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Conscientiousness and Health-Related Behaviors: A Meta-Analysis of the Leading Behavioral Contributors to Mortality

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Previous research has established conscientiousness as a predictor of longevity (H. S. Friedman et al., 1993; L. R. Martin & H. S. Friedman, 2000). To better understand this relationship, the authors conducted a meta-analysis of conscientiousness-related traits and the leading behavioral contributors to mortality in the United States (tobacco use, diet and activity patterns, excessive alcohol use, violence, risky sexual behavior, risky driving, suicide, and drug use). Data sources were located by combining conscientiousness-related terms and relevant health-related behavior terms in database searches as well as by retrieving dissertations and requesting unpublished data from electronic mailing lists. The resulting database contained 194 studies that were quantitatively synthesized. Results showed that conscientiousness-related traits were negatively related to all risky health-related behaviors and positively related to all beneficial health-related behaviors. This study demonstrates the importance of conscientiousness' contribution to the health process through its relationship to health-related behaviors.

Conscientiousness refers to individual differences in the propensity to follow socially prescribed norms for impulse control, to be task- and goal-directed, to be planful, to delay gratification, and to follow norms and rules (John & Srivastava, 1999). Despite being identified as a potentially important health-related trait (Friedman, 2000; Roberts & Bogg, 2004), the scope and importance of the relationship between conscientiousness and the health process has not been fully explored. For example, in a longitudinal study of childhood conscientiousness and longevity using data from the Terman Life Cycle Study of gifted children, Friedman et al. (1993) found an effect larger in magnitude than the effects of chemotherapy on breast cancer survival and coronary bypass surgery on 5-year survival (Meyer et al., 2001).

The relationship between conscientiousness and the health process has been overshadowed, in part because much more research attention has been focused on the health implications of other personality dimensions, such as hostility, depression, and neuroticism (e.g., Brandon & Loftin, 1991; Camatta & Nagoshi, 1995; Friedman, Tucker, & Reise, 1995; Kirkcaldy & Furnham, 1991; Potgieter & Venter, 1995; Walter, Nagoshi, Muntaner, & Haertzen, 1990). Conscientiousness faces the additional obstacle of only recently being identified as an independent domain, given the advent of the Big Five Taxonomy of traits (Goldberg, 1993). The Big Five Taxonomy organizes personality traits into five broad domains: Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience (or, Intellect; see Goldberg, 1993). Because of their relative newness, traits from the Big Five Taxonomy have only recently been the focus of empirical research linking them to health-related behaviors (e.g., Anderson & McLean, 1997; Arthur & Graziano, 1996; Hampson, Andrews, Barckley, Lichtenstein, & Lee, 2000).

This is not to say that traits related to the domain of Conscientiousness have been ignored in previous research. In fact, the opposite is true. Many studies have explored the relationships between personality traits and health behaviors using measures of personality that predate the Big Five Taxonomy. These personality inventories typically contain personality scales that tap into the Big Five, including Conscientiousness (P. T. Costa, Busch, Zonderman, & McCrae, 1986; P. T. Costa & McCrae, 1985, 1988; McCrae, Costa, & Busch, 1986; McCrae, Costa, & Piedmont, 1993; Piedmont, McCrae, & Costa, 1991). One unexplored possibility is to use the links between Conscientiousness and older measures of personality to classify various scales into the domain of Conscientiousness (Goldberg, 1999). Subsequently, research findings showing the relationship between conscientiousness-related traits and health-related behaviors can be extracted.

The goal of the present study is to use the known relationships between personality measures and the Big Five domain of Conscientiousness to organize and synthesize previous research linking conscientiousness-related traits to health. Specifically, we use meta-analytic techniques to estimate the relationship of conscientiousness-related traits and behaviors that are among the leading contributors to poor health and mortality (McGinnis & Foege, 1993). Meta-analytic methods have a number of advantages over primary data collection. In the present study, the greatest benefit was derived from the incorporation of accumulated insights from years of trait research, which allowed for the coherent synthesis of studies using pre-five-factor measures of conscientiousness-related traits.

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In the following sections, we review the role of conscientiousness in the health process, including relevant theories and models, the known links between conscientiousness and health behaviors, and the design and scope of the present study.

The Role of Conscientiousness in the Health Process

There is little in terms of explicit theory or modeling that attempts to explain the mechanisms or systems that tie conscientiousness to the health process. This is not surprising, considering how conscientiousness has only recently been identified as a likely contributor to important health outcomes (Friedman, 2000; Roberts & Bogg, 2004). However, in spite of the lack of a testable health model that explicitly requires the inclusion of conscientiousness, a number of researchers have created models that can accommodate conscientiousness and other personality constructs.

Specifically, the health process model put forth by Adler and Matthews (1994) provides a conceptual framework for understanding the relations between individual dispositions (i.e., personality), social environmental factors (e.g., socioeconomic status, family structure), health-related behaviors, psychophysiological mechanisms (e.g., cardiovascular reactivity), and disease. According to the model, personality traits act on health outcomes through their action on social environmental factors, health-related behaviors, and psychophysiological mechanisms. To our knowledge, conscientiousness-related traits have been linked to social environmental factors, such as marriage and work (e.g., Roberts & Bogg, 2004; Roberts, Caspi, & Moffitt, 2003), and to health behaviors but not directly to psychophysiological mechanisms.

Using data from the Mills Longitudinal Study of Women, Roberts and Bogg (2004) found that social responsibility (a facet of conscientiousness) at age 21 predicted the social environmental factors of divorce (negatively) and number of children (positively), and the health-related behaviors of marijuana and tobacco use (negatively), 20 and 30 years later. In a longitudinal study of work-related outcomes, Roberts, Caspi, and Moffitt (2003) found that constraint (a facet of conscientiousness) at age 18 positively predicted measures of occupational attainment, work satisfaction, work involvement, and financial security at age 26. Conscientiousness-related traits have been shown to be related to additional social environmental factors that contribute to positive health outcomes, such as high socioeconomic status (Judge, Higgins, Thoresen, & Barrick, 1999), marital stability (Cramer, 1993; Kelly & Conley, 1987), and greater religiosity (MacDonald, 2000).

Although there is a paucity of evidence linking conscientiousness and psychophysiological mechanisms, conscientiousness-related traits—in particular, disinhibition and impulsivity—have been linked to a variety of biological factors, including cortical arousal, neurotransmitter activity, testosterone, and gene expression (Zuckerman, 2003). Research has shown relations between a number of these biological factors and drug use, sexual activity, and violence, suggesting a psychobiological route to these health-related behaviors—a route that is not explicitly accounted for in the health process model proposed by Adler and Matthews (1994).

Initial evidence also suggests that conscientiousness' effect on health-related behaviors may be unaffected by other cognitive measures. In a test of the theory of planned behavior and its relation to the Big Five in the prediction of exercise, Conner and Abraham (2001) found Conscientiousness' prospective relation to exercise behavior to be unmediated by behavioral intentions, control, attitudes, norms, anticipated affective reaction, and the other Big Five domains.

For the purposes of this meta-analytic review, the scope of investigation only covers the relations between conscientiousness-related traits (individual dispositions) and health-related behaviors. Social environmental, psychobiological, and other cognitive factors, although important, are not among the points of emphasis here.

Health-related behaviors are now considered the primary factors contributing to poor health outcomes, such as cardiovascular disease and cancer (McGinnis & Foege, 1993). In the United States, the leading behavioral contributors to mortality are tobacco use, diet and level of physical activity, excessive alcohol use, shootings (divided into violence and suicide for the purposes of this investigation; see Method section), risky sexual behavior, risky driving and vehicular accidents, and illicit drug use (McGinnis & Foege, 1993). These behaviors are relevant to health and longevity through their relations to cardiovascular disease, cancer, AIDS, and accidental deaths. For example, findings from the Cardiovascular Health Study have shown that when assessed at a 7-year follow-up, the healthy subjects among the 5,888 participants age 65 and older were those who did not smoke, had a lower waist circumference, and exercised (Burke et al., 2001).

Two theoretical perspectives are useful in providing an account of the interplay between these important health-related behaviors and conscientiousness-related traits. The first, put forth by Clark and Watson (1999) in their "Big Three" framework (extraversion/positive emotionality, neuroticism/negative emotionality, and disinhibition vs. constraint), provides insights into the types of behaviors associated with the temperament factor of disinhibition versus constraint. Clark and Watson (1999) argued that

> disinhibited individuals are impulsive and somewhat reckless and are oriented primarily toward the feelings and sensations of the immediate moment; conversely, constrained individuals plan carefully, avoid risk or danger, and are controlled more strongly by the longer-term implications of their behavior. (p. 403)

Clearly, disinhibition overlaps with a lack of conscientiousness and can be assumed to reflect the temperamental core of this trait domain. Therefore, to the extent that disinhibition–constraint is linked to health behaviors, we can assume that conscientiousness will be as well. This leads to straightforward hypotheses about the relationship of conscientiousness-related traits to the health process.

First, individuals low in constraint should be more likely to engage in behaviors, such as alcohol use, drug use, inactivity, risky sex, risky driving, suicide, tobacco use, violence, and unhealthy eating, that have immediately gratifying effects or are characterized by a disregard for future consequences. Second, and in relation to the health process more broadly, individuals who are high in constraint should experience more health-protective benefits as a result of being more careful, less risky, and more concerned with the accumulated effects of their behaviors (e.g., diet and exercise).

The trait of impulse control, or *self-control* (often measured by disinhibition, impulsiveness, and control scales; see Table 1)—whose definition maps almost directly onto the Big Three domain of disinhibition versus constraint—has been linked to lower tobacco consumption (Clark & Watson, 1999; Watson & Clark,

Table 1
Major Personality Measures Coded for Six Facets of Conscientiousness

Industriousness	Order	Responsibility	Self-Control	Traditionalism	Virtue
Adjective Checklist: Achievement, Endurance	16 PF: Control, Self-Disciplined	California Psychological Inventory: Conformity, Responsibility, Socialization	Adjective Checklist: Self-Control	16 PF: Conforming, Conscientious, Uninhibited	California Psychological Inventory: Self-Control
California Psychological Inventory: Achievement via Conformance	Adjective Checklist: Order	California Q-set: Item 2	Barratt Impulsivity Scale	Adjective Checklist: Lability	California Q-set: Items 41, 70
California Q-set: Item 71	Bentler Psychological Inventory: Conscientiousness	Eysenck Personality Questionnaire: Psychoticism	California Psychological Inventory: Impulsivity	Bentler Psychological Inventory: Social conformity	Hogan Personality Inventory: Prudence: Perfect
Multidimensional Personality Questionnaire: Achievement	California Q-set: Item 6	Hogan Personality Inventory: Prudence; Prudence: Avoids Trouble, Good attachment	California Q-set: Items 25, 53	California Q-set: Items 7, 39, 62, 65	
Personality Research Form: Achievement	Hogan Personality Inventory: Prudence: Mastery	Jackson Personality Inventory: Responsibility	Eysenck Impulsiveness Scale	Jackson Personality Inventory: Conformity	
	NEO-FFI, NEO–PI, NEO–PI–R: Conscientiousness	Karolinska Scale of Personality: Socialization	Eysenck Personality Inventory: Impulsivity	Multidimensional Personality Questionnaire: Traditionalism	
	Personality Research Form: Order	MMPI: Psychopathic deviate	Eysenck Personality Questionnaire: Impulsivity		
	Tridimensional Personality Questionnaire: Disorderly/regimented, order	Terman Life Cycle Study: Conscientiousness	Hogan Personality Inventory: Prudence: Not Experience Seeking		
			Karolinska Scale of Personality: Impulsiveness, Monotony Avoidance		
			Multidimensional Personality Questionnaire: Control, Constraint, Harm Avoidance		
			Personality Research Form: Impulsivity		
			Rosenbaum Self-Control Questionnaire		
			Schalling Impulsivity Scale		
			Sensation Seeking Scale: Disinhibition		
			Tridimensional Personality Questionnaire: Impulsive/rigid, Novelty seeking: Impulsiveness		

Note. 16 PF = 16 Personality Factor Questionnaire; NEO-FFI = NEO–Five-Factor Inventory; NEO-PI = NEO–Personality Inventory; NEO-PI–R = NEO–Personality Inventory—Revised; MMPI = Minnesota Multiphasic Personality Inventory.

1993), lower drug and alcohol use (Caspi et al., 1997; Clark & Watson, 1999; Cooper, Agocha, Sheldon, 2000; Shedler & Block, 1990; Sher & Trull, 1994; Watson & Clark, 1993), lower rates of violent and criminal activity (Caspi et al., 1997; Halperin et al., 1995; Krueger et al., 1994; Luengo, Otero, Carillo-de-la-Pena, & Miron, 1994; Spence, Losoff, & Robbins, 1991), decreased likelihood to consider and attempt to commit suicide (Apter, Plutchik, & van Praag, 1993; Horesh, Gothelf, Ofek, Weizman, & Apter, 1999), less risky sexual and driving behavior (Caspi et al., 1997; Clark & Watson, 1999; Cooper et al., 2000; N. G. Martin & Boomsma, 1989; H. R. White & Johnson, 1988), and fewer problems with obesity (Chalmers, Bowyer, & Olenick, 1990). With the exception of activity level, the health-related behaviors investigated in these studies require some degree of restraint to avoid the behavior. Therefore, we would expect the self-control (i.e., constraint) facet of conscientiousness to be a strong predictor of excessive alcohol use, drug use, risky sex, risky driving, suicide, violence, tobacco use, and unhealthy eating.

The second perspective on the relationships between conscientiousness-related traits and health-related behaviors comes from problem-behavior theory (Donovan, Jessor, & Costa, 1991; Jessor, Chase, & Donovan, 1980). In problem-behavior theory, health-related behaviors are accounted for by the interaction of three systems: the personality system, the perceived environment system, and the behavior system. Underlying all three systems is a dimension of conventionality–unconventionality—"an orientation toward, commitment to, and involvement in the prevailing values, standards of behavior, and established institutions" (Donovan et al., 1991, p. 52). This definition, and the theory itself, is related to, in part, several aspects of Conscientiousness, such as the propensities to uphold social norms and traditions (i.e., traditionalism), avoid trouble, and not let others down (i.e., responsibility).

Empirical research based on problem-behavior theory supports the hypothesis that the personality component of conventionality–unconventionality plays an important role in determining health-related behaviors. For example, conventional adolescents were more likely to adopt more health-promoting behaviors, such as exercising regularly, using seat belts, and eating healthier food (Donovan et al., 1991). In other words, to the extent individuals are more conventional, they should exhibit less involvement in nonnormative health-degrading behaviors and more involvement or adherence to health-maintaining and health-promoting behaviors.

Responsibility (avoiding trouble, being reliable) is the conscientiousness-related trait that is most closely associated with problem-behavior theory that has received the most empirical attention in relation to health-related behaviors. Research focusing on the responsibility facet of conscientiousness (often measured by the Psychoticism Scale of the Eysenck Personality Questionnaire) has shown that it is associated with lower tobacco and alcohol consumption (Tucker et al., 1995), less suicidal ideation and suicidal behavior (Lolas, Gomez, & Suarez, 1991), and better exercise habits (Arai & Hisamichi, 1998; Hogan, 1989). We expected responsibility to show strong relations to excessive alcohol use, drug use, risky sex, risky driving, suicide, violence, and tobacco use. Responsibility's relation to activity and unhealthy eating might be attenuated by the less socially deviant nature of engagement in the health-degrading components of those behaviors. For example, there is a greater stigma attached to smoking in a restaurant than eating a cheeseburger in one.

Though the two perspectives outlined above provide indications as to how conscientiousness and health-related behaviors are associated, it is necessary to address the extent to which traits subsumed under these models fit the domain of Conscientiousness and whether there are other aspects of Conscientiousness not identified in these models. Recent research of interest confirms that the personality traits of self-control, conventionality, and responsibility do belong to the domain of Conscientiousness and that additional traits complete the domain.

Specifically, Roberts, Chernyshenko, Stark, and Goldberg (2004) factor analyzed scales from seven different personality inventories thought to tap into conscientiousness. They identified 36 measures of conscientiousness that were best subsumed by six factors: Self-Control, Traditionalism (conventionality), Responsibility, Industriousness, Order, and Virtue. *Self-control* is defined as the propensity to inhibit impulsive thoughts, feelings, and behaviors; *traditionalism* refers to characteristic levels of conventionality and norm adherence; *responsibility* is defined as reliability and socialization; *industriousness* refers to characteristic levels of achievement and persistence; *order* refers to being organized, efficient, and regimented; and *virtue* is defined by an adherence to a strong moral grounding. The facets of self-control, traditionalism, and responsibility correspond closely to the traits identified in both Clark and Watson's (1999) Big Three framework and problem-behavior theory.

This comprehensive mapping of the structure of Conscientiousness also adds the traits of order, industriousness, and virtue as potential predictors of health-related behaviors. Order (which is captured by a number of five-factor scales of Conscientiousness, i.e., Abridged Big Five-Dimensional Circumplex) has been shown to be negatively related to alcohol consumption (Cook, Young, Taylor, & Bedford, 1998) and risky driving (Arthur & Graziano, 1996; Booth-Kewley & Vickers, 1994) and to be positively related to good diet and exercise behaviors (Booth-Kewley & Vickers, 1994). We were unable to locate a comprehensive investigation of the magnitude of the relationships between industriousness and virtue and the health-related behaviors discussed above.

On the basis of theory and empirical research, we expected at least four domains of Conscientiousness—Order, Responsibility, Traditionalism, and Self-Control—to be negatively related to most risky health behaviors and positively related to most positive health behaviors, with the Big Three framework and problem-behavior theory indicating stronger relations for Self-Control, Responsibility, and Traditionalism than for Order. In addition to providing more refined estimates of the relationships between Order, Self-Control, Traditionalism, and Responsibility and health-related behaviors, we also investigate the other domains of the factor structure of Conscientiousness measures—Industriousness and Virtue—and their relevance to health-related behaviors (Roberts, Chernyshenko, et al., 2004).

The Need for a Meta-Analytic Approach

A meta-analysis of the relationship between conscientiousness and the health-related behaviors serves several purposes. First, it integrates voluminous research that has not been synthesized to date. Most previous research linking conscientiousness-related

traits to health-related behaviors has focused on predicting a single behavior, such as tobacco consumption. Although focusing on one behavior can be fruitful, it limits one's understanding of the scope of the effect of conscientiousness across the family of health-related behaviors. Clearly, avoiding most, if not all, of the risky health-related behaviors described above denotes some level of conscientiousness. Unlike previous research, which has ignored the commonalities across health behaviors (cf. Cooper, Wood, Orcutt, & Albino, 2003), we test the relationship between conscientiousness-related traits and all of the leading behavioral risk factors related to poor health outcomes.

Much of the research linking conscientiousness to health behaviors is found in journals dedicated to studying specific behaviors, such as tobacco smoking, accident prevention, excessive alcohol consumption, and diet and exercise. To date, findings across conscientiousness-related traits or across the identified behaviors have not been examined to determine how pervasive the influence of conscientiousness-related traits is across the leading behavioral contributors to mortality. Therefore, the effect of conscientiousness on the health process remains hidden in topical journals that appeal to researchers dedicated to understanding the predictors of specific health behaviors. The present meta-analysis brings together studies from diverse areas of research to systematically determine the influence of conscientiousness on the health process. A meta-analysis also can provide more certain information about the size of the relationship between conscientiousness and health-related behaviors. It should be noted however, that the dominant type of assessment used in addressing these research questions has been self-report. This necessarily puts some interpretive limits on the estimates derived from the analyses.

