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The Age of Anxiety? Birth Cohort Change in Anxiety and Neuroticism, 1952–1993

Jean M. Twenge
Case Western Reserve University

Two meta-analyses find that Americans have shifted toward substantially higher levels of anxiety and neuroticism during recent decades. Both college student (adult) and child samples increased almost a full standard deviation in anxiety between 1952 and 1993 (explaining about 20% of the variance in the trait). The average American child in the 1980s reported more anxiety than child psychiatric patients in the 1950s. Correlations with social indices (e.g., divorce rates, crime rates) suggest that decreases in social connectedness and increases in environmental dangers may be responsible for the rise in anxiety. Economic factors, however, seem to play little role. Birth cohort, as a proxy for broad social trends, may be an important influence on personality development, especially during childhood.

Over the last few decades, people seem to have become more anxious, worrying about safety, social acceptance, and job security more than in the past (e.g., Rosen, 1998; Sloan, 1996). The perceived trend is so strong that some authors have labeled the twentieth century "the age of anxiety" (e.g., Spielberger & Rickman, 1990, p. 69). These descriptions imply that modern life produces higher levels of anxiety. But does it? Have people actually grown more anxious, or does hindsight bias lead us to believe that people were less anxious in the past? If anxiety has increased, what are the causes? Why is modern life anxiety-producing?

These questions hint at a deeper one: Are there environmental influences on personality outside the individual family? If levels of anxiety have changed over a 30-year time span, the most likely cause is changes in the larger sociocultural environment. Recent research and theory in psychology has recognized that environments vary between countries and regions, producing differences in personality, emotion, perception, and behavior (e.g., Choi, Nisbett, & Norenzayan, 1999; Heine & Lehman, 1997; Markus & Kitayama, 1991; Markus, Kitayama, & Heiman, 1996; Markus, Kitayama, & VandenBos, 1996; Nisbett & Cohen, 1996; Suh, Diener, Oishi, & Triandis, 1998). Environments vary over time and generations in a similar way (e.g., the U.S. in the 1950s was a very different environment than the U.S. in the 1990s). Yet very little research has explored the effect of changing times on personality. Such research might help answer the challenge posed by Matthews and Deary (1998): " . . . with so much good evidence for broad heritability effects," they wrote, "the onus is on environmentalists to make clear hypotheses about the effects of specific environmental factors on personality and test them" (p. 120).

Most previous work on environmental effects (especially within countries) has focused on family environment. Although some of this research has been successful (e.g., Reiss, 1997), much of it has failed to find that growing up in the same house and with the same parents has much measurable effect on personality (e.g., Bergeman, Plomin, McClearn, Pedersen, & Friberg, 1988; Langinvaionio, Kaprio, Koskenvuo, & Lonngvist, 1984; Loehlin, 1992; Rowe, 1990; Shields, 1962). These studies do not include environmental effects outside the family; in fact, most seem to assume that there are no environmental influences outside the family (e.g., Bergeman et al., 1988; Bouchard, 1994; Loehlin, 1989, 1992; Pedersen, Plomin, McClearn, & Friedberg, 1988; Shields, 1962). For example, in their study of identical twins reared apart, Bergeman et al. (1988) stated that "in the absence of selective placement, any similarity" between the twins "is due to genetic influences" (p. 400). Loehlin (1989) made a similar statement (p. 1285). Thus, it is not surprising that at least one review of personality research discusses only two types of environmental influences: "those shared by family members and those unique to the individual" (Matthews & Deary, 1998; p. 106).

Such statements are true only if we consider genetics and family or individual environment to be the only two variables influencing personality. However, the larger sociocultural environment can also affect personality. Each generation effectively grows up in a different society; these societies vary in their attitudes, environmental threats, family structures, sexual norms, and in many other ways. A large number of theorists have suggested that birth cohort—as a proxy for the larger sociocultural environment—can have substantial effects on personality (e.g., Caspi, 1987; Elder, 1974, 1981; Gergen, 1973; Kertzer, 1983; Lambert, 1972; Nesselroade & Baltes, 1974; Ryder, 1965; Schaie, 1965; Sloan, 1996; Stewart & Healy, 1989; Woodruff & Birren, 1972). In addition, previous empirical studies have found strong cohort effects on a number of psychopathology, attitude, and life outcome variables (Duncan & Agronick, 1995; Dyer, 1987; Klerman & Weissman, 1989; Lewinsohn, Rohde, Seeley, & Fischer, 1993; Twenge,

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Correspondence concerning this article should be addressed to Jean M. Twenge, Department of Psychology, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, Ohio 44106-7123. Electronic mail may be sent to jmt20@po.cwru.edu.

1997a, 1997b, in press; Twenge & Campbell, 2000; Woodruff & Birren, 1972).

Thus, birth cohort, as a proxy for the larger sociocultural environment, may be a significant source of previously unexplored environmental effects on personality. Given the weak effects for environment found in much previous research, it seems prudent to test such theories. Even if genetics explain about 40% of the variance in anxiety/neuroticism, and family environment about 10%, that still leaves 50% of the variance unexplained. It is difficult (as well as distressing) to believe that half of the variance in personality is error variance. Birth cohort should not be ignored as a possible contributor to that 50%.

Acknowledging birth cohort differences would also resolve a striking paradox in personality research: Longitudinal studies have often found remarkable consistency in personality traits as people age (e.g., Conley, 1984; Costa & McCrae, 1988; Costa, McCrae, & Arenberg, 1980; Finn, 1986; Kelly, 1955), whereas cross-sectional studies purporting to measure age differences have often found large effects (e.g., Bendig, 1960; Costa et al., 1986; H. J. Eysenck & S. B. G. Eysenck, 1975; S. B. G. Eysenck & H. J. Eysenck, 1969; Gutman, 1966). Birth cohort can explain this: In a cross-sectional study, the individuals of different ages also belong to different birth cohorts (Baltes & Nesselroade, 1972; Buss, 1974; Nesselroade & Baltes, 1974; Schaie, 1965; Woodruff & Birren, 1972). Thus, at least some of the conflict between the results of longitudinal and cross-sectional studies may be explained by birth cohort differences in personality traits. This also suggests that cohort differences may be widespread.

Examining changes in anxiety might be particularly important. More people visit doctors for anxiety than for colds, and anxiety is now more common than depression (Barlow, 1988). Anxiety is a predisposing factor to major depression (Bagby, Joffe, Parker, Kalemba, & Harkeness, 1995; Surtees & Wainwright, 1996) and to suicide attempts (Coryell, Noyes, & Clancy, 1982; Coryell, Noyes, & House, 1986). Researchers have also linked self-reports of anxiety to a wide variety of physical ailments, including asthma, coronary heart disease, irritable bowel syndrome, ulcers, and inflammatory bowel disease (for a review, see Edelmann, 1992). Psychological consequences are also important. Out of the Big Five traits, neuroticism (closely related to anxiety) was the strongest predictor of life satisfaction, happiness, and negative affect in a recent meta-analysis (DeNeve & Cooper, 1998). High levels of trait anxiety impair cognitive performance (Seipp, 1991) [including in everyday tasks (Matthews, Coyle, & Craig, 1990)], predispose people to marital problems (O'Leary & Smith, 1991), and sometimes lead to alcohol and drug abuse (Chambless, Cherney, Caputo, & Rheinstein, 1987; Mullaney & Trippett, 1979; Smail, Stockwell, Canter, & Hodgeson, 1984). Thus, if anxiety levels have increased, it would have implications for mental and physical health.

