

Behavioral Factors Associated with Disease, Injury, and Death among Men: Evidence and Implications for Prevention

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Men in the United States suffer more severe chronic conditions, have higher death rates for all 15 leading causes of death, and die more than six years younger than women. In an attempt to explain these differences, this review summarizes recent evidence of gender differences in behaviors that significantly influence health and longevity. Drawing upon large studies, national data, and meta-analyses, it systematically demonstrates that males of all ages are more likely than females to engage in over 30 behaviors that increase the risk of disease, injury, and death. These findings provide compelling evidence that men's greatest health risks are preventable and indicate that poor health behaviors frequently co-occur among men. The implications of this review for future research and for the design of interventions with men are discussed.

Key Words: men, gender, health behavior, health risk, disease prevention, injury prevention, health promotion, sex differences

A variety of factors have been found to influence health. Among these factors are access to care, economic status, and ethnicity (Adler et al., 1994; Angell, 1993; Department of Health and Human Services [DHHS], 1998a; Gibbs, 1988; Laveist, 1993; Pappas, Queen, Hadden, & Fisher, 1993). Gender, however, consistently emerges as the strongest predictor of health and longevity. With respect to mortality, gender differences are greater in the United States than in any other industrialized country (Overfield, 1985). American men, on average, die more than six years

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younger than American women do (DHHS, 1996a). African-American men die nine years younger than African-American women do (DHHS, 1996a). Although death rates for unintentional injuries, suicides, and homicides are 2.5 to 4.5 times higher among men than women (DHHS, 1996a), violent deaths alone do not explain this disparity. Men have higher death rates for all 15 leading causes of death (DHHS, 1996a). Men's age-adjusted death rate for heart disease, for example, is two times higher than women's rate, and the death rate for cancer is 1.5 times higher (DHHS, 1996a). The incidence of seven of 10 of the most common infectious diseases in the United States is higher among men than among women (CDC, 1997a). Men are also more likely than women to suffer severe chronic conditions and fatal diseases (Verbrugge & Wingard, 1987) and to suffer them at an earlier age. Under age 65, for instance, nearly three out of four persons who die from heart attacks are men (American Heart Association [AHA], 1994a).

A variety of explanations for these disparities have been advanced in the past decade as sex and gender differences have become increasingly popular topics for health research (Kandrack, Grant, & Segall, 1991; Ory & Warner, 1990; Verbrugge, 1985, 1990; Verbrugge & Wingard, 1987; Wingard, 1984; Wingard, Cohn, Kaplan, Cirillo, & Cohen, 1989). The explanatory power of biological factors in predicting gender differences in morbidity and mortality is comparatively small (Kandrack, Grant, & Segall, 1991; Krantz, Grunberg, & Baum, 1985; Neel, 1990; Ory & Warner, 1990; Verbrugge, 1985, 1990). The possibility that poor health behavior on the part of men might account for the disparity had been raised as early as the mid-1970s (Verbrugge, 1985; Goldberg, 1976; Harrison, 1978; Lewis & Lewis, 1977; Waldron, 1976; Waldron & Johnston, 1976). While these reviews of gender differences in health behavior remain the most frequently cited works on the topic, they are all over 15 years old and they lack the robust evidence provided by national surveillance systems and a large number of recently published prospective studies and meta-analyses. In addition, these reviews focus principally on smoking, on the use of alcohol and other drugs, and to some extent on risk-taking behavior and occupational hazards. They are limited in their examinations of many other relevant health behaviors.

In light of much recent evidence on disease prevention and health promotion derived from research conducted since the mid-1980s, many health scientists contend that health behaviors are among the most important factors influencing health and that modifying health behaviors is "probably the most effective way" to prevent disease (Woolf, Jonas, & Lawrence, 1996, p. xxxvii). The evidence supporting this belief is compelling. According to a former U.S. Surgeon General, C. Everett Koop, a wealth of scientific data have "confirmed the importance ... of health behaviors in preventing disease" and "suggest that efforts directed at improving these behaviors are more likely to reduce morbidity and mortality in the United States than anything else we do" (1996, p. viii). An independent scientific panel established by the U.S. government that has evaluated thousands of research studies recently estimated that half of all deaths in the United States each year could be prevented through changes in personal health practices (U.S. Preventive Services Task Force [USPSTF], 1996). Similar conclusions have been reached by other health experts reviewing hundreds of studies (Woolf et al., 1996). These findings led the U.S. Assistant Secretary for

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Health to claim that “it is particularly pertinent to highlight the health consequences of behavior” (Lee, 1996, p. v). Recent, limited reviews suggest that the nearly seven-year difference in the life expectancies of women and men is due largely to men’s less healthy lifestyle habits (Courtenay, 1998a, 1998b, 2000a, 2000b). There are, however, no thorough contemporary reviews of gender differences in behavior that support this belief.

This review summarizes evidence of gender differences in behaviors that significantly influence the health and longevity of women and men in the United States. The studies included were identified through a keyword search in Medline and Psyclit. Findings from national surveillance systems, population-based studies, and meta-analyses are included whenever possible. The health-related behaviors examined here include those related to health care utilization, preventive care, diet, weight, physical activity, substance use, risk taking, violence, social support, and employment. These behaviors represent risk factors that are modifiable lifestyle habits. Consequently, the resulting adverse health effects of these behaviors are preventable.

HEALTH CARE UTILIZATION

Regular medical exams are critical to the early detection of many potentially fatal diseases. Men visit physicians less often than women, and they utilize significantly fewer health care services (Celentano, Linet, & Stewart, 1990; DHHS, 1998a; Helgeson, 1990; Hulka & Wheat, 1985; Solis, Marks, Garcia, & Shelton, 1990). This remains true even when reproductive and other sex-specific conditions are excluded (CDC, 1993a; Verbrugge, 1985; Wingard, 1984). According to the Centers for Disease Control, twice as many men (20%) as women (10%) have no regular source of medical care (CDC, 1998a). Over half (53%) of men aged 18 to 29 years do not have a regular physician, compared with one-third (33%) of women in this age group; among 30- to 44-year-olds, two of five (38%) men and one of five (22%) women lack a regular physician (Sandman, Simantov, & An, 2000). Among adults over most women’s childbearing age, men are less likely to have a regular physician. One in four (24%) men aged 45 to 64 years lacks a regular doctor—nearly twice the number of women (13%) in this age group who do (Sandman, Simantov, & An, 2000). Men represent 65% of those who have not visited a physician in two to five years and 70% of those who have not done so in more than five years (DHHS, 1998b). Among persons *with health problems*, men are significantly more likely than women to have had no recent physician contacts regardless of income or ethnicity (DHHS, 1998a). More men (16%) than women (13%) lack health insurance coverage (Powell-Griner, Anderson, & Murphy, 1997).

Men and women differ in other forms of health care utilization, such as oral hygiene and mental health. Men have fewer dental checkups than women (Marks, Garcia, & Solis, 1990; Prohaska, Leventhal, Leventhal, & Keller, 1985; Ronis, Lang, Farghaly, & Passow, 1993), which contributes to poor oral hygiene among men. Poor oral hygiene has been found to be associated with oral cancer (National Cancer Institute [NCI], 1991), and the oral cancer death rate for men is nearly three times higher than the rate for women (NCI, 1996). Men also use fewer outpatient mental

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health services than women (Corney, 1990; DHHS, 1993; Good, Dell, & Mintz, 1989; Rhodes & Goering, 1994; Wells, Manning, Duan, Newhouse, & Ware, 1986), despite being more likely than women to meet criteria for psychiatric diagnoses in their lifetimes (Robins, Locke, & Regier, 1991).

Physician visits are associated with a variety of positive outcomes. For example, having a regular source of medical care and seeing a physician in the past year are strongly associated with taking action to control hypertension (CDC, 1994a). People without insurance are at increased risk of death, regardless of whether they are employed (Sorlie, Johnson, Backlund, & Bradham, 1994). Having coverage is also one of the most important predictors of receiving clinical preventive services—such as periodic health exams and blood and cholesterol screenings—and men with full coverage are nearly two to three times more likely to receive recommended preventive services than men whose plans do not cover these services (Faulkner & Schaufler, 1997). Physician visits are especially important for the early detection of disease and for discovering conditions that are generally detected through screening. Annual medical checkups are one of the most consistent predictors of ever having a variety of cancer screening tests or of having had a recent test (Bostick, Sprafka, Virnig, & Potter, 1993; Polednak, 1990). (Health screenings are discussed below at greater length.) Because men do not receive timely or regular care, their health problems are often serious when they finally do seek help. For example, about half of men with testicular cancer are not diagnosed until the cancer is in an advanced stage, when it is fatal or disabling (Roth, Nichols, & Einhorn, 1993). Similarly, men's underutilization of mental health services may contribute to their more serious mental health conditions relative to women when they do receive psychiatric care (Fabrega, Mezzich, Ulrich, & Benjamin, 1990). The underutilization of mental health services among males may also contribute to a suicide rate that is four to 12 times higher than the rate for females (DHHS, 1993).

PREVENTIVE CARE

HEALTH SCREENINGS AND SELF-EXAMINATIONS

Regular screenings and self-exams can detect a variety of diseases at an early stage, when successful treatment is more likely. Ninety percent of cancers that are found when they are still localized are curable (Winawer & Shike, 1995). Some researchers contend, for example, that the primary reason that the mortality rate from prostate cancer has remained virtually unchanged for the past 30 years is that nearly half of the men have advanced forms of the disease when they are diagnosed (Gerber, Thompson, Thisted, & Chodak, 1993).

Gender differences are found for a variety of screenings. Men are less likely than women to have had their cholesterol levels checked (Powell-Griner, Anderson, & Murphy, 1997; Rossi, 1992). Significantly fewer men than women are regularly screened for high blood pressure (DHHS, 1981, 1990, 1993; Rossi, 1992; Solis, Marks, Garcia, & Shelton, 1990), and more men than women have never had their blood pressure taken at all (DHHS, 1993). While the evidence regarding cancer screening is not entirely consistent, one large study in three states found that, on

average, men were screened less frequently than women (Bostick, Sprafka, Virnig, & Potter, 1993), and other studies have found that men are less likely to get screened for skin cancer (Berwick, Fine, & Bologna, 1992; Koh et al., 1991).

Regular screening is considered critical for the detection of hypertension (National Stroke Association [NSA], 1994). A major risk factor for heart disease, hypertension is also the number-one controllable risk factor for stroke (AHA, 1996; Burt et al., 1995; CDC, 1993b; DHHS, 1991; Keil et al., 1993; NSA, 1995). Men have higher rates of hypertension than women in every age and ethnic group up to around age 60 or 70 (Burt et al., 1995; Dustan, 1996), when only the healthiest men are still alive. One in five men has hypertension (DHHS, 1998a). In a study of nearly 10,000 men, researchers in Britain recently found that hypertension in early adulthood is associated with the risk of death from heart disease and stroke in later life (McCarron, Smith, Okasha, & McEwen, 2000). Early detection and treatment appear to greatly reduce heart disease mortality (Cohn, Kaplan, & Cohen, 1988). Since men are less likely either to get screened or to see a physician regularly, 20% fewer men than women are treated with medication for hypertension, and 1.5 times more women than men have their hypertension under control (Burt et al., 1995; DHHS, 1998a; Klungel, de Boer, Paes, Seidell, & Bakker, 1997).