In addition to examining the average effect within each health-related behavior, we test whether facet of conscientiousness and type of measurement outcome moderate the relationship between conscientiousness and health-related behaviors. As was described above, different facets of conscientiousness (as measured by different personality scales) should have different levels of predictive validity. We test for variations in predictive validity by coding each study's personality scale(s) according to Roberts, Chernyshenko, et al.'s (2004) six-factor structure of Conscientiousness.

Many of the health behaviors identified above are often rated in terms of frequency, amount, or other variations in the enactment of the behavior. For example, risky sexual behaviors are often measured with items designed to assess condom use, the number of sexual partners over a certain period of time, as well as various risky sexual acts (e.g., intercourse with an intravenous drug user). For each health-related behavior, we code subcategories based on similar measurement outcomes. Although these analyses are exploratory, they may provide a preliminary understanding of the relative efficacy of various modes of health-related behavior assessment.

We also test whether the sample characteristic of age moderates the relationships, with the prediction that the relationships should be smaller in older samples. We test the effect of age because research has shown conscientiousness-related traits increase with age, even in adulthood (Helson & Kwan, 2000), whereas engagement in risky health behaviors decreases with age (Roberts & Bogg, 2004). This developmental combination may skew the distribution of both predictor and outcome, making it likely to find smaller relationships in older samples.

Method

Literature Search

The literature was initially searched via PsycINFO and PubMed online databases by combining conscientiousness-related terms and terms related to the behaviors described above. Specifically, the terms of *conscientiousness*, *impulse control*, *impulsivity*, *self-control*, *psychoticism*, and *disinhibition* were chosen for their prevalence among the taxonomy of traits related to conscientiousness measured by researchers. In addition, to try to capture more studies that fit into the factor structure identified by Roberts, Chernyshenko, et al. (2004), searches were conducted using the names of personality inventories and their relevant subscales. These included the 16 Personality Factor Questionnaire, the Adjective Checklist, the Big Five Inventory, the Bentler Psychological Inventory, the California Psychological Inventory, the California Q-set, the Eysenck Personality Inventory and the Eysenck Personality Questionnaire, the Hogan Personality Inventory, the Jackson Personality Inventory, the Karolinska Scale of Personality, the Minnesota Multiphasic Personality Inventory, the Multidimensional Personality Questionnaire, the NEO, the Personality Research Form, the Sensation-Seeking Scale, and the Tridimensional Personality Questionnaire. The terms chosen for the leading behavioral contributors of mortality—as derived by McGinnis and Foege (1993)—were as follows: for tobacco use, *tobacco*, *smoking*; for unhealthy eating, *eating*, *obesity*, *diet*; for activity, *exercise*, *physical activity*, *fitness*; for excessive alcohol use, *alcohol*, *alcohol use*, *alcohol abuse*; for firearms-related deaths, *violence*, *suicide*, *murder*, *homicide*, as indicators of firearms-related deaths; for risky sexual behavior, *sex*, *risky sex*; for driving, *driving*, *risky driving*; and for drug use, *drug*, *drug use*, *drug abuse*, *substance use*, *substance abuse*. Additional searches were conducted for dissertations using the same search strings. Once an initial body of literature was identified on the basis of the inclusion criteria, searches then were conducted using the reference lists from relevant articles. In addition, searches were performed on the names of authors from relevant articles. Requests also were made of personality and health psychology electronic mailing lists for unpublished data.

As mentioned previously, the lack of firearms-specific research required that we divide that category into suicide and violence categories. This split is justified by research showing that suicide makes up more than half of deaths attributed to firearms and that homicide—a clear indicator of violent behavior—constitutes nearly half of deaths related to firearms (McGinnis & Foege, 1993). As is discussed later in the description of moderator analyses, several studies in the violence domain were divided further into subcategories, including "aggressive delinquent acts," a behavioral domain not commonly grouped with health-related behaviors. Studies in this subcategory were included and analyzed on the basis of the findings of recent research showing delinquency among adolescents to have a largely unmediated relation (controlling for health-related behaviors and demographic factors) to general health status, somatic complaints (e.g., shortness of breath), and chronic conditions (e.g., asthma; Junger, Stroebe, & van der Laan, 2001).

The final body of literature for the study, displayed in Table 2, was composed of 194 studies, with 26 studies (13%) published in 2000 or later, 120 studies (62%) published in 1990–1999, 32 studies (16%) published in 1980–1989, 15 studies (8%) published in 1970–1979, zero studies published in 1960–1969, and one study (< 1%) published in 1950–1959. Twenty studies (10%) were either dissertations or unpublished studies.

An article was included if it provided (a) a relevant facet of conscientiousness as described above; (b) a measurable health-related behavior (e.g., frequency or quantity of behavior or, at the very least, presence of the behavior, not attitudes, values, or predispositions); (c) data presented in the form of correlations, *t* tests, comparable means with standard deviations, *d* values, or other convertible statistics; (d) an *N* for the sample used for the

(*text continues on page 906*)

Table 2
Study Information (Author, Year, Sample Size, Conscientiousness-Related Measure, Behavioral Measure or Indicator, and Effect Size) by Health-Related Outcome

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Activity		
Arai & Hisamichi	1998	18,112	EPQ–R: Psychoticism	Days per week of exercise	.03
Brandon & Loftin	1991	17	Self-Control Questionnaire	Maximal oxygen consumption (VO_2max)	.42
Conner & Abraham	2001	123	BFI: Conscientiousness NEO-FFI: Conscientiousness	Frequency of exercise in a week	.31
Courneya et al.	1999	300	NEO-FFI: Conscientiousness	Godin Leisure Time Exercise Questionnaire: Leisure Score Index	.23
Courneya & Hellsten	1998	264	NEO-FFI: Conscientiousness	Godin Leisure Time Exercise Questionnaire: Leisure Score Index	.15
Donovan et al.	1991	1,585	Conventionality–unconventionality	Frequency of exercise by oneself or in organized activities or sports outside of physical education classes	.24
Hogan	1989	97	HPI: Prudence: Good attachment Mastery Perfect Avoids Trouble Not Experience Seeking	Muscular strength (grip strength, medicine ball throw) Endurance (1.5 mile run, pull-ups to exhaustion)	.10
Marks & Lutgendorf	1999	97	BFI: Conscientiousness	Personal Lifestyle Questionnaire: Exercise	.21
Renfrow & Bolton	1979	46	16 PF: Conscientious Uninhibited Controlled	Study measure of aerobic capacity	.25
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS: Exercise	.22
Schnurr et al.	1990	156	Study measures: Inhibited Self-driving Pragmatic Lacks purpose	Average quantity of kcal/week of exercise based on five separate assessments	−.03
Schroder & Schwarzer	2003 (unpublished)	179	Habitual Self-Control	Composite measure of exercise	.24
Sharp	1974/1975 (unpublished)	100	MMPI: Psychopathic deviate	Time in 12-min run, estimate of VO_2max from Astrand-Rhyming bike test	.03
Tucker et al.	1995	972	Terman Life Cycle Study: Conscientiousness	Dichotomous participation in at least one physical activity coded as "high level"	.00
Vingerhoets et al.	1990	978	DPI: Rigidity	Exercising at least twice a week	−.02
Weber	1953	246	MMPI: Psychopathic deviate	Physical efficiency profile (mean of sit-ups in 2 min pull-ups, 100-yard pick-a-back run, and 300-yard shuttle run)	.06
Yeung & Hemsley	1997	252	EPQ–R: Psychoticism	Physical Activity Scale	−.02
			Excessive alcohol use		
Alterman et al.	1990	98	Sensation-Seeking Scale: Disinhibition	Frequency of alcohol consumption Frequency of intoxication Number of drinks per drinking occasion Absolute ounces of alcohol consumed per day	−.43
Arneklev et al.	1993	394	Low self-control, impulsivity	Drinking more than two or three alcoholic beverages in a week (dichotomous)	−.16
G. M. Barnes et al.	1999	1,095	Seven-item impulsivity scale Psychopathic States Inventory: Impulsivity	Total daily average alcohol consumption in ounces	−.23

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Excessive alcohol use (*continued*)		
Beckwith	1986	530	Study-derived factor of Discipline	Dichotomous use of alcohol consumption	−.20
Camatta & Nagoshi	1995	128	Eysenck 1.7: Impulsiveness	Quantity–frequency measure of alcohol consumption	−.22
Caspi et al.	1995	857	MPQ: Control, Traditionalism	Diagnostic Interview Schedule: Alcohol	−.27
Chalmers et al.	1990	259	ACL: Achievement Endurance Lability Order Self-Control	Outpatient problem drinkers vs. matched community controls	−.16
Cherpitel	1993	1,137	Risk taking/impulsivity	Quantity–frequency measure of alcohol consumption	−.22
Clapper et al.	1994	575	Sensation-Seeking Scale: Disinhibition	Age of first alcohol use Age of first intoxication Quantity–frequency measure of alcohol consumption	−.39
Colder & Chassin	1997	427	Eysenck: Impulsiveness	Quantity–frequency measure of alcohol consumption Alcohol dependency and social problems	−.28
Cook et al.	1998	891	CPI: Achievement via Conformance Conformity Responsibility Self-Control Socialization	Frequency of alcohol consumption in a week	−.10
Cooper et al.	2000	1,666	Eysenck eight-item impulsivity scale	Composite of frequencies of drinking to intoxication and consuming five or more drinks	−.23
Crocker	2003 (unpublished)	677	BFI: Conscientiousness	Average number of drinks consumed per week during the semester	−.09
Donovan et al.	1983	593	Tolerance of Deviance Value on Achievement	Problem drinkers (intoxicated six or more times, or experienced two or more negative consequences in one of six life areas in the past year) vs. non-problem drinkers	−.18
Duncan	2003 (unpublished)	137	BFI: Conscientiousness	Frequency of drinking more than is appropriate	−.07
Earleywine & Finn	1991	107	CPI: Socialization Sensation-Seeking Scale: Disinhibition	Frequency of alcohol consumption in a week Number of standard drinks per drinking occasion	−.30
Earleywine et al.	1990	202	CPI: Socialization	Frequency of alcohol consumption in a week Number of standard drinks per drinking occasion	−.26
Finn et al.	2000	433	Sensation-Seeking Scale: Disinhibition	Frequency of alcohol consumption in a week Number of standard drinks per drinking occasion Greatest number of drinks per occasion in past 6 months Michigan Alcohol Screening Test	−.24
Friedman, Tucker, Schwartz, et al.	1995	1,138	Childhood conscientiousness	Midlife occurrence of drinking fairly heavy or to excess	−.12
Grau & Ortet	1999	149	KSP: Impulsiveness, Socialization EPQ–R: Psychoticism	Frequency of alcohol consumption Quantity of alcohol consumption	−.31
Greene et al.	2000	724	Sensation-Seeking Scale: Disinhibition	Composite of quantity, frequency, and intoxication	−.69
Hallman et al.	1991	58	EPQ: Psychoticism Eysenck IVE: Impulsiveness KSP: Impulsiveness, Monotony Avoidance, Socialization	Clinical alcoholics vs. controls	−.28
Hampson et al.	2001	297	Block Ego Control Scale Value on Achievement	Quantity–frequency measure of alcohol consumption	−.30

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Excessive alcohol use (*continued*)		
Hindelang	1972	337	MMPI: Psychopathic deviate CPI: Responsibility, Self-Control Socialization	Frequency of alcohol consumption Frequency of intoxication	−.34
Hutchinson et al.	1998	203	Eysenck 1.7: Impulsiveness	Frequency of alcohol consumption and heavy alcohol use Problems with alcohol use	−.25
Jackson & Matthews	1988	88	EPI: Impulsivity	Social habitual consumption of alcohol	−.43
Justus et al.	2000	410	CPI: Socialization Eysenck IVE: Impulsiveness MMPI: Psychopathic deviate MPQ: Control Sensation-Seeking Scale: Disinhibition	Frequency of alcohol consumption in a week Quantity of alcohol consumption in a week Largest number of drinks on single occasion in past 6 months	−.23
Kashdan et al.	2003 (unpublished)	421	NEO-FFI: Conscientiousness	Average weekly alcohol consumption	−.14
Kohn & Coulas	1985	78	Sensation-Seeking Scale: Disinhibition	Frequency of alcohol consumption	−.34
Kopstein	1999 (unpublished)	2,565	Sensation-Seeking Scale: Disinhibition	Current alcohol use Binge alcohol use (consuming at least three drinks in a row in the 2 weeks prior to the survey)	−.27
La Grange et al.	1995	88	EPQ: Psychoticism Sensation-Seeking Scale: Disinhibition	Student Alcohol and Drug Use Survey: Alcohol use	−.31
Lejoyeux et al.	1998	60	Barratt Impulsivity Scale Sensation-Seeking Scale: Disinhibition	*DSM–IV* alcohol diagnosis	−.04
LoCastro et al.	2000	485	EPI: Impulsivity	Average number of drinks per day Frequency of experiencing 1 or more of 13 alcohol-related problems (e.g., drunk too often)	−.12
Loper et al.	1973	180	MMPI: Psychopathic deviate	Prealcoholics vs. controls	−.28
C. A. Martin et al.	1997	220	ARCMS: Impulsivity, sociopathy	Modified Personal History Questionnaire: Alcohol use	−.13
E. D. Martin & Sher	1994	467	NEO-FFI: Conscientiousness	*DSM–III–R* alcohol diagnosis: past only vs. never met lifetime criteria for alcohol use disorder *DSM–III–R* alcohol diagnosis: 12 month vs. never met lifetime criteria for alcohol use disorder	−.22
W. R. Martin et al.	1977	107	Maturation Scale: Impulsivity, Sociopathy	Identified alcoholics vs. controls	−.49
McGue et al.	1999	1,842	MPQ: Achievement, Constraint, Control, Traditionalism	*DSM–III–R* alcohol diagnosis	−.08
Meadows	1996 (unpublished)	598	EASI–III: Impulsivity	Global and 30-day consumption of alcohol	−.33
Musgrave-Musquart et al.	1997	161	NEO-PI–R: Conscientiousness	Frequency of alcohol consumption in a week	−.13
Nagoshi	1999	142	Eysenck 1.7: Impulsiveness	Frequency of alcohol use in past year Frequency of five or more drinks in a sitting Frequency of intoxication Quantity of alcohol consumption Problems with alcohol use	−.27
Nagoshi et al.	1992	108	EPQ: Psychoticism Eysenck 1.7: Impulsiveness	Diagnostic Interview Schedule: Alcohol	−.24
Nagoshi et al.	1991	199	Eysenck IVE: Impulsiveness	Quantity of alcohol consumption in g/month	−.12
Patock-Peckham et al.	1998	263	Eysenck 1.7: Impulsiveness	Frequency of alcohol use in past year Frequency of intoxication Quantity of alcohol consumption Problems with alcohol use	−.20

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Excessive alcohol use (*continued*)		
Peluso et al.	1999	198	Cognitive self-control	Study-derived drinking factor component	−.23
Plutchik & Plutchik	1989	100	Study measure of socialization	Brief version of Michigan Alcohol Screening Test	−.21
Ripa et al.	2001	691	Sensation-Seeking Scale: Disinhibition	Number of drinks per week	−.23
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS: Alcohol use	−.31
Schall et al.	1992	598	CPI: Socialization EPQ: Psychoticism Sensation-Seeking Scale: Disinhibition	Quantity of alcohol (in ounces) consumed during previous 4 weeks	−.28
Selzer et al.	1977	558	CPI: Responsibility, Self-Control	Michigan Alcohol Screening Test	−.28
Sharkansky & Finn	1998	120	MPQ: Control	Laboratory alcohol consumption Patterns of alcohol consumption each day of the week Number of alcoholic drinks consumed in a week	−.02
Slack	1994/1995 (unpublished)	1,493	BFI: Conscientiousness GTS: Disinhibition	Alcohol consumption	−.36
Soldz & Valliant	1999	162	NEO-PI: Conscientiousness Study-derived factor of observer rating of conscientiousness-related traits	*DSM–III–R* alcohol diagnosis	−.17
Soloff et al.	2000	33	Barratt Impulsiveness Scale Eysenck 1.6: Impulsiveness MPQ: Constraint	Alcohol use disorder (*DSM–IV* lifetime diagnosis of alcohol abuse and alcohol dependence) vs. non-alcohol use disorder	−.54
J. A. Stein et al.	1987	654	BPI: Conscientiousness, social conformity	Frequency of alcohol consumption	−.25
Stewart et al.	2001	154	NEO-FFI: Conscientiousness	Average quantity of alcohol consumed per drinking occasion Rutgers Alcohol Problem Index	−.22
Stuart	1997/1998 (unpublished)	86	Eysenck 1.7: Impulsiveness	Short Michigan Alcoholism Screening Test Quantity–Frequency Index: Alcohol	−.35
Vingerhoets et al.	1990	978	DPI: Rigidity	Consuming fewer than 45 drinks per month	−.06
Vollrath et al.	1999	656	NEO-FFI: Conscientiousness	Frequency of intoxication	−.18
von Knorring, Oreland, & von Knorring	1987	1,000	EPI: Impulsiveness KSP: Impulsiveness	Frequency of alcohol consumption	−.11
von Knorring, von Knorring, et al.	1987	193	KSP: Impulsiveness, Monotony Avoidance, Socialization	Type I (late onset) and Type II (early onset) alcoholics vs. healthy controls	−.14
Waldeck & Miller	1997	282	Chapman Scale: Impulsivity/nonconformity	Frequency of alcohol consumption	−.35
Whipple & Noble	1991	38	16 PF: Self-Disciplined, Conforming, Control MMPI: Psychopathic deviate TPQ: Novelty seeking: Disorderly/regimented, impulsive/reflective	*DSM–III–R* alcohol diagnosis	.02
Wood et al.	1995	1,189	CPI: Impulsivity	Frequency of alcohol consumption Frequency of intoxication	−.18
Zhang et al.	1997	625	Psychopathic State Inventory: Impulsivity	Quantity–frequency measure of alcohol consumption	−.23
			Drug use		
Allen et al.	1998	58	BIS-11 Eysenck IVE: Impulsiveness Impulsivity Inventory	Past substance dependence disorder group (based on Structured Clinical Interview for the *DSM–III–R* diagnosis) vs. normal group	−.22
Block et al.	1988	105	California Q-set: Items 2, 6, 7, 25, 39, 41, 53, 62, 65, 70, 71	Frequency of marijuana use Frequency of hard drug (amphetamines, barbiturates, cocaine, or hallucinogens) use	−.37