Before beginning a discussion of relevant theories of anxiety, a definition is necessary. In this article, *anxiety* should be read to mean *trait anxiety,* often described as "relatively stable individual differences in anxiety-proneness" (Spielberger & Rickman, 1990, p. 76). This definition is in contrast to state anxiety, usually understood as a transient emotion experienced in a particular situation. In addition, anxiety and neuroticism are treated as synonymous; the two concepts have a great deal in common (e.g., Barlow, 1988; H. J. Eysenck & S. B. G. Eysenck, 1991), and measures of anxiety and neuroticism often correlate .80 or more (Twenge, 2000).

Theories of Anxiety

If there are birth cohort differences in anxiety, why did they occur? That is, what specific changes in the larger sociocultural environment may lead to higher levels of anxiety? Three theories on the origin of anxiety, usually used to explain individual differences, are also informative in the discussion of change over time. The three models are *overall threat* (anxiety increases as environmental threat increases), *economic conditions* (anxiety increases as economic conditions deteriorate), and *social connectedness* (anxiety increases as social bonds weaken). Using social statistics from corresponding years (e.g., crime rates, unemployment rates, divorce rates), I tested each of these models for their effects on anxiety scores, both individually and in regression equations including all three models. These tests should demonstrate not only if anxiety has changed but which influences were the most important (and which were not). In addition, these statistics can be lagged to show if changes in the environment occurred before changes in anxiety or vice versa. If the former, this would suggest that the environment is shaping personality; if environmental changes occur after changes in anxiety, it would suggest instead that shifts in personality traits affected the environment.

Overall Threat

Overview

At one time, anxiety was conceptualized as an organism's fear reaction, or the emotional response evoked when the organism is physically threatened (e.g., Darwin, 1872). More recent theorists acknowledge that threats leading to anxiety can be physical or psychological (Barlow, 1988; May, 1979; Spielberger & Rickman, 1990). Evolutionary theory holds that emotions are adaptive—that they serve specific purposes for the survival of the individual. Anxiety and fear primarily serve to warn of potential danger and trigger defensive physiological and psychological reactions (Darwin, 1872). Simply the anticipation of physical threat can cause anxiety; whereas both anxiety and depression appear after a loss, only anxiety appears when a loss is threatened (Rholes, Riskind, & Neville, 1985).

An additional component of this model involves the act of appraising environmental threat. Beck and his colleagues (Beck, 1985; Beck & Emery, 1985) have argued that anxiety stems from a disordered perception of reality as dangerous. These cognitions, a result of faulty information processing, elicit the emotional response of anxiety. Under this viewpoint, the individual's cognitive appraisal of the situation is the most important step (e.g., Lazarus, 1966; Lazarus & Folkman, 1984; Spielberger, 1972).

Change Over Time

Under this model, we would expect anxiety to increase over time if physical and psychological threats have increased. By all accounts, most threats increased between 1952 and 1993 (e.g., Bronfenbrenner, McClelland, Wethington, Moen, & Ceci, 1996; Fukuyama, 1999). These include violent crime (U.S. Bureau of the Census, 1998), worries about nuclear war (Diamond & Bachman,

1986; Kramer, Kalick, & Milburn, 1983), fear of diseases such as AIDS (Henker, Whalen, & O'Neil, 1995; Wilkins & Lewis, 1993), and the entrance of women into higher education and the workforce (possibly a threat to men and a source of stress to women; e.g., Rosen, 1998). Composite measures, such as the Index of Social Health, suggest increases in threat even since the 1970s (Miringoff & Miringoff, 1999). Media coverage has also led to a greater perception of environmental threat (Cohl, 1997; Glassner, 1999).

Economic Conditions

Overview

Some authors have suggested that economic hardship is the modern equivalent of physical (and sometimes emotional) threat (Barlow, 1988). In the modern world, economic difficulties are detrimental to optimal survival and reproduction and thus might also be seen as a threat, producing anxiety. Economic difficulties can increase anxiety for children as well as adults; unemployment, for example, increases anxiety in children by straining relationships with parents (McLoyd, Jayaratne, Ceballo, & Borquez, 1994). If this model is correct, poor economic times should lead to increased anxiety as people feel their livelihoods threatened.

Change Over Time

Changes in economic conditions have been less linear than changes in other threats. Nevertheless, a general pattern of economic downturn emerges for this particular period. While the economy was booming from the 1950s to the late 1960s, it faltered in the 1970s and did not fully recover until the mid-1980s. Even then the upswing was not continuous (e.g., the stock market crash of 1987 and the recession of the early 1990s). Only after 1993 (when this study ends) did the economy experience continuous, sustained growth. Thus, the later part of the time period studied here experienced more economic hardship. Child poverty also increased even during some of the better economic times (Holtz, 1995; Howe & Strauss, 1993; Miringhoff & Miringhoff, 1999).

Social Connectedness

Overview

The social connectedness model focuses on social exclusion as particularly important to anxiety (Baumeister & Tice, 1990). Baumeister and colleagues (Baumeister & Leary, 1995; Baumeister & Tice, 1990) have proposed that anxiety is an adaptive response to being excluded from social groups and/or relationships. An influential review (Cohen & Wills, 1985) concluded that social support is correlated with lower self-reports of anxiety and depression.

Other authors have noted that the effect of social exclusion is not limited to individuals; lack of connection in a society may produce alienation and feelings of loneliness and despair. Fukuyama (1999) argued that Western societies have experienced a noticeable decrease in "social capital" (broadly defined as social connectedness and a sense of community) since the 1960s (see also Bronfenbrenner et al., 1996; Putnam, 2000).

Change Over Time

Many social statistics point to a breakdown in social connectedness. The divorce rate has increased, the birth rate has dropped, people marry later in life, and many more people now live alone (11% in 1950, compared with 25% in 1997). In addition, Putnam (2000) found that Americans are now less likely to join community organizations and visit friends than they once were. Connectedness can also be measured by levels of trust (Fukuyama, 1999), and these levels have also declined (only 18.3% of high school seniors in 1992 agreed that you can usually trust people, compared with 34.5% in 1975; Smith, 1997).

Empirical Evidence for Change

Although no known studies have examined change in anxiety over the time period studied, some evidence on related variables suggests that anxiety should increase over time. First, large panel studies have consistently found that younger cohorts show more, and longer, episodes of depression (Klerman & Weissman, 1989; Lewinsohn et al., 1993). Some psychologists have gone so far as to label this effect a modern *epidemic of depression* (Seligman, 1988, 1995) or *age of melancholy* (Hagnell, Lanke, Rorsman, & Ojesjo, 1982). Anxiety and depression are highly correlated (e.g., Tanaka-Matsumi & Kameoka, 1986), indicating that anxiety should also have increased. However, some authors have argued that anxiety and depression are distinct (e.g., Barlow, 1988; Tellegen, 1985; Torgersen, 1993).

Another limitation is more important: The depression studies are based on retrospective accounts, with participants self-reporting past episodes of depression. As the authors of these studies acknowledge (e.g., Klerman & Weissman, 1989; Lewinsohn et al., 1993), this method has obvious drawbacks. Respondents may not remember incidents, or their memory may exaggerate episodes. Also, the definition of a depressive episode might differ between age and cohort groups.

More direct evidence comes from authors who have examined self-reports of anxiety. These authors have found that more recent cohorts score higher on anxiety measures (Schonberg, 1974; Sutton-Smith, Rosenberg, & Morgan, 1961; Veroff, Douvan, & Kulka, 1981; cited in Veroff, Kulka, & Douvan, 1981, p. 36). These studies also have substantial limitations, however. They provide no data later than 1976, compare only a few samples against each other, and use nonstandard or outdated measures (none use the popular anxiety/neuroticism measures examined in this study).

