

## The Epidemiology of Nonspecific Psychological Distress in New York City, 2002 and 2003

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**ABSTRACT** *The 30-day prevalence of nonspecific psychological distress (NPD) is 3%, nationwide. Little is known about the prevalence and correlates of NPD in urban areas. This study documents the prevalence of NPD among adults in New York City (NYC) using population-based data from the 2002 and 2003 NYC Community Health Surveys (CHS) and identifies correlates of NPD in this population. We examined two cross-sectional random-digit-dialed telephone surveys of NYC adults (2002: N = 9,764; 2003: N = 9,802). Kessler's K6 scale was used to measure NPD. Age-adjusted 30-day prevalence of NPD declined from 6.4% [95% Confidence Interval (CI): 5.8–7.0] in 2002 to 5.1% [95% CI: 4.5–5.6] in 2003. New Yorkers who were poor, in poor health, chronically unemployed, uninsured, and formerly married had the highest prevalence of NPD. Declines occurred among those who were married, white, recently unemployed, and female. NPD prevalence in NYC is higher than national estimates. A stronger economy and recovery from September 11th attacks may have contributed to the 2003 decline observed among selected subgroups. The excess prevalence of NPD may be associated with substantial economic and societal burden. Research to understand the etiology of this high prevalence and interventions to promote mental health in NYC are indicated.*

**KEYWORDS** *Epidemiology, Mental health, Surveys.*

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### INTRODUCTION

Nonspecific psychological distress (NPD) is characterized by a constellation of psychological and somatic symptoms that are common among individuals with a wide range of mental disorders but are not specific to any single disorder.<sup>1</sup> During 2003, 19.6 million Americans ages 18 and older (9.2%) experienced nonspecific psychological distress (NPD),<sup>2</sup> and approximately 6.4 million Americans (3.1%) experienced NPD during any given month.<sup>3</sup> NPD is associated with poor physical health and with several economic and social limitations.<sup>4</sup> National data are available on NPD prevalence among demographic subgroups in the United States, but we know little about the prevalence and correlates of NPD in densely populated, heterogeneous urban areas. This study documents the prevalence of NPD among

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adults in NYC using population-based data from the 2002 and 2003 NYC Community Health Surveys (CHS) and identifies correlates of NPD in this population.

## METHODS

### Sample

The CHS is an annual, random digit-dialed telephone survey of approximately 10,000 New Yorkers carried out by the NYC Department of Health and Mental Hygiene (DOHMH).<sup>5,6</sup> The CHS is designed to provide neighborhood-level estimates of important health indicators, including the prevalence of NPD. Data were collected through computer-assisted telephone interviews of adult NYC residents from May to July 2002 and from April to August 2003. Interviews were completed in less than 20 minutes. The sampling frames for each survey were developed from a list of random digit telephone numbers with known New York City residential exchanges. In order to provide neighborhood estimates, a stratified random sample design was employed; the goal was to conduct approximately 300 interviews in each of 42 neighborhoods defined by zip code aggregation.<sup>7</sup> For sampling efficiency, neighborhoods were grouped into 33 neighborhoods in 2002 and 34 neighborhoods in 2003. Potential respondents were asked their Zip Code of residence and were determined to be ineligible if their neighborhood's quota had been met. Ten attempts were made to reach each telephone number. One adult (age 18 years or older) was randomly selected from each participating household. Our cooperation rates were 64% and 59% in 2002 and 2003, respectively, compared to 70.2% and 68.6% for the New York State Behavioral Risk Factor Surveillance System (NYS BRFSS) survey in those same years. CHS response rates for 2002 and 2003 were 21% and 26%, respectively, compared to the NYS BRFSS rates of 29.8% and 29.1%.<sup>8,9</sup> Less than 10% of CHS non-response among contacted individuals (non-cooperation) was attributable to insurmountable language barriers, another third to respondent's physical or mental limitations, and the remainder to refusals and break-offs. Sources of non-response reflected in the response rate but not in the cooperation rate included numbers that were never answered, those answered only by answering machines, non-working numbers, and non-residential numbers. After deleting records with incomplete NPD assessment data, our effective sample size was 9,342 (out of 9,764 completed interviews) in 2002 and 9,599 (out of 9,802 completed interviews) in 2003. Respondents were told that the survey was anonymous and confidential and were informed of their rights as participants. Consent was implied among those who chose to continue with the interview. The study was approved by the DOHMH Institutional Review Board.