Screenings substantially decrease the risk of death from colorectal cancer, men's third leading cause of cancer death (Mandel et al., 1993; Newcomb, Norfleet, Storer, Surawicz, & Marcus, 1992; USPSTF, 1996; Winawer, 1993). Randomized controlled trials show that screening by fecal occult blood testing can decrease the death rate of this disease by as much as 30% (Mandel et al., 1993). Since the early 1970s, the colorectal death rate has decreased 25% for women and only 12% for men (American Cancer Society [ACS], 1997). Failure to receive some form of regular screening may contribute to men's colorectal cancer death rate, which is 1.5 times higher than the rate for women (National Institutes of Health [NIH], 1992). Among those at risk for colorectal cancer, men are less likely than women to be aware of colorectal cancer screening tests (Brown, Potosky, Thompson, & Kessler, 1990). However, gender differences in overall colorectal cancer screening are not consistent (Bostick, Sprafka, Virnig, & Potter, 1993; Polednak, 1990); one large study found that women were 60% more likely than men to get screened regularly (Myers et al., 1991), although proctoscopic examinations specifically do appear to be more common among men (Powell-Griner, Anderson, & Murphy, 1997). Nearly six of 10 men at high risk for both colorectal and prostate cancers either have never had a digital rectal exam or have not had one in more than one year (American Medical Association, 1991).

Like screenings, self-examinations are an important aspect of health-promoting behavior and early detection of disease—particularly for men who see physicians less frequently. Little is known, however, about men's adherence to conducting self-exams. This is both because this form of self-care has not been widely encouraged among men and because self-exams are rarely studied. One recent study of a random sample of 6,000 health maintenance organization members found that 77% of the women conducted self-examinations for cancer compared to 45% of the men (Rossi, 1992).

Melanoma is 95% curable when discovered early (CDC, 1995a, 1995b), and

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monthly self-exams also play a critical role in skin cancer prevention (Koh, Geller, Miller, & Lew, 1995). A population-based study found that self-examinations may reduce mortality from melanoma by as much as 63% (Berwick, Begg, Fine, Roush, & Barnhill, 1996). Another population-based study of melanoma patients revealed that 66% of women discovered their own lesions, compared to 42% of men (Koh et al., 1992). It is likely that inadequate self-examination—along with the insufficient screening cited above—contributes to a melanoma death rate that is over twice as high for men as for women (CDC, 1995b) and to the fact that more middle-aged and older men than women are diagnosed with malignant melanoma at an advanced stage and with a poor prognosis (Geller, Koh, Miller, Mercer, & Lew, 1992).

The incidence of testicular cancer has increased 51% since the mid-1970s (McKiernan, Goluboff, Liberson, & Fisch, 1999). Although college-age men are among those at highest risk for testicular cancer, studies have found that three of four do not know how to perform a self-examination (Pinch, Heck, & Vinal, 1986), and only 8% to 14% conduct regular exams (Neef, Scutchfield, Elder, & Bender, 1991). They are significantly less likely to practice these exams than college women are likely to practice self-exams for breast cancer (Katz, Meyers, & Walls, 1995). Similarly, although the majority of men are at medium to high risk of getting a sexually transmitted disease (STD), including AIDS, most men never look for signs and symptoms (EDK, 1995).

OTHER FORMS OF PREVENTIVE CARE

Men are less likely than women to engage in a variety of preventive and self-care techniques, which contributes to men's increased risks. They are less likely than women to restrict their activities or stay in bed for both acute and chronic conditions, and they are less likely to persist in caring for a major health problem (DHHS, 1998a; Kandrack, Grant, & Segall, 1991; Verbrugge, 1985, 1990). Fewer men than women with hypertension attempt to control it by limiting salt intake, reducing weight, or exercising (CDC, 1994a), which contributes to men's higher heart disease death rates (discussed below). Men are more likely than women to demonstrate high-risk food-handling and preparation behaviors that increase their risk of contracting foodborne diseases, which lead to an estimated 6.6 to 33 million illnesses and as many as 9,000 deaths annually (Yang et al., 1998). Men are also significantly less likely than women to brush or floss their teeth (Ronis, Lang, Farghaly, & Passow, 1993; Swank, Vernon, Lairson, 1986). These last two gender differences in self-care, along with the fact that men have fewer dental checkups than women, contribute to men's poorer oral hygiene and an oral cancer death rate that is three times greater than the rate for women. Three additional forms of preventive care are examined below at greater length.

Medicines and Vitamin Supplements. Men use significantly fewer medicines than women do (Cafferata, Kasper, & Berstein, 1983; Helling et al., 1987; Lassila et al., 1996; Rossitter, 1983; Verbrugge, 1982, 1985, 1990), even for medical conditions that are more likely to occur among males (Rossitter, 1983), such as hypertension (Burt et al., 1995; CDC, 1994a). Men are also at highest risk of poor compliance

with hypertension treatment (Costa, 1996), which increases their risk of heart disease. Among older adults, fewer men (35%) than women (38%) nationally have ever received a vaccination for pneumonia (Powell-Griner, Anderson, & Murphy, 1997), which contributes to a death rate for pneumonia that is 1.6 times greater for men than for women (DHHS, 1996a).

Men are less likely than women to take vitamin supplements (Block et al., 1988; Rakowski, 1986; Slesinski, Subar, & Kahle, 1995; Subar & Block, 1990; Waldron, 1988), although they have less nutritious diets than women (see discussion of diet below), and consequently consume less adequate amounts of vitamins and minerals. For example, 23% of men, compared with 15% of women, have diets that provide inadequate levels of vitamin E (Murphy, Subar, & Block, 1990). Although there is increasingly strong evidence of the health protective effects of vitamins from natural sources, findings regarding the protective effects of vitamin supplements specifically are equivocal. There is increasing evidence, however, suggesting that vitamin E and C supplements can improve immunity in healthy individuals and reduce the risk of heart disease, cancer, and overall mortality (Enstrom, Kanim, & Klein, 1992; Gridley, McLaughlin, Block, Blot, Gluch, & Fraumeni, 1992; Kristal, Stanford, Cohen, Wicklund, & Patterson, 1999; Losonczy, Harris, & Havlik, 1996; Meydani et al., 1997; Rimm et al., 1993; Stephens et al., 1996; Suzukawa, Ayaori, Shige, Hisada, Ishikawa, & Nakamura, 1998). The protective effect of vitamin E does not appear to extend to those at *high risk* for cardiovascular events (Yusuf, Dagenais, Pogue, Bosch, & Sleight, 2000).

Sleep. Sleep is another form of self-care. There is growing evidence that immune functioning decreases with even modest sleep deprivation (Irwin et al., 1994; Moldofsky, Lue, Davidson, & Gorczynski, 1989). Driving while drowsy or asleep also contributes to an estimated 200,000 automobile crashes, thousands of deaths each year (National Highway Traffic Safety Administration [NHTSA], cited in National Sleep Foundation, 1995), and as many as one in four single-vehicle crashes (Brown, 1994; Summala & Mikkola, 1994). (The terms *unintentional injuries* and *automobile crashes* are used throughout—rather than the term *accidents*—to emphasize the fact that these events are preventable; see Cramer, 1998). Men get significantly less sleep than women do (Rediahs, Reis, & Creason, 1990; Reyner & Horne, 1995; Verbrugge, 1988). Even among a national sample of 11,000 health-conscious respondents, the men reported sleeping an average of six hours to the women's eight (Results of National Stress Survey, March, 1995).

Gender differences in sleep probably contribute to men's significantly higher injury rates. (Injury rates are discussed in detail below.) Each year, sleepiness is believed to cause 17,000 nighttime injury deaths, 3,500 unintentional injury deaths at home, and over half of all work-related injury deaths (Leger, 1994). Men account for 94% of the 16 work-related deaths that occur each day (CDC, 1998b; National Institute for Occupational Safety and Health [NIOSH], 1993), and although gender-specific nighttime injury death rates do not appear to be available, males of all ages represent nearly seven of every 10 unintentional injury deaths (National Safety Council [NSC], 1994).

The quality of men's sleep is also poorer (Kripke et al., 1997; Rediahs, Reis, &

Creason, 1990; Redline, Kump, Tishler, Browner, & Ferrette, 1994; Reynolds, Mesiano, Houck, & Kupfer, 1993; Wauquier, Van Sweden, Lagaay, Kemp, & Kamphuisen, 1992). One in four middle-aged men is believed to have undiagnosed sleep-disordered breathing (Young et al., 1993). Sleep apnea is the most serious of sleep disorders; undiagnosed, it is considered a major public health concern (Phillipson, 1993; Young et al., 1993). Sleep apnea is nearly three times more prevalent in men than in women (Hla et al., 1994; Redline, Kump, Tishler, Browner, & Ferrette, 1994; Young et al., 1993). Among middle-aged and older persons, sleep-disordered breathing and sleep apnea have been found to be associated with hypertension (Nieto et al., 2000). Sleep apnea increases the risk of heart attack 23 times in men (Hung, Whitford, Parsons, & Hillman, 1990) and is associated with poorer driving performance (Findley, Levinson, & Bonnie, 1992). A recent study found that people with mild to moderate sleep-disordered breathing performed worse on reaction time tests than people whose blood alcohol levels were sufficiently high to be considered illegal for driving a commercial motor vehicle in California (Powell et al., 1999). The higher prevalence of excess weight among men than women contributes to men's greater risk of sleep apnea. (Overweight and obesity are discussed below.)

Sun Protection. Skin cancer is the most common and most rapidly increasing cancer (CDC, 1995a). Melanoma causes about three-fourths of all skin cancer-associated deaths, and males account for two of every three melanoma deaths (CDC, 1995a, 1995b). The increase in melanoma among men is higher than that of any other cancer (CDC, 1995b). Avoiding direct sunlight and wearing sunscreen, hats, and protective clothing could have prevented many recent skin cancer diagnoses (ACS, 1997). Although more women (27%) than men (23%) "sunbathe," men and boys spend more time in the sun (Berwick, Fine, & Bologna, 1992; Mermelstein & Riesenberg, 1992; Robinson, Rademaker, Sylvester, & Cook, 1997), and significantly fewer men than women nationally stay in the shade to avoid the sun (Hall, Miller, Rogers, & Bewerse, 1999). Despite greater exposure to the sun and greater risk of melanoma among males, females of all ages are 1.5 to four times more likely than males to protect themselves from the sun with sunscreen and other forms of protection (Banks, Silverman, Schwartz, & Tunnessen, 1992; Berwick, Fine, & Bologna, 1992; Hall, May, Lew, Koh, & Nadel, 1997; Hall & Rogers, 1999; Koh et al., 1997; Mermelstein & Riesenberg, 1992). Females are also more likely than males to wear sunscreen with a solar protection factor (SPF) of 15 or higher (Koh et al., 1997, Mermelstein & Riesenberg, 1992) and to reapply sunscreen after swimming (Banks, Silverman, Schwartz, & Tunnessen, 1992).

Despite some controversy regarding the effectiveness of sunscreen, recent reviews of evidence indicate that using sunscreen can reduce the risk of skin cancer (Gasparro, Mitchnick, & Nash, 1998; Naylor & Farmer, 1997). It is estimated that sunscreen with an SPF of at least 15 blocks 93% of the burning rays (Preston & Stern, 1992). If used in young adulthood, sunscreen can lower the risk of skin cancer by as much as 80% (Stern, Weinstein, & Baker, 1986). Men's failure to use sunscreen and other forms of sun protection contributes substantially to their high death rate from skin cancer.

DIET, WEIGHT, AND PHYSICAL ACTIVITY

DIET

Poor diet, along with a sedentary lifestyle, accounted for an estimated 300,000 deaths in 1990—14% of deaths from all causes (McGinnis & Foege, 1993). Adopting healthy dietary habits appears to help prevent cancer, even among persons with historically poor diets (Winawer & Shike, 1995). Men's diets, in general, are less healthy and less nutritious than women's diets (Oleckno & Blacconiere, 1990a; Shi, 1998; Walker, Volkan, Sechrist, & Pender, 1988; Weissfeld, Kirsch, & Brooke, 1990). The average man's diet is a major contributor to heart disease and cancer, the leading killers in the United States (ACS, 1997; AHA, 1996; Denke, Sempos, & Grundy, 1993; NCI, 1996; Oppenheim, 1994). As much as 40% of cancer among men may be linked with diet (Winawer & Shike, 1995).