Overview and Methods

This article aims to explore change over time in anxiety and the reasons behind these changes. Study 1 examines 170 samples of American college students collected from the literature, computing the correlation between mean scores on anxiety measures and year of data collection. I also report correlations between anxiety scores and social statistics to determine the causes behind changes in anxiety and the likely direction of causation. Study 2 analyzed 99 samples of children who completed an anxiety measure. Examining child samples accomplished two goals: (a) it ensured that changing college populations and/or the unique composition of

college samples was not responsible for the results of Study 1, and (b) it determined if the cohort differences in anxiety originated early in life. Both of these studies gather data from the literature, using a modified meta-analysis technique called *cross-temporal meta-analysis* that has been used in four previous studies (Twenge, 1997a, 1997b, in press; Twenge & Campbell, 2000).

Study 1

This study uses meta-analytic techniques to gather and analyze data from samples of American college students between the years 1952 and 1993. These samples completed self-report measures of anxiety and neuroticism under normal conditions. Because college students are roughly the same age, data collected at different times provides a test of birth cohort differences. Assuming an average age of 20, the participants in the collected studies were born between 1932 and 1973. As discussed more extensively in the *Methods* section, college populations have necessarily changed over time; however, these changes have not been large, and the average income of students' parents did not change between the mid-1960s and the early 1990s (Dey, Astin, & Korn, 1992). In addition, trends in the percentage of high school students enrolling in college have been curvilinear rather than linear since the late 1960s.

Method

Locating Studies

I conducted a preliminary search using PsycInfo to determine the most popular measures of anxiety and neuroticism for college students. Researchers were most likely to use and list means for the Taylor Manifest Anxiety scale (TMAS; Taylor, 1953), the Eysenck Personality Inventory (EPI; H. J. Eysenck, 1968), the Eysenck Personality Questionnaire (EPQ; H. J. Eysenck & S. B. G. Eysenck, 1975), and the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; only the trait form was collected here). Year of data collection was coded as 2 years prior to publication unless another date was mentioned in the article (this technique was also used by Oliver & Hyde, 1993).

Published articles. The main source of studies was the Social Science Citation Index (SSCI), which was searched for studies that cited the above test sources. The SSCI begins its listings in 1956, three years after the publication of the TMAS scale. To find datapoints on the TMAS for these years (1953–1955), a manual search was conducted of the following journals: *Journal of Abnormal and Social Psychology, Journal of Social Psychology, Journal of Personality* (formerly *Character and Personality*), *Journal of Applied Psychology, Journal of Psychology, American Journal of Psychology, Journal of Consulting Psychology, Educational and Psychological Measurement, Psychological Reports,* and *Perceptual and Motor Skills.* In addition, the 1956 edition of the Buros Mental Measurement handbook was searched for references to the TMAS.

Dissertation Abstracts. Dissertations and masters' theses are major sources of unpublished data. Dissertation Abstracts catalogs master's theses and dissertations from 1861 to the present. I searched this database using the names of the scales as keywords.

Inclusion Rules

Possible studies for the analysis were included or excluded on the basis of specific rules. To be included in the analysis, a study had to meet the following criteria: (a) participants were undergraduates at conventional 4-year institutions; (b) participants were attending college in the United States (thus samples from all other countries were eliminated; it is expected that the differing cultural and political climates in these countries would confound the results because samples from other countries tend to score differently on the measures used here, e.g., Jamison, 1984); (c) the study included at least 10 male or 10 female participants; (d) participants were not clients at a counseling center or any other group singled out for being maladjusted; (e) means were reported for unselected groups of students, not groups that were extremely high or extremely low on a measure; and (f) means were broken down by sex. A number of studies did not provide means for the personality measures they used; most studies excluded from the analysis were eliminated for not including means rather than for violating any other criterion. The breakdown of means by sex is important given the sex differences in the variables under examination and the changing numbers of women in college psychology samples. In addition, the direction and magnitude of any personality change may differ for men and women. Thus, simply controlling for the number of women in the sample might not illustrate the true nature of the change.

These data collection and inclusion strategies yielded 170 studies, including 148 samples of men and 134 samples of women. In total, these studies included 40,192 college students (21,173 women and 19,019 men). A reference list of the studies included in the analyses is available on request.

Analyses

Two types of analyses can be performed on anxiety/neuroticism mean scores: (a) correlations between means and year within measure and (b) analyses summarizing across measures. Because these analyses examine means of specific measures, traditional meta-analytic techniques cannot be used to summarize across measures. Two methods were applied here: (a) a weighted average using conversions to z scores and (b) z scoring within measure and then combining the results across all measures to examine the correlation with year (see Table 1). This second method assumes homoscedasticity for all measures across the time period. Three of the four measures (EPI, EPQ, STAI) cover about the same time period (late 1960s/early 1970s to the early 1990s) and demonstrate homoscedasticity for this time period. However, the TMAS, first published in 1953, has considerably more datapoints from the 1950s and 1960s. Thus, any z score will place the mean for the TMAS much earlier than for the other measures, skewing the results. To correct for this, I examined the z scores for the EPI and STAI for the period 1968–1975, when the TMAS z score was near 0. The EPI and STAI samples showed z scores of $-.73$ for men and $-.53$ for women during this time (based on 16 samples of men and 18 samples of women). Thus, the z scores for the TMAS were adjusted downward by these amounts in the analyses including all four measures. Because this method is an approximation, I also report results separately by time period (the TMAS from 1952–1967, and z score results for the EPI, EPQ, and STAI only for the period 1968–1993). However, this bootstrap method may be the only way to summarize results across the entire time period.

Sources for Social Statistics

As noted previously, direct correlations can be computed between anxiety scores and social statistics. Most of these statistics were obtained from the Statistical Abstract of the United States (these were divorce rate, percentage of people living alone, women's age at first marriage, birth rate, unemployment, violent crime rate, AIDS cases, the suicide rate for people aged 15–24, women's labor force participation rate, and the percentage of bachelor's degrees awarded to women). Two statistics were obtained from the Monitoring the Future survey of American high school seniors (Bachman, Johnston, & O'Malley, 1998): the percentage of *often* responses to "How often do you worry about the chance of nuclear war?" and the percentage of *trust* responses to "Generally speaking, would you say that

Table 1
Weighted Correlations Between Year of Scale Administration and College Students' Anxiety/Neuroticism Scores, 1952–1993

Measure or composite	Time span	Men		Women	
		Bivariate	w/controls	Bivariate	w/controls
Entire time period					
TMAS	1952–1993	.62*** (41)	.61*** (41)	.48*** (32)	.50*** (32)
EPI-N	1969–1991	.26* (25)	.31** (25)	.43*** (25)	.48*** (25)
EPQ-N	1973–1993	.65*** (22)	.76*** (22)	.65*** (23)	.89*** (23)
STAI	1968–1993	.65*** (60)	.49*** (60)	.45*** (54)	.37** (54)
Overall weighted average	1952–1993	.56*** (148)	.54*** (148)	.49*** (134)	.58*** (134)
Within-scale Z scores (All measures; TMAS adjusted)	1952–1993	.52*** (148)	.64*** (148)	.39*** (134)	.53*** (134)
Within time periods					
TMAS	1952–1967	.48** (29)	.48** (29)	.64*** (24)	.37** (24)
Overall weighted average (EPI, EPQ, & STAI)	1968–1993	.54*** (107)	.52*** (107)	.49*** (102)	.58*** (102)
Within-scale Z scores (EPI, EPQ, & STAI)	1968–1993	.53*** (107)	.43*** (107)	.48*** (102)	.44*** (102)

Note. TMAS = Taylor Manifest Anxiety Scale; EPI-N = Eysenck Personality Inventory Neuroticism; EPQ-N = Eysenck Personality Questionnaire Neuroticism; STAI = State-Trait Anxiety Inventory. *N* of groups is shown in parentheses. Correlations are weighted for sample size of study.
* $p < .05$. ** $p < .01$. *** $p < .001$.

most people can be trusted or that you can't be too careful in dealing with people?" Most of these statistics were available for the entire time period. Others were only available for the last 20–25 years: The two questions from Monitoring the Future begin in 1975, and AIDS cases were reported beginning in 1981.