### Measures

The survey instrument was adapted from the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS)<sup>10</sup> and National Health Interview Survey (NHIS).<sup>11</sup> Surveys were conducted in nine languages in 2002 and 23 languages in 2003. Of all interviews conducted over the two survey years, 89% were in English, 9% in Spanish and 2% in other languages. Spanish language interviews were conducted using a questionnaire that had been translated and back translated. Interviews in other languages were conducted using either translated and back translated questionnaires or through an interpreter

provided by the telephone company. All items reported here were identical in both survey years, with the exception of questions about income, which were modified in 2003 to reduce the proportion of refusals, and questions about health insurance that were modified in 2003 to better estimate the proportion of uninsured New Yorkers.

### **Primary Dependent Variable**

The primary dependent variable, NPD, is characterized by high levels of cognitive, behavioral, emotional or psychological symptoms (typically associated with affective distress) that are common among individuals with a wide range of psychiatric disorders but that are not specific to any single disorder. The symptoms that comprise NPD have statistical properties that support its identification as a psychological construct, including high inter-correlation and high factor loadings on a first general dimension. Individuals with NPD are highly likely to have a DSM-IV disorder, but individuals who are in remission or are being successfully treated for a psychiatric disorder may not have sufficient symptoms of distress to meet threshold criteria for NPD.<sup>1</sup>

In this study, NPD was measured using the K6 scale developed by Kessler and colleagues,<sup>12-14</sup> the same scale that is currently used by the NHIS<sup>3</sup> and the National Survey on Drug Use and Health (NSDUH)<sup>2</sup> to measure annual national trends in 30-day and 12-month prevalence of NPD. The K6 scale, which was developed using item response theory (IRT), is a very brief, validated scale designed specifically to screen/assess general populations for the prevalence of mental health disorders. The K6 asks respondents how often during the preceding 30 days they felt "sad," "nervous," "restless," "hopeless," "worthless," or that "everything was an effort." Responses to these six feelings were measured on a scale of 0-4 from "none of the time" to "all of the time." Responses were summed (range: 0-24), and participants with scores greater than 12 were classified as having NPD.<sup>13</sup>

### **Key Independent Variables**

Variables considered for the analysis fell into six categories: 1) immutable characteristics, including survey year, age, self-reported race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, Asian, other), sex, and place of birth (U.S., other); 2) family/social characteristics, including language of interview, marital status, number of adults in the household, and participation in a community group; 3) economic factors, including income, education, employment, interruption of telephone service for more than 24 h in the past year (a hypothesized marker of financial and personal disorganization), and type of health insurance coverage (private, public or none); 4) health factors, including having a personal doctor, self-assessed global health status, having either diabetes or current asthma, and body weight; 5) modifiable risk factors, including current smoking, heavy or binge drinking (defined, using BRFSS criteria,<sup>15</sup> as either more than 60 drinks per month for men or 30 drinks per month for women, or consuming more than 4 drinks on a single occasion in the past 30 days), and having no exercise in the past 30 days; and, 6) residential proximity to the site of the September 11, 2001, attacks on the World Trade Center.

### **Statistical Analysis**

Survey data were weighted to account for unequal selection probabilities and non-response. Primary weights consisted of the number of adults in each household divided by the number of residential telephone lines. Post-stratification weights were used to adjust the sample estimates for each survey year and for the 2 years

combined to the precise age, race/ethnicity and gender composition of each neighborhood, as per the 2000 Census. Prevalence estimates using the combined sample weights were not significantly different from those obtained when each survey year was weighted separately. With the exception of household income, the demographic characteristics of the sample were consistent with those of the 2000 Census. Household incomes were lower in the CHS than in the Census, with a smaller proportion of individuals with household incomes of \$50,000 or more and a larger proportion with incomes in the \$25,000 to \$49,999 range. Prevalence estimates were computed for each year separately using individual year weights and for the