Fiber, Fruits, and Vegetables. There is robust evidence that the consumption of fiber, fruits, and vegetables reduces the risk of overall mortality (Ascherio & Willett, 1995; Francheschi et al., 1994; Giovannucci et al., 1995; Winawer & Shike, 1995), and of death from heart disease (Ascherio & Willett, 1995), cancer (Block, Patterson, & Subar, 1992; Ekman, 1999; Liebman, 1995; NCI, 1996; Winawer & Shike, 1995), and stroke, even when controlling for a variety of risk factors (Gillman et al., 1995). Men consume significantly less fiber and fruit and fewer vegetables than women (Foerster & Hudes, 1994; Leigh & Fries, 1993; McClelland, Demark-Wahnefried, Mustian, Cowan, & Campbell, 1998; Prohaska, Leventhal, Leventhal, & Keller, 1985; Rossi, 1992; Serdula et al., 1995; Subar et al., 1995; Van Horn et al., 1991). Among adults nationally, men are less likely than women to consume carotenoid-rich foods, such as carrots, spinach, broccoli, and other greens (Nebeling, Forman, Graubard, & Snyder, 1997).

These gender differences in fiber, fruit, and vegetable consumption significantly influence men's health. One extensive review of research found that low consumption of fruits and vegetables was associated with a significant risk of cancer in 128 of 156 dietary studies (Block, Patterson, & Subar, 1992). People who consume the largest amounts of fruits and vegetables reduce their risk of lung cancer by as much as 50%, compared to those who eat the smallest amounts (Blot & Fraumeni, 1992). Lung cancer is the second leading cause of cancer death among men, and their death rate is 2.5 times higher than the lung cancer death rate for women (ACS, 1997; NCI, 1996).

Dietary Fat. Limiting dietary fat is considered a primary means to improve health, reduce weight, and prevent heart disease, stroke, diabetes, and cancer (AHA, 1996; Winawer & Shike, 1995). Males of all ages consume more saturated fat and dietary cholesterol than females do, even when sex differences are adjusted for body size (American School Health Association [ASH], 1989; Block, Rosenberger, & Patterson, 1988; CDC, 1995c, 1997b; Kann et al., 1998; Rossi, 1992; Shi, 1998; Van Horn et al., 1991). Among college students, men are significantly more likely than women to eat foods that are typically high in fat content (CDC, 1997b). Men are also less

likely than women to limit fat or red meat in their diets (Kann et al., 1998; Rakowski, 1986) and are more likely to eat meals in restaurants and to eat convenience foods that are high in fat (Foerster & Hudes, 1994).

Saturated fat, specifically, is believed by some to be an important risk factor for heart disease (AHA, 1996; Ulbricht & Southgate, 1991), although others argue that the evidence is as yet insufficient (Ascherio & Willett, 1995). Dietary fat—and animal fat in particular—is directly related to the risk of advanced prostate cancer, which afflicts one in 11 men (Franceschi, 1994; Gann et al., 1994; Giovannucci et al., 1993; Hayes et al., 1999; LeMarchand, Kolonel, Wilkens, Myers, & Hirohata, 1994; Meyer, Bairati, Shadmani, Fradet, & Moore, 1999; Pienta & Esper, 1993a, 1993b; Whittemore et al., 1995). There is also evidence that a low-fat diet decreases the incidence of skin tumors in those with a history of skin cancer (Black et al., 1994); as noted above, men are more likely than women to have had skin cancer.

Cholesterol. Atherosclerosis, or hardening of the arteries, is caused by cholesterol, which the body produces after consuming animal fat and dietary cholesterol. High cholesterol is linked with heart disease and accounts for 43% of all heart disease deaths (CDC, 1993b; Keil et al., 1993). It is estimated that every 1% reduction in cholesterol leads to a 2% reduction in heart disease risk (Roth & Streicher-Lankin, 1995). While the dietary cholesterol intake of most females of all ages is within the recommended range, the cholesterol intake of males is substantially above recommended levels (Block, Rosenberger, & Patterson, 1988; White & Klimis-Tavantzis, 1992).

As a result of men's high-cholesterol diets, national surveys that analyze nutrient intakes consistently find that men have lower high-density lipoprotein HDL ("good") cholesterol levels than women, even when gender differences are adjusted for body size (Block, Rosenberger, & Patterson, 1988; Van Horn et al., 1991). Men under age 50 are at especially high risk of having elevated cholesterol levels (Williams, Winkleby, & Fortmann, 1993). Up to twice as many men as women under age 55 have levels high enough to require intervention (Sempos et al., 1993). A strong correlation has been found between men's serum cholesterol level measured early in adult life and subsequent incidence of cardiovascular disease in midlife (Klag et al., 1993). One in three men, compared to one in 10 women, will develop some major cardiovascular disease before age 60 (AHA, 2000). Current research suggests that lower cholesterol levels may be more important for men than for women in reducing the risk of heart disease (Walsh & Grady, 1995).

Additional Dietary Habits. Other dietary habits of men increase their health risks. Men are less likely than women to eat breakfast every day (DHHS, 1993), a habit that has been found to be associated with better health and lower mortality rates (Belloc, 1973; Belloc & Breslow, 1972; Breslow & Enstrom, 1980; Enstrom, Kanim, & Breslow, 1986; Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987; Wiley & Camacho, 1980). Men consume significantly more salt than women (Prohaska, Leventhal, Leventhal, & Keller, 1985; White & Klimis-Tavantzis, 1992), which may also increase their health risks. Although a recent analysis of national

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data did not find strong evidence of an association between salt intake and increased mortality (Alderman, Cohen, & Madhavan, 1998), sodium consumption is believed to be a primary contributor to high blood pressure and cardiovascular diseases such as stroke (Cappuccio & MacGregor, 1997; MacGregor, 1997; NSA, 1994; Nothwehr, Elmer, & Hannan, 1994). Salt may also be linked to cancers of the stomach (Joossens et al., 1996; Kneller et al., 1992) and esophagus (Chang-Claude et al., 1995; Correa & Chen, 1994)—which are, respectively, over two and over four times more common among men than women (ACS, 1997); however, some researchers argue that the current evidence does not indicate that a high salt intake increases the risk of cancer (Cohen & Roe, 1997).

WEIGHT

Maintaining desirable weight is unequivocally associated with better health and lower mortality rates (Andres, Muller, & Sorkin, 1993; Belloc, 1973; Belloc & Breslow, 1972; Berkman, Breslow, & Wingard, 1983; Breslow & Enstrom, 1980; Enstrom, Kanim, & Breslow, 1986; Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987). Excess weight is a primary contributor to hypertension (Kotchen, Kotchen, & Boegehold, 1991; Nothwehr, Elmer, & Hannan, 1994), heart disease, and stroke (AHA, 1996; CDC, 1993b; Gortmaker, Dietz, & Cheung, 1990; NSA, 1994; Nothwehr, Elmer, & Hannan, 1994).

Rates of overweight and obesity continue to rise. The greatest trends in increasing overweight and obesity have occurred among men (Galuska, Serdula, Pamuk, Siegel, & Byers, 1996). From 1991 to 1998, obesity increased 52% among men and 47% among women (Mokdad et al., 1999). National data indicate that 59% of men compared with 51% of women are overweight or obese (National Institutes of Health [NIH], 1998). The prevalence of overweight and obesity is consistently higher for men in all age groups up to age 80, when the average man has been dead eight years. It is 10% higher for 20- to 29-year-olds; 11% higher for 30- to 39-year-olds; 13% higher for 40- to 49-year-olds; 9% higher for 50- to 59-year-olds; 6% higher for 60- to 69-year-olds; and 15% higher for 70- to 79-year-olds (NIH, 1998). Obesity is also more common among adolescent boys than it is among adolescent girls (Popkin & Udry, 1998). Among college students aged 18 to 24 years, more men (17%) than women (14%) are overweight (CDC, 1997b). Among 30- to 44-year-olds, the age group displaying the largest gender difference, nearly one-third of men are overweight as compared to less than one-quarter of women (DHHS, 1993). Furthermore, more than 1.5 times more women than men nationally attempt to lose weight (Serdula et al., 1993). Among overweight adults specifically, 6% fewer men than women attempt to control their weight (CDC, 1996).

A variety of diseases are strongly associated with obesity (Pi-Sunyer, 1993), which accounts for an estimated 280,000 deaths each year among U.S. adults (Allison, Fontaine, Manson, Stevens, & VanItallie, 1999). Two-thirds of the hypertension among men aged 25 to 44 years is potentially attributable to excess weight (Kotchen, Kotchen, & Boegehold, 1991). In one recent study, men with waists measuring at least 40 inches were nearly three times as likely to develop heart disease as men with 34-inch waists (Rimm et al., 1995). Cancer is also associated with excess weight; a

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man who is 40% over his ideal weight increases his risk of cancer by 30% (Winawer & Shike, 1995). National data indicate that persons who are overweight increase their risk of colon cancer by 86%; those who are obese triple their risk (Ford, 1999). Excess weight also increases men's health risks through its influence on sleep. One study that examined both excess weight and sleep found that overweight truckers were more than twice as likely to be in crashes (Stoohs, Guilleminault, Itoi, & Dement, 1994). Excess weight is a risk factor for sleep apnea (Phillipson, 1993; Young et al., 1993), a disorder that, as noted above, is most common among men and is associated with an increased risk of both disease and injury.

PHYSICAL ACTIVITY

There is overwhelming and consistent evidence that physical activity significantly reduces the risk of major chronic diseases and premature death (Berlin & Coditz, 1990; Bouchard, Shephard, Stephens, Sutton, & McPherson, 1990; DHHS, 1996b; Enstrom, Kanim, & Breslow, 1986; Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987; Lee, Hsieh, & Paffenbarger, 1995; Paffenbarger, Hyde, Wing, Lee, Jung, & Kampert, 1993; Powell, Caspersen, Koplan, & Ford, 1989; Wei et al., 1999). The relationship remains even after controlling for genetic factors (Kujala, Kaprio, Sarna, & Koskenvuo, 1998) and appears to be causal (Livengood, Caspersen, & Koplan, 1993). Overweight and obese men with low fitness levels are especially at risk for death (Wei et al., 1999). Physical activity has been found to reduce the risk of cancer (Blair et al., 1989; Lee, Paffenbarger, & Hsieh, 1991; Winawer & Shike, 1995); the risk of colon cancer, specifically, is reduced by half (Giovannucci et al., 1995; Winawer & Shike, 1995). Twelve percent of all deaths are attributable to a lack of regular physical activity (Pate et al., 1995). Inactive men are two to three times more likely to die from any cause than their more active peers (inactive women are 2.5 to four times more likely to die than physically active women) (Berkman, Breslow, & Wingard, 1983; Powell, Thompson, Caspersen, & Kendrick, 1987). Physical activity offers additional benefits. People who exercise sleep better (Oppenheim, 1994), and, as previously noted, sleep contributes to health and longevity.