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r) [b]
			Drug use (*continued*)		
Brook et al.	1986	356	Study measure of conventionality–unconventionality	Stage of drug use (legal, marijuana, other illicit drugs)	−.41
Brooks	2002 (unpublished)	352	Adolescent Self-Reporting Rating Scale: Impulse control	Thirty-day recall of dichotomous use of cigarettes, alcohol, or marijuana	−.09
Caspi et al.	1995	857	MPQ: Control, Traditionalism	Diagnostic Interview Schedule: Marijuana	−.22
Chernyshenko	2002/2003 (unpublished)	539	Study measures of industriousness, order, responsibility, self-control, traditionalism, and virtue	HBC: Substance use	−.27
Colder & Stice	1998	1,669	GTS: Impulsivity	Frequency of alcohol consumption, heavy drinking, intoxication, and use of marijuana, stimulants, downers, inhalants, and hallucinogens	−.36
Eisen et al.	1992	48	BASIS-32: Impulsive	Alcohol/drug problem (based on Michigan Alcoholism Screening Test, drinking quantity, drug use and impact questionnaires, and clinical reports) vs. no problem	−.58
Farrell & Sullivan	2000	531	WAI: Impulse control, responsibility	Problem Behavior Frequency Scale: Drug use frequency	−.32
Ge & Conger	1999	406	MPQ: Constraint	Substance use problems: frequency of problems ranging from frequent drunkenness to being picked up by police for drug or alcohol problems over past 12 months	−.14
Goldstein & Sappington	1977	66	MMPI: Psychopathic deviate	Pre-users of marijuana and hallucinogens vs. controls	−.25
Greene et al.	2000	724	Sensation-Seeking Scale: Disinhibition	Frequency of use of marijuana, uppers, downers, LSD, tranquilizers, opiates, and cocaine/crack in past 90 days	−.49
Hindelang	1972	337	MMPI: Psychopathic deviate CPI: Responsibility, Self-Control, Socialization	Frequency of marijuana use over past year Frequency of sniffing glue over past year Frequency of LSD, methedrine, or mescaline over past year Frequency of using heroin over last year	−.21
Huq & Mahmud	1994	948	EPQ: Psychoticism	Drug treatment program attendees vs. normal controls	−.40
Jessor et al.	1980	10,405	Tolerance of Deviance	Involvement in Marijuana Scale	−.39
Kashdan et al.	2003 (unpublished)	421	NEO-FFI: Conscientiousness	Frequency of marijuana consumption Frequency of cocaine consumption Frequency of amphetamine consumption Frequency of opioid consumption	−.22
Kohn & Coulas	1985	78	Sensation-Seeking Scale: Disinhibition	Frequency of marijuana consumption	−.37
Kopstein	1999 (unpublished)	2,565	Sensation-Seeking Scale: Disinhibition	Current marijuana use Heavy marijuana use (smoking marijuana at least six times in the month prior to the survey)	−.26
Lopez-Torrecillas et al.	2000	124	Rosenbaum Self-Control Questionnaire	Drug consumers (consuming alcohol, hashish, cocaine, and/or heroin at least 2–3 times per week) vs. nonconsumers	−.16
Luengo, Otero, et al.	1994	1,041	Eysenck 1.7: Impulsiveness	Antisocial Behavior Questionnaire: Drug Consumption	−.15
C. A. Martin et al.	1997	220	ARCMS: Impulsivity	Modified Personal History Questionnaire: Marijuana use, narcotics use, polysubstance use	−.19
McGue et al.	1999	1,856	MPQ: Achievement, Constraint, Control, Traditionalism	*DSM–III–R* drug abuse diagnosis *DSM–III–R* alcohol and drug abuse diagnoses	−.15
Nagoshi et al.	1992	108	EPQ: Psychoticism Eysenck 1.7: Impulsiveness	Diagnostic Interview Schedule: marijuana, barbiturate, amphetamine, cocaine, opioid, hallucinogens	−.13
Nishith et al.	1994	80	EPQ: Psychoticism	Hallucinogen user vs. nonuser	−.52
Pfefferbaum & Woods	1994	296	CPI: Self-Control, Socialization	Substance delinquency (frequency of alcohol, cigarette, marijuana, or hard drug use in past 4 weeks)	−.38

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Drug use (*continued*)		
Ripa et al.	2001	691	Sensation-Seeking Scale: Disinhibition	Frequency of cannabis consumption Frequency of "other drug" consumption	−.23
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS and HBC composite: Drug use	−.30
Roberts & Bogg	2004	99	CPI: Social responsibility composite	Frequency of marijuana consumption	−.28
Satinder & Black	1984	48	Sensation-Seeking Scale: Disinhibition	Marijuana users vs. nonusers	−.60
Shanmugam	1979	434	EPQ: Psychoticism	Consumption of marijuana, amphetamines, barbiturates, tranquilizers, or opium	−.13
Shoal & Giancola	2003	311	MPQ: Constraint	Frequency of use 20 different substances	−.33
Slack	1994/1995 (unpublished)	1,493	BFI: Conscientiousness GTS: Disinhibition	Frequency of marijuana use Frequency of psychedelic use Frequency of stay-awake pill use Frequency of Ecstasy use Frequency of inhalants use Frequency of cocaine use Frequency of narcotics use Frequency of amphetamines use Frequency of tranquilizers use Frequency of amyl/butyl nitrites use Frequency of diet pills use	−.17
Soldz & Valliant	1999	162	NEO-PI: Conscientiousness Study-derived factor of observer rating of conscientiousness-related traits	Mood-altering drug use (sedatives, tranquilizers, antidepressants, and stimulants)	−.05
J. A. Stein et al.	1987	654	BPI: Conscientiousness, social conformity	Frequency of marijuana use Frequency of hard drug use	−.37
Stuart	1997/1998 (unpublished)	86	Eysenck 1.7: Impulsiveness	Marijuana consumption in past year Drug Abuse Screening Test score	−.39
Vitaro et al.	1998	506	Eysenck IVE: Impulsiveness Social Behavior Questionnaire: Impulsivity	Personal Experiences Screening Questionnaire: Problem Severity Scale (frequency of problems associated with drug use over past 12 months)	−.08
von Knorring, Oreland, & von Knorring	1987	1,062	EPI: Impulsiveness KSP: Impulsiveness	Mixed drug abuse (consumption of cannabis, glue, amphetamines, or opioids and alcohol)	−.11
Vukov et al.	1995	354	TPQ: Novelty seeking: Impulsiveness vs. reflection, disorderliness vs. regimentation	Opiate addicts vs. controls	−.18
Wagner	1993	355	Study measure of impulsivity	12-month frequency of marijuana use 12-month frequency of hard drug use	−.19
Wills & Cleary	1999	1,190	Tolerance of Deviance Study measures of cautiousness, good self-control, and poor self-control	Frequency of alcohol, marijuana, and tobacco use	−.20
Wills et al.	1994	430	Achievement orientation Modified Eysenck Impulsiveness Scale Order orientation Self-Control Rating Schedule Tolerance of Deviance Value on Achievement	Frequency of alcohol, marijuana, and tobacco use	−.20
Wills et al.	1998	949	Modified Eysenck Impulsiveness Scale	Frequency of alcohol, marijuana, and tobacco use	−.27

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Drug use (*continued*)		
Wong et al.	1997	969	Sensation-Seeking Scale: Disinhibition	Frequency of organic solvent, cannabis, heroin, tranquilizer, or narcotics use in past 6 months	−.28
Wood et al.	1995	1,189	CPI: Impulsivity	Dichotomous use of marijuana in past 4 weeks Frequency of marijuana use Dichotomous use of hard drugs (cocaine, crack, speed, downers, heroin, LSD, PCP) in past 4 weeks Frequency of hard drug (cocaine, crack, speed, downers, heroin, LSD, PCP) use	−.06
			Unhealthy eating		
Beckwith	1986	530	Study-derived factor of Discipline	Average amount and frequency of food consumption in a day	−.29
Carey et al.	1988	42	BSQ/MCTQ: Persistence/attention span	Obesity (95th or above percentile wt./ht.)	−.27
Chalmers et al.	1990	246	ACL: Achievement Endurance Lability Order Self-Control	Outpatient obese group vs. matched community controls	−.13
Donovan et al.	1991	1,585	Conventionality–unconventionality	Attention to a healthy diet (seeing that diet is balanced, limiting the amount of fat in the food) Healthful food preferences (choice of foods with lower sodium content, less saturated fat, or more complex carbohydrates)	−.28
Dorman	1984/1985 (unpublished)	40	CPI: Socialization	Obese—20% or more above ideal body weight (based on Metropolitan Insurance Company tables)	−.23
Friedman, Tucker, Schwartz, et al.	1995	1,044	Terman Life Cycle Study: Conscientiousness	Body mass index	−.03
Lazarus & Galassi	1994	52	EDI: Perfectionism	Obese binge eaters vs. nonbinge eaters	−.33
Li	1995	170	EPQ: Psychoticism	Simple obesity	−.25
Michaud	2002 (unpublished)	473	NEO-FFI: Conscientiousness	Body mass index	.08
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS: Diet	−.19
Schroder & Schwarzer	2003 (unpublished)	179	Habitual Self-Control	Body mass index	−.02
Vingerhoets et al.	1990	978	DPI: Rigidity	Maintaining a desirable weight (between 90%–130% of the ideal weight)	.03
Williamson et al.	1985	30	MMPI: Psychopathic deviate	Obese—20% or more above ideal body weight (based on Metropolitan Insurance Company tables) vs. controls	−.37
Yeung & Hemsley	1997	252	EPQ–R: Psychoticism	Body mass index	−.04
			Risky driving		
Arthur & Graziano	1996	477	NEO-FFI: Conscientiousness	Involvement in an at-fault traffic accident (based on police determination) Number of moving violation tickets	−.16
Booth-Kewley & Vickers	1994	176	NEO-PI: Conscientiousness NEO-FFI: Conscientiousness	HBC: Traffic risk taking	−.28
Caspi et al.	1995	846	MPQ: Control, Traditionalism	Dangerous driving habits	−.12

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Risky driving (*continued*)		
Cavaiola et al.	2003	138	MMPI: Psychopathic deviate	One-time conviction of drinking-and-driving-related offense	−.21
				Multiple convictions of drinking-and-driving-related offenses	
Donovan	1993	1,056	Psychosocial unconventionality	Drinking and driving—frequency in the past year of the following behaviors: driving within an hour of having 1–2 drinks, driving within an hour of having 3+ drinks, driving when high or lightheaded from drinking, driving when coordination was already affected, and drinking while driving	−.56
Donovan et al.	1991	1,585	Conventionality—unconventionality	Frequency of safety belt usage in a car	−.27
Furnham & Saipe	1993	73	Sensation-Seeking Scale: Disinhibition	Conviction for non-alcohol-related driving offense	−.12
				Number of recorded accidents	
Greene et al.	2000	724	Sensation-Seeking Scale: Disinhibition	Frequency of driving over 80 miles per hr (mph; 128.72 km/h), driving more than 20 mph (32.18 km/h), over the speed limit, and passing in a no-passing zone	−.48
				Frequency of driving under the influence and being a passenger of a driver under the influence in the past year	
Hampson et al.	2001	297	Block Ego Control Scale	Riding in a car with an intoxicated driver or driving a car while intoxicated	−.24
			Value on Achievement		
Hindelang	1972	337	MMPI: Psychopathic deviate	Frequency of drag racing on street in excess of 20 mph (32.18 km/h) over the speed limit over past year	−.17
			CPI: Responsibility, Self-Control, Socialization	Frequency of driving while strongly under the influence of alcohol or drugs over past year	
				Frequency of being in hit-and-run accidents over past year	
Homant et al.	1993	69	Sensation-Seeking Scale: Disinhibition	Self report of initiating high-speed police pursuit in past 12 months	−.24
				Police department record of initiating high-speed pursuit in past 2 years that resulted in damage to a police vehicle	
Leaman & Fitch	1987	242	Eysenck IVE: Impulsiveness	Driving a motorcycle of at least 100 cc	−.09
N. G. Martin & Boomsma	1989	364	EPQ: Psychoticism	Willingness to drive 1 hr after consuming .75 g EtOH/kg body weight	−.04
				Willingness to drive 2 hr after consuming .75 g EtOH/kg body weight	
				Willingness to drive 3 hr after consuming .75 g EtOH/kg body weight	
Pfefferbaum & Woods	1994	296	CPI: Self-Control, Socialization	Joyriding	−.22
Ripa et al.	2001	691	Sensation-Seeking Scale: Disinhibition	Drunk driving	−.16
				Speeding	
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	HBC: Traffic risk taking	−.25
Selzer et al.	1977	575	CPI: Responsibility, Self-Control	Drunken driving conviction group vs. controls	−.11
Stacy et al.	1991	614	Social conformity	Frequency of drunk driving	−.22
				Arrest or conviction for driving while intoxicated	
Trimpop & Kirkcaldy	1997	120	Sensation-Seeking Scale: Disinhibition	Convicted of at least one moving violation (speeding, traffic ticket, reckless driving, alcohol while driving, running a red light, etc.)	−.25
				Involvement in at least one traffic accident	
Vavrik	1997	100	JPI: Conformity, responsibility	High-risk drivers (two or more at fault accidents in the past 2 years) vs. low-risk drivers	.03
			PRF: Achievement, impulsivity, order		
Vollrath et al.	1999	656	NEO-FFI: Conscientiousness	Frequency of drunk driving	−.05

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Risky sex		
Arnett	1990	145	Sensation-Seeking Scale: Disinhibition	Sex without contraception group vs. sex with contraception group	−.23
G. E. Barnes et al.	1984	307	EPQ: Psychoticism	Dichotomous participation in intercourse	−.01
				Dichotomous participation in oral–genital contact	
				Dichotomous participation in male homosexual acts	
				Dichotomous participation in group sex	
Bogaert	1993	375	EPQ: Psychoticism	Age of first intercourse	.00
				Maximum number of sexual partners in a month	
				Number of sexual partners in lifetime	
Bogaert & Fisher	1995	215	EPQ: Psychoticism	Maximum number of sexual partners in a month	−.21
				Number of sexual partners in lifetime	
Breakwell	1996	209	Modified Eysenck impulsivity scale	Number of sexual partners in lifetime	−.27
				Number of sexual partners in past 6 months	
				Age of first intercourse	
Caspi et al.	1995	842	MPQ: Control, Traditionalism	Unsafe sex: intercourse with five or more different partners in past 12 months; never or seldom uses a condom	−.15
Clift et al.	1993	503	Eysenck 1.7: Impulsiveness	Have a regular heterosexual partner	−.13
				Used condom with regular, heterosexual partner during last intercourse	
				Have casual heterosexual partner(s) in past year	
				Used condom(s) with casual heterosexual partner(s) in past year	
				Used condom with casual heterosexual partner during last intercourse	
Cooper et al.	2000	1,666	Eysenck eight-item impulsivity scale	Frequency of high-risk HIV behaviors: anal intercourse; one-night stands; intercourse with a stranger or prostitute; intercourse in exchange for drugs or money; and intercourse with someone who has had many partners, used IV drugs, or is HIV positive	−.12
F. M. Costa et al.	1996	971	Expectation for achievement Intolerance of deviance	Index of contraceptive use, regularity of any contraceptive use, or condom use in the past year, use of contraception at last intercourse	−.10
Crocker	2003 (unpublished)	640	BFI: Conscientiousness	Frequency of unprotected (no condom) sex during semester	−.04
Fontaine	1994	74	EPQ–R: Psychoticism	Sexual relations with a bisexual	−.33
				Oral sex	
				Sexual relations with an intravenous drug user	
				Sexual relations with someone who “sleeps around”	
				One-night stand (i.e., meet someone, have sexual intercourse, and do not continue into a relationship)	
				Unprotected (no condom) anal intercourse	
				Sexual relations with different partners	
				Sexual relations with people met on holiday	
Greene et al.	2000	724	Sensation-Seeking Scale: Disinhibition	Composite of number of partners in past 6 months and 2 years and frequency of condom use during sexual intercourse	−.25
Hernandez & DiClemente	1992	123	Rosenbaum Self-Control Scale	High-risk sexual behavior group vs. low-risk sexual behavior group	−.15
			Sensation-Seeking Scale: Disinhibition		
Hindelang	1972	337	MMPI: Psychopathic deviate	Frequency of promiscuous activities over past year	−.17
			CPI: Responsibility, Self-Control, Socialization	Frequency of visiting a prostitute in past year	

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Risky sex (*continued*)		
Horvath & Zuckerman	1993	447	Eysenck: Narrow Impulsivity Scale Sensation-Seeking Scale: Disinhibition	Risky sexual behavior (females: number of heterosexual partners, frequency of anal intercourse, nonuse of condoms by partners, nonuse of spermicide; males: lifetime number of heterosexual partners, lifetime number of homosexual partners, frequency of receptive anal intercourse, and nonuse of condoms)	−.13
Justus et al.	2000	410	CPI: Socialization Eysenck IVE: Impulsiveness MMPI: Psychopathic deviate MPQ: Control Sensation-Seeking Scale: Disinhibition	Frequency of one-night stands in past 12 months Frequency of intercourse over past 12 months with a man or woman just met	−.21
Malamuth	1986	155	EPQ: Psychoticism	Dichotomous participation in various sexual acts including kissing, fondling of breasts, intercourse, and oral sex	.03
C. A. Martin et al.	1997	220	ARCMS: Impulsivity	Modified Personal History Questionnaire: Sexual activity	−.19
Meadows	1996 (unpublished)	598	EASI–III: Impulsivity	Global condom use—lifetime condom use Frequency of condom use in past 30 days Condom use at first intercourse after high school graduation Condom use at first intercourse with most recent partner Condom use at most recent intercourse	−.24
J. D. Miller	2002 (unpublished)	210	NEO-PI–R: Conscientiousness; competence, order, dutifulness, achievement striving, self-discipline, deliberation	Age of first intercourse Condom use Dichotomous intercourse Number of sexual partners in lifetime	−.05
Ripa et al.	2001	691	Sensation-Seeking Scale: Disinhibition	Sexual Behavior Scale score Number of sexually transmitted diseases Condom use in a risky sexual situation	−.22
Schafer et al.	1994	698	Impulsivity, Risk-Taking, and Sensation-Seeking Scale	No-condom with new partner group vs. condom with new partner group	−.02
Vollrath et al.	1999	656	NEO-FFI: Conscientiousness	Frequency of starting a new sexual relationship, having sex with a person just met, and having unprotected sex with a new sexual partner	−.12
H. R. White & Johnson	1988	844	PRF: Impulsivity Sensation-Seeking Scale: Disinhibition	Virginity status	−.13
Wright & Reise	1997	350	NEO-FFI: Conscientiousness	Sociosexual Orientation Inventory: Sexual relations	−.11
			Suicide		
Angst & Clayton	1998	2,786	Freiburg Personality Inventory: Inhibition	Completed suicide attempters vs. controls	−.02
Cabiles	1996 (unpublished)	95	Barratt Impulsivity Scale Dimensions of Temperament: Impulsivity	High lethality suicide attempters (e.g., hanging, firearms, and explosives) vs. nonattempter controls Low lethality suicide attempters (e.g., analgesics, poisoning) vs. nonattempter controls	−.10
Duberstein et al.	1994	101	NEO-PI: Conscientiousness	Completed suicide attempters vs. controls	.07
Eliason	2000/2001 (unpublished)	40	Impulsivity Rigidity	Suicide attempters vs. nonattempter controls	−.49