**TABLE 1. New York city community health survey 2002–2003: changes in age-adjusted\* NPD prevalence by year**

Characteristic	2002 Percent (95% CI) (n = 9,342)	2003 Percent (95% CI) (n = 9,599)	Percent change	T <sup>†</sup>	Sample Size	p
Total NYC	6.4 (5.8–7.0)	5.1 (4.5–5.6)	-20.3	-3.14	18,941	0.002
Age Group						
18–24	4.7 (3.4–6.5)	4.4 (3.0–6.4)	-6.4	-0.28	1,927	0.776
25–44	5.7 (4.8–6.7)	4.3 (3.7–5.1)	-24.6	-2.21	8,241	0.027
45–64	8.0 (6.8–9.3)	6.5 (5.5–7.7)	-18.8	-1.76	5,627	0.078
65+	6.5 (5.1–8.2)	4.7 (3.5–6.4)	-27.7	-1.63	3,146	0.102
Sex						
Male	5.3 (4.5–6.3)	4.3 (3.6–5.2)	-18.9	-1.62	8,006	0.106
Female	7.4 (6.6–8.3)	5.7 (5.0–6.5)	-23.0	-2.94	10,935	0.003
Race						
White	5.1 (4.2–6.1)	3.2 (2.6–3.9)	-37.3	-3.31	7,870	<0.001
Black	4.5 (3.6–5.6)	4.6 (3.6–6.0)	0.02	0.22	4,610	0.828
Hispanic	11.8 (10.2–13.5)	10.3 (8.6–12.2)	-12.7	-1.17	4,828	0.240
Asian	4.0 (2.3–6.7)	2.8 (1.6–4.7)	-30.0	-0.91	1,204	0.362
Other	7.5 (4.2–13.0)	3.2 (1.5–6.6)	-57.3	-1.74	429	0.082
Marital status						
Married or cohabitating	5.5 (4.5–6.6)	2.8 (2.2–3.4)	-49.1	-4.42	7,643	<0.001
Previously married	9.6 (8.0–11.5)	9.3 (7.4–11.7)	-3.1	-0.18	5,170	0.861
Never married	6.6 (5.4–8.0)	6.4 (4.9–8.2)	-3.0	-0.20	6,008	0.840
Employment						
Employed	3.8 (3.1–4.6)	3.2 (2.6–4.0)	-15.8	-1.18	11,213	0.239
Student/homemaker/retired	7.7 (6.0–9.7)	4.2 (3.2–5.5)	-45.5	-3.12	4,699	0.002
Unemployed <1 year	10.3 (7.3–14.4)	3.9 (2.6–5.9)	-62.1	-3.23	923	0.001
Unemployed >1 year or unable to work	17.2 (14.5–20.4)	17.6 (14.7–21.0)	2.3	0.17	1,969	0.864
Income						
Less than \$25,000	11.5 (10.1–13.1)	9.1 (7.9–10.4)	-20.9	-2.43	6,322	0.015
\$25,000 to \$49,999	4.5 (3.5–5.6)	2.9 (2.2–3.8)	-35.6	-2.31	4,977	0.021
\$50,000 or more	2.6 (1.8–3.6)	1.5 (1.0–2.5)	-42.3	-1.76	5,086	0.079
Respondent doesn't know	12.9 (10.1–16.3)	8.7 (6.3–12.0)	-32.6	-1.98	1,403	0.048
Missing	3.9 (2.3–6.3)	3.8 (2.2–6.3)	-1.6	-0.04	1,153	0.964

\*All variables except age group were directly standardized to the year 2000 projected U.S. standard population using 4 age groups: 18–24, 25–44, 45–64 and 65 years and older.

†Student's *t*-test that the difference in prevalence (contrast mean) between years = 0.