Although, in general, men are slightly more physically active than women (CDC, 2000a; DHHS, 1996b; Powell-Griner, Anderson, & Murphy, 1997), this does not remain true in all cases or for all age groups. At work, only 49% of men are physically active compared to 65% of women who are (CDC, 2000a). Among those aged 18 to 34 years, equal numbers of women and men engage in little or no physical activity, and among those aged 35 to 54 years, the number is higher for men (61%) than it is for women (57%) (CDC, 1993c). This sedentary lifestyle in middle age contributes to men's greater risk of heart disease. As noted above, men account for nearly three of four persons who die from heart attacks under age 65. Over one-third of all heart disease deaths are attributed to physical inactivity, more than those attributed to smoking, excess weight, or hypertension (CDC, 1993b). Among older adults, women maintain their levels of physical activity over time while levels among men decrease significantly (Stanley & Freysinger, 1995). In terms of trends over time, an analysis of physical activity patterns using national data indicates that women are making more beneficial changes than are men (Caspersen & Merritt, 1995).

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The type and intensity of physical activity also differ by gender. Women place greater value on exercising for health (Weissfeld, Kirsch, & Brooke, 1990), and they adhere to more regular exercise patterns (Walker, Volkan, Sechrist, & Pender, 1988), which focus on aerobics or walking (DHHS, 1993, 1996b). Aerobic activity reduces blood pressure and improves cholesterol levels (Hagberg, 1990; King, Haskell, Young, Oka, & Stefanick, 1995; Oppenheim, 1994), and women's greater involvement in this activity probably contributes to their healthier levels of blood pressure and cholesterol. Over 1.5 times more women than men nationally walk as a form of exercise and do so regularly (Siegel, Brackbill, & Heath, 1995). In contrast, men are more likely than women to engage in strengthening exercises (such as weight lifting) and team sports (Kann et al., 1998; Stevens, Jacobs, & White, 1985), such as football, basketball, or baseball (CDC, 1992a; DHHS, 1996b). These forms of exercise are a contributor to men's greater risk of injury and death (discussed below).

Increasingly, health scientists are specifying the amount and intensity of physical activity that is necessary for good health (USPSTF, 1996). It is light to moderate exercise—the type that women are more likely to engage in—that many experts agree and research shows is optimal for the body's well-being (Blair et al., 1989; Giovannucci et al., 1995; Pate et al., 1995; Schneck et al., 1995). Such exercise—which can include walking, gardening, housework, and playing with children—provides substantial health benefits even when done in short bouts and has been found to reduce the risk of death by over 40% (Paffenbarger et al., 1993). On the other hand, people who engage in *infrequent* but strenuous physical activity, the kind that men are more likely than women to engage in—such as jogging, playing tennis, shoveling snow, or mowing the lawn less than once a week—may be at particularly high risk for death from coronary heart disease (Willich et al., 1993); in one recent study, these individuals increased their risk of heart attack 100 times (Mittleman et al., 1993). When speeds of activities such as walking are accounted for, the proportion of adults engaged in “*regular, vigorous activity*” is actually slightly higher among women (DHHS, 1996b; emphasis added).

SUBSTANCE USE

The use of tobacco, alcohol, anabolic steroids, and other drugs or substances is significantly greater among men than women (Substance Abuse and Mental Health Services Administration [SAMHSA], 1997). For example, twice as many men as women reported using marijuana in a recent month, and 2.5 times more men used cocaine (SAMHSA, 1997). The prevalence of substance abuse and dependence is much greater among men than women (Kessler et al., 1994; Robins et al., 1984), and men begin using tobacco, alcohol, and other drugs much younger than women do (Harrell, Bangdiwala, Deng, Webb, & Bradley, 1998; Kann et al., 1998; Pascale & Evans, 1993). Among both high school and college students nationally, the use of marijuana, cocaine or “crack” cocaine, inhalants, and injection drugs is greater among males than females (CDC, 1995c, 1997b; Kann et al., 1998).

Tobacco, alcohol, anabolic steroids, and other drugs or substances are implicated in a variety of health problems. The death rate for drug-induced deaths—which

excludes unintentional injuries, homicides, and other indirect causes related to use—is twice as high for men as it is for women (DHHS, 1992). For example, frequent and heavy use of alcohol and other drugs is strongly associated with high-risk sexual activity and risk of STDs, including AIDS (Ericksen & Trocki, 1992, 1994; O’Leary, Goodhart, Jemmott, & Boccher-Lattimore, 1992; Shafer et al., 1993), the leading cause of death among 25- to 44-year-old men (DHHS, 1996a). Persons under the influence of alcohol or drugs—and who are not necessarily problem users—are at increased risk for suicidal thoughts and unplanned suicide attempts (Borges, Walters, & Kessler, 2000). As noted above, men’s rates of suicide far exceed those of women. The use of tobacco, alcohol, and anabolic steroids is examined below at greater length.

TOBACCO

Cigarettes and Cigars. Cigarette smoking is considered the single most preventable cause of illness and death in the United States (DHHS, 1998a; McGinnis & Foege, 1993), even after controlling for potentially confounding factors such as other health practices and health status at the time of survey (Berkman, Breslow, & Wingard, 1983; Camacho & Wiley, 1983; Enstrom, Kanim, & Breslow, 1986; Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987). In fact, having smoked is one of the strongest predictors of reduced mortality (Enstrom, Kanim, & Breslow, 1986). Tobacco use accounts for roughly one in five deaths overall and one in four deaths among those aged 35 to 64 years (Bartecchi, MacKenzie, & Schrier, 1995; McGinnis & Foege, 1993; Winawer & Shike, 1995).

National data indicate that significantly more men than women smoke—26%, compared to 21% (CDC, 1998c). One recent analysis of these data indicates that the percentages are actually underestimated for men and overestimated for women (Arday et al., 1997). Furthermore, declines in daily smoking are occurring among women but not men (CDC, 1994b). Among high school students nationally, more males than females smoke and smoke frequently (CDC, 1998d; Kann et al., 1998), and among seniors, the percentage who smoked in the past month increased 39% for males and 5% for females from 1980 to 1997 (AHA, 2000). High school males are also significantly more likely than females to smoke bidis—sweet-smelling cigarettes that have higher levels of nicotine than standard cigarettes (CDC, 2000b). Furthermore, although men are more successful than women at quitting smoking (Bjornson et al., 1995; Glassman et al., 1990), men are significantly less likely to attempt to quit or to be former smokers (CDC, 1998e). Tobacco use in general is similarly more prevalent among college men than college women, and daily use is also greater (Presley, Meilman, & Cashin, 1996). Among 18- to 24-year-old college students, men are also less likely than women to attempt to quit smoking (CDC, 1997b). In one of the few studies to examine the initiation of smoking in youth below grade nine, boys were found to begin experimental smoking earlier and to experiment with smoking more than girls (Harrell, Bangdiwala, Deng, Webb, & Bradley, 1998). Young men’s greater experimentation with smoking cigarettes is particularly troublesome because about one-third to one-half of people who experiment with cigarettes become regular users (Giovino, Henningfield, Tomar, Escobedo

& Slade, 1995). Men's smoking habits are also more dangerous than women's—a significant, yet frequently overlooked, fact. Among smokers, 1.5 times more men than women smoke a pack or more per day (SAMHSA, 1997). Men also inhale more deeply than women (Blair et al., 1980; Waldron, 1986, 1988), smoke cigarettes that are higher in tar and nicotine (DHHS, 1981), and are more likely to smoke cigarettes without filter tips (Blair et al., 1980).

Twice as many male as female deaths are attributed to smoking (CDC, 1994c, 1997c; Nelson et al., 1994). Cigarette smoking causes an estimated 22% of all cancer deaths in women; the combination of pipe, cigar, and cigarette smoking is responsible for 45% of all men's cancer deaths (Shopland, Eyre, & Pechacek, 1991). (Cigar smoking is discussed below.) Men's higher lifetime use of tobacco is considered a primary reason for their higher rates of cardiovascular disease and stroke, which account for over 40% of all deaths (AHA, 1994b, 2000). The risk of heart attack and stroke among smokers is more than double the risk for nonsmokers, and the risk of sudden cardiac death is up to four times greater (AHA, 1996; NSA, 1994). Almost one-third of all cancer deaths are attributed to smoking, and of the nearly one-half million people who die tobacco-related cancer deaths each year, the majority are men (ACS, 1997; NCI, 1996). The lung cancer death rate for men is 2.5 times higher than the rate for women (NCI, 1996), and nearly nine of 10 male lung cancer deaths can be directly attributed to cigarette smoking (ACS, 1997; Shopland, Eyre, & Pechacek, 1991). Among men who smoke, the risk of lung cancer is more than 2,000% higher than it is among men who do not smoke (NCI, 1996). Men who smoke double their risk of prostate cancer (Daniell, 1995; Hiatt, Armstrong, Klatsky, & Sidney, 1994).

Most cigar smokers are also men (Burns, Hoffman, Cummings, & Amacher, 1998; CDC, 1998d). Even among middle school (grades six through eight) and high school boys, 8% and 20%, respectively, smoke cigars—twice the number of girls that do (CDC, 2000b). The consumption of cigars has increased dramatically over the past decade among young and middle-aged men, especially (200%) among men aged 18 to 24 (Burns, Hoffman, Cummings, & Amacher, 1998). Regularly smoking cigars doubles a man's risk of lung cancer and increases his risk of oral cancer between eight and 16 times; smokers who inhale deeply increase their risk of oral cancer 27 times (NCI, 1998). A recent prospective study of smokers—excluding men who ever smoked cigarettes or pipes—indicates that cigar smoking increases the risk of lung cancer five times, the risk of cancer of the larynx 10 times, the risk of cancer of the oral cavity and pharynx four times, and the risk of esophageal cancer nearly two times (Shapiro, Jacobs, & Thun, 2000). Additional research suggests that cigar smoking also increases the risk for coronary heart disease, particularly among younger men (Jacobs, Thun, & Apicella, 1999).

Smokeless Tobacco. Smokeless tobacco is also used primarily by men, and its use has increased steadily since the 1970s (CDC, 1993d; Cohen, Sattler, Felix, & Brownell, 1987). Over six million men currently use smokeless tobacco (SAMHSA, 1997). Smokeless tobacco use rates among males of all ages and for all patterns of use range from seven to over 40 times higher than the rates among females (SAMHSA, 1997). Among middle school students nationally, 4% of boys and 1% of

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girls use smokeless tobacco (CDC, 2000b). Among high school students nationally, 16% of males report recent use of smokeless tobacco, more than 10 times the number of females (CDC, 1998d; Kann et al., 1998). Fourteen percent of 18- to 24-year-old college men currently use smokeless tobacco, and less than 1% of college women do (CDC, 1997b). Even among a sample of elementary school students, almost twice as many had experimented with smokeless tobacco as had tried cigarettes, and boys were significantly more likely to experiment than girls (Cohen, Sattler, Felix, & Brownell, 1987). Smokeless tobacco users increase their risk of developing oral cancer by nearly 50 times (ACS, 1997; CDC, 1993d; Shopland, Eyre, & Pechacek, 1991). Men's greater use of smokeless tobacco contributes to an incidence of oral cancer that is more than twice as high as it is among women and a death rate that is nearly three times as high (ACS, 1997).

