a review of the adult outcomes of antisocial adolescent girls. Am J Psychiatry 1998;155:862–870
28. Pine DS, Wasserman G, Coplan J, et al. Cardiac profile and disruptive behavior in boys at risk for delinquency. Psychosom Med 1996;58: 342–353
29. Odgers CL, Caspi A, Broadbent JA, et al. Prediction of differential adult health burden by conduct problem subtypes in males. Arch Gen Psychiatry 2007;64:476–484
30. Pajer K, Stouthamer-Loeber M, Gardner W, et al. Women with antisocial behaviour: long-term health disability and help-seeking for emotional problems. Crim Behav Ment Health 2006;16:29–42
31. Black DW, Braun D. Antisocial patients: a comparison of those with and those without childhood conduct disorders. Ann Clin Psychiatry 1998;10: 53–57
32. Brooner RK, Schmidt CW, Felch LJ, et al. Antisocial behavior of intravenous drug abusers: implications for diagnosis of antisocial personality disorder. Am J Psychiatry 1992;149:482–487
33. Cacciola JS, Rutherford MJ, Alterman AI, et al. An examination of the diagnostic criteria for antisocial personality disorder in substance abusers. J Nerv Ment Dis 1994;182:517–523
34. Cacciola JS, Alterman AI, Rutherford MJ, et al. Treatment response of antisocial substance abusers. J Nerv Ment Dis 1995;183:166–171
35. Cottler LB, Price RK, Compton WM, et al. Subtypes of adult antisocial behavior among drug abusers. J Nerv Ment Dis 1995;183:154–161
36. Goldstein RB, Powers SI, McCusker J, et al. Antisocial behavioral syndromes among residential drug abuse treatment clients. Drug Alcohol Depend 1998;49:201–216
37. Goldstein RB, Bigelow C, McCusker J, et al. Antisocial behavioral syndromes and return to drug use following residential relapse prevention/ health education treatment. Am J Drug Alcohol Abuse 2001;27:453–482
38. Galbaud du Fort G, Boothroyd LJ, Bland RC, et al. Spouse similarity for antisocial behaviour in the general population. Psychol Med 2002;32: 1407–1416
39. Marmorstein NR. Adult antisocial behavior without conduct disorder: demographic characteristics and risk for co-occurring psychopathology. Can J Psychiatry 2006;51:226–233
40. Tweed JL, George LK, Blazer D, et al. Adult onset of severe and pervasive antisocial behavior: a distinct syndrome? J Pers Disord 1994;8: 192–202
41. Goldstein RB, Dawson DA, Saha TD, et al. Antisocial behavioral syndromes and DSM-IV alcohol use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Alcohol Clin Exp Res 2007;31:814–828
42. Goldstein RB, Compton WM, Pulay AJ, et al. Antisocial behavioral syndromes and DSM-IV drug use disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions [published online ahead of print April 12, 2007]. Drug Alcohol Depend 2007;90:145–158. doi:10.1016/j.drugalcdep.2007.02.023
43. Langbehn DR, Cadoret RJ. The adult antisocial syndrome with and without antecedent conduct disorders: comparisons from an adoption study. Compr Psychiatry 2001;42:272–282
44. Pilote L, Dasgupta K, Guru V, et al. A comprehensive view of sex-specific issues related to cardiovascular disease. CMAJ 2007;176: S1–S44
45. Clark JM. The epidemiology of nonalcoholic fatty liver disease in adults. J Clin Gastroenterol 2006;40(3, suppl 1):S5–S10
46. Corso P, Finkelstein E, Miller T, et al. Incidence and lifetime costs of injuries in the United States. Inj Prev 2006;12:212–218
47. Joish VN, Donaldson G, Stockdale W, et al. The economic impact of GERD and PUD: examination of direct and indirect costs using a large integrated employer claims database. Curr Med Res Opin 2005;21:535–543
48. Lockshin MD. Sex differences in autoimmune disease. Orthop Clin North Am 2006;37:629–633
49. Alamanos Y, Voulgari PV, Drosos AA. Incidence and prevalence of rheumatoid arthritis, based on the 1987 American College of Rheumatology criteria: a systematic review. Semin Arthritis Rheum 2006;36:182–188
50. Doran MF, Pond GR, Crowson CS, et al. Trends in incidence and mortality in rheumatoid arthritis in Rochester, Minnesota, over a forty-year period. Arthritis Rheum 2002;46:625–631
51. Gabriel SE, Crowson CS, O'Fallon WM. The epidemiology of rheumatoid arthritis in Rochester, Minnesota, 1955–1985. Arthritis Rheum 1999;42:415–420
52. Weisman C. Women's use of health care. In: Falik M, Collins KS, eds. Women's Health: The Commonwealth Fund Survey. Baltimore, Md: Johns Hopkins University Press; 1996:19–48
