

Who's Stressed? Distributions of Psychological Stress in the United States in Probability Samples from 1983, 2006, and 2009¹

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Psychological stress was assessed in 3 national surveys administered in 1983, 2006, and 2009. In all 3 surveys, stress was higher among women than men; and increased with decreasing age, education, and income. Unemployed persons reported high levels of stress, while the retired reported low levels. All associations were independent of one another and of race/ethnicity. Although minorities generally reported more stress than Whites, these differences lost significance when adjusted for the other demographics. Stress increased little in response to the 2008–2009 economic downturn, except among middle-aged, college-educated White men with full-time employment. These data suggest greater stress-related health risks among women, younger adults, those of lower socioeconomic status, and men potentially subject to substantial losses of income and wealth.

Potentially stressful life events are thought to increase risk for disease when one perceives that the demands these events impose tax or exceed a person's adaptive capacity (Lazarus & Folkman, 1984). In turn, the perception of stress may influence the pathogenesis of physical disease by causing negative affective states (e.g., feelings of anxiety and depression), which then exert direct effects on physiological processes or behavioral patterns that influence disease risk (Cohen, Janicki-Deverts, & Miller, 2007). Psychological stress is thought to influence a wide range of physiological processes and

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disease states, with existing evidence supporting stress as a risk factor in depression (Hammen, 2005; Kessler, 1997; Mazure, 1998; Monroe & Simons, 1991), cardiovascular disease (Krantz & McCeney, 2002; Rozanski, Blumenthal, & Kaplan, 1999), HIV/AIDS (Cole & Kemeny, 2001; Pereira & Penedo, 2005), delayed wound healing (Kiecolt-Glaser et al., 2005), upper respiratory infections (Miller & Cohen, 2005), autoimmune diseases (Heijnen & Kavelaars, 2005), and total mortality (Neilsen, Kristensen, Schnohr, & Gronbaek, 2008).

Up to now, comparing stress levels in our society in different years or decades has been impeded by the lack of studies of stress in probability samples of the United States, particularly studies that use valid and comparable measures. In this article, we take advantage of data that were collected using a validated measure of psychological stress that was incorporated into three national surveys that were conducted on three separate occasions over the course of 26 years. The surveys were conducted by professional polling organizations for their own purposes. The first was a telephone survey conducted in 1983, and the remaining two were Internet-based surveys conducted just before (in November 2006) and during (April 2009) a severe economic downturn.

The measure of psychological stress used in these surveys was the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988). Higher levels of psychological stress as measured by the PSS have been associated with elevated markers of biological aging (Epel et al., 2004), higher cortisol levels (Pruessner, Hellhammer, & Kirschbaum, 1999; Ruiz, Fullerton, Brown, & Schoolfield, 2001; van Eck & Nicolson, 1994), as well as suppressed immune function (Burns, Drayson, Ring, & Carroll, 2002; Maes et al., 1999), greater infection-induced release of pro-inflammatory cytokines (Cohen, Doyle, & Skoner, 1999), greater susceptibility to infectious disease (Cobb & Steptoe, 1996; Cohen, Tyrrell, & Smith, 1993; Culhane et al., 2001; Dyck, Short, & Vitaliano, 1999), slower wound healing (Ebrecht et al., 2004), and higher prostate-specific antigen levels (Stone, Mezzacappa, Donatone, & Gonder, 1999). Persons who score higher on the PSS also report poorer health practices, such as sleeping fewer hours, skipping breakfast, and consuming greater quantities of alcohol (Cohen & Williamson, 1988).

We address two questions in this article. The first question is as follows: Is psychological stress associated with sex, age, education, income, employment status, and/or race/ethnicity, and are distributions of stress across demographic characteristics constant over the quarter century covered by the three surveys? The second question is as follows: Was the 2008–2009 economic downturn associated with a rise in psychological stress in the population in general or in specific demographic subgroups?