ALCOHOL

Both the quantity and the frequency of alcohol consumption are higher among men than women (Hasin, Grant, & Weinflash, 1988; McCreary, Newcomb, & Sadava, 1999). Five times more men than women drink an average of two or more alcoholic drinks per day (DHHS, 1993). Research consistently reveals greater problem and heavy drinking among men, and a higher prevalence of alcohol abuse and dependence (Hasin, Grant, & Weinflash, 1988; Huselid & Cooper, 1992; Kann et al., 1998; Kessler et al., 1994; Lex, 1991; Robins et al., 1984; Thomas, 1995). Among adults nationally, men are three times more likely than women to binge drink (binge drinking is typically defined as consuming five or more drinks in one sitting) and seven times more likely to report chronic drinking (Powell-Griner, Anderson, & Murphy, 1997). Furthermore, there is no evidence that these drinking trends have changed over the past several decades or that the gender gap is narrowing (Biener, 1987; Perkins, 1992; Robbins, 1989; Wesley, 1992). Both heavy use and frequent use are significantly more prevalent among adolescent and young men than among young women (CDC, 1995c; Guthrie, Loveland-Cherry, Frey, & Dielman, 1994; Kann et al., 1998; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Perkins, 1992; Prendergast, 1994; Presley, Meilman, & Cashin, 1996; Thomas, 1995; Wechsler, Davenport, Dowdall, Moyekens, & Castillo, 1994; Wesley, 1992). Among college students, frequent binge drinking increased 14% between 1993 and 1999, and men are significantly more likely than women to binge drink (Wechsler, Kuo, & Lee, 2000).

The death rate for alcohol-induced causes (excluding unintentional injuries, homicides, and other indirect causes related to use) is 3.5 times higher for men than it is for women (DHHS, 1993). Even when controlling for potentially confounding variables, excessive alcohol consumption is strongly correlated with hypertension (Flegal & Cauley, 1985; Kotchen, Kotchen, & Boegehold, 1991; Nothwehr, Elmer, & Hannan, 1994; Wallace, Lynch, Pomehn, Criqui, & Heiss, 1981), stroke (NSA, 1994) and is considered one of the strongest contributors to men's excess morbidity and mortality from cardiovascular diseases (Verbrugge, 1985). There is definitive evidence that excessive alcohol consumption can induce both cancer (NCI, 1996; Winawer & Shike, 1995) and cirrhosis, which kill 1.5 and 2.5 times more men than

women, respectively (DHHS, 1996a). As noted above, alcohol use also increases men's risks of STDs and AIDS. Among college students nationally, binge drinkers are seven times more likely than their nonbinging peers to have unprotected sex (Wechsler, Davenport, Dowdall, Moyekens, & Castillo, 1994) and frequent binge drinkers are seven times more likely to engage in unplanned sexual activities (Wechsler, Kuo, & Lee, 2000). Heavy drinking, specifically, has been found to be a predictor of STDs in men only (Ericksen & Trocki, 1994).

Men's alcohol consumption also contributes heavily to their higher rates of both nonfatal and fatal injuries, particularly from motor vehicle crashes (DHHS, 1990). (Unintentional injuries are discussed in the following section.) Men account for most of the four million hospital emergency room visits that are alcohol- or drug-related (National Center for Health Statistics, 1996). A recent meta-analysis of 65 medical examiner studies found that 47% of people who died by homicide, 31% of those who died by injury, and 29% of those who died by suicide tested positive for alcohol; percentages for persons who had a blood alcohol content level indicating intoxication were 32% of homicides, 31% of fatal injuries, and 23% of suicides (Smith, Branas, & Miller, 1999); far more men than women die from all of these causes. Alcohol is implicated in nearly half of all homicides, which are four times more prevalent among men, and suicides, which—as noted above—are four to 12 times more prevalent among men than women (DHHS, 1991, 1996a; Smith, Branas, & Miller, 1999). Among pedestrians killed nationally, 43% of men are intoxicated compared to only 20% of women (CDC, 1994d); men represent nearly three out of four pedestrians killed nationally (discussed below). One of four fatally injured bicyclists had been drinking, and over 90% of them were male (Rodgers, 1995). Among college students nationally, frequent binge drinkers are over 10 times more likely than their nonbinging peers to get hurt or injured (Wechsler, Davenport, Dowdall, Moyekens, & Castillo, 1994). Alcohol is considered the “ubiquitous catalyst” for drowning (Modell, 1993, p. 256); up to 50% of persons who drown have consumed alcohol near the time of death (CDC, 1993e). Half of men compared to one-third of women use alcohol during aquatic activities (CDC, 1993e). One in three college men nationally, aged 18 to 24 years, have drunk alcohol while boating or swimming compared to one in four college women (CDC, 1997b). The drowning death rate is five times greater for males than for females; in the 15- to 24-year-old age group, the ratio is 10 to one (CDC, 1993e; NSC, 1998). Half of all people who injure their spinal cords in swimming pools had been drinking, and nearly 90% of those injured are men (DeVivo & Sekar, 1997). The use of alcohol also increases the risk of both occupational illness and injury (DHHS, 1990); as noted above, men account for 94% of all fatal injuries on the job and account for most occupational illnesses (which are discussed below).

It is important to note that women's more moderate drinking probably *contributes* to their health and longevity. There is conclusive evidence that light or moderate drinkers are in better health and have lower mortality rates than heavy drinkers and people who do not drink at all (Camacho, Kaplan, & Cohen, 1987; Hulley & Gordon, 1981; Peele, 1993; Steinberg, Pearson, & Kuller, 1991; Wiley & Camacho, 1980; Wolf, Kannel, & Verter, 1983). In fact, moderate drinking protects against heart disease and stroke and increases levels of HDL, the “good” cholesterol (Berger

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et al., 1999; Colditz et al., 1985; Friedman & Kimball, 1986; Frimpong & Lapp, 1989; Gaziano et al., 1993; Gaziano et al., 2000; Hulley & Gordon, 1981; Kannel & Ellison, 1996; Linn et al., 1993; Maclure, 1993; Moore & Pearson, 1986; Sacco et al., 1999; Steinberg, Pearson, & Kuller, 1991).

ANABOLIC STEROIDS

The unprescribed use and abuse of anabolic steroids is a relatively new phenomenon that occurs most often among men between the ages of 18 and 25, particularly among athletes (DHHS, 1991; Meilman, Crace, Presley, & Lyerla, 1994). It is estimated that one-half million U.S. adolescents use steroids (DHHS, 1991). Three percent of all college students have used unprescribed steroids during their lifetimes. Although in California only, 2% of college men report steroid use (Patrick, Covin, Fulop, Calfas, & Lovato, 1997), this amounts to over 300 men on the University of California, Berkeley, campus alone. Although the long-term effects of use are currently unknown, short-term anabolic steroid use has been associated with liver disease, altered blood lipids, infertility, increased risk of injury, suicide, homicide, heart attack, and cancer (Brower, 1998; Street, Antonio, & Cudlipp, 1996). Studies have associated the use of steroids with changes in physiology and with behaviors and perceptions among adolescent users that are consistent with psychological dependence (DHHS, 1991). Furthermore, college men who use steroids are also more likely to use other drugs, including marijuana, cocaine, tobacco, and alcohol; nearly three of four users report arguments or fights as a consequence of using steroids, and nearly half report being hurt or injured (Meilman et al., 1995). As noted by Brower (1998), multiple and simultaneous drug use may further increase the risks associated with anabolic steroids.

RISK TAKING

Males of all ages are significantly more likely to engage in a broad range of risky and physically dangerous activities (Garrison, McKeown, & Valois, 1993; Klein et al., 1993; Zuckerman, 1983, 1984, 1994). Risk-taking behavior among males of all ages is a major contributor to their injury rates, which are much higher than those of females, except in old age. The injury-related hospital emergency room visit rate is nearly 1.5 times greater for men than for women (Burt, 1995). Men aged 17 to 44 sustain up to 60% more injuries than women (Verbrugge, 1985) and are twice as likely as women to be hospitalized for nonfatal head injuries (DHHS, 2000). Young men aged 16 to 24 years are at greatest risk for traumatic brain injuries, such as those resulting from car crashes (Winslade, 1998).

Injury is the leading cause of death for one- to 44-year-olds and the main reason for the large gender differences in mortality at these ages (CDC, 1994e; NSC, 1998). Among those aged 15 to 24 years, more than three of every four deaths are male (DHHS, 1996a), and unintentional injuries are the leading killer, claiming over 1.5 times more lives than the next leading cause of death (NSC, 1998). The death rate for falls is twice as high for men as for women (DHSS, 2000). Risk taking by men and boys is a major contributor to their injury deaths. For example, males are more

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likely than females to jaywalk (ASHA, 1989; National Highway Traffic Safety Administration [NHTSA], 1997). A pedestrian is injured every seven minutes, and one is killed every 1.5 hours (NHTSA, 1997). Males represent 68% of all pedestrian fatalities nationwide (NHTSA, 1997), and in California, nearly three of four of pedestrians killed jaywalking are male (CHP, 1995). Gender differences in a variety of risk-taking behaviors are examined below.

RECKLESS DRIVING

Motor vehicle-related fatalities account for more than half of all unintentional injury deaths (NSC, 1998). Per mile driven, men are at consistently greater risk than women for being in an automobile crash—whether the crash is fatal or results in injuries or property damage (Massie, Green, & Campbell, 1997). The death rate for motor vehicle crashes is two times higher for men than women; each day motor vehicle crashes kill nearly 80 men (DHHS, 1996a). The number of miles driven does not account for the gender difference in motor vehicle deaths (NSC, 1992), but men's reckless driving can. Men are more likely than women to drive dangerously—for example, by tailgating and running red lights (DeJoy, 1992; Farrow & Brissing, 1990; Preusser, Williams, & Lund, 1991; Zuckerman, 1983, 1984, 1994). They are also more likely than women to have committed moving violations and to have had their driver's license suspended or revoked (DeJoy, 1992). Significantly fewer men than women obey speed limits (CDC, 1994f; DeJoy, 1992; Pinch, Heck, & Vinal, 1986), and nearly one-third of young men report taking risks for fun while driving—over four times the number of young women who do so (Jessor, 1987). Significantly more male than female high school students studied in one county drive 20 miles per hour over the speed limit, pass a car in a no-passing zone, pass two cars at a time on a two-lane road, or take risks while driving because it makes driving more fun (CDC, 1994f). As a result of their reckless driving, men are at fault in nearly eight of 10 fatal crashes in California and are responsible for twice as many injury crashes as women (California Highway Patrol [CHP], 1994). Speed is a primary cause of injury crashes and the second leading cause of fatal crashes in California (CHP, 1994).

DRINKING AND DRIVING

More than one of three adults and one of two teenagers admits to drinking and driving (Schuckit, 1994). Four times more men than women nationally report having driven drunk in a recent month (Powell-Griner, Anderson, & Murphy, 1997). The rate of alcohol-impaired driving is five times higher among men than among women nationally, and it is highest among men aged 18 to 34 years (Simin et al., 1997). Ninety-six percent of all those charged with drunk driving are men (Department of Justice [DOJ], 1994a), and the risk of repeat arrests is significantly higher among men than women (CDC, 1994g). Young men nationally in both high school and college are significantly more likely than young women nationally to drive after drinking (CDC, 1997b; Kann et al., 1998; Lewis, Goodhart, & Burns, 1996; Patrick, Covin, Fulop, Calfas, & Lovato, 1997). Among college students nationally, two to over 2.5 times more men than women have driven after consuming five or more

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drinks, and 62% of frequent male binge drinkers have driven after drinking (Wechsler, Davenport, Dowdall, Grossman, & Zanakos, 1997). Among adolescent students, 2.5 times more males than females rode frequently with a driver who used drugs or alcohol (ASHA, 1989).

Motor vehicle crashes are the fifth leading cause of death, and the primary cause of death for people under 34 years of age (NSC, 1998). Alcohol-related motor vehicle crashes account for 44% of all traffic fatalities (CDC, 1994h), and two out of three people killed are men (DHHS, 1996a). Driving impaired by alcohol or other drugs is a leading cause of death among those under age 25 (CDC, 1994h), and in this age group, males are 2.5 times more likely than females to die in motor vehicle crashes (DHHS, 1996a). Alcohol-impaired driving is 30 times more common among binge drinkers (Simin, 1997), most of whom are men. Those arrested for drunk driving are at substantially greater risk of death in an alcohol-related motor vehicle crash in the future than those who have not been arrested (CDC, 1994g).