53. Cale EM, Lilienfeld SO. Sex differences in psychopathy and antisocial personality disorder: a review and integration. Clin Psychol Rev 2002;22: 1179–1207
54. Keenan K, Loeber R, Green S. Conduct disorder in girls: a review of the literature. Clin Child Fam Psychol Rev 1999;2:3–19
55. Ohan JL, Johnston C. Gender appropriateness of symptom criteria for attention-deficit/hyperactivity disorder, oppositional-defiant disorder, and conduct disorder. Child Psychiatry Hum Dev 2005;35:359–381
56. Grant BF, Kaplan K, Shepard J, et al. Source and accuracy statement for Wave 1 of the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions. Bethesda, Md: National Institute on Alcohol Abuse and Alcoholism; 2003. Available at http://niaaa.census.gov/pdfs/source_and_accuracy_statement.pdf. Accessed May 8, 2007
57. Grant BF, Dawson DA, Stinson FS, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. Drug Alcohol Depend 2003;71:7–16
58. Grant BF, Hasin DS, Stinson FS, et al. Prevalence, correlates, and disability of personality disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 2004;65:948–958
59. Grant BF, Dawson DA, Hasin DS. The Alcohol Use Disorder and Associated Disabilities Interview Schedule–DSM-IV Version. Bethesda, Md: National Institute on Alcohol Abuse and Alcoholism; 2001. Available at http://niaaa.census.gov/questionaire.html. Accessed Oct 3, 2007
60. Ware JE, Kosinski M, Turner-Bowker DM, et al. How to score version 2 of the SF-12 Health Survey. Lincoln, RI: Quality Metric; 2002
61. Grant BF, Stinson FS, Dawson DA, et al. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry 2004;61:807–816
62. Grant BF, Hasin DS, Chou SP, et al. Nicotine dependence and psychiatric disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry 2004; 61:1107–1115
63. Spencer EA, Appleby PN, Davey GK, et al. Validity of self-reported height and weight in 4808 EPIC-Oxford participants. Public Health Nutr 2002;5:561–565
64. Jeffery RW. Bias in reported body weight as a function of education, occupation, health and weight concern. Addict Behav 1996;21:217–222
65. Schutz Y, Woringer V. Obesity in Switzerland: a critical assessment of prevalence in children and adults. Int J Obes Relat Metab Disord 2002; 26(suppl 2):S3–S11
66. Stewart AL. The reliability and validity of self-reported weight and height. J Chronic Dis 1982;35:295–309
67. Stunkard AJ, Albaum JM. The accuracy of self-reported weights. Am J Clin Nutr 1981;34:1593–1599
68. Canino G, Bravo M, Ramírez R, et al. The Spanish Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS): reliability and concordance with clinical diagnoses in a Hispanic population. J Stud Alcohol 1999;60:790–799
69. Compton WM, Grant BF, Colliver JD, et al. Prevalence of marijuana use disorder in the United States: 1991–1992 and 2001–2002. JAMA 2004; 291:2114–2121
70. Grant BF, Harford TC, Dawson DA, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS): reliability of

alcohol and drug modules in a general population sample. Drug Alcohol Depend 1995;39:37–44
71. Hasin D, Carpenter KM, McCloud S, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS): reliability of alcohol and drug modules in a clinical sample. Drug Alcohol Depend 1997;44:133–141
72. Hasin DS, Muthén B, Grant BF. The dimensionality of DSM-IV alcohol abuse and dependence: factor analysis in a clinical sample. In: Vrasti R, ed. Alcoholism: New Research Perspectives. Munich, Germany: Hogrefe and Hubner; 1997:27–39
73. Hasin DS, Schuckit MA, Martin CS, et al. The validity of DSM-IV alcohol dependence: what do we know and what do we need to know? Alcohol Clin Exp Res 2003;27:244–252
74. Hasin D, Paykin A. Alcohol dependence and abuse diagnoses: concurrent validity in a nationally representative sample. Alcohol Clin Exp Res 1999;23:144–150
75. Vrasti R, Grant BF, Chatterji S, et al. The reliability of the Romanian version of the alcohol module of the WHO Alcohol Use Disorder and Associated Disabilities Interview Schedule-Alcohol/Drug-Revised (AUDADIS-ADR). Eur Addict Res 1998;4:144–149
76. Conway KP, Compton W, Stinson FS, et al. Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 2006;67:247–257
77. Grant BF, Stinson FS, Hasin DS, et al. Prevalence, correlates, and comorbidity of bipolar I disorder and Axis I and II disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 2005;66:1205–1215