Method

Description of the Surveys

Harris Poll Survey. Respondents were 960 male and 1,427 female residents of the United States, 18 years of age and older (M age = 42.8 years, $SD = 17.2$), who completed a telephone interview conducted by Louis Harris and Associates, Inc., in 1983. Based on U.S. Bureau of Census information, a national area probability sample was developed from the distribution of the adult, non-institutionalized population of the United States. With counties as primary sampling units, a random-digit dialing procedure was used to select telephone numbers to be called within each sampling unit. The interviewer asked to speak to the person in the household who was both 18 years of age or over, and whose birthday had been most recent. The 2,387 persons meeting the criteria for inclusion in the analyses represented 69.6% of the 3,430 individuals with whom telephone contact was made (926 refused to be interviewed, and 117 terminated the interview prior to completion).

eNation Survey. The 2006 and 2009 surveys each consisted of 2,000 adults 18 years of age or older (2006: M age = 46.8 years, $SD = 14.7$; 2009: M age = 44.6 years, $SD = 15.5$) in the contiguous United States. The surveys were conducted in November 2006 and April 2009, respectively. Each sample consisted of individuals selected from the online segment of Synovate's Consumer Opinion Panel (SCOP), a national panel of households. Each sample was balanced to be representative of the general population based on region, sex, age, and household income data from the 2000 U.S. Census.

Members of the samples received a customized e-mail inviting them to participate in a specific survey. Panelists were given up to 3 days to complete the online survey by connecting to a link contained in the e-mail invitation. If sufficient numbers of a particular demographic did not respond, new panelists were added as necessary to obtain appropriate demographic distributions. Individuals were re-screened at the beginning of the survey to ensure that the demographic distributions were accurate.

Measures

Demographics. In all three surveys, age was assessed as years of age at the time of the interview; and sex was self-reported as male or female. Education was coded in 9 categories in the Harris Poll data and 10 in the eNation data. For analysis, the data were collapsed into the following five common categories: less than high school, high school, some college/less than 4-year degree, bachelor's degree, and advanced degree. The Harris Poll assessed race/

ethnicity with a single, 5-category item (Asian or Pacific Islander; Aleut, Eskimo, or American Indian; non-Hispanic Black; non-Hispanic White; and Hispanic). The eNation surveys assessed race/ethnicity with two items: a 4-category race item (White; Black; Asian or Pacific Islander; and other); and a 5-category Hispanic, Latino, or Spanish origin item (Mexican, Mexican American, Chicano; Puerto Rican; Cuban; other Spanish; and not Hispanic). To create comparable variables across samples, we collapsed categories in both cases, creating four alternatives: White, Black, Hispanic or other.

The Harris poll assessed employment status using an 8-category item (employed full time, employed part time, in the military, unemployed, retired, homemaker, student, and disabled/too ill to work). The eNation surveys assessed employment status using a 7-category item (work for someone else full-time, work for someone else part-time, self-employed, retired, unemployed, homemaker, and student/disabled, etc.). For purposes of analysis, we collapsed these categories to create the following 6 employment classes: employed full-time (employed full-time, work for someone else full-time, self-employed, in the military); employed part-time; retired; unemployed; homemaker; and other (disabled/too ill to work, student, student/disabled, etc.).

Both the Harris Poll and the eNation surveys assessed income by asking respondents to select an income range that best approximated their annual household income. From these data, we created a continuous income variable by assigning each participant the midpoint value of his or her selected income range. For example, an individual who chose the range \$15,000-\$20,000 was assigned an income of \$17,500. In order to facilitate comparison across survey years, 1983 and 2006 incomes were converted to their 2009 dollar equivalents using the Bureau of Labor Statistics' CPI (Consumer Price Index) Inflation Calculator (www.bls.gov/data/inflation_calculator.htm).

Psychological Stress Scale. In all three surveys, the 10-item Perceived Stress Scale (PSS-10) was used to assess the degree to which situations in life are perceived as stressful (Cohen et al., 1983; Cohen & Williamson, 1988). Items in the PSS-10 were designed to tap how unpredictable, uncontrollable, and overloading respondents find their lives. The PSS-10 items were introduced with "In the last month, how often have you felt . . ." which was followed by such items as *nervous and stressed, that difficulties were piling up so high that you could not overcome them, and that you could not cope with all the things that you had to*. Participants responded on a 5-point scale ranging from 0 (*never*) to 4 (*very often*). Of the 10 items, 4 items were worded in a positive direction, so they were reverse-scored. The responses to the 10 items were then summed to create a psychological stress score, with higher scores indicating greater psychological stress. Internal reliabilities (Cronbach's α s)

for the PSS-10 were .78 in the Harris Poll sample, and .91 in both the 2006 and 2009 eNation samples.

Results

Associations Between Stress and Demographic Characteristics

We began by assessing the relation between each of the six individual demographic variables and psychological stress in each survey. We used multiple linear regressions when examining continuous variables (age, education, and income), and ANCOVAs when examining categorical variables (sex, race/ethnicity, and employment status). We also conducted a single linear regression for each survey where we entered all six of the demographic variables simultaneously (categorical variables were dummy-coded). This analysis provides the association of each demographic variable with perceived stress, independent of all the remaining demographics. Table 1 presents the observed means and standard deviations for each level of each demographic (continuous variables were categorized here for presentation). Table 2 presents statistics for both the individual (unadjusted) analyses and the analyses adjusted for the remaining five demographics.