SAFETY BELT USE

Wearing safety belts is potentially the single most effective method for preventing injuries from motor-vehicle crashes (CDC, 1993f). Wearing safety belts reduces the risk of serious injury due to motor vehicle crashes by up to 52% and reduces the risk of death by 43% (CDC, 1993f; DHHS, 1991; Hargarten & Karlson, 1994). Men of all ages, and younger men in particular, are less likely than women to wear safety belts, either as drivers or as passengers (CDC, 1992b, 1992c, 1995c, 1997b; Foss, Beirness, & Sprattler, 1994; Hunter, Stutts, Stewart, & Rodgman, 1990; Insurance Institute for Highway Safety [IIHS], 1994; Kann et al., 1998; Leigh & Fries, 1993; Lewis, Goodhart, & Burns, 1996; Oleckno & Blacconiere, 1990b; Pinch, Heck, & Vinal, 1986; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Powell-Griner, Anderson, & Murphy, 1997; Preusser, Williams, & Lund, 1991; Rossi, 1992). In one study where drivers were both observed and questioned, more than three of four observed not wearing safety belts were male; one-third of these unbelted drivers had reported that they *always* wore safety belts (Preusser, Williams, & Lund, 1991). (These findings have implications for reported helmet use, which is discussed below.) Among occupants in motor vehicle crashes, men are more likely than women to be unbelted at the time of collision (Hargarten & Karlson, 1994).

The failure to wear safety belts significantly increases men's risks. In a recent year, the use of safety belts saved an estimated 5,225 lives among front-seat occupants and could have saved an additional 9,000 lives if the front-seat occupants had been wearing them (CDC, 1992d; NSC, 1994). An examination of the impact of safety belt use among nearly 1,000 injured motor vehicle occupants treated at hospitals throughout Iowa revealed that unbelted occupants were more likely to be male, to have been in a head-on or rollover crash, to have had more severe injuries, to have been permanently disabled, or to have died in the hospital (CDC, 1993f).

HELMET USE

Bicycle helmets are known to prevent head injuries (CDC, 1995d), reducing the risk

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by 85% (CDC, 1992b). Among all bicyclists, only about 18% wear helmets all or most of the time (CDC, 1995d), and among high school and college bicyclists, only 10% do (CDC, 1992c; 1997b). Although women and men generally *report* similar use, men are at much greater risk of bicycle injury and death; this suggests that men exaggerate the frequency of their helmet use, as they do their use of safety belts, and that bicycle helmet use is in fact less common among men. Both fatal and nonfatal bicycle-related head injuries are higher for males than females in all age groups (CDC, 1995d). Males account for 85% to 90% of all bicycle-related deaths, and in California, for 80% of bicycle-related injuries (CHP, 1994; Rodgers, 1995). In California, 90% of bicyclists killed, and more than 90% of those injured, were not wearing helmets (CHP, 1994).

Helmet use reduces the risk for death from motorcycle crashes between 28% and 73% (CDC, 1992b). Available data regarding motorcycle helmet use do reveal gender differences. Among adolescent motorcyclists, only 40% always wear helmets, and more males than females rarely or never use them (ASHA, 1989; CDC, 1995c); among high school students, 38% of males and 32% of females rarely or never wear helmets (Kann et al., 1998). This has important health implications for adolescent males, since they are nearly two times more likely than adolescent females to ride motorcycles or minibikes (ASHA, 1989; CDC, 1992c). Among California college students, men are significantly less likely to wear a helmet always when riding a motorcycle (Patrick, Covin, Fulop, Calfas, & Lovato, 1997). Young men account for nearly three out of four motor vehicle deaths among 15- to 24-year-olds (DHHS, 1996a).

SEXUAL ACTIVITY

Each day, 33,000 Americans become infected with STDs (EDK, 1995), and sexual behavior accounted for an estimated 30,000 deaths in 1990 (McGinnis & Foege, 1993). Men begin sexual activity much earlier than women, and twice as many men as women engage in high-risk sexual activities (Bastani et al., 1996; EDK, 1995). They are more likely to be sexually active, to have more sexual partners, to have sex while under the influence of alcohol or other drugs, to have had large numbers of sexual partners overall, and to be nonmonogamous in adulthood (Bastani et al., 1996; CDC, 1992e, 1997b; EDK, 1995; Ericksen & Trocki, 1992, 1994; Kann et al., 1998; Leigh, Temple, & Trocki, 1993; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Wiley et al., 1996; Zuckerman, 1994). More than half of all high school students have had sexual intercourse, and the percentage is higher among males than females (CDC, 1992f, 1995c); by age 19, only one of five males remains a virgin (Oppenheim, 1994). Over 50% of all men have had six or more partners during their lifetimes, compared to 25% of women (EDK, 1995). Only one in four men always uses a condom, and less than one-third of men at high risk for STDs always do so (EDK, 1995). Among 15- to 19-year-old sexually active males nationally, 33% did not use a condom at last intercourse, 27% had at least one experience of unprotected sex in the year prior to being surveyed, and 10% never use a condom (Sonenstein, Ku, Lindberg, Turner, & Pleck, 1998). Among college students, 22% of men, compared with 13% of women, had drunk alcohol or used drugs at last sexual intercourse (CDC, 1997b).

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Based on a variety of behaviors, including condom use and number of sexual partners, men are much more likely than women to be in the highest-risk group for AIDS and other STDs (EDK, 1995; Ericksen & Trocki, 1992, 1994; Leigh, Temple, & Trocki, 1993; Shafer et al., 1993). The percentage of men at high risk for STDs is double that of women (Bastani et al., 1996; EDK, 1995). The incidence of male rectal gonorrhea among men who have sex with men in one major city nearly doubled from 1994 to 1997; in 1997, 45% of men surveyed who had had unprotected anal intercourse during the preceding six months reported not knowing the HIV serostatus of all their sex partners—and among those who had done so with multiple partners, 68% did not know their partners' serostatus, which increases the risk for HIV infection and transmission (CDC, 1999). Eighty-six percent of all STDs occur among those under age 30 (CDC, 1992f), and six of 10 men in this age group are at medium to high risk, 2.5 times the number of women (EDK, 1995). Human papillomavirus (HPV) is one of the two most common STDs found among college students (American College Health Association [ACHA], 1995; EDK, 1995), and there is currently strong evidence linking HPV with penile cancer (Fackelman, 1992; Maden et al., 1995; Zazove, Caruthers, & Reed, 1991). Hepatitis B, which can be transmitted through body fluids such as saliva and semen exchanged during sex, increases the risk of liver cancer (Winawer & Shike, 1995). Men are 1.5 times more likely than women to become infected with hepatitis B (CDC, 1995e). Human immunodeficiency virus (HIV) is the most lethal STD. Currently, 80% of those infected with HIV, and 80% of those who die from the disease, are men (DHHS, 1996a; Ward & Duchin, 1998). As noted above, HIV is the leading cause of death among 25- to 44-year-old men.

SPORTS AND RECREATION

It has been suggested that sports injuries pose a greater public health risk than many reportable infectious diseases (Kraus & Conroy, 1984). It is estimated that three to five million sports injuries are sustained annually in the United States (Kraus & Conroy, 1984; NSC, 1998). This clearly constitutes a substantial health problem, particularly for males. Men and boys are more likely than women and girls to participate in risky sports and recreational activities. For instance, men are significantly more likely than women to engage in skydiving, hang gliding, race car driving, scuba diving, mountain climbing, and body contact sports (Zuckerman, 1983, 1984, 1994). Almost three in four adolescent males, compared to less than half of adolescent females, drive or ride go-carts, snowmobiles, or all-terrain vehicles, and they do so more frequently (ASHA, 1989). Sports and recreation is a main contributor to injuries sustained by those under age 18 (Scheidt et al., 1995), and boys under age 18 have much higher sports and recreation injury rates than girls (Rivara, Bergman, LoGerfo, & Weiss, 1982). Sports that are almost exclusively male are responsible for a large number of injuries and deaths. In a recent year, for example, football caused nearly one-half million injuries and 13 deaths, and hunting resulted in 1,132 nonfatal and 139 fatal reported injuries (NSC, 1994).

Higher rates of sports injuries among males are a consistent finding in most studies examining sports in which both sexes frequently participate, such as skiing

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(Kraus & Conroy, 1984) and bicycle riding (Rodgers, 1995). The fact that men and boys take greater physical risks while engaged in sports and recreation contributes to their higher injury rates. Among adolescent bike riders, for example, only one-third as many males as females use a bicycle light and always wear reflective clothing when riding at night (ASHA, 1989). As noted above, males account for 80% to 90% of all bicycle injuries and deaths.

Water sports are a major contributor to men's higher injury and death rates. As noted previously, drowning is more common among men than women. Risky swimming, boating, and diving habits increase the risk of drowning and spinal cord injury among men and boys. Significantly more boys than girls swim and ice skate in unsupervised areas, for example, or swim alone and dive into water of unknown depth (ASHA, 1989). Diving causes three of four recreation-related spinal cord injuries, and most of these are sustained by men (DeVivo & Sekar, 1997; DeVivo, Rutt, Black, Go, & Stover, 1992; Kraus, Franti, Riggins, Richards, & Borhani, 1975; Perrine, Mundt, & Weiner, 1994). As discussed above, men's alcohol use while boating also represents a substantial health risk. It contributes to a death rate for boating-related drownings that is 14 times greater for men than for women (CDC, 1993e).

VIOLENCE

There is consistent evidence that American men express significantly more aggression than American women—particularly physical aggression (Cohn, 1991; DOJ, 1994a; Eagly & Steffen, 1986; Maccoby, 1988). Men's willingness to engage in overt physical aggression and violence contributes to their health risks and premature deaths. Men are much more likely than women to be both the perpetrators and the victims of violence (Courtenay, 1999; DOJ, 1995). In the United States, violent deaths from suicide and homicide are the third leading cause of premature death (defined by years of potential life lost) before age 65 (CDC, 1994i). As noted above, the homicide death rate is four times greater for men than it is for women, and the suicide rate is up to 12 times higher for men.

FIGHTING

Nearly one-half of men nationally have been punched or beaten by another person, compared to one-quarter of women (DOJ, 1994a). College men are twice as likely as college women to have been in a physical fight (CDC, 1997b; Lewis, Goodhart, & Burns, 1996; Patrick, Covin, Fulop, Calfas, & Lovato, 1997). During the course of one year, half of all adolescent male students nationally are in a physical fight, and the incidence of fighting is two to four times greater for males than for females (ASHA, 1989; CDC, 1992c, 1992g; Kann et al., 1998). Regardless of the provocation, more adolescent males than females consider physical fighting to be an appropriate response (ASHA, 1989). For example, 3.5 times more male than female students believe that fighting is appropriate when someone cuts into the front of a line (ASHA, 1989). Fighting among men and boys contributes to both their injury and homicide rates, which, as noted above, are far greater among males than females of all ages. One of every 30 adolescents report that they have received medical care for

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injuries related to physical fighting (Lowry, Powell, Kann, Collins, & Kolbe, 1998). Furthermore, fighting is the most immediate antecedent behavior for a great proportion of homicides and is often considered a necessary, if not a sufficient, cause (CDC, 1992g; Gelles & Straus, 1988; DHHS, 1991).