78. Grant BF. Prevalence and correlates of drug use and DSM-IV drug dependence in the United States: results of the National Longitudinal Alcohol Epidemiologic Survey. J Subst Abuse 1996;8:195–210
79. Grant BF, Dawson DA. Age of onset of drug use and its association with DSM-IV drug abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey. J Subst Abuse 1998;10:163–173
80. Agresti A. Categorical Data Analysis. New York, NY: John Wiley & Sons, Inc; 1990
81. Hosmer DW, Lemeshow S. Applied Logistic Regression. 2nd ed. New York, NY: John Wiley & Sons, Inc; 2000
82. Research Triangle Institute. Software for Survey Data Analysis, SUDAAN. Version 9.0. Research Triangle Park, NC: Research Triangle Institute; 2002
83. Suls J, Bunde J. Anger, anxiety, and depression as risk factors for cardiovascular disease: the problems and implications of overlapping affective dispositions. Psychol Bull 2005;131:260–300
84. Dodge KA. Translational science in action: hostile attributional style and the development of aggressive behavior problems. Dev Psychopathol 2006;18:791–814
85. Rowe R, Maughan B, Eley TC. Links between antisocial behavior and depressed mood: the role of life events and attributional style. J Abnorm Child Psychol 2006;34:293–302
86. Wetterling T, Veltrup C, Driessen M, et al. Drinking pattern and alcohol-related medical disorders. Alcohol Alcohol 1999;34:330–336
87. Yates WR, Petty F, Brown K. Risk factors for alcohol hepatotoxicity among male alcoholics. Drug Alcohol Depend 1987;20:155–162
88. Bedogni G, Miglioli L, Masutti F, et al. Prevalence of and risk factors for nonalcoholic fatty liver disease: the Dionysos Nutrition and Liver Study. Hepatology 2005;42:44–52
89. Cave M, Deaciuc I, Mendez C, et al. Nonalcoholic fatty liver disease: predisposing factors and the role of nutrition. J Nutr Biochem 2007;18:184–195
90. Gramenzi A, Caputo F, Biselli M, et al. Review article: alcoholic liver disease—pathophysiological aspects and risk factors. Aliment Pharmacol Ther 2006;24:1151–1161
91. Ioannou GN, Weiss NS, Boyko EJ, et al. Is central obesity associated with cirrhosis-related death or hospitalization? a population-based, cohort study. Clin Gastroenterol Hepatol 2005;3:67–74
92. Lieber CS. Relationships between nutrition, alcohol use, and liver disease. Alcohol Res Health 2003;27:220–231
93. Moscatiello S, Manini R, Marchesini G. Diabetes and liver disease: an ominous association. Nutr Metab Cardiovasc Dis 2007;17:63–70
94. Valtueña S, Pellegrini N, Ardigò D, et al. Dietary glycemic index and liver steatosis. Am J Clin Nutr 2006;84:136–142
95. McHutchinson JG. Understanding hepatitis C. Am J Managed Care 2004;10:S21–S29
96. Brown TD, Johnston RC, Saltzman CL, et al. Posttraumatic osteoarthritis: a first estimate of incidence, prevalence, and burden of disease. J Orthop Trauma 2006;20:739–744
97. Garstang SV, Stitik TP. Osteoarthritis: epidemiology, risk factors, and pathophysiology. Am J Phys Med Rehabil 2006;85(suppl 11):S2–S11
98. Gerstley L, McLellan AT, Alterman AI, et al. Ability to form an alliance with the therapist: a possible marker of prognosis for patients with antisocial personality disorder. Am J Psychiatry 1989;146:508–512
99. Ward R. Assessment and management of personality disorders. Am Fam Physician 2004;70:1505–1512
100. Rueter MA, Chao W, Conger RD. The effect of systematic variation in retrospective conduct disorder reports on antisocial personality disorder diagnoses. J Consult Clin Psychol 2000;68:307–312
101. Berkson J. Limitation of the application of fourfold table analysis to hospital data. Biomed Bull 1946;2:47–53
102. Reuben A. Alcohol and the liver. Curr Opin Gastroenterol 2006;22:263–271
103. Sandler RS, Everhart JE, Donowitz M, et al. The burden of selected digestive diseases in the United States. Gastroenterology 2002;122:1500–1511
104. Watkins LO. Epidemiology and burden of cardiovascular disease. Clin Cardiol 2004;27(6, suppl 3):III2–6
105. Wiebe DJ, Nance ML, Branas CC. Determining objective injury prevention priorities. Inj Prev 2006;12:347–350
106. Williams EJ, Iredale JP. Liver cirrhosis. Postgrad Med J 1998;74:193–202
107. Pi-Sunyer FX. Use of lifestyle changes treatment plans and drug therapy in controlling cardiovascular and metabolic risk factors. Obesity (Silver Spring) 2006;14(suppl 3):135S–142S
108. Reid WH, Gacono C. Treatment of antisocial personality, psychopathy, and other characterologic antisocial syndromes. Behav Sci Law 2000;18:647–662