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Suicide (*continued*)		
Horesh et al.	1997	62	Impulsivity Control Scale	Suicidal inpatients (ideation or attempt) vs. nonsuicidal controls	−.50
Kashden et al.	1993	43	Gordon Diagnostic System: Attention, impulsivity	Suicidal inpatients (ideation or attempt) vs. nonsuicidal controls	−.22
Lehnert et al.	1994	427	Offer Self Image Questionnaire: Impulse Control Scale	Suicide attempters vs. nonattempter controls	−.20
Lennings	1994	397	Schalling Impulsivity Scale	BDI (Item 9) current suicidal ideation	−.02
Lester	1987	174	EPQ: Psychoticism	Prior suicidal ideation Prior suicide threats Prior suicide attempts	−.25
Lester	1990	145	Impulsivity Scale	BDI (Item 9) current suicidal ideation Prior suicidal ideation Prior suicide threats Prior (single) suicide attempt	−.13
Lester	1993	145	Dysfunctional Impulsivity	BDI (Item 9) current suicidal ideation Prior suicidal ideation Prior suicide threats	−.18
Mann et al.	1999	203	Barratt Impulsivity Scale	Suicide attempters vs. nonattempters	−.14
C. A. Martin et al.	1997	220	ARCMS: Impulsivity, sociopathy	BDI/*DSM–IV* composite of suicide ideation	−.18
Nordstrom et al.	1995	62	EPQ: Psychoticism KSP: Impulsivity, Monotony Avoidance, Socialization Nonconformity	Suicide attempters vs. nonattempters	−.31
Pendse et al.	1999	46	KSP: Impulsivity, Monotony Avoidance, Socialization	Suicide attempters vs. nonattempter controls	−.27
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS: Suicide ideation or attempt	−.17
Sadowski	1994/1995 (unpublished)	85	BIS-11	Suicide attempters vs. nonattempter controls Suicide ideators vs. nonideator controls	−.43
D. Stein et al.	1998	136	Suicide Potential Scale (composite scale of patient, parents, and therapist interviews regarding general tendency toward anxiety, depression, aggression, and impulsivity): Impulsivity	Single suicide attempters vs. controls Multiple suicide attempters vs. controls	−.49
Velting	1999	185	NEO-PI–R: Conscientiousness	Adult Suicidal Ideation Questionnaire	−.33
			Tobacco use		
Allan et al.	1995	205	EPQ: Psychoticism	Number of cigarettes smoked per day	−.22
Arai et al.	1997	18,426	EPQ–R: Psychoticism	Smokers vs. nonsmokers	−.08
Arneklev et al.	1993	394	Low self-control, impulsivity	Smoke tobacco products (dichotomous)	−.10
Beckwith	1986	530	Study-derived factor of Discipline	Use of tobacco products in past 12 months (dichotomous)	−.30
Bickel et al.	1999	45	EPQ: Impulsivity	Smokers vs. never smokers	−.14
Canals et al.	1997	290	EPQ: Psychoticism	Light smokers (smoke 1–9 cigarettes per day) vs. nonsmokers Moderate to heavy smokers (smoke 10 or more cigarettes per day) vs. nonsmokers	−.15
Carton et al.	1994	164	Sensation-Seeking Scale: Disinhibition	Smokers vs. nonsmokers	−.24
Crocker	2003 (unpublished)	618	BFI: Conscientiousness	Frequency of cigarette smoking	−.15
Friedman, Tucker, Schwartz, et al.	1995	689	Terman Life Cycle Study: Conscientiousness	Lifetime occurrence of smoking in cigarette-years (i.e., total number of years smoked × average number of cigarettes smoked per day in those years)	−.13
Geist & Herrmann	1990	287	ACL: Endurance, Order, Self-Control	Smokers vs. nonsmokers	−.06

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Tobacco use (*continued*)		
Golding et al.	1983	178	EPQ: Psychoticism	Smokers vs. nonsmokers	−.38
Greene et al.	2000	724	Sensation-Seeking Scale: Disinhibition	Composite score of number of cigarettes smoked per day and years of smoking	−.32
Heaven	1989	193	EPQ: Psychoticism	Smoke tobacco products (dichotomous)	−.13
Jacobs & Spilken	1971	150	Boston University Personality Inventory: Impulsivity	Heavy smokers (smoke a pack or more per day) vs. nonsmokers	−.29
Jamison	1979	1,282	EPQ: Psychoticism	Composite of smoking during school hours, buying cigarettes to smoke them, and smoking cigarettes	−.28
Jansevics	1994/1995 (unpublished)	50	NEO-PI–R: Conscientiousness	Light smokers (smoke 1–5 cigarettes at least 4 days per week) vs. nonsmokers Heavy smokers (smoke 20 or more cigarettes daily) vs. nonsmokers	.07
Jorm et al.	1999	2,011	EPQ-R: Psychoticism	Smokers vs. nonsmokers	−.14
Kashdan et al.	2003 (unpublished)	421	NEO-FFI: Conscientiousness	Frequency of tobacco use	−.15
Kassel et al.	1994	207	EPI: Impulsivity Sensation-Seeking Scale: Disinhibition	Regular smokers vs. nonsmokers Chippers (smoke 1–5 cigarettes at least 4 days a week) vs. nonsmokers	−.19
Kohn & Coulas	1985	78	Sensation-Seeking Scale: Disinhibition	Frequency of tobacco product use	−.22
Kopstein	1999 (unpublished)	2,565	Sensation-Seeking Scale: Disinhibition	Smoke less than half pack per day in past month (dichotomous) Smoke more than half pack per day in past month (dichotomous)	−.25
La Grange et al.	1995	88	EPQ: Psychoticism Sensation-Seeking Scale: Disinhibition	Student Alcohol and Drug Use Survey: Tobacco product use	−.19
Lipkus et al.	1994	4,646	MMPI: Psychopathic deviate	Ever smokers vs. never smokers	−.16
C. A. Martin et al.	1997	220	ARCMS: Impulsivity	Modified Personal History Questionnaire: Nicotine use	−.20
Mitchell	1999	40	ACL: Order, Self-Control BIS-11 EPI: Impulsivity Sensation-Seeking Scale: Disinhibition TPQ: Novelty seeking: Impulsiveness vs. reflection, disorderliness vs. regimentation	Regular smokers (15 or more cigarettes per day) vs. never smokers	−.25
Musgrave-Musquart et al.	1997	161	NEO-PI–R: Conscientiousness	Daily use of cigarettes, pipes/cigars, chewing/dipping	−.11
Nagoshi et al.	1992	108	EPQ: Psychoticism Eysenck 1.7: Impulsiveness	Diagnostic Interview Schedule: Cigarettes	−.10
Parkes	1984	270	EPQ: Psychoticism	Smokers vs. nonsmokers	−.09
Reynolds & Nichols	1976	852	CPI: Achievement via Conformance, Responsibility, Socialization, Self-Control	Frequency of smoking cigarettes	−.21
Ripa et al.	2001	691	Sensation-Seeking Scale: Disinhibition	Smoke tobacco products (dichotomous) Number of cigarettes smoked per day	−.06
Robbins et al.	1971	85	MMPI: Psychopathic deviate	Level of smoking	−.32
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS: Tobacco use	−.37
Roberts & Bogg	2004	99	CPI: Social responsibility composite	Frequency of tobacco consumption	−.30
Seltzer & Oechsli	1985	1,127	EPQ: Psychoticism	Smokers vs. nonsmokers	−.07
Sijuwola	1989	578	EPQ: Psychoticism	Smokers vs. nonsmokers	−.15
Slack	1994/1995 (unpublished)	1,493	BFI: Conscientiousness GTS: Disinhibition	Frequency of cigarette use	−.24
Soldz & Valliant	1999	162	NEO-PI: Conscientiousness Study-derived factor of observer rating of conscientiousness-related traits	"Pack-years" of smoking	−.15

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r) [b]
			Tobacco use (*continued*)		
Spielberger et al.	1995	747	EPQ: Psychoticism	Smokers vs. nonsmokers	−.13
				Smokeless tobacco users vs. nonusers	−.13
			Eysenck 1.7: Impulsiveness		
Spielberger & Jacobs	1982	862	EPQ: Psychoticism	Smokers vs. nonsmokers	−.09
Vingerhoets et al.	1990	978	DPI: Rigidity	Smoking cigarettes	−.03
Vollrath et al.	1999	656	NEO-FFI: Conscientiousness	Number of cigarettes smoked per day	−.15
Wakefield	1989	403	EPQ: Psychoticism	Smoke tobacco products (dichotomous)	−.09
Waldeck & Miller	1997	282	Chapman Scale: Impulsivity/nonconformity	Frequency of tobacco product use	−.23
A. F. Williams	1973	386	PRF: Impulsivity, order	Number of days in past 7 when cigarettes were smoked	−.18
J. H. Williams et al.	1996	360	EPQ: Psychoticism	Smokers vs. nonsmokers	−.19
Wood et al.	1995	1,189	CPI: Impulsivity	Dichotomous use of tobacco products in past 4 weeks	−.26
				Frequency of tobacco product use	
			Violence		
Allsopp & Feldman	1974	197	EPQ: Psychoticism	Frequency of antisocial behavior (as assessed by a revised Antisocial Behavior Questionnaire), ranging from distracting school behavior to breaking into private property or stealing something	−.41
G. E. Barnes et al.	1984	307	EPQ: Psychoticism	Forcing someone to do something sexual he or she did not want to do	−.05
Barnett & Hamberger	1992	135	CPI: Achievement via Conformance, Responsibility, Socialization, Self-Control	Maritally violent group (having engaged in more than two acts of "minor" physical violence (e.g., manhandling), or engaging in one act of severe violence (e.g., kicking) toward partner vs. nonviolent maritally satisfied group	−.41
Caspi et al.	1995	846	MPQ: Control, traditionalism	Violent crime conviction (dichotomous)	−.12
Colder & Chassin	1997	371	Eysenck: Impulsiveness	Property (steal or try to steal something with value >$50) or person (hit or threatened to hit someone) offenses in past 6 months, based on National Youth Survey Delinquency Scale	−.23
Dykeman et al.	1996	280	Junior Impulsiveness Questionnaire	Conflict Tactics Scale—School Violent Behavior Form: Frequency of Violent Behavior	−.33
Eysenck & McGurk	1980	1,016	EPQ: Psychoticism	Delinquents (held at a detention center) vs. nondelinquent	−.35
			Eysenck IVE: Impulsiveness		
Farrington	1989	411	Study measures: high impulsivity, lack of concentration, high laziness	Teenage violence (between ages 16 and 18): fighting, carrying and using weapons, fighting police officers	−.10
				Adult violence (age 32): fist fights	
				Convictions for violence (between ages 10 and 32): serious assault, robbery, and threatening behavior	
Ge & Conger	1999	406	MPQ: Constraint	Frequency of delinquent behaviors, ranging from cutting classes to attacking someone with a weapon, over the past year	−.21
Hindelang	1972	337	MMPI: Psychopathic deviate	Frequency of theft greater than $10 in past year	−.22
			CPI: Responsibility, Self-Control, Socialization	Frequency of property destruction greater than $10 in past year	
				Frequency of engaging in fist fights with an individual in past year	
				Frequency of engaging in gang fist fights in past year	
				Frequency of engaging in fights with an individual using a weapon in past year	
				Frequency of engaging in gang fights with weapons in past year	
				Frequency of shaking down others for money in past year	
				Frequency of forcing sexual attention on a girl against her will in past year	

Table 2 (*continued*)

Author(s)	Year	N [a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Violence (*continued*)		
Krueger et al.	1994	862	MPQ: Constraint, Control, Traditionalism	Self-report of one or more of 43 illegal acts in the past 12 months Informant report of antisocial (e.g., fighting), illegal (e.g., stealing), alcohol, or drug problems Contact with police resulting in filing of a standard incident form Court convictions (except for routine traffic offenses)	−.19
Luengo, Carillo-de-la-Pena, et al.	1994	1,226	BIS-10 Eysenck 1.6: Impulsiveness	Frequency of vandalism affecting public or private property Frequency of theft Frequency of aggression toward other people Frequency of rule-breaking behavior (behavior banned to minors, or trifling offenses)	−.25
Lynam et al.	1993	214	Study-derived composite Impulsivity Index	Frequency scale of delinquency (ranging from vandalism at home to multiple instances of stealing cars, breaking and entering, or selling drugs)	−.35
Malamuth	1986	155	EPQ: Psychoticism	Sexual aggression (dichotomous; e.g., "I have had sexual intercourse with a woman when she didn't want to because I used some degree of physical force [twisting her arm, holding her down, etc.]")	−.15
C. A. Martin et al.	1997	220	ARCMS: Impulsivity, sociopathy	Modified Personal History Questionnaire: Conduct disorder behaviors	−.27
J. D. Miller	2002 (unpublished)	210	NEO-PI–R: Conscientiousness; competence, order, dutifulness, achievement striving, self-discipline, deliberation	Frequency of crime/delinquency, ranging from driving drunk or high to burglary to attacking another person to being arrested	−.15
Pfefferbaum & Woods	1994	296	CPI: Self-Control, Socialization	Frequency of property delinquency in past year (ranging from petty theft to criminal vandalism) Frequency of interpersonal delinquency in past year (ranging from hitting an instructor or supervisor to using a gun, knife, or other weapon to get something from someone else)	−.32
Preston	1998/1999 (unpublished)	56	NEO-PI–R: Conscientiousness; competence, order, dutifulness, achievement striving, self-discipline, deliberation	Reactive violence–unplanned violence in response to an intense emotional state Instrumental violence/delinquent behavior—violence or delinquent behavior enacted for personal gain	−.20
Rigby et al.	1989	115	The Children's Impulsiveness Scale	Self-Reported Delinquency Scale	−.54
Roberts	2003 (unpublished)	735	Adjective-based conscientiousness scale	BRFSS: Violence	−.20
Sommer et al.	1992	452	Barron Ego Strength Scale EPQ–R: Psychoticism	Six-item scale from Conflict Tactics Scale reflecting moderately severe forms of spousal abuse	−.27
Spence et al.	1991	318	Study Impulsiveness Scale	For men, frequency of (a) falsely saying flattering things, (b) trying to get date drunk, (c) getting into a "wrestling match", (d) ignoring date's protests and continuing sexual behaviors, or (e) using physical restraint to make a date have sex; for women, frequency of having a date (a) falsely say flattering things, (b) get date drunk, (c) get into a "wrestling match," (d) ignore protests and continue his sexual behaviors, or (e) use physical restraint to force sex	−.29
Stuart	1997/1998 (unpublished)	86	Eysenck 1.7: Impulsiveness	Engaged in at least one act of violence toward wife	−.41

(*table continues*)

Table 2 (*continued*)

Author(s)	Year	N[a]	Conscientiousness measure	Behavioral measure	Effect (r)[b]
			Violence (*continued*)		
J. L. White et al.	1994	401	California Child Q-set: Ego undercontrol Eysenck Impulsivity Scale Teacher-Rated Impulsivity Scale	Deliquency: from stealing money from mother's purse to serious offenses, such as car theft and breaking and entering	−.32
Zhang et al.	1997	625	Psychopathic State Inventory: Impulsivity	Prevalence of attacking someone with the idea of seriously hurting or killing someone in the past 12 months	−.29

Note. EPQ–R = Eysenck Personality Questionnaire—Revised; BFI = Big Five Inventory; NEO-FFI = NEO–Five-Factor Inventory; HPI = Hogan Personality Inventory; 16 PF = 16 Personality Factor Questionnaire; BRFSS = Behavioral Risk Factor Surveillance System; MMPI = Minnesota Multiphasic Personality Inventory; DPI = Dutch Personality Inventory; MPQ = Multidimensional Personality Questionnaire; ACL = Adjective Checklist; CPI = California Psychological Inventory; KSP = Karolinska Scale of Personality; EPQ = Eysenck Personality Questionnaire; Eysenck IVE = Eysenck Impulsiveness, Venturesomeness, and Empathy Scales; *DSM–IV* = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994); EPI = Eysenck Personality Inventory; ARCMS = Addiction Research Center Maturation Scale; *DSM–III–R* = *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; American Psychiatric Association, 1987); EASI–III = Emotionality, Activity, Sociability, and Impulsivity—III; NEO-PI–R = NEO–Personality Inventory—Revised; GTS = General Temperament Survey; NEO-PI = NEO-Personality Inventory; TPQ = Tridimensional Personality Questionnaire; BIS-11 = Barratt Impulsivity Scale–11; BASIS-32 = Behavior and Symptom Identification Scale–32; WAI = Weinberger Adjustment Inventory; HBC = Health Behavior Checklist; BSQ/MCTQ = Body Shape Questionnaire/Middle Childhood Temperament Questionnaire; EDI = Eating Disorder Inventory; JPI = Jackson Personality Inventory; PRF = Personality Research Form; BDI = Beck Depression Inventory; BIS-10 = Barratt Impulsivity Scale–10.

[a] Total sample size for all measures within a behavioral domain for a specific study. [b] The average effect for all measures within a behavioral domain for a specific study.

statistic; (e) age data; and (f) in the case of quasi-experimental designs (not unusual in alcohol, tobacco, and drug research), a control subsample.

Of the 194 studies analyzed, 124 provided correlational data, 65 provided means and standard deviations that were transformed into correlations, and 5 provided other statistics that required transformation (i.e., t tests). Ten studies used longitudinal designs in which behavioral outcomes were predicted from prior personality ratings. Sixty-nine studies used quasi-experimental designs, comparing a group of nonusers or controls to a group of users or enactors of the behavior. Twenty-three studies used diagnoses, inpatient status, or other clinical distinctions for part of the sample.

Study Moderators

We coded the studies on the basis of the system of Conscientiousness described below (Roberts, Chernyshenko, et al., 2004). In addition, each study was coded for its measurement outcome (described below), age (below age 30, above age 30), and statistical method used to derive the data (e.g., derived from means and standard deviations, t tests). We calculated agreement for the type of Conscientiousness trait (see below). Because of the redundant and self-evident nature of the behavioral measures, it was only necessary to calculate the reliability ratings for the conscientiousness-related traits. As such, only Tim Bogg coded the measurement outcomes associated with each health-related behavior. For age, each study was coded (again, by one rater) below or above age 30 on the basis of the age at which the health-related behavior was assessed. Because the vast majority of studies were cross-sectional in design, the coded age was typically the same age as when the corresponding personality measure was administered.

Conscientiousness-related personality scales. To test whether certain types of conscientiousness measures affected the relationship between conscientiousness and health behaviors, we used a recent analysis of conscientiousness-related personality scales (Roberts, Chernyshenko, et al., 2004). In this study, 36 scales from seven different personality inventories thought to tap into conscientiousness were factor analyzed, resulting in six factors: Order, Self-Control, Responsibility, Industriousness, Traditionalism, and Virtue. We used these six factors as the basis for organizing and categorizing existing personality scales into different facets of conscientiousness. For the scales analyzed in Roberts, Chernyshenko, et al. (2004), this consisted of simply coding these scales according to the results of the factor analysis. For additional scales not examined by Roberts, Chernyshenko, et al. (2004), we used descriptions of the measures and known empirical correlations to categorize the scales into one of the six domains of Conscientiousness. Table 1 provides an overview of how major personality measures and inventories were coded for each of the six Conscientiousness facets in the present study.

In addition to those inventories described in Table 1, measures coded for Industriousness included various achievement, concentration, discipline, laziness, purpose, and self-driving scales. For Order, additional measures included conscientiousness (as indicated by the factor structure derived by Roberts, Chernyshenko, et al., 2004, in which general trait measures of Conscientiousness loaded on Order), order, rigidity, and inattention scales. For Responsibility, additional measures included sociopathy and social conformity scales. For Self-Control, additional measures included impulsivity, impulsiveness, inhibition, and control scales. For Traditionalism, additional measures included conventionality, conformity, rebelliousness, and tolerance of deviance scales. No additional measures were coded for Virtue.

Reliability of ratings for the codings of Conscientiousness was checked via intraclass correlation and was found to be quite high (r = .89). All remaining discrepancies were resolved through discussion.

Activity. For activity, the various measures were coded into two categories: frequency and quantity of exercise (63%) and fitness level (37%). The frequency and quantity of exercise category was represented by

measurement outcomes such as fast walking for 20 min per week, jogging for 20 min per week, and exercising five or more times in a week. Fitness level was represented by measurement outcomes such as muscular strength, endurance, and cardiovascular responses (e.g., maximal oxygen consumption).

Excessive alcohol use. For excessive alcohol use, the measures were coded into two categories: heavy drinking (46%) and quantity and frequency of consumption (54%). Heavy drinking was represented by measurement outcomes such as *DSM–IV* (American Psychiatric Association, 1994) alcohol diagnosis, problem drinking (e.g., alcoholism, impairment, increased tolerance), and the frequency of consuming more than five drinks in a sitting. Quantity and frequency of consumption was represented by measurement outcomes such as the number of drinks consumed in a typical day, use of alcohol in past 4 weeks, and the frequency of alcohol use in the past year.