These particular statistics were chosen using two main criteria. First, the social indicators had to be readily available and easily quantified as meaningful continuous variables. Some interesting statistics are not readily available (e.g., average geographical mobility). Others are difficult to quantify as continuous variables (e.g., improvements in birth control technology). Second, the statistics were chosen to be representative of general trends. For example, statistics on the percentage of law, medical, and doctorate degrees awarded to women are available; however, they follow almost exactly the same pattern as the more broadly representative statistics on the percentage of undergraduate degrees awarded to women. Thus, the latter statistic was used. Economic statistics are another example of representativeness. Unemployment, which was included, is arguably the best economic indicator. Others, such as gross national product, tend to increase steadily even when adjusted for inflation and are thus not meaningful indicators of the nation's economic health.

Control Variables and Limitations

It is possible that samples may differ in region and type of college in a way that confounds with birth cohort. These two variables were recorded for each datapoint; region was coded as East, Midwest, South, or West according to the U.S. Census designations, and type of college was coded as public or private according to a list of U.S. colleges and universities. These two variables were used as controls in the analyses (with region coded using dummy variables). Most studies did not report information on the racial or socioeconomic status composition of the samples; thus, it was not possible to use these variables as controls. Specific measure (e.g., TMAS, STAI) was entered to control for variance between methods/scales.

Another possible limitation is changes in the college population over the time period. One measure of this might be the median income of college students' parents, an indicator of socioeconomic status. Dey et al.'s (1992) summary of a national, yearly sample found that the median income of college students' families did not change from 1966 to 1991 when adjusted for inflation (although variations from 1952 to 1965 are unknown). As for the racial composition of college samples, this changed only slightly (Black students were 6% of the college population in 1960 and are now about 10%; Asians increased from 2% to 5%; and Hispanics increased from 4% to 7%).

One statistic that has changed more is the number of people going to college. Reliable data on the percentage of high school graduates enrolling in college was available beginning in 1960 (U.S. Bureau of the Census, 1998). In 1960, 45% of high school graduates enrolled in college; in 1967 (the year before data are available for the more recent measures of anxiety/neuroticism), this figure was 52%. This 7% rise was fairly linear, increasing about 1% per year. For the time period covered by the more recent measures, the percentage rose from 55% (in 1968) to 62% (in 1993). However, even this small change was not linear; college enrollment actually declined during the 1970s, not reaching the 1968 figure of 55% again until 1984. Thus, the available statistics suggest that change in the college population is likely to most strongly affect the pre-1968 era, when this statistic changed fairly quickly (about 1% a year) and in a linear fashion; here, this mainly affects the results for the TMAS.

Results

Correlations Between Mean Scores and Year

Have college students' self-reported levels of anxiety and neuroticism increased from 1952 to 1993? The results show unequivocally that they have. In regressions weighted by sample size, every measure produced a significant positive correlation with year (see Table 1), with most correlations over .40 and many over .60.

In the weighted regressions, the larger samples—as better estimates of the population mean—were proportionally weighted in computing the average distance from the regression line. These regressions differ from simple bivariate correlations only in their weighting by *n*. Correlations unweighted for sample size produced very similar, though sometimes stronger, results (e.g., the correla-

tion between women's STAI scores and year rose to .40, $p < .001$, in the unweighted analyses). Correlations were also similar when controls for type of college (public vs. private), region, and specific measure were included in a multiple regression to test for the unique effect of year (betas for year are reported in Table 1).

When did the increase in anxiety begin? An analysis of the TMAS, the most popular measure of anxiety between 1952 and 1967, showed that anxiety increased during this time period. Thus, the increase began during the 1950s (see Table 1). The increase continued throughout the 1970s and 1980s; *z*-scored scale combinations of the EPI, EPQ, and STAI also demonstrated a significant increase in anxiety/neuroticism scores from 1968 to 1993. *Z* scores (with the correction applied to the TMAS) over the entire time period (1952–1993) also showed a clear, linear rise in scores, as did the correlations mathematically averaged over the measures (using Fisher's *r* to *z* transform; see Table 1). Although the betas for men appear to be larger than those for women in many cases, the differences between the betas were not significant when compared (using Fisher's *r* to *z* and the formula for comparing two correlations in Wolf, 1986, p. 36).

Sex differences in anxiety, calculated using the formula to compute *d* and weighted by *w* (e.g., Wolf, 1986) were $d = .24$ across 118 samples of college students, meaning that women scored about a quarter of a standard deviation higher than men. The effect size did not show a significant correlation with year when entered into a regression equation with all samples included. However, there was a significant correlation with year for the TMAS samples collected 1952–1967, $r = .33$ ($k = 15$), $p < .05$. This result indicates that sex differences were increasing during the postwar period, with women reporting more anxiety compared with men over time. There was no significant correlation between the *d* for sex differences and year for samples collected 1968–1993. Thus, for the most recent era, men's and women's anxiety changed at about the same rate.

Magnitude of Change

The above results show that anxiety has increased in a linear manner. But how much has anxiety increased? After all, it is possible to have change that is linear yet small in magnitude. Analyses using the regression equations demonstrate that this is not the case here: Anxiety scores have risen about a standard deviation from the 1950s to the 1990s, explaining about 20% of the variance.

I used the regression equations to compute the average score at the beginning and end of the regression lines. These computations were performed both with and without the controls; with the controls, the mean score was computed using the 0 values of the dummy variables (here, a public university in the East). The controls produced no major changes (greater than .05 standard deviations) for most groups; the only differences occurred for women on the TMAS. Thus, means without controls are reported for most groups, with both estimates reported for women's TMAS scores. The meta-analytic *d* (difference in terms of standard deviations) allows for standardization across measures; thus, the change is reported in terms of *d*.

In this study, the TMAS is the sole measure of anxiety from 1952 to 1967. Men's TMAS scores began at 12.88 and rose to 15.84; with an average SD of 7.24 in these samples, this was an increase of $d = .41$. Without controls applied, women's scores rose from 13.15 to 19.76 ($SD = 7.48$), $d = .88$. However, these samples were confounded with type of college; with the controls applied, women's scores rise from 14.30 to 18.17, $d = .52$.

Three measures were available from 1968–1993 (the EPI, EPQ, and STAI); for each, means were calculated representing 1968 and 1993. On the EPI, men's scores rose from 8.75 to 10.05, a change of $d = .27$ ($SD = 4.85$). Women's scores increased from 9.78 to 11.91 ($SD = 4.79$), $d = .45$. Changes on the EPQ were larger; for men, scores advanced from 9.06 to 12.29 ($SD = 5.19$), $d = .62$. Women's scores rose from 11.48 to 14.06 ($SD = 4.94$), $d = .65$. As for the STAI, men's scores increased from 36.37 to 40.73 ($SD = 7.75$), $d = .56$; women's scores rose from 37.94 to 41.92 ($SD = 8.01$), $d = .50$. Weighting by *n*, this averaged to a change of .47 *SD*s for men and .52 *SD*s for women over the period 1968–1993. Cohen (1977) would classify these as medium effect sizes ($d = .50$).