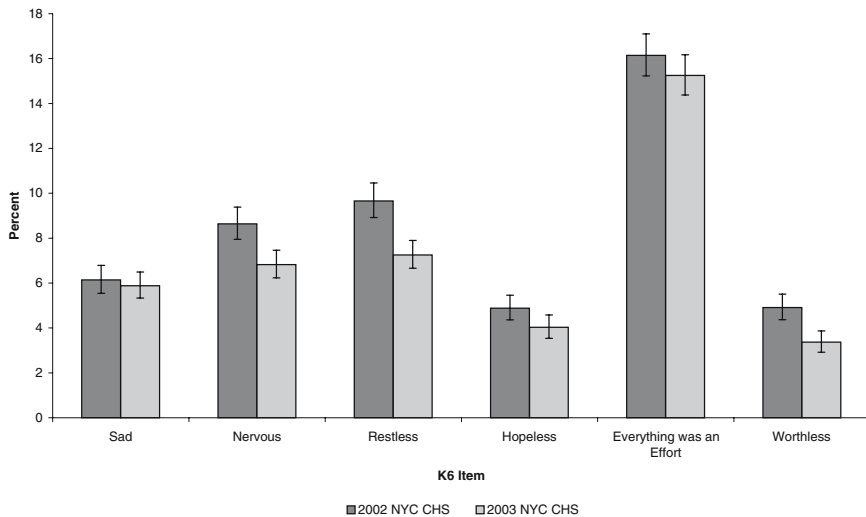
combined sample using combined sample weights. SUDAAN® statistical software<sup>16</sup> was used to directly standardize all prevalence estimates to the July 2000 U.S. standard population and to correct standard errors for the complex sample design using Taylor Series linearization. The probability that between-year differences in group-specific prevalence were significantly different from zero was evaluated using two-sided Student's *T* tests.

Multivariable modeling was conducted on the combined 2002 and 2003 sample using a forward stepwise approach. First a set of core variables (age, sex, race/ethnicity, survey year) was entered into the model. Because of their role as potential confounders, these variables were defined as necessary for inclusion regardless of statistical significance. Other variables for potential inclusion in the multivariable model were selected if their bivariate relationship with NPD had a chi square *p* value less than 0.10. Variables that met this criterion were then entered individually according to the strength of their bivariate association with NPD, from strongest to weakest. Variables were kept in the model if they had a Wald *F* *p* value less than 0.05. Variables that did not meet this criterion either at the step of inclusion or upon inclusion of subsequent variables were excluded. Potentially important variables that had been excluded during the model building process were re-evaluated and included when appropriate. Potentially meaningful two-way interactions (e.g., sex, race) were assessed, but none were statistically significant.

## RESULTS

### Between-Year Differences in the Prevalence of NPD

The age-adjusted 30-day prevalence of NPD was 6.4% (95% Confidence Interval (CI): 5.8–7.0) in 2002 and 5.1% (95% CI: 4.6–5.6) in 2003. Table 1 presents the age-adjusted NPD prevalence estimates by year and demographic subgroup. The highest age-adjusted rates were found among adults age 45–64, women, Hispanics, individuals who were previously married, and those with incomes below \$25,000.



**FIGURE 1.** New York city community health survey 2002–2003: percent (95% CI) of participants responding “all of the time” or “most of the time” by K6 item and survey year.

**TABLE 2. New York City community health survey 2002–2003: multivariable logistic regression model predicting NPD**

Characteristic	Age-adjusted* prevalence (95% CI) (n = 18,941)	Fully adjusted odds ratio (95% CI) (n = 17,735)
Total NYC	5.6 (5.2–6.0)	–
Survey year		
2002	6.4 (5.8–7.0)	1.6 (1.3–1.9)
2003	4.9 (4.4–5.5)	Ref
Sex		
Male	4.6 (4.1–5.2)	Ref
Female	6.4 (5.9–7.0)	1.2 (1.0–1.5)
Age group		
18–24	4.7 (3.7–5.9)	1.4 (0.9–2.1)
25–44	4.9 (4.4–5.5)	1.8 (1.3–2.4)
45–64	7.0 (6.3–7.8)	1.7 (1.2–2.2)
65+	5.6 (4.6–6.7)	Ref
Race/ethnicity		
White	4.0 (3.5–4.5)	Ref
Black	4.4 (3.7–5.2)	0.7 (0.5–0.9)
Hispanic	10.6 (9.5–11.9)	1.3 (1.1–1.7)
Asian	3.5 (2.3–5.1)	0.6 (0.4–1.0)
Other	5.7 (3.6–8.8)	0.8 (0.5–1.4)
Birthplace		
U.S. born	4.5 (4.1–4.9)	Ref
Foreign born	7.3 (6.6–8.1)	1.5 (1.2–1.8)
Interview language		
English	4.9 (4.5–5.3)	Ref
Spanish	12.0 (10.1–14.2)	0.6 (0.5–0.8)
Other	6.4 (4.1–9.7)	1.0 (0.6–1.6)
Marital status		
Married or cohabitating	4.0 (3.5–4.6)	Ref
Previously married	9.5 (8.2–11.1)	1.5 (1.2–1.9)
Never married	6.1 (5.3–7.1)	1.2 (1.0–1.5)
Employment		
Employed	3.5 (3.0–4.1)	Ref
Student/homemaker/retired	5.7 (4.8–6.7)	1.1 (0.9–1.5)
Unemployed <1 year	7.1 (5.5–9.0)	1.7 (1.2–2.4)
Unemployed >1 year or unable to work	17.3 (15.2–19.5)	2.5 (2.0–3.2)
Income		
Less than \$25,000	9.8 (8.9–10.7)	2.0 (1.5–2.8)
\$25,000 to \$49,999	3.9 (3.3–4.6)	1.5 (1.1–2.1)
\$50,000 or more	1.9 (1.5–2.5)	Ref
Respondent doesn't know	7.5 (6.3–8.8)	2.1 (1.4–3.1)
Respondent refused	4.1 (2.9–5.7)	1.3 (0.8–2.1)
Telephone service interruption		
Lost service >24 h	9.5 (8.2–11.0)	1.5 (1.2–1.9)
Didn't lose service	5.1 (4.7–5.5)	Ref
Health insurance		
Private	3.2 (2.8–3.7)	Ref
Public	10.6 (9.6–11.7)	1.3 (1.1–1.7)
No Coverage	9.0 (7.1–11.4)	1.7 (1.3–2.3)