As is apparent from Tables 1 and 2, the distributions of stress remained virtually identical across the three surveys (26 years). In all cases, women reported greater stress than did men; stress decreased with increasing age, education, and income; and minorities tended to report more stress than did Whites. The unemployed reported more stress than did the employed in 1983 and 2006, but not in 2009; and the retired reported the lowest level of stress across employment categories in all three surveys. Controlling for the remaining demographic variables had little effect on the results, except in the case of race/ethnicity, where the differences between Whites and minorities no longer approached significance when the controls were added to the equation (see adjusted statistics in Table 3). We also reran the race/ethnicity analyses from all three samples, controlling only for education, income, and employment status. As in the analyses containing all of the covariates, the association between race/ethnicity and stress no longer approached significance.

Stress and the 2008–2009 Economic Downturn

To determine whether perceived stress increased during the period of the 2008–2009 economic downturn, we compared mean stress levels reported in the 2006 survey with those reported in 2009 (see Table 1). Across the two

Table 1

Unadjusted PSS Means for All Three Years

	1983			2006			2009		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Sex									
Men	926	12.07	5.89	966	14.46	7.81	968	15.52	7.44
Women	1344	13.68	6.57	1034	16.10	7.73	1032	16.14	7.56
Age (in years)									
Less than 25	349	14.54	5.95	137	18.64	7.24	223	16.78	6.86
25–34	593	13.45	6.45	331	17.78	7.19	433	17.46	7.31
35–44	453	12.94	6.02	396	16.72	6.99	331	16.38	7.07
45–54	285	12.67	6.09	540	15.20	8.24	419	16.94	7.83
55–64	282	11.89	6.94	347	13.41	7.29	372	14.50	7.20
65 and older	296	11.98	6.31	249	10.80	7.19	222	11.09	6.77
Race									
White	1924	12.80	6.23	1716	15.16	7.81	1704	15.70	7.51
Black	176	14.67	7.17	99	16.44	7.52	99	15.68	7.51
Hispanic	98	13.98	6.85	86	15.78	7.79	81	17.00	7.45
Other	50	13.96	5.31	63	17.32	8.59	84	17.44	7.67
Education									
Less than high school	369	14.32	6.73	76	17.55	7.77	62	19.11	7.92
High school	799	13.10	6.70	516	16.38	7.69	404	16.59	7.76
Some college	555	13.15	6.24	856	15.57	7.96	784	16.00	7.54
Bachelor's degree	399	12.07	5.51	365	13.71	7.42	513	15.17	7.22
Advanced degree	142	11.41	5.20	183	13.23	7.32	231	14.65	7.14
Employment									
Full-time	1227	12.38	5.84	1108	15.22	7.53	1037	16.23	7.31
Part-time	250	14.32	6.61	196	15.86	7.10	167	15.32	7.28
Unemployed	123	16.46	6.28	77	20.21	8.38	187	16.62	6.97
Retired	280	11.68	6.43	311	11.50	7.40	282	12.34	7.63
Homemaker	256	12.87	6.80	144	16.93	7.95	156	15.79	7.33
Other	113	16.76	6.97	140	18.64	7.66	159	18.99	7.57
Income (2009 \$US)									
\$25,000 or less	369	15.57	7.03	424	17.08	7.88	313	17.77	7.60
\$25,001–\$35,000	303	14.06	6.25	167	16.04	7.88	367	16.69	7.72
\$35,001–\$50,000	512	12.79	6.16	516	15.34	7.55	191	16.37	8.27
\$50,001–\$75,000	426	11.88	5.88	479	14.90	7.44	418	15.26	7.54
\$75,001 or more	478	11.80	5.44	414	13.62	8.07	711	14.74	6.88

Note. PSS = Perceived Stress Scale (Cohen et al., 1983; Cohen & Williamson, 1988).