Adding these results with those for the TMAS (1952–1967), women's anxiety scores rose 1.40 standard deviations (without controls) or $d = 1.04$ *SD*s (with controls) from 1952 to 1993; men's scores rose $d = .88$. Weighting by *n*, this averages to a change of .97 standard deviations for both sexes combined. By Cohen's (1977) definition, these are large effect sizes (greater than .80). These effect sizes convert to $r = .40$ for men and $r = .46$ for women (with the controls applied); thus, birth cohort (as a proxy for the larger sociocultural environment) explains between 16% and 21% of the variance in personality, considerably more than family environment explains in most studies.

The regression equations can also be used to estimate mean anxiety scores for the past and future. If the regression equation for the TMAS is used to compute a predicted score for 1945, scores have risen 1.28 to 1.82 standard deviations for women between the end of World War II and 1993, and $d = 1.07$ for men. If this pattern continued from 1993 to 2000 (a debatable point), scores have risen $d = 1.42$ to 1.96 for women and 1.21 for men between 1945 and 2000 (1.18 to 1.54 for women and 1.02 for men between 1952 and 2000).

Correlations Between Mean Scores and Social Statistics

Thus, it seems clear that anxiety has increased considerably over time. Why has this occurred? Correlating anxiety scores directly with social statistics provides a view of possible causes and outcomes of the rise in college students' anxiety scores. The social statistics are facets of the sociocultural environment; what is important is not a higher crime rate itself, for example, but that more people are the victims of crime, and more people feel unsafe. Overall, the results suggest that low social connectedness and high overall threat predict higher anxiety scores; economic conditions are not related to anxiety when controlled for the other two influences.

These statistics were matched with the anxiety data in five ways: ten years before the data were collected, 5 years before, the year of data collection, 5 years after, and 10 years after. These analyses report correlations between these social statistics and the *z*-scored scale combinations of TMAS, EPI, EPQ, and STAI scores, with the TMAS adjusted as described previously. They are computed both for individual statistics (betas with only one predictor in the equation) and, at the bottom of the table, in a regression equation

including both composites controlled for each other (economic conditions, and social connectedness plus other threats).

Social connectedness predicted anxiety scores well (see Tables 2 and 3). The divorce rate and birth rate preceded anxiety levels; correlations were highest for the childhood (10 years prior) and adolescent (5 years prior) time periods (for the divorce rate, the correlations for the 10 years prior and actual year, 5, and 10 years after were significantly different at $p < .05$; there were no significant differences for birth rate). People living alone and women's average age at first marriage both showed fairly consistent correlations over the time periods. Trust was significantly correlated for the adolescent and college years (a result that might be expected, given that the item was from a survey of high school seniors). For the most part, the correlations are stronger when lagged into the past or matched with the present, suggesting that environmental change is preceding personality change (and thus that the environment is causing personality change). The few significant correlations during the future years could have occurred for two reasons. They may be an artifact of the steady linear increase of some variables (e.g., women's age at first marriage). Alternatively, they could represent the influence of personality (here, anxiety) on society-wide behavior; for example, perhaps women who are anxious marry later.

Overall threat also predicted anxiety scores. Crime rates demonstrated significant correlations for all periods except 10 years after data collection. Correlations for AIDS cases were somewhat higher for the adolescent, college, and young adult (5 years after) time periods, which might be expected for a variable more relevant for the sexually active, single person (10 years prior was significantly different from 5 years after at $p < .05$). Worry about nuclear war showed a significant positive correlation for the adolescent years; however, the correlation was negative for 5 years after college (significantly different at $p < .01$, most likely because worry about nuclear war has been declining since the late 1980s). Statistics measuring women's status (LFPR, college degrees) displayed fairly consistent correlations with anxiety for both men and women.

Economic conditions showed more mixed results. Unemployment rates correlated with anxiety scores when lagged 10 and 5 years into the past, particularly for men. These correlations were significantly different from those 5 and 10 years after college at $p < .05$, suggesting that parental unemployment precedes later anxiety. However, the percentage of children in poverty did not correlate significantly with anxiety scores, even when lagged into the respondents' childhood and adolescent years.

These analyses suggest that several aspects of the larger environment may have influenced levels of anxiety. But which are the strongest influences, when controlled for the others? Unfortunately, the influences of social connectedness and overall threat cannot be separated; when the statistics in each category are z scored and added into an index, social connectedness and overall threat correlate over .95. This is a simple historical fact: For example, the divorce rate and crime rate increased at about the same rate during the late 1960s and 1970s. (The decrease in social connectedness and the increase in crime are probably related: see, e.g., Sampson & Laub, 1990; Twenge, Baumeister, Tice, Faber, & Stucke, 2000). Thus, the two composites display too much multicollinearity to be entered separately into a regression equation. However, economic conditions have fluctuated more and correlate only .65 with an index combining social connectedness and overall threat.

Table 2
Correlations Between Social Indicators and Z-Scored Scale Combinations of Men's Anxiety/Neuroticism Scores, Weighted for Sample Size, 1952–1993

Social indicator	10 years prior	5 years prior	Actual year	5 years after	10 years after
Overall threat					
Crime rate	.34***	.43***	.36***	.40***	.21
AIDS cases	.29**	.37***	.49***	.54***	.30**
Worry about nuclear war	−.04	.47***	−.26	−.61***	−.19
Suicide rate, ages 15–24	.51***	.26**	.25*	.14	.14
Women's LFPR	.54***	.55***	.50***	.45***	.39***
College degrees awarded to women	.23*	.52***	.47***	.44***	.27**
Index of social health (reverse)	−.45**	−.66***	−.23*	−.20	.00
Economic conditions					
Unemployment rate	.43***	.29***	.07	.05	.08
Percentage of children in poverty	−.06	.19	−.02	.01	.00
Low social connectedness					
Divorce rate	.48***	.32***	.25**	.27**	.24
Percentage of people living alone	.46***	.48***	.44***	.41***	.30**
Women's age at first marriage	.44***	.58***	.56***	.42***	.48***
Birth rate (reverse)	−.40***	−.30***	−.35***	−.29**	−.25
Trust (reverse)	−.12	−.44***	−.59***	−.09	.14
Regression with total scales					
Economic conditions	−.23	.27	−.39**	−.25	.07
Social connectedness + other threats	.76***	.44**	.59***	.24	.21

Note. n varies from 56 to 148 because of missing indicators for some years. LFPR = Labor force participation rate.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Correlations Between Social Indicators and Z-Scored Scale Combinations of Women's Anxiety/Neuroticism Scores, Weighted for Sample Size, 1952–1993

Social indicator	10 years prior	5 years prior	Actual year	5 years after	10 years after
Overall threat					
Crime rate	.32**	.33***	.22*	.29**	.06
AIDS cases	.19	.27**	.39***	.47***	.24*
Worry about nuclear war	.04	.36***	−.16	−.49***	−.25*
Suicide rate, ages 15–24	.42***	.19	.21*	.04	.07
Women's LFPR	.42***	.41***	.38***	.32***	.31**
College degrees awarded to women	.19	.39***	.33***	.34***	.13
Index of social health (reverse)	−.34**	−.53***	−.26*	−.17	.07
Economic conditions					
Unemployment rate	.29**	.22*	.05	−.03	−.09
Percentage of children in poverty	−.04	.22*	.10	.09	−.07
Low social connectedness					
Divorce rate	.39***	.23*	.11	.11	.19
Percentage of people living alone	.35***	.36***	.32***	.28*	.17
Women's age at first marriage	.34***	.44***	.44***	.34***	.37***
Birth rate (reverse)	−.31***	−.15	−.19	−.14	−.29*
Trust (reverse)	−.18	−.33*	−.46***	−.15	.10
Regression with total scales					
Economic conditions	−.23	.31*	−.20	−.08	−.27
Social connectedness + other threats	.65***	.39**	.44***	.26	.15

Note. n varies from 54 to 134 because of missing indicators for some years. LFPR = Labor force participation rate.
* $p < .05$. ** $p < .01$ *** $p < .001$.