**TABLE 2. Continued**

Characteristic	Age-adjusted* prevalence (95% CI) ( <i>n</i> = 18,941)	Fully adjusted odds ratio (95% CI) ( <i>n</i> = 17,735)
Self-assessed health status		
Good to excellent	2.9 (2.6–3.2)	Ref
Fair or poor	16.8 (15.1–18.5)	3.8 (3.1–4.6)
Diabetes or current asthma		
Don't have diabetes or current asthma	4.8 (4.5–5.3)	Ref
Have diabetes or current asthma	10.9 (9.4–12.5)	1.4 (1.1–1.7)
Smoking status		
Not a current smoker	4.9 (4.5–5.4)	Ref
Current smoker	8.1 (7.2–9.2)	1.5 (1.2–1.8)
Exercise		
Physically active in past 30 days	3.9 (3.5–4.3)	Ref
No exercise past 30 days	9.2 (8.4–10.1)	1.6 (1.4–1.9)

\*All variables except age group were directly standardized to the year 2000 projected U.S. standard population using 4 age groups: 18–24, 25–44, 45–64 and 65 years and older.

The most significant declines in NPD prevalence ( $p < 0.01$ ) occurred among New Yorkers who were married or living with a partner, white, unemployed less than 1 year, students, homemakers or retired, or female.

Figure 1 presents the proportion of New Yorkers responding “all” or “most” of the time to each of the six items that comprise the K6 scale. The decline in NPD was driven by reductions in feelings of restlessness, worthlessness, nervousness ( $p < 0.001$ ) and to a lesser extent, hopelessness ( $p < 0.05$ ). There was no significant change in the proportions responding “all” or “most” of the time to the other two items (sadness, and everything was an effort).

### Multivariable Modeling to Predict NPD

As shown in Table 2, when controlling for other factors, respondents surveyed in 2002 were significantly more likely than those in 2003 to have NPD (Adjusted Odds Ratio (AOR): 1.6; 95% CI: 1.3–1.9). In the combined sample, NPD was more likely to be found among New Yorkers ages 25–44 (AOR: 1.7; 95% CI: 1.2–2.3) and 45–64 (AOR: 1.6; 95% CI: 1.2–2.2) than among those age 65 and older. Despite large differences in the age-adjusted prevalence of NPD between Hispanics and whites, this difference was less significant after controlling for the other factors in the model (OR: 1.3; 95% CI: 1.1–1.7). Among blacks, however, the likelihood of having NPD was lower (AOR: 0.7; 95% CI: 0.5–0.9) than it was among whites. Other demographic factors associated with NPD include having been born outside the United States (AOR: 1.4; 95% CI: 1.2–1.8) and having been previously married (AOR: 1.5; 95% CI: 1.2–1.9). Despite higher age-adjusted prevalence rates, respondents interviewed in Spanish were less likely to have NPD than respondents interviewed in English, after controlling for other factors (AOR: 0.6; 95% CI: 0.4–0.8).