WEAPONS

If current trends continue, firearms will soon surpass motor vehicles as the leading cause of injury death in the United States (CDC, 1994f, 1994i). Men are as likely as women to live in households with firearms, but more than twice as likely to live in households with loaded firearms (Powell, Jacklin, Nelson, & Bland, 1998). Furthermore, firearms are owned and used primarily by males. Half of all American men own a gun, compared to only 22% of women (The Gallup Organization, 1995). Among owners, men are significantly more likely than women to own automatic or semiautomatic guns (Hemenway & Richardson, 1997). More than 1.5 times as many adolescent males as females have access to guns (ASHA, 1989). Not surprisingly, among students nationally, young men in both high school and college are significantly more likely than young women to carry a weapon (Lewis, Goodhart, & Burns, 1996; Patrick, Covin, Fulop, Calfas, & Lovato, 1997). More than one of 10 college men nationally carries a gun, knife, or other weapon, nearly three times the number of women who do (CDC, 1997b; Presley, Meilman, & Cashin, 1997). Among high school students nationally, nearly one in three young men—four times the number of women—has carried a weapon to school in a recent month, and one in 10—more than six times the number of women—has carried a gun; 10% to 14% of males carry guns to school, over six to 7.5 times the number of females who do so (CDC, 1995c; Kann et al., 1998).

Owning and carrying weapons further increases men's risks. Firearm-related injuries are seven times greater among males than females (Annest, Mercy, Gibson, & Ryan, 1995). Nearly 40,000 persons die from firearm-related injuries each year (Frattaroli & Teret, 1998), and nearly 90% of these are male, including the more than 85% of deaths that are considered unintentional injuries (NSC, 1998). Among the seven juveniles murdered each day, nearly three out of four are male and 61% are killed with a firearm (Sickmund, Snyder, & Poe-Yamagata, 1997). Nearly 90% of the homicides among those aged 15 to 19 are firearm related, and nearly four of five victims are male (CDC, 1994j; DHHS, 1996a). Gun ownership significantly increases the risk of suicide (Wintemute, Parham, Beaumont, Wright, & Drake, 1999). Findings from two population-based, case-control studies indicate that gun ownership is independently associated with a higher risk of both suicide and homicide, nearly tripling the risk of homicide (Kellermann et al., 1993) and increasing the risk of suicide almost five times (Kellermann et al., 1992). As noted above, the death rate for suicide is four to 12 times greater for men than women, and the homicide rate is four times greater. National data also indicate that gun ownership is associated with an even greater risk for suicide than for homicide (Kaplan & Geling, 1998). Over half of all firearm-related deaths are suicides (NSC, 1998).

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CRIMINAL ACTIVITY

Men account for 85% of defendants convicted of all crimes and 95% of those convicted of violent crimes (DOJ, 1994a). Like other unhealthy male habits, criminal behavior is often first apparent in boyhood (see, for example, Klein et al., 1993). An examination of 15 high-risk delinquent activities among high school seniors nationally reveals consistently greater male involvement. Eight times more males than females have used a weapon to get something from a person; six times more have stolen some part of a car or have set fire to property on purpose; five times more have damaged work property on purpose; and four times more have hurt someone badly enough to need bandages or a doctor (DOJ, 1994a). Indeed, boys account for 94% of all known juvenile killers (Poe-Yamagata, 1997). In a recent 10-year period, the number of children known to have committed murder has increased 211% among boys and 34% among girls (Poe-Yamagata, 1997).

Crime is a dangerous activity, and men's greater involvement in crime contributes significantly to their injuries and deaths. For example, the death rate due to interventions by law enforcement officials is four times greater for men than for women (DHHS, 1996a). In American jails, suicide is the leading cause of death (DHHS, 1991). Suicide rates for prisoners are 16 times greater than the rates for individuals in the general population, and nearly all of these deaths are male (DHHS, 1991). Of those sentenced to death, 99% are male (DOJ, 1994a).

SOCIAL SUPPORT AND MARRIAGE

SOCIAL SUPPORT

Social relationships and social support are strongly associated with longevity (e.g., Berkman & Breslow, 1983; House, Landis, & Umberson, 1988; Shye, Mullooly, Feeborn, & Pope, 1995; Umberson, 1992). Research consistently indicates, however, that men have much smaller social networks than women do (Belle, 1987; Broadhead et al., 1983; Burda, Vaux, & Schill, 1984; Fischer & Oliner, 1983; Kandrack, Grant, & Segall, 1991; Muhlenkamp & Sayles, 1986; Verbrugge, 1985). Men have fewer, less intimate friendships than women (McGill, 1985; Rubin, 1983; Sherrod, 1987), and they are less likely to have a close confidant, particularly someone other than a spouse (Antonucci, & Akiyama, 1987; Corney, 1990; O'Neil, Lancee, & Freeman, 1985; Umberson, Wortman, & Kessler, 1992; Williams, 1985). Some researchers have even concluded that most men have no close friends (Levinson, 1978; McGill, 1985). Men's social networks are also less multifaceted and supportive than women's (Antonucci & Akiyama, 1987), and in times of stress men mobilize less varied social supports than women do (Belle, 1987). Even among adolescents and young adults, males are less likely than females to seek social support when they need help (Ashton & Fuehrer, 1993; Frydenberg & Lewis, 1991).

There is consistent evidence that the lack of social relationships constitutes a risk factor for mortality—especially for men (Berkman, 1984; Berkman & Breslow, 1983; Blazer, 1982; House, Landis, & Umberson, 1988; House, Robbins, & Metzner, 1982; Schoenbach, Kaplan, Fredman, & Kleinbaum, 1986; Seeman, Kaplan,

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Knudsen, Cohen, & Guralnik, 1987; Shye, Mullooly, Feeborn, & Pope, 1995; Umberson, 1992). Men with the lowest levels of social relationships are two to three times more likely to die than men with the highest levels of social relationships, even after controlling for health and a variety of other possible confounding factors (Berkman, 1984; Berkman & Breslow, 1983; House, Robbins, & Metzner, 1982; Schoenbach, Kaplan, Fredman, & Kleinbaum, 1986). Men's social isolation significantly decreases their chance of survival after heart disease, cancer, and stroke (Berkman, Leo-Summers, & Horwitz, 1992; Friedman & Booth-Kewley, 1987; Kaplan, 1985; Oxman, Freeman, & Manheimer, 1995; Reynolds & Kaplan, 1990; Ruberman, Weinblat, Goldberg, & Chaudhary, 1984; Vogt, Mullooly, Ernst, Pope, & Hollis, 1992). In one study of heart disease patients, 50% of those without a confidant were dead after five years compared to only 17% of those with a spouse or confidant (Williams et al., 1992). People with higher levels of social support also maintain more positive health practices (Bovbjerg et al., 1995; Cwikel, Dielman, Kirsch, & Israel, 1988; Lonnquist, Weiss, & Larsen, 1992; Muhlenkamp & Sayles, 1986). They are likelier to modify unhealthy behavior (Gruninger, 1995) and to adhere to medical treatment (Meichenbaum & Turk, 1987; O'Brien, Petrie, & Raeburn, 1992). Their immune systems function better (Kaplan, 1991; Winawer & Shike, 1995), and they have lower psychophysiologic responses to stress (Fleming, Baum, Gisriel, & Gatchel, 1982; Kirschbaum, Klauer, Filipp, & Hellhammer, 1995; Lepore, Allen, & Evans, 1993).

MARRIAGE

Marriage is an important health factor. Being married predicts survival, and all the current scientific evidence indicates that this correlation—and unhealthy behaviors and other health risks associated with being unmarried—are greater for men than women (House, Landis, & Umberson, 1988; Schoenbach, Kaplan, Fredman, & Kleinbaum, 1986; Schone & Weinick, 1998; Shye, Mullooly, Feeborn, & Pope, 1995). In fact, some studies have found that marriage is associated with better health status and healthier behaviors for men, but not women (Brown & McCreedy, 1986; Camacho & Wiley, 1983). Whether single, separated, widowed, or divorced, unmarried men have more serious health risks than married men, and they engage in poorer health behavior (Umberson, 1992). For example, they drink and smoke more (DHHS, 1993; Umberson, 1992); they eat fewer fruits and vegetables (Serdula et al., 1995); they are at greater risk of contracting STDs (EDK, 1995); they utilize medical services less often (Wingard, 1984); they are less likely to have had a blood pressure test in the last year or ever (DHHS, 1993); and they are likelier to commit suicide (Smith, Mercy, & Conn, 1988).

EMPLOYMENT

Most jobs in America are neatly demarcated by sex. The vast majority of secretaries, receptionists, child-care professionals, nurses, and salespeople are women (Bureau of Labor Statistics [BLS], 1991). Work in timber cutting, fishing, mining, construction, truck driving, farming, and foresting is done almost exclusively by men (BLS,

1991). Ninety-five percent of all local and state police officers are male (DOJ, 1994b), as are the vast majority of firefighters (K. Gerstner, U.S. Fire Administration, personal communication, June 12, 1995).

Jobs held by men are the most dangerous jobs. While males constitute only a little over half (56%) of the workforce, they account for nearly all (94%) fatal injuries on the job (NIOSH, 1993). Mining, construction, timber cutting, and fishing have the highest injury death rates, while the largest number of total injury deaths occur in production, craft and repair, transportation, labor, farming, foresting, and fishing—all of which are jobs held primarily by men (CDC, 1998b; NIOSH, 1993; BLS, 1993). Among law enforcement officers, 97% of those killed in the line of duty are male (DOJ, 1994b), and 98% of all firefighters killed are male (K. Gerstner, U.S. Fire Administration, personal communication, June 12, 1995). Young men aged 25 to 29 years account for the largest number of occupational injury deaths (NIOSH, 1993). In the only study to examine occupational risks among adolescents, which used a population-based sample of North Carolina youth, males were significantly more likely than females to be exposed to all nine work hazards examined (Dunn, Runyan, Cohen, & Schulman, 1998).

Injuries are only one cause of occupational morbidity and mortality. Approximately 32 million workers are exposed to one or more chemical hazards (Winawer & Shike, 1995). According to the Occupational Safety and Health Administration, the five occupations with the greatest percentage of workers exposed to hazardous chemicals are, in descending order, construction, agriculture, oil and gas extraction, water transportation, and forestry (cited in Winawer & Shike, 1995, p. 185)—all jobs held primarily by men. Occupational diseases that result from exposure account for approximately 350,000 new cases of illness and up to 70,000 deaths each year (NIOSH, 1991). Based on the most conservative estimates, 137 workers die each day from occupational diseases (NIOSH, 1994a), and an estimated 130 of these are male (derived from data in NIOSH, 1994a). Men exposed to solvents such as cleaning fluids, degreasers, gasoline, kerosene, and jet fuel for a year or more are six times more likely to develop Alzheimer's disease than men with no exposure (Kukull et al., 1995). Men also account for 95% of occupational deaths due to work-related lung diseases (NIOSH, 1994b).

American industry utilizes about 160 proven carcinogens and 2,000 more potential carcinogens (Winawer & Shike, 1995), and an estimated three to nine million workers are exposed to them (NIOSH, cited in Landrigan & Baker, 1991). There is sufficient evidence to indicate a causal association between cancer in humans and a large variety of chemicals—including asbestos, benzene, chromium, and vinyl chloride—as well as a variety of industrial processes—such as furniture manufacturing, iron and steel founding, and nickel refining (NCI, 1996). Workers exposed to asbestos alone experience a 50% risk of dying from cancer, nearly three times greater than the cancer risk of the average population (Winawer & Shike, 1995). Asbestos is responsible for 10,000 occupational cancer deaths each year, with most of the victims being men: abatement workers, custodians, construction workers, shipyard workers, miners, insulation workers, firefighters, tire-manufacturing workers, and maintenance workers (NIOSH, 1991). Occupational exposure accounts for up to 35% of male lung cancer deaths (Vineis & Simonato, 1991; Vineis et al.,

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1988), or nearly 35,000 new cases of male lung cancer every year (ACS, 1997). Bladder cancer is also strongly linked to occupational exposure (Devesa, Grauman, & Blot, 1994), and the death rate for bladder cancer is nearly 3.5 times greater for men than women (ACS, 1997). Occupational exposure has also been implicated in the development of kidney cancer, which kills more than two men for every woman (ACS, 1997; NCI, 1989; NCI, 1996), and prostate cancer (Oppenheim, 1994). Workplace exposure may help to explain why one in two men, compared with one in three women, will develop cancer in his lifetime (ACS, 1997).