Thus, the index of economic conditions (unemployment and child poverty) and the social connectedness/threat index were entered into a regression equation together (and thus the results at the bottom of Tables 2 and 3 show the two composites controlled for each other). The results are clear: When controlled for social connectedness/threat, economic conditions do not correlate significantly with anxiety levels. Thus, the environmental attributes of low social connectedness and high threat explain high levels of anxiety, but poor economic conditions do not necessarily lead to high anxiety (at least during this 40-year period).

Study 2

Anxiety clearly increases among college students from the 1950s to the 1990s. Does this result replicate for samples of children, who are both younger and less susceptible to biased sampling? College student samples have a possible limitation: The number and types of people who go to college changes from year to year, and these samples are often not representative of their age group at large. As discussed previously, this is more a problem in the samples collected during the 1950s and early 1960s. However, it cannot be fully ruled out as an explanation for any of the time periods. In addition, college students come from the middle and higher classes; perhaps economic conditions do not explain changes in college students' anxiety scores because they did not experience the brunt of hard economic times.

In addition, college students are typically 18 years of age or older, an age usually described as late adolescence or early adulthood. These individuals have already passed through the developmental stages of childhood and most of adolescence. Thus, it is impossible to know when the rise in anxiety and neuroticism scores began for these birth cohorts. It could be that the later birth cohorts became more anxious than their predecessors only after they entered college; on the other hand, they could have been more anxious since childhood. Many theories maintain that anxiety tendencies begin in childhood (Barlow, 1988), and this study provides a partial test of those theories. The correlations with social statistics in Study 1 suggested that the childhood environment is particularly important, but a direct examination seemed warranted.

Study 2 attempts to address these questions by examining samples of schoolchildren of approximately the same birth cohorts as the college students studied above. Using children (especially those under the age of 16) virtually eliminates the selection bias inherent in the college samples (both its possible changes in composition and its general SES bias). For the time period in question (1950s–early 1990s), almost all normal children were enrolled in school, and this did not change much from year to year. In addition, studies using children usually report information on the racial and socioeconomic composition of the samples, allowing these variables to be used as controls.

The samples of college students examined above completed the measures of anxiety and neuroticism between the years 1952 and 1993. Subtracting 10 years estimates when these participants were 10 years old (a typical age for completing a children's anxiety measure; see following). Thus, these birth cohorts were common in child samples between about 1942 and 1983. No widely used measures of children's anxiety were available before the 1950s. In 1956, a group of authors published the Children's Manifest Anxiety scale (CMAS; Castaneda, McCandless, & Palermo, 1956), which soon became the most popular measure of

children's anxiety and remained so until the late 1970s–early 1980s. This scale was normed on 4th- to 6th-grade children (thus about 9 to 11 years old) and was most often used for this age group. Thus, Study 2 used the same cross-temporal meta-analysis method used in Study 1 to examine samples of children who completed the CMAS from the mid-1950s to the 1980s.

Method

Locating Studies

Similar to the method used in Study 1, published studies were located using PsycInfo and the SSCI. PsycInfo was used as a preliminary search technique using the keywords "Children's Manifest Anxiety" and "children and manifest anxiety." Serendipitously, the SSCI begins its coverage in 1956, the year the CMAS was published. Studies that cited the CMAS source (Castaneda et al., 1956) were located. Dissertation Abstracts was used to locate unpublished datapoints with the same keywords used in the PsycInfo search.

Inclusion Rules

Studies were included in the analyses if (a) participants were children between the ages of 9 and 17 (grades 4–12) (the scale was normed on 4th–6th graders, and children in the 3rd grade or younger often score considerably higher on the measure; e.g., Holloway, 1961; Rie, 1963); (b) samples were collected in the United States; (c) participants were not clients at a counseling center or any other group singled out for being maladjusted; (d) means were reported for unselected groups of students, not groups that were extremely high or extremely low on the measure; and (e) means were reported, either broken down by sex or for an entire sample. In Study 1, only means broken down by sex were included; analyses for mixed-sex samples are included here for comparison because many fewer samples from the 1970s–1980s reported means broken down by sex. In addition, the sex composition of the child samples is very stable, in contrast to the studies of college students where the percentage of women in the samples is highly confounded with year.

Year of data collection was coded as 2 years prior to publication unless another date was mentioned in the article (Oliver & Hyde, 1993). Birth cohort was computed by subtracting the sample's mean age from the year of data collection (range = 1940–1978). If only a grade level was provided, 5 years were added to estimate age. Studies reporting separate means for different age/grade groups were entered as separate samples. Studies were also coded for region, race composition, urban/rural location, and socioeconomic status.

This method yielded 99 samples reporting means on the CMAS, including 6,600 boys and 5,456 girls (total n = 12,056). The samples were primarily collected between 1954 and 1981 (only one sample was collected after 1981, in 1988). This roughly corresponds to the middle and later birth cohorts of college students included in Study 1: Assuming that the college student samples were 10 years older than the child samples, this is equivalent to the years 1964–1991 for the college samples.

Results

Correlations Between Mean Scores and Year

The results for the child samples exactly parallel those for college students: Self-reported anxiety increases in a linear fashion. Correlations weighted by sample size appear in Table 4. All correlations between CMAS means and year are .58 or above, with the mixed-sex samples showing a correlation of .77 (most likely because of a greater number of datapoints post-1970, when CMAS scores continued to rise). The correlations are similar (or even higher) when controls are added to the regression for region, urban versus rural location, socioeconomic status, and race.

Because these samples ranged in age from 9 to 17 years old, age differences in anxiety may be confounded with year (e.g., if more of the younger samples were collected later). In addition, the effect for year of data collection could be either a time period or a birth cohort effect. Thus, the correlation between birth year and CMAS scores was also computed. As shown in Table 4, these correlations are very similar to those with year, suggesting that the data are not confounded by age and that much of the change can be attributed to birth cohort. Because the majority of the datapoints were children 13 years and younger (most 9–11 years), I analyzed the data using only this age group; the results were almost identical to the results when all the age groups were included.