Drug use. Drug use was coded into two primary categories: marijuana use (31%) and opiate/heroin use (9%). The remainder of the drug use domain was coded as polysubstance use (reflecting measures that did not readily discriminate between various types of drugs). Marijuana use was represented by measurement outcomes such as being given a *DSM–III–R* (American Psychiatric Association, 1987) 12-month marijuana use diagnosis, marijuana use in the past 4 weeks, and frequency of cannabis use in the past 12 months. Opiate/heroin use was represented by measurement outcomes such as lifetime occurrence of opioid use, opiate addiction, and frequency of heroin use over the past year.

Unhealthy eating. For unhealthy eating, the measures were coded into two categories: food selection (21%) and obesity, weight, and mass (79%). Food selection was represented by measurement outcomes such as healthful food preferences (i.e., low sodium content, less saturated fat, or more complex carbohydrates). Obesity, weight, and mass was represented by measurement outcomes such as a body mass index greater than 25 kg/m^2, being at least 20% overweight according to Metropolitan Insurance Company norms, and maintaining a desirable weight (i.e., between 90% and 130% of ideal weight).

Risky driving. For risky driving, the outcomes were coded into two categories: drunk driving/riding (46%) and speeding, hazardous driving, and vehicular accidents (54%). Drunk driving/riding was represented by measurement outcomes such as an arrest or conviction for driving while intoxicated, frequency of drunk driving, and riding in a car with an intoxicated driver. Speeding, hazardous driving, and vehicular accidents was represented by measurement outcomes such as the frequency of joyriding, drag racing, and being in two or more at-fault accidents in the past year.

Risky sex. For risky sex, the outcomes were coded into three categories: number of partners (24%), protected (35%), and risky acts and partners (41%). Number of partners was represented by measurement outcomes such as the number of sexual partners in a lifetime and the maximum number of sexual partners in a month. Protected was represented by measurement outcomes such as never or seldom using a condom and the use of a condom with a regular, heterosexual partner during last intercourse. Risky acts and partners was represented by measurement outcomes such as the frequency of group sex and having sexual relations with an intravenous drug user.

Suicide. For suicide, the outcomes were coded into two categories: attempted/completed (50%) and ideation and risk factors (50%). Attempted/completed was represented by measures such as the frequency of one or more suicide attempts and completed suicide. The ideation and risk factors category was represented by measurement outcomes such as a Suicide Behavior Questionnaire diagnosis of current suicidal risk and overt suicidal ideation with a definite plan to act.

Tobacco use. For tobacco use, the outcomes were coded into two categories: smoke/not smoke (60%) and quantity and frequency (40%). Smoke/not smoke was represented by measurement outcomes assessing differences between smokers and nonsmokers. Quantity and frequency was represented by measurement outcomes assessing the amount and rate of tobacco product consumption.

Violence. For violence, the outcomes were coded into four categories: aggressive delinquent acts (45%); conviction, detention, and incarceration (12%); interpersonal aggression (31%); and sexual aggression (12%). The aggressive delinquent acts category was represented by measurement outcomes such as vandalism and property destruction. Conviction, detention, and incarceration was represented by measurement outcomes such as a violent crime conviction and a conviction for violence between the ages of 10 and 32. Interpersonal aggression was represented by measurement outcomes such as fist fighting and using a weapon in an attack. Sexual aggression was represented by measurement outcomes such as sexual assault and forcing sexual attention.

Data Analysis

We followed the systems described by Hedges and Olkin (1985) and Lipsey and Wilson (2001) to quantitatively synthesize the relationship between conscientiousness-related traits and the health-related behaviors. For all analyses, we used a fixed-effects model because we had hypothesized that variability between studies could, in part, be explained by variables used for our moderator analyses (i.e., facet of conscientiousness, type of measurement outcome, and age above and below 30 years). Effect sizes consisted of Fisher's z-transformed correlation coefficients. If studies reported effects in different metrics (e.g., t tests, means), they were transformed into correlation coefficients using formulas provided by Rosenthal (1991). To establish grand mean estimates of the relationship between conscientiousness and health-related behaviors, the z-transformed correlation coefficients were weighted by the inverse of the variance. The estimated average correlations were then obtained through a z-to-r transformation of the effect size estimates. Confidence intervals and tests of heterogeneity were calculated using formulas from Hedges and Olkin. Each behavioral domain was analyzed separately and can be considered to have generated its own meta-analysis. All analyses were computed using a meta-analysis software package (Biostat, 2000). In Table 2, the correlation for each study is the average effect (r) for all measures within a behavioral domain for that specific study.

For each of the moderators within each health-related behavior, between-groups heterogeneity (Q_B) analyses were conducted. This test is the meta-analytic equivalent of analysis of variance. Effect sizes were grouped by moderator (e.g., age above vs. below 30 years) within each health-related behavior. The Q_B analyses partition the overall Q statistic (the weighted sum of squares of the individual effects sizes around the grand mean) for each health-related behavior such that Q_B represents the weighted sum of squares of the mean effect sizes for each group around the grand mean (Lipsey & Wilson, 2001). All between-groups health-related behavior moderator analyses were conducted in a pairwise fashion.

In addition, for each behavioral category, we tested the likelihood of data censoring using a trim and fill procedure, which addresses problems associated with any form of data censoring, including publication bias (Duval & Tweedie, 2000). The trim and fill procedure is a nonparametric statistical technique that examines the symmetry and distribution of effect sizes plotted by the inverse of the variance or standard error. This technique first estimates the number of studies that may be missing because of data censoring. Then, the trim and fill procedure calculates hypothetical effects for potentially omitted studies and then reestimates the average effect size and confidence intervals on the basis of the influence of studies that would have been included in the analyses if they had been published. For effect sizes that were predominantly in the negative direction (i.e., all domains except activity), the program required that we first reversed the sign of all the effects before running the trim and fill analyses.

The trim and fill procedure was performed with the DVBID library (Biggerstaff, 2000) using the S-Plus statistical computing program. This program generates three estimators of missing studies, L_0, R_0, and Q_0. We

used the L_0 estimator because it is the most robust estimator (Duval & Tweedie, 2000).

Results

For clarity and consistency, the effects were coded so that they represented the relationship between positive aspects of conscientiousness (e.g., restraint; discipline; self-control or, the inverse of psychoticism; disinhibition) and the health-deleterious aspects of the behavioral categories (e.g., smoking cigarettes, drunk driving). The exception to this rule is activity, given that no studies used measures to assess inactivity. Therefore, results for activity should be interpreted as representing the relationship between positive aspects of conscientiousness and the health-promoting aspects of the behavioral category.

Overall Relationships Between Health Behaviors and Conscientiousness-Related Traits

Table 3 shows the average correlation, number of studies, total sample size, 95% confidence interval, and heterogeneity statistic for the relationship between conscientiousness and each behavioral domain. According to the 95% confidence intervals, conscientiousness-related traits significantly predicted each behavioral domain (i.e., zero was not included in the interval). The largest predictive relationship found between conscientiousness-related traits and a behavioral domain was for drug use ($r = -.28$), whereas the smallest was for activity ($r = .05$). Correlations for the behavioral domains of excessive alcohol use, unhealthy eating, risky driving, risky sex, suicide, tobacco use, and violence ranged from $-.12$ to $-.25$. Tests of heterogeneity for each behavioral domain were significant ($p < .05$), indicating the appropriateness of moderator analyses. To avoid capitalizing on chance, a more conservative significance level ($p < .01$) was used for all the moderator analyses (i.e., Q_B).

The trim and fill analyses (L_0) revealed no significant effect of data censoring on the average correlations for each domain. None of the confidence intervals for the behavioral categories included zero.

Relationships Between Health Behaviors and Conscientiousness-Related Traits Moderated by Facet of Conscientiousness

We expected the six facets of conscientiousness to show variability in their relations to the health behavior domains. Table 4 shows the average correlation for each of the six factors of Conscientiousness and each behavioral domain. Subscripts accompany each effect size to indicate significant differences ($p < .01$) based on paired between-groups heterogeneity analyses of variance.

In line with our hypotheses, Self-Control and Traditionalism were the most consistent predictors of health behaviors. The domains of Responsibility and Virtue also were consistent predictors of most of the health-related behaviors for which they were coded. The domain of Responsibility was the most variable: Responsibility was tied for strongest predictor of suicide ($r = -.25$) and violence ($r = -.26$), was the second strongest predictor of drug use ($r = -.32$), yet was one of the weakest predictors of activity ($r = .03$).

Industriousness and Order generally showed smaller predictive relations to the health-related behaviors, with the notable exception of the stronger relationship between Industriousness and activity ($r = .18$). The effect sizes for Industriousness ranged from $-.06$ to $-.22$, and the effect sizes for Order ranged in magnitude from .01 to $-.22$. As we expected, these trait domains tended to show lower levels of predictive validity than the other four factors.

Relationships Between Health Behaviors and Conscientiousness-Related Traits Moderated by Measurement Outcome

Each health behavior was assessed using a variety of methods and measures. The second moderator we considered was the type of measurement outcome used to assess the behavior. Table 5 shows the average correlation, number of samples, total sample size, and 95% confidence interval for the measurement outcomes associated with each behavioral domain. The relationship between conscientiousness and health behaviors was moderated by type of outcome in seven health behavior domains: activity, excessive alcohol use, drug use, unhealthy eating, risky driving, suicide, and violence.

Table 3
Average Correlations for Conscientiousness-Related Traits and Health-Related Behaviors, With Number of Studies, Ns for Sample, 95% Confidence Intervals (CIs), and Q Statistics

Health behavior	*r*	No. of studies	*N*	95% CI Lower	95% CI Upper	*Q*
Activity	.05	17	24,259	.04	.07	136.80
Excessive alcohol use	−.25	65	32,137	−.25	−.24	1,109.89
Drug use	−.28	44	36,573	−.29	−.27	662.21
Unhealthy eating	−.13	14	6,356	−.16	−.11	126.78
Risky driving	−.25	21	10,171	−.27	−.24	422.63
Risky sex	−.13	25	12,410	−.15	−.11	76.75
Suicide	−.12	19	6,087	−.14	−.09	123.47
Tobacco use	−.14	46	46,725	−.15	−.13	352.83
Violence	−.25	25	10,277	−.26	−.24	119.22

Note. All tests for heterogeneity were significant at $p < .05$.

Table 4
Average Correlations for Conscientiousness-Related Traits and Health-Related Behaviors by Facet of Conscientiousness

	Facet of Conscientiousness					
Health behavior	Industriousness	Order	Responsibility	Self-Control	Traditionalism	Virtue
Activity	$.18_{a,b}$	$.08_{b,c}$	$.03_{c}$	$.07_{b,c}$	$.23_{a}$	—
Excessive alcohol use	$-.08_{d}$	$-.15_{c}$	$-.18_{c}$	$-.29_{a}$	$-.21_{b}$	$-.25_{a,b}$
Drug use	$-.12_{d}$	$-.14_{d}$	$-.32_{b}$	$-.24_{c}$	$-.35_{a}$	$-.25_{c}$
Unhealthy eating	$-.22_{a}$	$.01_{b}$†	$-.05_{b}$	$-.08_{b}$†	$-.25_{a}$	—
Risky driving	$-.10_{c}$	$-.11_{c}$	$-.16_{c}$	$-.25_{b}$	$-.34_{a}$	$-.13_{c}$
Risky sex	$-.13_{a,b}$	$-.08_{b}$	$-.12_{a,b}$	$-.15_{a}$	$-.09_{a,b}$	—
Suicide	—	$-.22_{a,b}$	$-.25_{a}$	$-.10_{b}$	—	—
Tobacco use	$-.21_{a}$	$-.11_{b}$	$-.12_{b}$	$-.21_{a}$	—	—
Violence	$-.14_{b}$	$-.14_{b}$	$-.26_{a}$	$-.26_{a}$	$-.16_{b}$	$-.28_{a}$

Note. A dash indicates the factor was not coded or the coefficient was derived from one sample. Correlations with different subscripts differ significantly at $p < .01$, based on paired between-groups heterogeneity analyses of variance.
† Confidence interval includes zero.

The smallest overall relationship between conscientiousness and health behaviors was for activity level. As can be seen in Table 5, the type of measurement outcome moderated this effect ($Q_B = 6.12$, $p < .01$). In this case, studies that assessed activity level through self-report questions concerning how much and how often a person exercised were largely unrelated to conscientiousness ($r = .05$). In contrast, studies that focused on fitness level assessed as strength, endurance, and flexibility, had effect sizes more consistent with the other health-behavior domains ($r = .13$).

The second domain that showed a significant moderator effect by outcome was excessive alcohol use. Conscientiousness-related traits predicted the frequency and quantity measures better than measures assessing clinical, socially disruptive, and other destructive drinking patterns ($rs = -.27$ and $-.23$, respectively; $Q_B = 26.30$, $p < .01$).

Table 5
Average Correlations for Conscientiousness-Related Traits and Health-Related Behaviors by Outcome

					95% CI	
Health behavior	Outcome	r	No. of samples	N	Lower	Upper
Activity	Exercise (frequency/quantity)	$.05_{a}$	12	23,553	.04	.06
	Fitness level	$.13_{b}$	7	1,070	.07	.19
Excessive alcohol use	Heavy drinking	$-.23_{a}$	35	17,338	−.25	−.22
	Quantity/frequency	$-.27_{b}$	41	20,748	−.28	−.26
Drug use	Marijuana use	$-.33_{b}$	17	20,325	−.34	−.32
	Opiate/heroin use	$-.22_{a}$	5	2,189	−.25	−.18
	Polysubstance use	$-.24_{a}$	36	20,810	−.25	−.23
Unhealthy eating	Food selection	$-.25_{b}$	3	2,850	−.28	−.23
	Obesity/weight/mass	$-.02_{a}$†	11	3,506	−.06	.01
Risky driving	Drunk driving/riding	$-.28_{b}$	11	6,298	−.30	−.26
	Speeding/hazardous driving/accidents	$-.25_{a}$	13	5,625	−.26	−.22
Risky sex	Number of partners	−.15	8	3,324	−.18	−.12
	Protected	−.11	12	6,975	−.13	−.09
	Risky acts/partners	−.15	14	6,351	−.17	−.12
Suicide	Attempted/completed	$-.08_{a}$	11	4,221	−.11	−.05
	Ideation/risk factors	$-.20_{b}$	11	2,220	−.24	−.16
Tobacco use	Smoke/not smoke	−.15	29	19,252	−.16	−.13
	Quantity/frequency	−.13	19	29,352	−.14	−.12
Violence	Aggressive delinquent acts	$-.26_{b}$	15	6,057	−.28	−.24
	Conviction/detention/incarceration	$-.20_{a}$	4	3,135	−.23	−.17
	Interpersonal aggression	$-.26_{b}$	10	3,904	−.29	−.24
	Sexual aggression	$-.17_{a}$	4	1,117	−.23	−.12

Note. Correlations with different subscripts differ significantly at $p < .01$, based on paired between-groups heterogeneity analyses of variance.
† Confidence interval (CI) includes zero.

The third domain that showed a significant moderator effect was drug use. Marijuana use showed stronger relations to conscientiousness-related traits than opiate/heroin use and poly-substance use (rs = −.33, −.22, and −.24 respectively; Q_Bs = 34.15 and 119.99, $p < .01$).

The fourth domain that showed a significant moderator effect was unhealthy eating. In this case, conscientiousness-related traits predicted measures assessing the selection and consumption of unhealthy food to a greater extent than measures assessing body mass, obesity, weight, and so forth (rs = −.25 and −.02, respectively; $Q_B = 91.76$, $p < .01$). The prediction of physiological outcomes from conscientiousness-related traits is most likely complicated by other factors, such as genetics and physiology, which also account for levels of obesity.

The fifth domain, risky driving, also showed a significant moderator effect by measurement outcome. Conscientiousness-related traits predicted measures assessing drunk driving or being the passenger in a vehicle driven by someone who was intoxicated to a greater extent than measures assessing speeding, accident involvement, or other hazardous driving behaviors (rs = −.28 and −.25, respectively; $Q_B = 6.40$, $p < .01$).

The type of measurement outcome also moderated the effect of conscientiousness on suicide. Specifically, conscientiousness-related traits predicted measures assessing suicidal ideation and risk factors better than measures assessing attempted or completed suicides (rs = −.20 and −.08, respectively; $Q_B = 20.06$, $p < .01$).

Finally, the effect of conscientiousness on violence was moderated by type of measurement outcome. Conscientiousness-related traits predicted measures assessing aggressive delinquent acts (e.g., conduct disorders, vandalism, physical threats) better than measures assessing violent crime convictions, detention, and incarceration and measures assessing date rape, forced sexual acts, and other sexual violence (rs = −.26, −.20, and −.17; $Q_B = 10.12$ and 8.94, respectively, $p < .01$). Similarly, conscientiousness-related traits predicted measures assessing interpersonal aggression (e.g., fighting, using a weapon in an attack) better than measures assessing violent crime convictions, detention, and incarceration and measures assessing date rape, forced sexual acts, and other sexual violence (rs = −.26, −.20, and −.17; $Q_B = 9.87$ and 9.18, respectively, $p < .01$).

Relationships Between Health Behaviors and Conscientiousness-Related Traits Moderated by Age

We hypothesized that age-related trends showing increases in conscientiousness-related traits and decreases in the enactment of health-degrading behaviors should result in smaller predictive relationships in older samples. Table 6 shows the average correlation, number of samples, total sample size, and 95% confidence interval for each behavioral domain by age above and below 30 years. We found evidence to support our hypothesis for the domains of excessive alcohol use, drug use, unhealthy eating, risky driving, and tobacco use (all Q_Bs > 6.64, $p < .01$). The same pattern was found for activity, but in this case, the change in magnitude indicates a drop in a health-promoting behavior. In general, studies that relied on samples over the age of 30 reported smaller effect sizes.

Discussion

This meta-analysis demonstrates that the personality dimension of Conscientiousness is associated with the most important health-related behaviors. Friedman et al. (1993) first identified conscientiousness as a predictor of longevity. Subsequent follow-ups to the

Table 6
Average Correlations for Conscientiousness-Related Traits and Health-Related Behaviors by Age Below and Above 30 Years

Health behavior	Age	r	No. of samples	N	95% CI Lower	95% CI Upper
Activity	< 30	$.21_a$	8	3,450	.18	.24
	> 30	$.03_b$	9	20,809	.01	.04
Excessive alcohol use	< 30	$-.28_a$	42	22,175	−.29	−.27
	> 30	$-.15_b$	23	9,962	−.17	−.13
Drug use	< 30	$-.29_a$	38	32,905	−.30	−.28
	> 30	$-.18_b$	6	3,002	−.21	−.14
Unhealthy eating	< 30	$-.18_a$	9	4,649	−.20	−.15
	> 30	$-.02_b$†	5	1,707	−.07	−.03
Risky driving	< 30	$-.27_a$	18	8,836	−.28	−.26
	> 30	$-.14_b$	3	1,335	−.20	−.09
Risky sex	< 30	−.13	23	10,873	−.15	−.11
	> 30	−.12	3	1,537	−.17	−.07
Suicide	< 30	−.11	14	5,613	−.14	−.09
	> 30	−.19	5	474	−.27	−.10
Tobacco use	< 30	$-.21_a$	30	16,794	−.22	−.19
	> 30	$-.10_b$	16	29,931	−.11	−.09
Violence	< 30	−.25	22	9,604	−.25	−.23
	> 30	−.32	3	673	−.38	−.26

Note. Correlations with different subscripts differ significantly at $p < .01$, based on paired between-groups heterogeneity analyses of variance.
† Confidence interval (CI) includes zero.