Economic factors were among the strongest correlates of NPD. The most important of these was employment. The highest likelihood of NPD was observed among adults who were unemployed for more than 1 year or unable to work. These



New Yorkers were more than twice as likely as employed individuals to experience NPD. Recent unemployment was also positively associated with NPD (AOR: 1.8; 95% CI: 1.3–2.5).

There was a negative linear relationship between household income and NPD, with the highest probability of NPD occurring among New Yorkers from households with incomes below \$25,000 per year (AOR: 2.1; 95% CI: 1.5–2.9) or whose household income was unknown (AOR: 2.1; 95% CI: 1.4–3.2). Even New Yorkers with incomes between \$25,000 and \$49,999 had a 50% greater likelihood of having NPD compared to those with incomes of \$50,000 or more. Other economic factors that remained significant correlates of NPD in the adjusted model were having lost telephone service for more than 24 h during the past year (AOR: 1.5; 95% CI: 1.2–1.9), having no health insurance coverage (AOR: 1.7; 95% CI: 1.3–2.2), or being insured through Medicaid, Medicare or Child Health Plus (OR: 1.3; 95% CI: 1.0–1.6).

New Yorkers who reported fair or poor health had the greatest overall likelihood of experiencing NPD. These individuals had levels of NPD that were 2.7 times higher than among New Yorkers with good to excellent health. Individuals with diabetes or current asthma also experienced higher odds of NPD (AOR: 1.3; 95% CI: 1.1–1.6). Modifiable risk factors also proved to be significant correlates of NPD. NPD was 40% more likely in current smokers than nonsmokers and 60% more likely among sedentary New Yorkers than among those who had exercised in the past 30 days. Variables that were not found to be significant correlates of NPD, after controlling for the other factors in the model, included the number of adults in the household, education, community participation, having a personal doctor, body weight, and residential proximity to the site of the September 11 attacks.

## DISCUSSION

Using population-based surveys of NYC adults in 2002 and 2003, we found that NPD was elevated compared to national estimates (6.4 vs. 3.0% in 2002 and 5.1 vs. 3.1% in 2003)<sup>3</sup> but declined between 2002 and 2003. There are several possible explanations why the prevalence of NPD documented in this study was higher than in the rest of the country. First, it is possible that some of the differences documented here may be due to differences in the prevalence of primary risk factors for NPD such as low income,<sup>17–20</sup> poor health<sup>18,21</sup> and not being married.<sup>4,18–22</sup> In NYC, 21% of the population lives below the poverty level,<sup>23</sup> compared to 12% nationwide.<sup>24</sup> In 2003, 15% of New York respondents reported fair or poor health, compared to 12% of NHIS respondents, and 52% of CHS respondents were neither married nor living with a partner compared to 37% of respondents nationally.<sup>25</sup>

Second, this survey was conducted in the aftermath of the September 11 terrorist attacks. Previous work has shown that there were substantial psychological sequelae of the attacks in the general population of NYC in 2002 and 2003<sup>26,27</sup> and that levels of posttraumatic stress disorder (PTSD) symptoms were higher in New York City than in the rest of the country.<sup>28</sup> It is likely that some of these psychopathological consequences of the attacks contributed to the NPD documented here. The decline in NPD between 2002 and 2003 observed in NYC, but not seen nationally, would favor this explanation.<sup>3</sup>

Third, characteristics of the survey and its administration may explain some of the observed differences. The CHS was conducted over the telephone, in contrast to the face-to-face NHIS interviews that provide national prevalence estimates.



Respondents may have been more likely to report negative emotional states over the telephone than in face-to-face interviews. Also, some portion of the disparity between NHIS and CHS findings could be attributed to the fact that 11% of CHS respondents were interviewed in a language other than English, compared to 6% of NHIS respondents. The age-adjusted prevalence of NPD was 12.0% (95% CI: 10.1–14.2) among CHS respondents interviewed in Spanish and 6.4% (95% CI 4.1–9.7) among those interviewed in other foreign languages. However, even among CHS respondents interviewed in English, the prevalence of NPD is about 60% higher than the overall 2003 NHIS estimate (4.9% (95% CI: 4.5–5.3) vs. 3.1 (95% CI: 2.9–3.4).