A variety of chemical and nonchemical workplace factors have been implicated in the development of cardiovascular disease (Kristensen, 1989, cited in Harrington, 1991), which is the leading killer of men. However, cardiovascular disease has been examined in only one workplace study, which found that an estimated one-half of the deaths could have been avoided if the occupational risk factors had not occurred, and that three times more males than females died prematurely from cardiovascular disease (Olsen & Kristensen, 1991).

Unemployment is also consistently linked with a variety of negative health effects (Abraham & Krowchuk, 1986; Hammarstrom, 1994), and there is evidence that these negative effects are greater for men than women (Elder & Liker, 1982; United Nations, cited in Edwards, 1994). For example, associations between unemployment and psychological problems are stronger among men than women (Catalano, Dooley, & Jackson, 1981; Frank, 1981; Horwitz, 1982; Marshall & Funch, 1979; Warr & Parry, 1982). Similarly, rates of suicide are linked with unemployment and economic depression for men, but not for women (Boor, 1980; Holinger, 1979; Vigderhous & Fishman, 1978). One recent prospective study found that unemployment is also a risk factor for increased alcohol consumption among youth, particularly for males, as well as for increased tobacco use, illicit drug use, suicide, and unintentional injuries (Hammarstrom, 1994)—all of which are behaviors that males are more likely to engage in.

CONCLUSION

Men in America suffer more severe chronic conditions than women, they die more than six years younger, and they have higher death rates for all 15 leading causes of death. The present review provides evidence suggesting that men's behavior is a major—if not the primary—determinant of their excess mortality and premature deaths. Furthermore, this review reveals that the leading causes of disease and death among men are clearly linked to over 30 behaviors and lifestyle habits that are controllable and can be modified. The conclusions drawn here find support in studies examining overall health-promoting behavior patterns; this research provides strong evidence that men have significantly less healthy lifestyles than women (e.g., Brener & Collins, 1998; Kandrack, Grant, & Segall, 1991; Lonnquist, Weiss, & Larsen, 1992; Merighi, Courtenay, & McCreary, 2000; Oleckno & Blacconiere, 1990a; Prohaska, Leventhal, Leventhal, & Keller, 1985; Rakowski, 1986; Rossi, 1992; Shi, 1998; Walker, Volkan, Sechrist, & Pender, 1988; Weiss, Larson, & Baker, 1996; Weissfeld, Kirsch, & Brooke, 1990).

The behaviors examined here frequently co-occur in healthy or unhealthy clus-

ters (e.g., Brener & Collins, 1998; Donovan, Jessor, & Costa, 1993; Emmons, Marcus, Linnan, Rossi, & Abrams, 1994; Leigh & Fries, 1993; Merighi, Courtenay, & McCreary, 2000; Oleckno & Blacconiere, 1990; Schoenborn, 1993; Schoenborn & Benson, 1988). Among college students, nearly twice as many men (13%) as women (7%) currently combine alcohol and illegal drug use (CDC, 1997b). The interaction of these behaviors often compounds men's health risks. For example, when combined with alcohol use, tobacco use activates cell division and tumor growth, increasing the already high risk of cancer up to 15 times (Winawer & Shike, 1995). Similarly, unbelted drivers also drive dangerously, which compounds the risk of injury (Preusser, Williams, & Lund, 1991; Hunter, Stutts, Steward, & Rodgman, 1990; CDC, 1993f). Rather than representing a collection of discrete and isolated activities, these behaviors may represent organized constellations of behavior or a risk behavior syndrome (Jessor, Donovan, & Costa, 1991). This review reveals that such a syndrome would be far more common among men than among women. However, little is currently known about constellations of health-related behaviors practiced by individuals (Rossi, 1992), and even less is known about the psychosocial mechanisms that mediate these behaviors (Emmons, Marcus, Linnan, Rossi, & Abrams, 1994).

The central question raised by these findings is why men are more likely than women to engage in behaviors that put them at greater risks for disease, injury, and death. Rarely is this question posed. Instead, health scientists and health educators too often accept men's shorter lives as inevitable. For example, the American Heart Association and the National Stroke Association both contend that male "gender" and "being male" are "uncontrollable" risk factors that "can't be changed" (AHA, 1996, p. 20; NSA, 1994, p. 15). The underlying assumption is that men's greater risks for developing heart disease and stroke are strictly inherent or biological. There is, however, limited scientific evidence to support this assumption, which suggests that men's higher risk is unavoidable.

Several implications for future study can be drawn from this review. Although researchers have long examined relationships between biologic sex and health practices, very few attempts are made to move beyond the use of biologic sex as an independent or control variable and to explain "what about gender, exactly, is at work" (Kunkel, 1996, p. 294). *Why* do men behave more self-destructively than women, and *why* do they do less to promote their health? For example, men's greater use of tobacco, alcohol, and other substances is well documented. Why men are more likely to use these substances, however, is poorly understood. The lack of research examining this issue appears to reflect the cultural assumption that using tobacco, alcohol, and other drugs is simply what men do (McCreary, Newcomb, & Sadava, 1999); the topic appears too obvious or irrelevant to warrant scientific scrutiny. Elsewhere (Courtenay, 1998a, 2000a, 2000b) it has been suggested that American life links drinking and drug use with normal male behavior, both fostering this behavior among men and contributing to the cultural resignation in addressing the subject.

Similarly, although injury and death due to recreation, risk taking, and violence are consistently associated with being male, epidemiologic data are consistently presented as if *gender* were of no particular relevance (Courtenay, 1999). Few researchers even identify male biologic sex as a risk factor, and even fewer have

attempted to explain what it is exactly about men that leads them to engage in activities that seriously threaten their health. The failure to identify and examine men's risk taking as problematic perpetuates the false, yet widespread, cultural assumption that these behaviors are "natural" or inherent (Courtenay, 1998a, 1999, 2000a, 2000b). Indeed, the failure to question men's risk-taking behavior and violence reflects an underlying social assumption that it is normal, that men just *are* violent or *are* risk takers. The data presented here suggest that there is something specific to men that makes them more likely than women to engage in behaviors that are apt to harm them. Only very recently, however, has the subject of men's health been comprehensively addressed in the medical literature (Courtenay & Keeling, 2000a, 2000b).

The fact that unhealthy behaviors cluster suggests that there may be an underlying "cause" of men's unhealthy lifestyles. Masculinity may be an important mediating factor in the co-occurrence of multiple health risk behaviors. Indeed, it has been theorized from a social constructionist perspective that men's risk-taking behavior and disregard for their health needs are among the resources that men use to define themselves as "masculine" or "manly" (Courtenay, 1998a, 2000a). Indeed, recent evidence indicates that boys are encouraged to adopt a variety of behaviors that increase their health risks (Courtenay, 2000b; Morrongiello & Dayler, 1996). Additionally, a growing body of research provides evidence that men who adopt traditional beliefs about masculinity are at increased risk for a variety of health problems (Courtenay, 1998a; McCreary, Newcomb, & Sadava, 1999; for review see O'Neil, Good, & Holmes, 1995). Masculinity may be the missing co-factor—the "secret, powerful social factor" (Verbrugge, 1990, p. 183)—in analyses of gender and health where men's greater risks persist and remain unexplained despite adjustment for numerous variables (Wingard, 1984). Further research is needed to test this hypothesis, as well as to explore other possible mediating factors in men's risk taking, substance use, and increased health risks.

More rigorous examinations of gender differences in physical activity and dieting are also needed. Less-than-thorough analyses are misleading. Unsupported assumptions accompanying many studies that report gender differences in exercise typically suggest that "strenuous" exercise is healthy, and that dieting is unhealthy. In fact, as the data presented here suggest, women's more numerous attempts to control their diet may contribute to their reduced risk of mortality. Furthermore, most discussions of diet and body image focus on weight loss and the culturally feminine ideal of slimness. Little is known about weight *gain* and the culturally masculine ideal of muscularity. One study has demonstrated that the standard of bodily attractiveness for men is bigger and bulkier than that for women; that between 28% and 68% of all normal-weight adolescent boys want to gain weight; and that this desire is associated with dieting to *increase* weight (McCreary & Sasse, 2000). The evidence from another study of college students (see Raudenbush & Zellner, 1997) supports these findings. Given these findings, and the higher prevalence of overweight among men, epidemiologic data are warranted to further examine gender and *intended* weight gain.

Similarly, although the evidence regarding the health benefits of physical activity is consistently strong, much remains unclear about subtle gender differences in the health effects of various types and levels of physical activity. Although the Sur-

geon General's report *Physical Activity and Health* identifies a variety of sports that primarily men engage in when it discusses the adverse effects of physical activity, this report does not discuss gender (DHHS, 1996b). Troubling inconsistencies lie in the fact that while men are generally reported to engage in more physical exercise (which is linked with health and longevity) than women, they are more likely to die younger. The preceding review of research suggests that men's tendency to engage in infrequent but strenuous physical activity, and activities that increase the risk of physical injury and premature death, may help to explain these inconsistencies.

This review also has important implications for health-care providers who work with men, which have been addressed elsewhere (Courtenay, 1998c, 2000c, in press; Courtenay & Sabo, in press). Although many counseling and psychological interventions with men have been recommended in the past two decades (Courtenay, 2000d), very rarely are these interventions designed to reduce men's health risks. Even more rarely are health interventions designed to address the unique needs of various populations of men, such as gay and bisexual men (Scarce, 1999), men in prison (Courtenay & Sabo, in press), or African-American men (Davis, 1999). Given this lack of clinical guidance, it is not surprising that men receive significantly less physician time in medical encounters than women, and that men are provided with fewer and briefer explanations—both simple and technical (Hall, Roter, & Katz, 1988; Waitzkin, 1984; Weisman & Teitelbaum, 1989). Despite men's greater involvement in high-risk behaviors, they receive less advice from physicians about changing risk factors for disease than women do during checkups (Friedman, Brownson, Peterson, & Wilkerson, 1994). For example, only 29% of physicians routinely provide age-appropriate instruction on performing testicular self-examination, compared to the 86% who provide instruction to women on performing breast self-examination (Misenner and Fuller, 1995).

Because men have fewer contacts with health professionals throughout their lives, the contacts that they do have provide a critical opportunity for assessment, education, and intervention. A clinical practice guideline for health professionals was recently developed that integrates both psychosocial and medical research on men, along with evidence demonstrating the effectiveness of specific interventions (Courtenay, 1996a, 1998c, in press). This guideline identifies behavioral and psychosocial factors that affect the onset, progression, and management of men's health problems and outlines specific recommendations for addressing these factors when treating men. A health risk assessment form has also been developed specifically for men (Courtenay, 1996b). This assessment form, which also identifies risks associated with masculinity, is designed to be used by health-care professionals in the health education of men. Additional research is needed to measure the effectiveness of these and other gender-specific interventions in promoting health and reducing men's risks. Research is also needed to examine differential risks and effective risk reduction strategies among various populations of men.

If men are to live as long as women do, and the evidence presented here suggests that they can, they will need to change their unhealthy behavior. However, they are unlikely to do so until the underlying motivation for their behavior is identified. Only then will men reclaim the nearly seven years that their own behavior has stolen from them.

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