Table 2
PSS Score Comparisons Between Categorical Demographic Characteristics, Unadjusted and Adjusted for the Remaining Five Characteristics

	1983		2006		2009	
	<i>F</i>	<i>df</i>	<i>F</i>	<i>df</i>	<i>F</i>	<i>df</i>
Sex						
Unadjusted	35.73	1,2268	22.35	1,1998	3.49	1,1998
Adjusted	25.42	1,2037	10.19	1,1930	7.11	1,1945
Race/ethnicity						
Unadjusted	5.88	3,2244	2.40	3,1960	2.14	3,1964
Adjusted	0.30	3,2037	0.28	3,1930	0.74	3,1945
Employment						
Unadjusted	25.23	3,1876	35.78	3,1688	22.50	3,1669
Adjusted	7.79	3,1720	7.78	3,1651	4.40	3,1638

Note. PSS = Perceived Stress Scale (Cohen et al., 1983; Cohen & Williamson, 1988). Employment comparison limited to persons with the following employment statuses: employed full-time; employed part-time; unemployed; and retired.

Table 3
Associations of PSS Score With Continuous Demographic Characteristics, Unadjusted and Adjusted for the Remaining Characteristics

	1983				2006				2009			
	B	SE	b	p	B	SE	b	p	B	SE	b	p
Age												
Unadjusted	-0.05	.01	-.13	<.001	-0.15	.01	-.29	<.001	-0.10	.01	-.21	<.001
Adjusted	-0.04	.01	-.11	<.001	-0.12	.01	-.23	<.001	-0.06	.01	-.13	<.001
Education												
Unadjusted	-0.64	.12	-.11	<.001	-1.17	.17	-.15	<.001	-0.81	.17	-.11	<.001
Adjusted	-0.27	.13	-.05	<.04	-0.71	.18	-.09	<.001	-0.45	.18	-.06	<.02
Income												
Unadjusted	-2.53E ⁻⁵	.00	-.17	<.001	-3.44E ⁻⁵	.00	-.14	<.001	-2.84E ⁻⁵	.00	-.14	<.001
Adjusted	-1.87E ⁻⁵	.00	-.12	<.001	-1.17E ⁻⁵	.00	-.05	<.05	-2.44E ⁻⁵	.00	-.12	<.001

Note. PSS = Perceived Stress Scale (Cohen et al., 1983; Cohen & Williamson, 1988). E⁻⁵ = × 10⁻⁵.

surveys, stress levels increased in Whites, $F(1, 3394) = 5.73, p < .02$; men, $F(1, 1883) = 5.63, p < .02$; those aged 45 to 54 years, $F(1, 933) = 19.89, p < .001$; those aged 55 to 64 years, $F(1, 693) = 6.96, p < .01$; those with 4-year college degrees, $F(1, 860) = 3.30, p < .06$; those with advanced degrees, $F(1, 402) = 3.77, p < .07$; and those with full-time employment, $F(1, 2106) = 10.44, p < .001$. Analyses that collapsed across education levels (those with 4-year degrees and those with advanced degrees) and age (45–54-year-olds and 55–64-year-olds) indicate that stress increased between 2006 and 2009 for those with at least 4 years of college, $F(1, 1251) = 7.05, p < .01$; and for those aged 45 to 64 years, $F(1, 1618) = 22.01, p < .001$. By comparison, stress levels decreased between 2006 and 2009 among the unemployed, $F(1, 262) = 9.70, p < .01$.

One inference that might be drawn from the preceding data is that the stress levels of individuals at the intersection of groups whose stress rose between 2006 and 2009 (i.e., men, Whites, 45–64-year-olds, college graduates, and those with full-time employment) would show the largest increase in stress during the period of the economic downturn. We explored this possibility by comparing the stress levels of White, college-educated men who were between the ages of 45 and 64 years and who were employed full time in 2006 ($n = 94$) with those of similar others in 2009 ($n = 71$). The mean PSS score for this population in 2006 was 12.73 ($SD = 7.34$), while the mean score in 2009 was 15.21 ($SD = 7.28$), $F(1, 164) = 5.68, p < .02$. The increase of 2.48 points was nearly 2 times any increase found for any individual demographic characteristic.

Discussion

Psychological stress has been found to contribute to poorer health practices, increased disease risk, accelerated disease progression, greater symptom reporting, more frequent health service utilization, and increased mortality (e.g., Cohen et al., 2007; McEwen, 2002; Pennebaker, 1982). Hence, differences in stress between demographic groups and changes in stress across historical periods may be important markers of populations under increased risk for physical and psychological disease.

Even though the data reported here were collected more than two decades apart, the results of surveys conducted in 1983, 2006, and 2009 were consistent with regard to the independent (of other demographic characteristics) relations of psychological stress with sex, age, education, income, and employment status. First, women reported more stress than did men. This result parallels other studies showing that women report more stressful life events (Kessler, McLeod, & Wethington, 1985) and rate their stressful life

events as having a more negative impact than do men (see review by Davis, Matthews, & Twamley, 1999). Second, psychological stress increased in a graded fashion with decreasing education and income. This is consistent with evidence for both the rise in stressful events and the decline in coping resources associated with decreasing socioeconomic status (Adler et al., 1994).