Magnitude of Change

The increases in anxiety for children were large as well as linear. I again quantified the changes by using the regression equations and the average standard deviation of the samples. These computations were performed both with and without the controls and were virtually identical; computations without the controls are reported. Samples of boys increased from 14.94 on the CMAS in 1954 to 19.91 in 1981, a change of .67 standard deviations. Samples of girls increased from 16.32 to 22.46, a shift of .79 standard deviations. Mixed-sex samples, which include more samples after 1970, demonstrate even larger changes, increasing from 15.08 to 22.42 from 1954 to 1981, an increase of .99 standard deviations. The latest mixed-sex datapoint was actually collected

Table 4
Weighted Correlations Between Year, Birth Cohort, and Responses to the Children's Manifest Anxiety Scale

Analysis	Time span	Boys	Girls	Mixed-sex
Bivariate				
Year of data collection	1954–1981	.58*** (67)	.62*** (59)	.77*** (89)
Birth year	1940–1970	.63*** (67)	.61*** (59)	.76*** (89)
With controls				
Year of data collection	1954–1981	.60*** (67)	.72*** (59)	.78*** (89)
Birth year	1940–1970	.62*** (67)	.70*** (59)	.77*** (89)

Note. N on which correlations are based is shown in parentheses.
* $p < .05$. ** $p < .01$. *** $p < .001$.

in 1988, when the regression line computes an average score of 24.33, reflecting a change of 1.25 standard deviations between 1954 and 1988. By Cohen's (1977) criteria, almost all of these changes qualify as large (.80 or over). Thus, children's anxiety scores increase about a standard deviation over the time period, again explaining about 20% of the variance in scores.

It is also interesting to compare the scores of more recent samples with a 1957 sample of child clinic patients admitted with psychiatric problems (Levitt, 1959). The mean score of the 1957 psychiatric sample was 20.82, about the same as the mean score of the normal child samples collected between 1970 and 1988 (20.59). By 1980–1988, the average score for normal children was 23.26. Thus, by the 1980s normal children were scoring higher than 1950s child psychiatric patients on self-reported anxiety. This difference demonstrates the change in interpretation produced by an increase of one standard deviation.

To directly compare the results for children with those for college students, I projected the mean scores for 1952 and 1993 (using the regression equation) to calculate the effect size over the same time period. For boys, the effect size was 1.01, for girls 1.20, and for mixed-sex samples, 1.50 standard deviations. These effect sizes are very similar to (though a little higher than) the changes for the college students, which were .88 for men and 1.04 for women.

Across the 50 studies including both boys and girls, the weighted d for sex differences was .22. The effect size differs between age groups; it is smaller among the 37 samples of elementary school children (ages 9–11) where $d = .20$ and larger among the 13 samples of adolescents (ages 12–17), where $d = .31$ ($p < .05$ by a chi-square for moderator variables). Thus, in both age groups, girls score higher on anxiety measures than boys do; this difference increases during adolescence. The effect size does not show a significant correlation with year.

Correlations Between Mean Scores and Social Statistics

Child samples increased in anxiety just as college students did, but were the antecedents of these changes the same? Table 5 shows correlations between mixed-sex samples (where the most data were available) and the lagged social statistics. The average age of the children in these samples is 11, so these statistics correspond (respectively) to infancy, 6 years old, 11 years old, 16 years old, and 21 years old. Three statistics included in the analyses in Study 1 were not included because they were only available beginning in the mid-1970s or later (trust, fear of nuclear war, and AIDS cases) and there were not enough data from this time period.

Strong, significant correlations appear between social connectedness and anxiety, as well as between overall threat and anxiety. Changes in the divorce rate, the birth rate, and the crime rate are all highly correlated with children's anxiety. In general, it appears that lower social connectedness and higher threat led to higher anxiety.

These samples were drawn from a more diverse range of socioeconomic status than the college samples, and thus we might expect more of an influence from economic conditions. However, this was not the case: Economic conditions were not correlated with anxiety, similar to the college samples. Unemployment rates are positively correlated with children's anxiety, particularly for the study year and 5 years prior. In contrast, the percentage of children in poverty is actually negatively correlated with anxiety. One might think that when more children were living in poverty, the overall average anxiety score would go up. However, the percentage of children in poverty decreased during the 1960s, exactly when anxiety scores began to zoom upward. When the index for economic conditions was entered into a regression equation with a social connectedness/threat index, its influence was negligible (see Table 5). Thus, even in a sample diverse in socio-

Table 5
Correlations Between Social Indicators and Children's Manifest Anxiety Scores, Weighted for Sample Size, 1954–1988

Social indicators	10 years prior	5 years prior	Actual year	5 years after	10 years after
Overall threat					
Crime rate	.70***	.79***	.75***	.73***	.76***
Suicide rate, ages 15–24	.52***	.70***	.72***	.69***	.70***
Women's LFPR	.67***	.74***	.74***	.76***	.76***
College degrees awarded to women	−.38**	.77***	.72***	.76***	.74***
Economic conditions					
Unemployment rate	.32**	.42***	.41***	.34**	.24*
Percentage of children in poverty	−.48***	−.55***	−.22*	−.43**	.16
Low social connectedness					
Divorce rate	−.22	.58***	.71***	.69***	.66***
Percentage of people living alone	.70***	.68***	.77***	.75***	.74***
Women's age at first marriage	.34**	.60***	.70***	.72***	.74***
Birth rate (reverse)	−.47***	−.69***	−.71***	−.68***	−.46**
Regression with total scales					
Economic conditions	.03	.13	.04	−.08	.00
Social connectedness + other threats	.67***	.81***	.76***	.77***	.74***

Note. n varies from 61 to 99 because of missing indicators for some years. LFPR = Labor force participation rate.
* $p < .05$. ** $p < .01$. *** $p < .001$.

economic status, economic conditions do not explain the rise in anxiety.

The correlations between mean scores and social connectedness/threat were strong and relatively consistent across the measurement years. However, the correlations were generally strongest for the year of data collection and 5 years afterward, corresponding to the years of middle childhood and adolescence (the difference between the correlations were significant at $p < .05$ or greater for the divorce rate, women's age at first marriage, and college degrees awarded to women). This result parallels the results found for college students, where many correlations were stronger for those years; in the college-student analyses, this corresponded to 5 and 10 years prior to data collection.

General Discussion

Two meta-analyses find that self-reports of anxiety/neuroticism have increased substantially from the 1950s to the early 1990s. Thus, the larger sociocultural environment—an influence on personality beyond genetics and individual family environment—has a considerable effect on a major personality trait. Samples of college students between 1952 and 1993 show increases on four different measures of anxiety and neuroticism. Study 2 replicates this increase for samples of schoolchildren, showing that sampling bias was not responsible for the college-student results. Both meta-analyses find that self-reports of anxiety increase about one standard deviation over 30–40 years, explaining about 20% of the variance (considerably more than family environment explains in most studies). The birth cohort change in anxiety is so large that by the 1980s normal child samples were scoring higher than child psychiatric patients from the 1950s (Levitt, 1959). In both studies, anxiety levels are correlated with low social connectedness and high environmental threat; economic conditions do not explain the rise in anxiety, even among the socioeconomically diverse samples in Study 2.

Theoretical Implications

A Third Influence on Personality

What do these studies tell us about personality and its development? First, they demonstrate the impact of the larger sociocultural environment. Clearly, the larger environment should be considered a third influence on individual differences in personality, taking a place next to the more recognized effects of genetics and family/individual environment. Researchers have often found that family environment has little effect on personality, making the recognition of sociocultural environment and birth cohort all the more important.

The Importance of Childhood Environment

Correlations between anxiety and social indicators are somewhat higher in the childhood and adolescent years than in adulthood, no matter what the age of the sample. In addition, children's anxiety scores showed a strong birth cohort effect. These results suggest that personality is most susceptible to the larger environment during the childhood years. Because the environmental changes precede the personality changes, it is likely that environment is causing personality rather than vice versa. This is also consistent with the research finding stability in personality traits after late adolescence (e.g., Conley, 1984; Costa & McCrae, 1988; Costa et al., 1980; Finn, 1986; Kelly, 1955). The significant correlations between anxiety and future social conditions may be an artifact of steady linear change; on the other hand, they could reflect the influence of the person on the situation. Perhaps people who are anxious marry later, commit more crimes, and are more likely to live alone. However, this is speculative; further research should investigate the effect of personality on societal change.