Factors associated with NPD in this study are, for the most part, consistent with correlates identified in the literature. Our data confirm the previously observed protective mental health effect of marriage<sup>4,18–22</sup> and an inverse linear relationship between income and NPD.<sup>2,17,20</sup> We also found NPD to occur more frequently among individuals between the ages of 25 and 64 than among older individuals and found no difference in NPD prevalence between the youngest and oldest adults. These findings are consistent with those of the NHIS<sup>29</sup> and Australian National Mental Health Survey<sup>4</sup> but contrary to other research that shows middle age as the period with the least distress.<sup>30</sup> As was found by the NHIS,<sup>29</sup> our age-adjusted estimates show higher NPD prevalence among Hispanics and no difference between blacks and whites. After controlling for income, health status and the other factors in the multivariable model, however, NPD in NYC was less likely to occur among blacks than whites, and the increased rate among Hispanics was attenuated.

Other correlates of NPD observed in this study that have been documented elsewhere include gender,<sup>3,19,22</sup> employment,<sup>4,31</sup> fair or poor health,<sup>18,19</sup> diabetes or asthma,<sup>4</sup> health care access,<sup>19</sup> smoking,<sup>4,19,30</sup> and exercise.<sup>19,30,32</sup> We also found higher rates of NPD among individuals whose telephone service had been interrupted for more than 24 h in the past year. We hypothesize that this variable is a marker for financial or personal disorganization that is independent of income. Unlike other studies,<sup>2,4</sup> we found no relationship, after controlling for other factors, between body mass index and NPD. Nor did we observe an association between NPD and alcohol consumption.

We created a marker for exposure to the September 11 attacks that was based on residential proximity to the World Trade Center site but found no association between this variable and SPD. Movement of the most affected residents out of the area shortly after the attacks and the fact that most New Yorkers affected by the September 11 attacks were exposed to the trauma at their place of work, not in their home, may explain this finding.

The findings in this study are subject to a number of limitations. First, the sample represents only non-institutionalized adults with land-based telephones, thus excluding individuals who are homeless, undergoing residential psychiatric treatment, living in other group settings, and those without any telephone service or with only mobile phone service. While this limits generalizability, homeless individuals and those living in group-settings are also not represented in studies providing comparable national estimates, such as the NHIS. Second, the cross-sectional nature of the study prevents us from fully understanding the observed associations between NPD and its correlates. Nor can we measure the extent to which the decline in NPD is attributable to either recovery from the psychological sequelae of the September 11, 2001, attacks, or to the City's improving economic climate.<sup>33</sup> Third, until we conduct a validation study of the K6 in NYC, we cannot be certain that the 12/13

cut-point used to distinguish cases from non-cases is optimal for this population. Fourth, the K6 has not been validated in Spanish. Bias introduced by use of a Spanish version of the K6 may account for some of the higher prevalence we observed in the Spanish language interviews, although it would not account for the observed higher prevalence of NPD overall. Fifth, the data are self-reported and do not include diagnostic measures of specific mental disorders.

In summary, the prevalence of NPD in NYC is high and occurs disproportionately among New Yorkers who are poor, in poor health, chronically unemployed, uninsured and formerly married. The prevalence of NPD declined between 2002 and 2003 but declined least among the groups with the highest prevalence. The excess prevalence of NPD in New York City has very high social and economic costs. Poor mental health (including intentional injuries) accounts for the second highest percentage of disability-adjusted life years (DALY's) in developed countries, second only to cardiovascular disease.<sup>34</sup> The economic burden of mental disorders is shouldered by the individual sufferers, family and friends, employers and society, and includes economic and intrapersonal costs associated with care, absenteeism and lost productivity, comorbid physical disease, treatment side effects, premature death, personal anguish, stigma and social isolation.<sup>35</sup> These findings suggest that we need both research to understand the etiology of this higher-than-expected NPD prevalence and a multi-faceted approach to promote mental health in New York City. Community-based interventions to reduce poverty, social isolation, community violence and other community-level risk factors for NPD may be warranted<sup>36</sup> together with individual-level interventions to expand access to mental health assessment and to evidence-based pharmacologic and non-pharmacologic treatment.

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