It is also consistent with evidence that increasing socioeconomic status (SES) is associated with decreasing risk for both morbidity and premature mortality (Adler et al., 1994). In the 1983 and 2006 surveys, the employed reported less stress than did the unemployed, although this was not true in 2009 during the economic downturn. Unemployment, though generally associated with significant psychological stress, may lose some of its potency as a personal stressor when experienced in the context of an elevated national unemployment rate (approaching 10% at the time of the 2009 survey). A major component of the stress associated with job loss is a loss of self-esteem and social status. Both of these threats to the self may be attenuated when job loss can be attributed to an external cause, such as the economy, rather than to individual failure. Also, many of the unemployed in the 2009 survey may have recently lost their jobs as a result of the economic downturn, as opposed to earlier surveys probably tapping many people who had been unemployed for some time.

Interestingly, across all three surveys, retirees reported less stress than did individuals in any other employment category. These data are consistent with a review that argued that the presumed negative impact of retirement in relation to both relationships and health is largely unsubstantiated (Eckerdt & Sergeant, 2006). Finally, all three surveys showed psychological stress to decrease in a graded fashion with increasing age. The comparatively lower psychological stress among the oldest group may be partly or wholly attributable to those reporting greater stress having shorter life spans (e.g., Neilsen et al., 2008). However, this would not account for the graded relation of stress and age throughout the entire adult life course that we found in each of the surveys. A possible explanation for the lower reports of stress with increasing age is that as we grow older, we both interpret events as less stressful and develop better coping strategies. This interpretation is consistent with recent evidence that as people age, they focus less on negative emotions and savor positive aspects of life (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Lockenhof, Costa, & Lane, 2008; Mroczek, 2001).

Although mean differences indicated the possibility that minorities experienced more stress than did Whites, these differences did not approach significance once controls were included for the other demographic variables, particularly education, income, and employment status. These data suggest

that the race differences that did exist before adjustment were likely attributable to minorities being of lower SES, rather than to personal experiences of racial/ethnic discrimination.

Finally, was there an increase in stress associated with the recent (2008–2009) economic downturn? We found that significant increases in stress occurred among Whites, men, 45–64-year-olds, those with full-time employment, and those with college educations. These associations were driven primarily by a substantial increase in psychological stress by those at the intersection of these demographic groups: White, college-educated, employed men between the ages of 45 and 64 years. This may be attributable to the threat of job loss, actual job loss, or loss of retirement funds in a group with limited time remaining in their work careers to recover.

This interpretation is supported by results from a 2009 Gallup poll (Price, 2009) that was conducted for the American Psychological Association and inquired about Americans' sources of stress. Specifically, among 45–54-year-olds, men reported increases in money- and work-related stress, while women reported decreases in these same areas. Health implications of increased stress in this group are suggested by recent evidence that displaced workers with larger losses in earnings suffer greater increases in mortality (Sullivan & Wachter, 2009). In contrast to the substantial increase in reports of stress in this group is the apparent resilience of other demographic groups in response to the economic downturn. This may, to some extent, be because events that are shared by others in the larger community are appraised as less stressful than events experienced only by an individual.

Overall, these data help identify populations who are most likely to experience the highest levels of stress and associated disease risk. This would include persons of lower SES and women. In contrast, the results also suggest that as we age, our experience of stress is attenuated, with the youngest adults actually experiencing the greatest level of stress. Similarly, the data on the economic downturn suggest that the greatest sensitivity to this problem may occur in relatively well-off middle-aged men, a group that generally reports relatively low levels of stress in their lives.

These data are correlational, and causal inference is not possible. However, many of the reverse causation explanations (e.g., stress causing sex or age group membership) are implausible, and the major demographic third-factor explanations are controlled for in the analyses. Also, although it seems likely that differences between 2006 and 2009 were attributable to changes in the economy, it is possible that some other cultural changes during this period drove the changes in stress levels that we found.

It would have been quite interesting to examine changes in stress that occurred between 1983 and the polls that were conducted 23 and 25 years

later. In fact, there were small increases in almost every demographic category (see Table 1). However, the 1983 poll was based on telephone interviews, while the later ones were based on Internet questionnaires. Consequently, it was impossible to determine whether these increases were attributable to change over the time period or to mode of data collection.

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