Terman data by Friedman and colleagues, as well as studies by many others, have examined the relationship between facets of conscientiousness and various health-related factors (e.g., Cooper et al., 2000; Tucker et al., 1995). Before the present meta-analysis, no study had examined the relationship of conscientiousness to the set of health behaviors most strongly associated with the leading contributors to mortality. Although not tested directly, the findings of this study suggest the importance of investigating how conscientiousness is related to health outcomes through its effect on the behaviors known to affect health and mortality.

In line with the health process model by Adler and Matthews (1994) and the assertion by Contrada, Cather, and O'Leary (1999) that behaviors should play a significant role in mediating the relationship between personality and disease, this study establishes a consistent set of relationships between conscientiousness-related traits and health-related behaviors. Complementing research on hostility, which is primarily related to coronary heart disease (T. Q. Miller, Smith, Turner, Guijarro, & Hallet, 1996), and anxiety, which is primarily related to HIV risk and drug use (Blumberg & Dickey, 2003; Strain, 2002), conscientiousness has been shown to be related to these domains through its effect on the behaviors related to cardiovascular health (such as tobacco consumption, exercise, and healthy eating), as well as through its relation to risky sexual behaviors and illicit drug use. In addition, conscientiousness predicts other significant health-related contributors to mortality—getting in car accidents, exhibiting violent behaviors, and committing suicide. These latter behaviors tend to receive less attention in the field of personality and health, though they are just as important in contributing to mortality (McGinnis & Foege, 1993). However, unlike personality traits such as hostility and anxiety, conscientiousness is associated with all of these health-related behaviors. There appear to be multiple pathways for individuals lacking in conscientiousness to experience poor health outcomes.

Moderators of the Conscientiousness–Health Behavior Relationship

For each health-related behavior, the heterogeneity statistics indicated the effects could vary with the inclusion of a moderator variable. The moderator analyses assessed the type of conscientiousness measure used to predict the health behaviors, the measurement outcome within each health-related behavior, and age. We found significant moderated relationships for each of these sets of moderators.

The first set of moderator analyses revealed important distinctions among the facets of conscientiousness. Because the Big Five has only recently been developed and has not had much of an opportunity to shape assessment practices, the typical approach to understanding and measuring conscientiousness is to use some unitary measure (e.g., Goldberg, 1992), which, as shown by Roberts, Bogg, Walton, Chernyshenko, and Stark (2004), is best subsumed under the order facet. Only recently have investigators moved to a more deliberate and systematic assessment of conscientiousness to take advantage of the well-known increment in validity that is gained by using more specific levels of measurement (e.g., Ashton, 1998; Mershon & Gorsuch, 1988; Paunonen, 1998; Paunonen & Ashton, 2001). It is clear from our analyses of the factors of Conscientiousness that increases in predictive validity can be achieved when specific facets of conscientiousness are used rather than pooling all measures into one large domain measure (i.e., relying on a measure of order as a proxy for the larger domain of Conscientiousness).

As indicated by the frameworks of Clark and Watson (1999) and Donovan et al. (1991), the facets of responsibility, self-control, and traditionalism showed the strongest predictions across the behavioral domains. The responsibility and self-control facets had already shown important relations to health behaviors. In contrast, very few models of conscientiousness include facets related to traditionalism (with the exception of the conventionality–unconventionality domain put forth by Donovan et al., 1991). Nonetheless, it appears to be among the best conscientiousness-related predictors of risky health behaviors. We also found consistent predictions (where available) for the facet of virtue, indicating its likely utility in accounting for individual differences in health-related behaviors, in spite of its absence from even the most progressive frameworks for conscientiousness and behavior. In contrast, we found that one facet of conscientiousness that has shown strong predictive relations to work-related behaviors, industriousness (Hough & Ones, 2002), had lower relative relations to health-related behaviors. It should be noted that the facet of order accounted for some predictive validity in each behavioral domain for which it was coded, with the exception of unhealthy eating, but it rarely rose to the level of the other facets. This finding is significant for researchers using shorter measures of the Big Five, as the order facet appears to be the primary construct assessed by these short measures of the Big Five trait of Conscientiousness (Roberts, Chernyshenko, et al., 2004).

The relationship between conscientiousness and health-related behaviors was moderated by type of measurement outcome in seven domains: activity, excessive alcohol use, drug use, unhealthy eating, risky driving, suicide, and violence. With the exceptions of activity level and risky driving, it appears that the effect of conscientiousness was lower for studies that focused on dichotomous outcomes (e.g., diagnosis of alcoholism, committed suicide) or complex outcomes that are most likely determined by multiple factors (e.g., body mass index). The results for the activity domain showed that typical self-report studies of activity level might underestimate the relationship with conscientiousness, possibly because of the socially desirable nature of the domain and inaccurate reporting. In contrast, studies of fitness that assess actual physical abilities show a larger effect size. For excessive alcohol use, the smaller relation for the measurement outcome of heavy drinking may be due to range restriction, as heavy drinking is typically assessed as a dichotomous outcome (e.g., diagnosis), or this may be due to the fact that clinical levels of drinking may be a more complex outcome saturated by other constructs that are comorbid with heavy drinking, such as depression (Burns & Teesson, 2002). Similarly, the dichotomous outcomes of attempted or completed suicides demonstrated lower predictive validity, most likely because the distribution of individuals is skewed toward not attempting suicide or because of range restriction.

The pattern across type of measurement outcome reconfirms two relatively well-known rules of assessment. Dichotomous outcomes tend to attenuate correlations, and behaviors are typically complex and overdetermined. Future research may benefit from using measurement outcomes with high fidelity, restricted content, and a continuous scale.

Finally, as was hypothesized on the basis of trends in previous research (Helson & Kwan, 2000), we found the predictive relationship between conscientiousness-related traits and activity, excessive alcohol use, drug use, unhealthy eating, risky driving, and tobacco use to be smaller in samples above age 30. For the health-related behaviors that showed decreases with age, there may be floor and ceiling effects that lessen the size of the relationships. If people increase in conscientiousness throughout the life course (Roberts, Robins, Caspi, & Trzesniewski, 2003) and discontinue risky health behaviors (Roberts & Bogg, 2004), then one possibility is that the base rate for the behaviors becomes so low as to preclude a correlation. The opposite finding for activity suggests that activity levels and fitness decrease after age 30, a finding that reflects evidence of declines in activity levels that begin shortly after adolescence and continue throughout adulthood (P. M. Barnes & Schoenborn, 2003). Overall, the results provide a rough sketch of how the relationships between health behaviors and conscientiousness-related traits shape each other over time.

The broader developmental picture that emerges from the age differences in predictive validity is one of transaction between conscientiousness and health-related behaviors. It is possible that changes in the behaviors contribute to the changes in conscientiousness. The acts of quitting smoking, eating well, and diminishing one's drug and excessive alcohol consumption may contribute to the increases in conscientiousness found across the life course (Roberts & Bogg, 2004). In turn, gains in conscientiousness may contribute to decreases in risky health behaviors.

Limitations, Implications, Conclusions

This is the most comprehensive study to date demonstrating the importance of the personality trait domain of Conscientiousness in the health process. Three points merit emphasis: (a) The effects of conscientiousness-related traits were consistent across health-related behaviors, (b) the effect sizes were as large or larger than many other risk factors for health (Meyer et al., 2001), and (c) the sheer amount of data synthesized provides increased confidence in the nature of the findings. Nonetheless, the study has limitations particular to the method of meta-analysis and to the domain studied.

As is appropriate in any meta-analysis, we made attempts to account for data censoring by securing as many unpublished data sources as possible and by using statistical tools to account for the possible effects of excluded studies. Although the trim and fill analyses showed no significant effect of data censoring, the small number of studies available for some of the health-related behaviors merits some caution. In particular, the domains of activity and unhealthy eating—the two most important health-related behaviors—generated the fewest number of studies. It is clear these domains are ripe for additional primary research concerning the magnitude of their relationship to conscientiousness-related traits.

It also should be noted that not all of the studies used the highest quality measures of personality or health behaviors, nor did they use study designs that permitted the clearest inferences. Almost all studies used self-reports and were cross-sectional in nature. This is a weakness of the primary research and, by extension, the results of the present meta-analysis. The extent to which observer, online, or prospective studies might replicate findings such as these is an open and important issue for personality and health-related behavior research. Future research should concentrate on gathering observer and experience sampling ratings (e.g., act frequency, daily diary) of personality and actual behaviors and aggregate them over time to provide a more definitive test of the relationship between conscientiousness and health-related behaviors.

Finally, very few studies used a measure created to comprehensively assess conscientiousness, leaving the question open as to whether more recent efforts at investigating the lower order structure of Conscientiousness might demonstrate consistent or higher levels of predictive validity across the health-related behaviors (e.g., Roberts, Bogg, et al., 2004). Furthermore, existing measures of personality emphasize specific aspects of conscientiousness over others. For example, in our coding for facets of conscientiousness, it became clear that many investigators prefer to use measures of self-control in research pertaining to health-related behaviors. Although this preference is a matter of professional judgment, it would appear to be limiting—especially given our findings for the other facets—if the goal is to understand the multiple complex relationships between various health behaviors and conscientiousness, let alone personality in general.

Similarly, it became clear that some of the health-related behaviors require more attention than others. In particular, as indicated by the lower number of studies for the domains of activity, unhealthy eating, and suicide, more research is needed linking these health-related behaviors to conscientiousness-related traits. Alcohol, drug, and tobacco use have received a disproportionate amount of attention, especially in conjunction with self-control, impulsivity, and impulse control measures. While these behavioral domains are important to health, the others are critical to complete understanding of health.

In spite of the limitations, the results of this study send a clear message: Conscientiousness consistently predicts the most important health-related behaviors. It should be noted that a comprehensive analysis of the overall relations of the other five-factor dimensions to the health-related behaviors addressed in this study is not currently available, leaving those relations largely unknown and, in many cases, unexplored. The insights derived from this study suggest the potential value of intervention programs that focus on individuals who demonstrate a lack of conscientiousness in conjunction with unhealthy behaviors. It also invites alternative intervention ideas, such as targeting a broad range of conscientiousness-related behaviors, in addition to specific health behaviors. Although causal relations cannot be inferred from the correlational analyses contained in this meta-analysis, it seems reasonable to expect that if conscientiousness can be changed then it should have an effect on the full spectrum of health behaviors.

With the advent of modern medicine, we have entered a phase of history in which most of the primary reasons for premature mortality have behavioral substrates. This study suggests the obvious inference that if behaviors contribute to mortality, then psychological factors, like conscientiousness, or the lack thereof, should be among the factors associated with important health outcomes.

References

References marked with an asterisk indicate studies included in the meta-analyses.

Adler, N., & Matthews, K. (1994). Health psychology: Why do some people get sick and some stay well? *Annual Review of Psychology, 45*, 229–259.

*Allan, L. M., Williams, J. H., Wellman, N. A., Tonin, J., Taylor, E., Feldon, J., & Rawlins, J. N. P. (1995). Effects of tobacco smoking, schizotypy and number of pre-exposures on latent inhibition in healthy subjects. *Personality and Individual Differences, 19,* 893–902.

*Allen, T. J., Moeller, F. G., Rhoades, H. M., & Cherek, D. R. (1998). Impulsivity and history of drug dependence. *Drug and Alcohol Dependence, 50,* 137–145.

*Allsopp, J. F., & Feldman, M. P. (1974). Extraversion, neuroticism, psychoticism and antisocial behavior in schoolgirls. *Social Behavior and Personality, 2,* 184–190.

*Alterman, A. I., Hall, J. G., Purtill, J. J., Searles, J. S., Holahan, J. M., & McLellan, A. T. (1990). Heavy drinking and its correlates in young men. *Addictive Behaviors, 15,* 95–103.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Anderson, K. W., & McLean, P. D. (1997). Conscientiousness in depression: Tendencies, predictive utility, and longitudinal stability. *Cognitive Therapy and Research, 21,* 223–238.

*Angst, J., & Clayton, P. J. (1998). Personality, smoking and suicide: A prospective study. *Journal of Affective Disorders, 51,* 55–62.

Apter, A., Plutchik, R., & van Praag, H. M. (1993). Anxiety, impulsivity and depressed mood in relation to suicidal and violent behavior. *Acta Psychiatrica Scandinavica, 87*, 1–5.

*Arai, Y., & Hisamichi, S. (1998). Self-reported exercise frequency and personality: A population-based study in Japan. *Perceptual and Motor Skills, 87*, 1371–1375.

*Arai, Y., Hosokawa, T., Fukao, A., Izumi, Y., & Hisamichi, S. (1997). Smoking behaviour and personality: A population-based study in Japan. *Addiction, 92,* 1023–1033.

*Arneklev, B. J., Grasmick, H. G., Tittle, C. R., & Bursik, R. J., Jr. (1993). Low self-control and imprudent behavior. *Journal of Quantitative Criminology, 9,* 225–247.

*Arnett, J. (1990). Contraceptive use, sensation seeking, and adolescent egocentrism. *Journal of Youth and Adolescence, 19,* 171–180.

*Arthur, W., Jr., & Graziano, W. G. (1996). The five-factor model, conscientiousness, and driving accident involvement. *Journal of Personality, 64,* 593–618.

Ashton, M. C. (1998). Personality and job performance: The importance of narrow traits. *Journal of Organizational Behavior, 19*, 289–303.

*Barnes, G. E., Malamuth, N. M., & Check, J. V. (1984). Personality and sexuality. *Personality and Individual Differences, 5,* 159–172.

*Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (1999). Gambling and alcohol use among youth: Influences of demographic, socialization, and individual factors. *Addictive Behaviors, 24,* 749–767.

Barnes, P. M., & Schoenborn, C. A. (2003). Physical activity among adults: United States, 2000. Advance data from vital and health statistics: No. 333. Hyattsville, MD: National Center for Health Statistics.

*Barnett, O. W., & Hamberger, L. K. (1992). The assessment of maritally violent men on the California Psychological Inventory. *Violence and Victims, 7,* 15–28.

*Beckwith, J. B. (1986). Personality variables and eating, drinking, and smoking in adult women. *Social Behavior and Personality, 14,* 221–238.

*Bickel, W. K., Odum, A. L., & Madden, G. J. (1999). Impulsivity and cigarette smoking: Delay discounting in current, never, and ex-smokers. *Psychopharmacology, 146,* 447–454.

Biggerstaff, B. (2000). S-Plus library DVBID (dvbidlib.exe) [Computer software]. Retrieved from http://www.stat.colostate.edu/~bradb/files/

Biostat. (2000). Comprehensive meta-analysis [Computer software]. Englewood, NJ: Author.

*Block, J., Block, J. H., & Keyes, S. (1988). Longitudinally foretelling drug usage in adolescence: Early childhood personality and environmental precursors. *Child Development, 59,* 336–355.

Blumberg, S. J., & Dickey, W. C. (2003). Prevalence of HIV risk behaviors, risk perceptions, and testing among U.S. adults with mental disorders. *Journal of Acquired Immune Deficiency Syndromes, 32,* 77–79.

*Bogaert, A. F. (1993). Personality, delinquency, and sexuality: Data from three Canadian samples. *Personality and Individual Differences, 15,* 353–356.

*Bogaert, A. F., & Fisher, W. A. (1995). Predictors of university men's number of sexual partners. *Journal of Sex Research, 32,* 119–130.

*Booth-Kewley, S., & Vickers, R. R., Jr. (1994). Associations between major domains of personality and health behavior. *Journal of Personality, 62*, 281–298.

*Brandon, J. E., & Loftin, J. M. (1991). Relationship of fitness to depression, state and trait anxiety, internal health locus of control, and self-control. *Perceptual and Motor Skills, 73,* 563–568.

*Breakwell, G. M. (1996). Risk estimation and sexual behaviour: A longitudinal study of 16–21-year-olds. *Journal of Health Psychology, 1,* 79–91.

*Brook, J. S., Whiteman, M., Gordon, A. S., & Cohen, P. (1986). Dynamics of childhood and adolescent personality traits and adolescent drug use. *Developmental Psychology, 22,* 403–414.

*Brooks, R. J. (2002). The effects of racial/ethnic identity, parenting practices, and impulse control on drug use, problem behaviors, self-concept, and depression in African-American adolescents (Doctoral dissertation, Georgia State University, 2002). *Dissertation Abstracts International, 63,* 1555.

Burke, G. L., Arnold, A. M., Bild, D. E., Cushman, M., Fried, L. P., Newman, A., et al. (2001). Factors associated with healthy aging: The cardiovascular health study. *Journal of the American Geriatrics Society, 49,* 254–262.

Burns, L., & Teesson, M. (2002). Alcohol use disorders comorbid with anxiety, depression and drug use disorders: Findings from the Australian National Survey of Mental Health and Well-Being. *Drug and Alcohol Dependence, 68,* 299–307.

*Cabiles, P. (1976). Impulsivity and depression as factors in suicidal males (Doctoral dissertation, Long Island University, 1976). *Dissertation Abstracts International, 37,* 1890.

*Camatta, C. D., & Nagoshi, C. T. (1995). Stress, depression, irrational beliefs, and alcohol use and problems in a college student sample. *Alcoholism: Clinical and Experimental Research, 19,* 142–146.

*Canals, J., Blade, J., & Domenech, E. (1997). Smoking and personality predictors in young Spanish people. *Personality and Individual Differences, 23,* 905–908.

*Carey, W. B., Hegvik, R. L., & McDevitt, S. C. (1988). Temperamental factors associated with rapid weight gain and obesity in middle childhood. *Developmental and Behavioral Pediatrics, 9,* 194–198.

*Carton, S., Jouvent, R., & Widloecher, D. (1994). Sensation seeking, nicotine dependence, and smoking motivation in female and male smokers. *Addictive Behaviors, 19,* 219–227.

Caspi, A., Begg, D., Dickson, N., Harrington, H., Langley, J., Moffitt, T. E., & Silva, P. A. (1997). Personality differences predict health-risk behaviors in young adulthood: Evidence from a longitudinal study. *Journal of Personality and Social Psychology, 73*, 1052–1063.

*Caspi, A., Begg, D., Dickson, N., Langley, J., Moffitt, T. E., McGee, R., & Silva, P. A. (1995). Identification of personality types at risk for poor health and injury in late adolescence. *Criminal Behaviour and Mental Health, 5,* 330–350.

*Cavaiola, A. A., Strohmetz, D. B., Wolf, J. M., & Lavender, N. J. (2003).

Comparison of DWI offenders with non-DWI individuals on the MMPI-2 and the Michigan Alcoholism Screening Test. *Addictive Behaviors, 28,* 971–977.

*Chalmers, D. K., Bowyer, C. A., & Olenick, N. L. (1990). Problem drinking and obesity: A comparison in personality patterns and life-style. *International Journal of the Addictions, 25,* 803–817.

*Chernyshenko, O. S. (2003). Applications of ideal point approaches to scale construction and scoring in personality measurement: The development of a six-faceted measure of conscientiousness (Doctoral dissertation, University of Illinois at Urbana–Champaign, 2002). *Dissertation Abstracts International, 63,* 5556.

*Cherpitel, C. J. (1993). Alcohol, injury, and risk-taking behavior: Data from a national sample. *Alcoholism: Clinical and Experimental Research, 17,* 762–766.

*Clapper, R. L., Martin, C. S., & Clifford, P. R. (1994). Personality, social environment, and past behavior as predictors of late adolescent alcohol use. *Journal of Substance Abuse, 6,* 305–313.

Clark, L. A., & Watson, D. (1999). Temperament: A new paradigm for trait psychology. In L. Pervin & O. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 399–423). New York: Guilford Press.