One might well have assumed that children would mainly be affected by family influences whereas adults would be affected by broader social trends. The present data do not support that analysis, however; they suggest that childhood is the time of the greatest societal influence (of course, some of these effects could be mediated through the immediate family). Contrary to views that children have nothing to worry about except bullies and Oedipal dynamics, these findings indicate that children's anxiety strongly reflects what is happening in the society at large. Theories of personality development may benefit by incorporating some understanding that children live in the society as a whole rather than in a narrow, circumscribed world.

The Effects of Low Social Connectedness and High Threat

What social forces have led to the increase in anxiety? The two most important are low social connectedness and high environmental threat. These results demonstrate the singular importance of social bonds and attachment to other human beings (e.g., Baumeister & Leary, 1995; Bowlby, 1969; Fukuyama, 1999; Putnam, 2000; Twenge et al., 2000). Societies with low levels of social integration produce adults prone to anxiety. Societies with high levels of environmental threat have much the same effect. This may be a society-wide demonstration of human beings' natural tendency to become anxious when threatened (e.g., Barlow, 1988; Darwin, 1872). These threats can be physical (such as violent crime) or more psychological (worry about nuclear war or women's roles; May, 1979). Many of these changes (both in social connectedness and in threat) stem from the increasing individualism and freedom of American society. As Schwartz (2000) has noted, too much freedom can lead to poor outcomes, in which we are paralyzed by our choices and then blame ourselves when things do not go well. Our greater autonomy may lead to increased challenges and excitement, but it also leads to greater isolation from others, more threats to our bodies and minds, and thus higher levels of free-floating anxiety.

Perhaps surprisingly, economic indices had very little independent effect on anxiety. Apparently, children are less concerned with whether their family has enough money than whether it is threatened by violence or dissolution. Why might this be? First, economic conditions might be relative: If the economy is doing badly and you are poor, many other people are probably poor as well. This theory is consistent with the concept of relative deprivation (e.g., Collins, 1996; Wood, 1989); one feels less deprived when everyone else is deprived too. As several authors have suggested, it may be the perception rather than the reality that is most important for producing anxiety (e.g., Beck & Emery, 1985; Lazarus & Folkman, 1984; Spielberger, 1972). Similarly, the material benefits of good economic times might be more than out-

weighed by the stress they produce. When everyone is doing well, there is more pressure to succeed, leading to anxiety. This argument also explains why women's anxiety would rise even as they obtained greater opportunities; greater opportunities lead to greater expectations and more stress. Last, it might be that economic conditions are just not that important to anxiety levels, especially in the samples studied here (who are too young to support themselves and thus are not worrying as much about economic conditions—either their own or the country's overall). This finding is similar to research on happiness: Beyond a certain level of survival, having more money does not lead to greater happiness (Myers & Diener, 1995).

Strengths and Practical Implications

The replication of the results over samples and measures increases confidence in the conclusions. Increases in anxiety appear in all of the measures of anxiety and neuroticism included, and the results for college students replicate in child samples. This result is especially important because college samples may differ over time in basic characteristics, whereas child samples remain more similar.

The increase in anxiety is not merely consistent across measures and samples; it is also large. Cohen (1977) classified any effect size over .80 as large; averaging across all samples, the effect size for cohort effects on anxiety in this study was .98, almost a standard deviation (and this calculation is conservative, relying on analyses with controls and only changes for years where data exist for a particular measure). In a normal distribution, a shift of one standard deviation moves the median score from the 50th percentile to the 84th percentile. In other words, the average respondent from 1993 would score at the 84th percentile on a distribution of self-reports of anxiety collected in the 1950s. As another means of comparison, the birth cohort difference reported here is larger than almost all psychological sex differences (e.g., sex differences in aggression are $d = .29$ in adults, $d = .50$ in children). They are even larger than many physical sex differences (e.g., grip strength, long jump, throw accuracy, and the 50-yard dash; Ashmore, 1990).

Another strength of this study is that it is based on current self-reports rather than retrospective recollections. All of the studies of birth cohort differences in depression rely on the retrospective reports of participants, a method with obvious drawbacks (e.g., Klerman & Weissman, 1989). In contrast, the two meta-analyses reported here are based on self-reports of anxiety actually completed at different points in time. It thus collects the true responses of participants many years into the past, rather than asking people to remember their traits or experiences.

These findings have specific implications relevant to clinical and applied concerns. First, the results suggest that cases of depression will continue to increase in the coming decades, as anxiety tends to predispose people to depression (Bagby et al., 1995; Surtees & Wainwright, 1996). Anxiety is also highly correlated with alcohol abuse and other substance abuse (Mullaney & Trippett, 1979; Smail et al., 1984); usually anxiety precedes the onset of drinking or substance abuse (Chambless et al., 1987; Mullaney & Trippett, 1979; Smail et al., 1984). This suggests that the United States will continue to grapple with the problem of substance abuse. There are also implications for physical health. Research has found that anxious people have a higher mortality rate, most likely because anxiety has been linked to higher occurrences of asthma, irritable bowel syndrome, ulcers, inflammatory bowel disease, and coronary heart disease (Edelmann, 1992). Although some of these health problems are decreasing because of changes in health habits and better care (e.g., coronary heart disease), others (e.g., asthma, irritable bowel syndrome) are on the increase. If anxiety accounts for some of this trend, the increases are likely to continue.

A Limitation

The results presented here all involve self-reports of anxiety and neuroticism. Thus, change over time on the scales could reflect either true shifts in personality traits or the respondents' willingness to describe themselves in different terms, perhaps because of changes in social desirability (e.g., Edwards, 1957). This limitation cannot be completely overcome; it is difficult to study trait (as opposed to state) anxiety without relying on self-report (especially in a meta-analysis, which must gather the available data). Thus, self-report measures are the best data available for studying change over time in anxiety. This concern can also be addressed in several ways. First, previous empirical evidence suggests that anxiety should increase over time (e.g., the studies of birth cohort differences in lifetime depression). In addition, it is unlikely that any large discrepancy between self-reported and actual anxiety would remain that way for long; the experienced self will likely change to meet the expressed self (Tice, 1994).

Conclusion: If There Is an Epidemic of Anxiety, What Is the Cure?

Self-reports of anxiety have risen about a standard deviation between the 1950s and 1990s, a result consistent across samples of college students and children and across different measures. Anxiety is so high now that normal samples of children from the 1980s outscore psychiatric populations from the 1950s (Levitt, 1959). If this is true, how can we reduce feelings of anxiety on a societal level? Seemingly, anxiety will decrease when threat decreases and social connectedness increases. Economic conditions will not have much of an effect, at least for child, adolescent, and young adult samples. Many environmental threats have declined somewhat in the years since the end of this study (1994–2000): Crime rates are down, for example, and worries about nuclear war have decreased. These are good signs for stopping or even reversing increases in anxiety. However, social connectedness has not improved very much. Although divorce rates have decreased somewhat, the percentage of people living alone continues to increase, and levels of trust are still declining. Improvements in these statistics—and a general feeling of belongingness and closeness in our communities—would likely decrease feelings of anxiety. Until people feel both safe and connected to others, anxiety is likely to remain high.

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