*Clift, S. M., Wilkins, J. C., & Davidson, E. A. (1993). Impulsiveness, venturesomeness and sexual risk-taking among heterosexual GUM clinic attenders. *Personality and Individual Differences, 15,* 403–410.

*Colder, C. R., & Chassin, L. (1997). Affectivity and impulsivity: Temperament risk for adolescent alcohol involvement. *Psychology of Addictive Behaviors, 11,* 83–97.

*Colder, C. R., & Stice, E. (1998). A longitudinal study of the interactive effects of impulsivity and anger on adolescent problem behavior. *Journal of Youth and Adolescence, 27,* 255–274.

*Conner, M., & Abraham, C. (2001). Conscientiousness and the theory of planned behavior: Toward a more complete model of the antecedents of intentions of behavior. *Personality and Social Psychology Bulletin, 27,* 1547–1561.

Contrada, R. J., Cather, C., & O'Leary, A. (1999). Personality and health: Dispositions and processes in disease susceptibility and adaptation to illness. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 576–604). New York: Guilford Press.

*Cook, M., Young, A., Taylor, D., & Bedford, A. (1998). Personality correlates of alcohol consumption. *Personality and Individual Differences, 24*, 641–647.

*Cooper, M. L., Agocha, V. B., & Sheldon, M. S. (2000). A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. *Journal of Personality, 68,* 1059–1088.

Cooper, M. L., Wood, P. K., Orcutt, H. K., & Albino, A. (2003). Personality and the predisposition to engage in risky or problem behaviors during adolescence. *Journal of Personality and Social Psychology, 84,* 390–410.

*Costa, F. M., Jessor, R., Fortenberry, J. D., & Donovan, J. E. (1996). Psychosocial conventionality, health orientation, and contraceptive use in adolescence. *Journal of Adolescent Health, 18,* 404–416.

Costa, P. T., Busch, C. M., Zonderman, A. B., & McCrae, R. R. (1986). Correlations of MMPI factor scales with measures of the five factor model of personality. *Journal of Personality Assessment, 50,* 640–650.

Costa, P. T., & McCrae, R. R. (1985). Comparison of EPI and psychoticism scales with measures of the five-factor model of personality. *Personality and Individual Differences, 6,* 587–597.

Costa, P. T., & McCrae, R. R. (1988). From catalog to classification: Murray's needs and the five-factor model. *Journal of Personality and Social Psychology, 55,* 258–265.

*Courneya, K. S., Bobick, T. M., & Schinke, R. J. (1999). Does the theory of planned behavior mediate the relation between personality and exercise behavior? *Basic and Applied Social Psychology, 21,* 317–324.

*Courneya, K. S., & Hellsten, L. M. (1998). Personality correlates of exercise behavior, motives, barriers and preferences: An application of the five-factor model. *Personality and Individual Differences, 24,* 625–633.

Cramer, D. (1993). Personality and marital dissolution. *Personality and Individual Differences, 14*, 605–607.

*Crocker, J. (2003). [Personality and health behaviors in an undergraduate sample]. Unpublished raw data.

*Donovan, J. E. (1993). Young adult drinking-driving: Behavioral and psychosocial correlates. *Journal of Studies on Alcohol, 54,* 600–613.

*Donovan, J. E., Jessor, R., & Costa, F. M. (1991). Adolescent health behavior and conventionality–unconventionality: An extension of problem-behavior therapy. *Health Psychology, 10,* 52–61.

*Donovan, J. E., Jessor, R., & Jessor, L. (1983). Problem drinking in adolescence and young adulthood. *Journal of Studies on Alcohol, 44,* 109–137.

*Dorman, L. M. (1985). Personality correlates of bulimic, anorectic, and obese women (Doctoral dissertation, Case Western Reserve University, 1984). *Dissertation Abstracts International, 45,* 2683.

*Duberstein, P. R., Yeates, C., & Caine, E. D. (1994). Age differences in the personality characteristics of suicide completers: Preliminary findings from a psychological autopsy study. *Psychiatry: Interpersonal and Biological Processes, 57,* 213–224.

*Duncan, L. (2003). [Personality and health relations]. Unpublished raw data.

Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56,* 455–463.

*Dykeman, C., Daehlin, W, Doyle, S., & Flamer, H. S. (1996). Psychological predictors of school-based violence: Implications for school counselors. *School Counselor, 44,* 35–47.

*Earleywine, M., & Finn, P. R. (1991). Sensation seeking explains the relation between behavioral disinhibition and alcohol consumption. *Addictive Behaviors, 16,* 123–128.

*Earleywine, M., Finn, P. R., & Martin, C. S. (1990). Personality risk and alcohol consumption: A latent variable analysis. *Addictive Behaviors, 15,* 183–187.

*Eisen, S. V., Youngman, D. J., Grob, M. C., & Dill, D. L. (1992). Alcohol, drugs, and psychiatric disorders: A current view of hospitalized adolescents. *Journal of Adolescent Research, 7,* 250–265.

*Eliason, R. V. (2001). The roles of cognitive rigidity and impulsivity in adolescent suicide attempts (Doctoral dissertation, West Virginia University, 2000). *Dissertation Abstracts International, 62,* 1075.

*Eysenck, S. B. G., & McGurk, B. J. (1980). Impulsiveness and venturesomeness in a detention center population. *Psychological Reports, 47,* 1299–1306.

*Farrell, A. D., & Sullivan, T. N. (2000). Structure of the Weinberger Adjustment Inventory Self-Restraint Scale and its relation to problem behaviors in adolescence. *Psychological Assessment, 12,* 394–401.

*Farrington, D. P. (1989). Early predictors of adolescent aggression and adult violence. *Violence and Victims, 4,* 79–100.

*Finn, P. R., Sharkansky, E. J., Brandt, K. M., & Turcotte, N. (2000). The effects of familial risk, personality, and expectancies on alcohol use and abuse. *Journal of Abnormal Psychology, 109,* 122–133.

*Fontaine, K. R. (1994). Personality correlates of sexual risk-taking among men. *Personality and Individual Differences, 17,* 693–694.

Friedman, H. S. (2000). Long-term relations of personality and health: Dynamisms, mechanisms, tropisms. *Journal of Personality, 68,* 1089–1108.

Friedman, H. S., Tucker, J. S., & Reise, S. P. (1995). Personality dimensions and measures potentially relevant to health: A focus on hostility. *Annals of Behavioral Medicine, 17,* 245–253.

*Friedman, H. S., Tucker, J. S., Schwartz, J. E., Martin, L. R., Tomlinson-Keasey, C., Wingard, D. L., & Criqui, M. H. (1995). Childhood conscientiousness and longevity: Health behaviors and cause of death. *Journal of Personality and Social Psychology,* 68, 696–703.

Friedman, H. S., Tucker, J. S., Tomlinson-Keasey, C., Schwartz, J. E., Wingard, D. L., & Criqui, M. H. (1993). Does childhood personality predict longevity? *Journal of Personality and Social Psychology, 65*, 176–185.

*Furnham, A., & Saipe, J. (1993). Personality correlates of convicted drivers. *Personality and Individual Differences, 14,* 329–336.

*Ge, X., & Conger, R. D. (1999). Adjustment problems and emerging personality characteristics from early to late adolescence. *American Journal of Community Psychology, 27,* 429–459.

*Geist, C. R., & Herrmann, S. M. (1990). A comparison of the psychological characteristics of smokers, ex-smokers, and nonsmokers. *Journal of Clinical Psychology, 46,* 102–105.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4*, 26–42.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist, 48*, 26–34.

Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe* (Vol. 7, pp. 7–28). Tilburg, the Netherlands: Tilburg University Press.

*Golding, J. F., Harpur, T., & Brent-Smith, H. (1983). Personality, drinking and drug-taking correlates of cigarette smoking. *Personality and Individual Differences, 4,* 703–706.

*Goldstein, J. W., & Sappington, J. T. (1977). Personality characteristics of students who became heavy drug users: An MMPI study of an avant-garde. *American Journal of Drug and Alcohol Abuse, 4,* 401–412.

*Grau, E., & Ortet, G. (1999). Personality traits and alcohol consumption in a sample of non-alcoholic women. *Personality and Individual Differences, 27,* 1057–1066.

*Greene, K., Krcmar, M., Walters, L. H., Rubin, D. L., Hale, J., & Hale, L. (2000). Targeting adolescent risk-taking behaviors: The contributions of egocentrism and sensation-seeking. *Journal of Adolescence, 23,* 439–461.

*Hallman, J., von Knorring, L., Edman, G., & Oreland, L. (1991). Personality traits and platelet monoamine oxidase activity in alcoholic women. *Addictive Behaviors, 16,* 553–541.

Halperin, J. M., Newcorn, J. H., Matier, K., Bedi, G., Hall, S., & Sharma, V. (1995). Impulsivity and the initiation of fights in children with disruptive disorders. *Journal of Child Psychology and Psychiatry, 36*, 119–1211.

Hampson, S. E., Andrews, J. A., Barckley, M., Lichtenstein, E., & Lee, M. E. (2000). Conscientiousness, perceived risk, and risk-reduction behaviors: A preliminary study. *Health Psychology, 19,* 496–500.

*Hampson, S. E., Severson, H. H., Burns, W. J., Slovic, P., & Fisher, K. J. (2001). Risk perception, personality factors and alcohol use among adolescents. *Personality and Individual Differences, 30,* 167–181.

*Heaven, P. C. L. (1989). Adolescent smoking, toughmindedness, and attitudes to authority. *Australian Psychologist, 24,* 27–35.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis.* Orlando, FL: Academic Press.

Helson, R., & Kwan, V. S. Y. (2000). Personality development in adulthood: The broad picture and processes in one longitudinal sample. In S. Hampson (Ed.), *Advances in personality psychology* (Vol. 1, pp. 77–106). London: Routledge.

*Hernandez, J. T., & DiClemente, R. J. (1992). Self-control and ego identity development as predictors of unprotected sex in late adolescent males. *Journal of Adolescence, 15,* 437–447.

*Hindelang, M. J. (1972). The relationship of self-reported delinquency to scales of the CPI and MMPI. *Journal of Criminal Law, Criminology and Police Sciences, 63,* 75–81.

*Hogan, J. (1989). Personality correlates of physical fitness. *Journal of Personality and Social Psychology, 56,* 284–288.

*Homant, R. J., Kennedy, D. B., & Howton, J. D. (1993). Sensation seeking as a factor in police pursuit. *Criminal Justice and Behavior, 20,* 293–305.

Horesh, N., Gothelf, D., Ofek, H., Weizman, T., & Apter, A. (1999). Impulsivity as a correlate of suicidal behavior in adolescent psychiatric inpatients. *Crisis, 20,* 8–14.

*Horesh, N., Rolnick, T., Iancu, I., Dannon, P., Lepkifker, E., Apter, A., & Kotler, M. (1997). Anger, impulsivity, and suicide risk. *Psychotherapy and Psychosomatics, 66,* 92–96.

*Horvath, P., & Zuckerman, M. (1993). Sensation seeking, risk appraisal, and risky behavior. *Personality and Individual Differences, 14,* 41–52.

Hough, L. M., & Ones, D. S. (2002). The structure, measurement, validity, and use of personality variables in industrial work, and organizational psychology. In N. Anderson, D. S. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of industrial, work, and organizational psychology* (Vol. 1, pp. 233–277). London: Sage.

*Huq, M., & Mahmud, S. H. (1994). Drug addicts and their personality traits. *Bangladesh Journal of Psychology, 14,* 17–26.

*Hutchinson, G. T., Patock-Peckham, J. A., Cheong, J., & Nagoshi, C. T. (1998). Irrational beliefs and behavioral misregulation in the role of alcohol abuse among college students. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 16,* 61–74.

*Jackson, C. P., & Matthews, G. (1988). The prediction of habitual alcohol use from alcohol related expectancies and personality. *Alcohol and Alcoholism, 23,* 305–314.

*Jacobs, M. A., & Spilken, A. Z. (1971). Personality patterns associated with heavy cigarette smoking in male college students. *Journal of Consulting and Clinical Psychology, 37,* 428–432.

*Jamison, R. N. (1979). Cigarette smoking and personality in male and female adolescents. *Psychological Reports, 44,* 842.

*Jansevics, R. R. (1995). Initial experiences with nicotine and the role of personality among light, heavy, and nonsmokers: Testing the sensitivity model of the acquisition of nicotine dependence (Doctoral dissertation, University of Washington, 1994). *Dissertation Abstracts International, 56,* 1110.

*Jessor, R., Chase, J. A., & Donovan, J. E. (1980). Psychosocial correlates of marijuana use and problem drinking in a national sample of adolescents. *American Journal of Public Health, 70,* 604–613.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102–138). New York: Guilford Press.

*Jorm, A. F., Rodgers, B., Jacomb, P. A., Christensen, H., Henderson, S., & Korten, A. E. (1999). Smoking and mental health: Results from a community survey. *The Medical Journal of Australia, 170,* 74–77.

Judge, T. A., Higgins, C. A., Thoresen, C. J., & Barrick, M. R. (1999). The Big Five personality traits, general mental ability, and career success across the life span. *Personnel Psychology, 52*, 621–652.

Junger, M., Stroebe, W., & van der Laan, A. M. (2001). Delinquency, health behavior, and health. *British Journal of Health Psychology, 6,* 103–120.

*Justus, A. N., Finn, P. R., & Steinmetz, J. E. (2000). The influence of traits of disinhibition on the association between alcohol use and risky sexual behavior. *Alcoholism: Clinical and Experimental Research, 24,* 1028–1035.

*Kashdan, T. B., Vetter, C. J., & Collins, L. (2003). *Substance use in college-aged individuals: Associations with personality and gender.* Manuscript submitted for publication.

*Kashden, J., Fremouw, W. J., Callahan, T. S., & Franzen, M. D. (1993). Impulsivity in suicidal and nonsuicidal adolescents. *Journal of Abnormal Child Psychology, 21,* 339–353.

*Kassel, J. D., Shiffman, S., Gnys, M., Paty, J., & Zettler-Segal, M. (1994). Psychosocial and personality differences in chippers and regular smokers. *Addictive Behaviors, 19,* 565–575.

Kelly, E., & Conley, J. (1987). Personality and compatibility: A prospec-

tive analysis of marital stability and marital satisfaction. *Journal of Personality and Social Psychology, 52*, 27–40.

Kirkcaldy, B., & Furnham, A. (1991). Extraversion, neuroticism, psychoticism and recreational choice. *Personality and Individual Differences, 12,* 737–745.

*Kohn, P. M., & Coulas, J. T. (1985). Sensation seeking, augmenting–reducing, and the perceived and preferred effects of drugs. *Journal of Personality and Social Psychology, 48,* 99–106.

*Kopstein, A. N. (1999). Motivational and personality factors associated with adolescent alcohol, tobacco, and marijuana use (Doctoral dissertation, Johns Hopkins University, 1999). *Dissertation Abstracts International, 60,* 1558.

*Krueger, R. F., Schmutte, P. S., Caspi, A., Moffitt, T. E., Campbell, K., & Silva, P. A. (1994). Personality traits are linked to crime among men and women: Evidence from a birth cohort. *Journal of Abnormal Psychology, 103,* 328–338.

*La Grange, L., Jones, T. D., Erb, L., & Reyes, E. (1995). Alcohol consumption: Biochemical and personality correlates in a college student population. *Addictive Behaviors, 20,* 93–103.

*Lazarus, S., & Galassi, J. P. (1994). Affect and cognitions in obese binge eaters and nonbinge eaters: The association between depression, anxiety, and bulimic cognitions. *Eating Disorders, 2,* 141–157.

*Leaman, A., & Fitch, M. (1987). Impulsiveness and venturesomeness in young motorcyclists. *Personality and Individual Differences, 8,* 945–946.

*Lehnert, K. L., Overholser, J. C., & Spirito, A. (1994). Internalized and externalized anger in adolescent suicide attempters. *Journal of Adolescent Research, 9,* 105–119.

*Lejoyeux, M., Feuche, N., Loi, S., Solomon, J., & Ades, J. (1998). Impulse-control disorders in alcoholics are related to sensation seeking and not to impulsivity. *Psychiatry Research, 81,* 149–155.

*Lennings, C. J. (1994). Time perspective, mood disturbance, and suicide liberation. *Omega: Journal of Death and Dying, 29,* 153–164.

*Lester, D. (1987). Suicidal preoccupation and dysthymia in college students. *Psychological Reports, 61,* 762.

*Lester, D. (1990). Impulsivity and threatened suicide. *Personality and Individual Differences, 11,* 1097–1098.

*Lester, D. (1993). Functional and dysfunctional impulsivity and depression and suicidal ideation in a subclinical population. *Journal of General Psychology, 120,* 187–188.

*Li, X. (1995). A study of intelligence and personality in children with simple obesity. *International Journal of Obesity, 19,* 355–357.

*Lipkus, I. M., Barefoot, J. C., Williams, R. B., & Siegler, I. C. (1994). Personality measures as predictors of smoking initiation and cessation in the UNC Alumni Heart Study. *Health Psychology, 13,* 149–155.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis.* Thousand Oaks, CA: Sage.

*LoCastro, J., Spiro, A., III, Monnelly, E., & Ciraulo, D. (2000). Personality, family history, and alcohol use among older men: The VA Normative Aging Study. *Alcoholism: Clinical and Experimental Research, 24,* 501–511.

Lolas, F., Gomez, A., & Suarez, L. (1991). EPQ-R and suicide attempt: The relevance of psychoticism. *Personality and Individual Differences, 12,* 899–902.

*Loper, R. G., Kammeier, M. L., & Hoffman, H. (1973). MMPI characteristics of college freshman males who later became alcoholics. *Journal of Abnormal Psychology, 82,* 159–162.

*Lopez-Torrecillas, F., Garcia, J. F. G., Garcia, M. P., Izquierdo, D. G., & Sanchez-Barrera, M. B. (2000). Variables modulating stress and coping that discriminate drug consumers from low or nondrug consumers. *Addictive Behaviors, 25,* 161–165.

*Luengo, M. A., Carillo-de-la-Pena, M. T., Otero, J. M., & Romero, E. (1994). A short-term longitudinal study of impulsivity and antisocial behavior. *Journal of Personality and Social Psychology, 66,* 542–548.

*Luengo, M. A., Otero, J. M., Carillo-de-la-Pena, M. T., & Miron, L. (1994). Dimensions of antisocial behaviour in juvenile delinquency: A study of personality variables. *Psychology, Crime and Law, 1,* 27–37.

*Lynam, D., Moffitt, T., & Stouthamer-Loeber, M. (1993). Explaining the relation between IQ and delinquency: Class, race, test motivation, school failure, or self-control? *Journal of Abnormal Psychology, 102,* 187–196.

MacDonald, D. A. (2000) Spirituality: Description, measurement, and relation to the five factor model of personality. *Journal of Personality, 68*, 153–197.

*Malamuth, N. M. (1986). Predictors of naturalistic sexual aggression. *Journal of Personality and Social Psychology, 50,* 953–962.

*Mann, J. J., Waternaux, C., Haas, G. L., & Malone, K. M. (1999). Toward a clinical model of suicidal behavior in psychiatric patients. *American Journal of Psychiatry, 156,* 181–189.

*Marks, G. R., & Lutgendorf, S. K. (1999). Perceived health competence and personality factors differentially predict health behaviors in older adults. *Journal of Aging and Health, 11,* 221–239.

*Martin, C. A., Milich, R., Martin, W. R., Hartung, C. M., & Haigler, E. D. (1997). Gender differences in adolescent psychiatric outpatient substance use: Associated behaviors and feelings. *Journal of the Academy of Child & Adolescent Psychiatry, 36,* 486–494.

*Martin, E. D., & Sher, K. J. (1994). Family history of alcoholism, alcohol use disorders and the five-factor model of personality. *Journal of Studies on Alcohol, 55,* 81–90.

Martin, L. R., & Friedman, H. S. (2000). Comparing personality scales across time: An illustrative study of validity and consistency in life-span archival data. *Journal of Personality, 68,* 85–110.

*Martin, N. G., & Boomsma, D. I. (1989). Willingness to drive when drunk and personality: A twin study. *Behavior Genetics, 19,* 97–111.

*Martin, W. R., Hewett, B. B., Baker, A. J., & Haertzen, C. A. (1977). Aspects of the psychopathology and pathophysiology of addiction. *Drug and Alcohol Dependence,* 2, 185–202.

McCrae, R. R., Costa, P. T., & Busch, C. M. (1986). Evaluating comprehensiveness in personality systems: The California Q-set and the five-factor model. *Journal of Personality, 54,* 430–446.

McCrae, R. R., Costa, P. T., Jr., & Piedmont, R. L. (1993). Folk concepts, natural language, and psychological constructs: The California Psychological Inventory and the five-factor model. *Journal of Personality, 61*, 1–26.

McGinnis, M., & Foege, W. (1993). Actual causes of death in the United States. *Journal of the American Medical Association, 270*, 2207–2212.

*McGue, M., Slutske, W., & Iacono, W. G. (1999). Personality and substance use disorders: II. Alcoholism versus drug use disorders. *Journal of Consulting and Clinical Psychology, 67,* 394–404.

*Meadows, W. R. (1996). The role of individual difference variables in accounting for associations between alcohol consumption and sexual risk-taking (Doctoral dissertation, Florida State University, 1995). *Dissertation Abstracts International, 56,* 7050.

Mershon, B., & Gorsuch, R. L. (1988). Number of factors in personality sphere: Does increase in factors increase predictability of real life criteria? *Journal of Personality and Social Psychology, 55*, 675–680.

Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., et al. (2001). Psychological testing and psychological assessment. *American Psychologist, 56,* 128–165.

*Michaud, M. A. (2002). Personality and exercise: A prospective analysis using the transtheoretical model of behavior change (Doctoral dissertation, Ohio University, 2002). *Dissertation Abstracts International, 62,* 4262.

*Miller, J. D. (2002). Personality and problem behaviors: An exploration of the mechanisms (Doctoral dissertation, University of Kentucky, 2002). *Dissertation Abstracts International, 63,* 1038.

Miller, T. Q., Smith, T. W., Turner, C. W., Guijarro, M. L., & Hallet, A. J. (1996). A meta-analytic review of research on hostility and physical health. *Psychological Bulletin, 119,* 322–348.

*Mitchell, S. H. (1999). Measures of impulsivity in cigarette smokers and non-smokers. *Psychopharmacology, 146,* 455–464.

*Musgrave-Musquart, D., Bromley, S. P., & Dalley, M. B. (1997). Personality, academic attribution, and substance use as predictors of academic achievement in college students. *Journal of Social Behavior and Personality, 12,* 501–511.

*Nagoshi, C. T. (1999). Perceived control of drinking and other predictors of alcohol use and problems in a college student sample. *Addiction Research, 7,* 291–306.

*Nagoshi, C. T., Walter, D., Muntaner, C., & Haertzen, C. A. (1992). Validation of the Tridimensional Personality Questionnaire in a sample of male drug users. *Personality and Individual Differences, 13,* 401–409.

*Nagoshi, C. T., Wilson, J. R., & Rodriguez, L. A. (1991). Impulsivity, sensation seeking, and behavioral and emotional responses to alcohol. *Alcoholism: Clinical and Experimental Research, 15,* 661–667.

*Nishith, P., Mueser, K. T., & Gupta, P. (1994). Personality and hallucinogen abuse in a college population from India. *Personality and Individual Differences, 17,* 561–563.

*Nordstrom, P., Schalling, D., & Asberg, M. (1995). Temperamental vulnerability in attempted suicide. *Acta Psychiatrica Scandinavica, 92,* 155–160.

*Parkes, K. R. (1984). Smoking and the Eysenck personality dimensions: An interactive model. *Psychological Medicine, 14,* 825–834.

*Patock-Peckham, J. A., Hutchinson, G. T., Cheong, J., & Nagoshi, C. T. (1998). Effect of religion and religiosity on alcohol use in a college student sample. *Drug and Alcohol Dependence, 49,* 81–88.

Paunonen, S. V. (1998). Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology, 74*, 538–556.

Paunonen, S. V., & Ashton, M. C. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology, 81*, 524–539.

*Peluso, T., Ricciardelli, L. A., & Williams, R. J. (1999). Self-control in relation to problem drinking and symptoms of disordered eating. *Addictive Behaviors, 24,* 439–442.

*Pendse, B., Westrin, A., & Engstrom, G. (1999). Temperament traits in seasonal affective disorder, suicide attempters with non-seasonal major depression, and healthy controls. *Journal of Affective Disorders, 54,* 55–65.

*Pfefferbaum, B., & Woods, P. B. (1994). Self-report study of impulsive and delinquent behavior in college students. *Journal of Adolescent Health, 15,* 295–302.

Piedmont, R. L., McCrae, R. R., & Costa, P. T. (1991). Adjective Check List scales and the five-factor model. *Journal of Personality and Social Psychology, 60,* 630–637.

*Plutchik, A., & Plutchik, R. (1989). Psychosocial correlates of alcoholism. *Integrative Psychiatry, 6,* 205–210.

Potgieter, J. R., & Venter, R. E. (1995). Relationship between adherence to exercise and scores on Extraversion and Neuroticism. *Perceptual and Motor Skills, 81,* 520–522.

*Preston, L. A. (1999). Psychopathy and its associations to the five factor model of normal personality (Doctoral dissertation, Southern Illinois University, 1998). *Dissertation Abstracts International, 60,* 1312.

*Renfrow, N. E., & Bolton, B. (1979). Personality characteristics associated with aerobic exercise in adult males. *Journal of Personality Assessment, 43,* 261–266.

*Reynolds, C., & Nichols, R. (1976). Personality and behavioral correlates of cigarette smoking: One-year follow-up. *Psychological Reports, 38,* 251–258.

*Rigby, K., Mak, A. S., & Slee, P. T. (1989). Impulsiveness, orientation to institutional authority, and gender as forms in self-reported delinquency among Australian adolescents. *Personality and Individual Differences, 10,* 689–692.

*Ripa, C. P. L., Hansen, H. S., Mortensen, E. L., Sanders, S. A., & Reinisch, J. M. (2001). A Danish version of the sensation seeking scale and its relation to a broad spectrum of behavioral and psychological characteristics. *Personality and Individual Differences, 30,* 1371–1386.

*Robbins, P. R., Tanck, R. H., & Meyersburg, H. A. (1971). Psychological factors in smoking, drinking, and drug experimentation. *Journal of Clinical Psychology, 27,* 450–452.

*Roberts, B. W. (2003). [Personality and health in a community sample]. Unpublished raw data.

*Roberts, B. W., & Bogg, T. (2004). A longitudinal study of the relationships between conscientiousness and the social environmental factors and substance use behaviors that influence health. *Journal of Personality, 72,* 325–353.

Roberts, B. W., Bogg, T., Walton, K. E., Chernyshenko, O. S., & Stark, S. E. (2004). A lexical investigation of the lower-order structure of Conscientiousness. *Journal of Research in Personality, 38,* 164–178.

Roberts, B. W., Caspi, A., & Moffitt, T. E. (2003). Work experiences and personality development in young adulthood. *Journal of Personality and Social Psychology, 84,* 582–593.

Roberts, B. W., Chernyshenko, O. S., Stark, S. E., & Goldberg, L. R. (2004). *The structure of Conscientiousness: An empirical investigation based on seven major personality questionnaires*. Unpublished manuscript, University of Illinois, Urbana–Champaign.

Roberts, B. W., Robins, R. W., Caspi, A., & Trzesniewski, K. (2003). Personality trait development in adulthood. In J. Mortimer & M. Shanahan (Eds.), *Handbook of the life course* (pp. 579–598). New York: Kluwer Academic.

Rosenthal, R. (1991). *Meta-analytic procedures for social research.* Thousand Oaks, CA: Sage.

*Sadowski, C. (1995). Cognitive distortions, impulsivity, and stressful life events in suicidal adolescents (Doctoral dissertation, Louisiana State University, 1994). *Dissertation Abstracts International, 56,* 1709.

*Satinder, K. P., & Black, A. (1984). Cannabis use and sensation-seeking orientation. *Journal of Psychology, 116,* 101–105.

*Schafer, J., Blanchard, L., & Fals-Stewart, W. (1994). Drug use and risky sexual behavior. *Psychology of Addictive Behaviors, 8,* 3–7.

*Schall, M., Kemeny, A., & Maltzman, I. (1992). Factors associated with alcohol use in university students. *Journal of Studies on Alcohol, 53,* 122–136.

*Schnurr, P. P., Vaillant, C. O., & Vaillant, G. E. (1990). Predicting exercise in late midlife from young adult personality characteristics. *International Journal of Aging and Human Development, 30,* 153–160.

*Schroder, K. E. E., & Schwarzer, R. (2003). *Habitual self-control and the management of health behavior among heart patients.* Manuscript submitted for publication.

*Seltzer, C. C., & Oechsli, F. W. (1985). Psychosocial characteristics of adolescent smokers before they started smoking: Evidence of self-selection. *Journal of Chronic Diseases, 38,* 17–26.

*Selzer, M. L., Vinokur, A., & Wilson, T. D. (1977). A psychosocial comparison of drunken drivers and alcoholics. *Journal of Studies on Alcohol, 38,* 1294–1312.

*Shanmugam, T. E. (1979). Personality factors underlying drug abuse among college students. *Psychological Studies, 24,* 24–34.

*Sharkansky, E. J., & Finn, P. R. (1998). Effects of outcome expectancies and disinhibition on ad lib alcohol consumption. *Journal of Studies on Alcohol, 59,* 198–206.

*Sharp, M. W. (1975). The relationship of aerobic physical fitness to selected personality traits measured by the Minnesota Multiphasic Personality Inventory (Doctoral dissertation, Texas A&M University, 1974). *Dissertation Abstracts International, 35,* 5939.

Shedler, J., & Block, J. (1990). Adolescent drug use and psychological health: A longitudinal inquiry. *American Psychologist, 45*, 612–630.

Sher, K. J., & Trull, T. J. (1994). Personality and disinhibitory psychopa-

thology: Alcoholism and antisocial personality disorder. *Journal of Abnormal Psychology, 103*, 92–102.

*Shoal, G. D., & Giancola, P. R. (2003). Negative affectivity and drug use in adolescent boys: Moderating and mediating mechanisms. *Journal of Personality and Social Psychology, 84,* 221–233.

*Sijuwola, O. A. (1989). Dimensions of personality and smoking behaviour. *African Journal of Medicine and Medical Sciences, 18,* 105–108.

*Slack, A. K. (1995). Personality and substance use in college populations (Doctoral dissertation, Southern Methodist University, 1994). *Dissertation Abstracts International, 55,* 4159.

*Soldz, S., & Valliant, G. E. (1999). The Big Five personality traits and the life course: A 45-year longitudinal study. *Journal of Research in Personality, 33,* 208–232.

*Soloff, P. H., Lynch, K. G., & Moss, H. B. (2000). Serotonin, impulsivity, and alcohol use disorders in the older adolescent: A psychobiological study. *Alcoholism: Clinical and Experimental Research, 24,* 1609–1619.

*Sommer, R., Barnes, G. E., & Murray, R. P. (1992). Alcohol consumption, alcohol abuse, personality and female perpetrated spouse abuse. *Personality and Individual Differences, 13,* 1315–1323.

*Spence, J. T., Losoff, M., & Robbins, A. S. (1991). Sexually aggressive tactics in dating relationships: Personality and attitudinal correlates. *Journal of Social and Clinical Psychology, 10,* 289–304.

*Spielberger, C. D., Foreyt, J. P., Goodrick, G. K., & Reheiser, E. C. (1995). Personality characteristics of users of smokeless tobacco compared with cigarette smokers and non-users of tobacco products. *Personality and Individual Differences, 19,* 439–448.

*Spielberger, C. D., & Jacobs, G. A. (1982). Personality and smoking behavior. *Journal of Personality Assessment, 46,* 396–403.

*Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (1991). Personality, problem drinking, and drunk driving: Mediating, moderating, and direct-effect models. *Journal of Personality and Social Psychology, 60,* 795–811.

*Stein, D., Apter, A., Ratzoni, G., Har-Even, D., & Avidan, G. (1998). Association between multiple suicide attempts and negative affects in adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 37,* 488–494.

*Stein, J. A., Newcomb, M. D., & Bentler, P. M. (1987). Personality and drug use: Reciprocal effects across four years. *Personality and Individual Differences, 8*, 419–430.

*Stewart, S. H., Loughlin, H. L., & Rhyno, E. (2001). Internal drinking motives mediate domain-drinking relations in young adults. *Personality and Individual Differences, 30,* 271–286.

Strain, E. C. (2002). Assessment and treatment of comorbid psychiatric disorders in opioid-dependent patients. *Clinical Journal of Pain, 18,* 14–27.

*Stuart, G. L. (1998). Impulsivity as a predictor of marital violence: Testing a mediational model (Doctoral dissertation, Indiana University, 1997). *Dissertation Abstracts International, 59,* 889.

*Trimpop, R., & Kirkcaldy, B. (1997). Personality predictors of driving accidents. *Personality and Individual Differences, 23,* 147–152.

*Tucker, J. S., Friedman, H. S., Tomlinson-Keasey, C., Schwartz, J. E., Wingard, D. L., Criqui, M. H., & Martin, L. R. (1995). Childhood psychosocial predictors of adulthood smoking, alcohol consumption, and physical activity. *Journal of Applied Social Psychology, 25,* 1885–1899.

*Vavrik, J. (1997). Personality and risk-taking: A brief report on adolescent male drivers. *Journal of Adolescence, 20,* 461–465.

*Velting, D. M. (1999). Suicidal ideation and the five-factor model of personality. *Personality and Individual Differences, 27,* 943–952.

*Vingerhoets, A. J., Croon, M., Jeninga, A. J., & Menges, L. J. (1990). Personality and health habits. *Psychology and Health, 4,* 333–342.

*Vitaro, F., Ferland, F., Jacques, C., & Ladouceur, R. (1998). Gambling, substance use, and impulsivity during adolescence. *Psychology of Addictive Behaviors, 12,* 185–194.

*Vollrath, M., Knock, D., & Cassano, L. (1999). Personality, risky health behaviour, and perceived susceptibility to health risks. *European Journal of Personality, 13,* 39–50.

*von Knorring, L., Oreland, L., & von Knorring, A. (1987). Personality traits and platelet MAO activity in alcohol and drug abusing teenage boys. *Acta Psychiatrica Scandinavica, 775,* 307–314.

*von Knorring, L., von Knorring, A., Smigan, L., Lindberg, U., & Edholm, M. (1987). Personality traits in subtypes of alcoholics. *Journal of Studies on Alcohol, 48,* 523–527.

*Vukov, M., Baba-Milkic, N., Lecic, D., Mijalkovic, S., & Marinkovic, J. (1995). Personality dimensions of opiate addicts. *Acta Psychiatrica Scandinavica, 91,* 103–107.

*Wagner, E. F. (1993). Delay of gratification, coping with stress, and substance use in adolescence. *Experimental and Clinical Psychopharmacology, 1,* 27–43.

*Wakefield, J. A., Jr. (1989). Personality, health and cigarette smoking. *Personality and Individual Differences, 10,* 541–546.

*Waldeck, T. L., & Miller, L. S. (1997). Gender and impulsivity differences in licit substance use. *Journal of Substance Abuse, 9,* 269–275.

Walter, D., Nagoshi, C., Muntaner, C., & Haertzen, C. A. (1990). The prediction of drug dependence from expectancy for hostility while intoxicated. *International Journal of the Addictions, 25,* 1151–1168.

Watson, D., & Clark, L. A. (1993). Behavioral disinhibition versus constraint: A dispositional perspective. In D. M. Wegner & J. W. Pennebaker (Eds.), *Handbook of mental control* (pp. 506–527). Upper Saddle River, NJ: Prentice Hall.

*Weber, J. R. (1953). Relationship of physical fitness to success in college and to personality. *Research Quarterly of the American Association for Health, Physical Education, and Recreation, 24,* 471–474.

*Whipple, S. C., & Noble, E. P. (1991). Personality characteristics of alcoholic fathers and their sons. *Journal of Studies on Alcohol, 52,* 331–337.

*White, H. R., & Johnson, V. (1988). Risk taking as a predictor of adolescent sexual activity and use of contraception. *Journal of Adolescent Research, 3,* 317–331.

*White, J. L., Moffitt, T. E., Caspi, A., Bartusch, D. J., Needles, D. J., Stouthamer-Loeber, M. (1994). Measuring impulsivity and examining its relationship to delinquency. *Journal of Abnormal Psychology, 103,* 192–205.

*Williams, A. F. (1973). Personality and other characteristics associated with cigarette smoking among young teenagers. *Journal of Health and Social Behavior, 14,* 374–380.

*Williams, J. H., Wellman, N. A., Allan, L. M., Taylor, E., Tonin, J., Feldon, J., & Rawlins, J. N. P. (1996). Tobacco smoking correlates with schizotypal and borderline personality traits. *Personality and Individual Differences, 20,* 267–270.

*Williamson, D. A., Kelley, M. L., Davis, C. J., Ruggiero, L., & Blouin, D. C. (1985). Psychopathology of eating disorders: A controlled comparison of bulimic, obese, and normal subjects. *Journal of Consulting and Clinical Psychology, 53,* 161–166.

*Wills, T. A., & Cleary, S. D. (1999). Peer and adolescent substance use among 6th–9th graders: Latent growth analyses of influence versus selection mechanisms. *Health Psychology, 18,* 453–463.

*Wills, T. A., Vaccaro, D., & McNamara, G. (1994). Novelty seeking, risk taking, and related constructs as predictors of adolescent substance use: An application of Cloninger's theory. *Journal of Substance Abuse, 6,* 1–20.

*Wills, T. A., Windle, M., & Cleary, S. D. (1998). Temperament and novelty seeking in adolescent substance use: Convergence of dimensions of temperament with constructs from Cloninger's theory. *Journal of Personality and Social Psychology, 74,* 387–406.

*Wong, C. S. Y., Tang, C. S. K., & Schwarzer, R. (1997). Psychosocial correlates of substance use: Comparing high school students with incar-

cerated offenders in Hong Kong. *Journal of Drug Education, 27,* 147–172.

*Wood, P. B., Cochran, J. K., Pfefferbaum, B., & Arneklev, B. J. (1995). Sensation-seeking and delinquent substance use: An extension of learning theory. *Journal of Drug Issues, 25,* 173–193.

*Wright, T. M., & Reise, S. P. (1997). Personality and unrestricted sexual behavior: Correlations of sociosexuality in Caucasian and Asian college students. *Journal of Research in Personality, 31,* 166–192.

*Yeung, R. R., & Hemsley, D. R. (1997). Personality, exercise and psychological well-being: Static relationships in the community. *Personality and Individual Differences, 22,* 47–53.

*Zhang, L., Wieczorek, W. F., & Welte, J. W. (1997). The nexus between alcohol and violent crime. *Alcoholism: Clinical and Experimental Research, 21,* 1264–1271.

Zuckerman, M. (2003). Biological bases of personality. In T. Millon & M. J. Lerner (Eds.), *Handbook of psychology: Vol. 5. Personality and social psychology* (pp. 85–116). New York: Wiley.

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