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Increase in Body Mass Index from Normal Weight to Overweight in a Cross-Sectional Sample of Healthy Research Volunteers

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Abstract

Current literature provides limited information about healthy volunteers serving as controls for biomedical research. This study describes trends in body mass index (BMI), a ratio of weight to height (kg/m^2), of the population of healthy volunteers at the National Institutes of Health Clinical Center (NIH CC) and compares these trends to a nationally-representative sample as reported by the National Health and Nutrition Examination Survey (NHANES). We hypothesized that BMI trends at the NIH CC would follow those of the US population. This cross-sectional study examined the BMI of healthy volunteers at the NIH CC from 1976-80, 1981-87, 1988-94, 1995-98, and for all subsequent two-year periods onward until 2012. Study data were extracted from the NIH Biomedical Translational Research Information System (BTRIS). Subjects were selected based on a discharge code of “volunteer.” Descriptive statistics of volunteers at the NIH CC were calculated for height, weight, age-adjusted BMI, age, and gender, and associations between categorical variables were analyzed using the χ^2 -test. Differences between BMI categories or time periods for continuous independent variables were assessed using Kruskal-Wallis and post-hoc Tamhane T2 tests. The 13,898 healthy volunteers with median age of age 34 years were 53% female and primarily non-Hispanic whites. Mean BMI was within the normal category from 1976-1987. From 1988 on, mean BMI fluctuated, but increased overall. The BMI of healthy volunteers at the NIH CC appears to follow national trends as described by NHANES data of increasing body weight during the past three decades followed by a recent plateau.

Keywords

body mass index; BMI; overweight; obesity; healthy volunteer

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1. Introduction

Healthy volunteers are needed to serve as controls in biomedical research and should represent the general population to provide externally valid data. However, little is known about the physical health of individuals serving as controls in clinical studies because most recent research has evaluated psychological health in this population [1-7]. Research to date has found that healthy volunteers are likely to be more extroverted and self-confident, as well as have less neuroticism and higher sensation seeking tendencies than individuals who choose not to volunteer [1-7]. In the limited research on the physical health of volunteers in the US, height and weight values for smokers were compared to national data in an intervention trial. These particular healthy volunteers had a mean body mass index (BMI), a ratio of weight to height (kg/m^2), below national averages [7]. However, no large-scale studies in the US have primarily examined the prevalence of overweight and obesity among healthy volunteers cross sectionally.

The National Institutes of Health (NIH) consists of 27 institutes and centers dedicated to conducting the nation's medical research. The NIH Clinical Center (NIH CC), the nation's largest clinical research hospital, enrolls nearly 10,000 research participants each year from across the United States. Historically, information collected about NIH research participants was stored in multiple, separate systems making data sharing amongst investigators challenging. Because the US government mandates the sharing of clinical data that have been collected with federal funding, the NIH Laboratory for Informatics Development created the Biomedical Translational Research Information System (BTRIS). BTRIS is a clinical research data repository that allows investigators access to de-identified, NIH intramural data across protocols in order to answer new research questions using existing data [8, 9].

Approximately 3,500 healthy volunteers are enrolled as research participants at the NIH CC each year [10, 11]. These volunteers are recruited through the NIH CC website as well as with fliers posted throughout the area, web-based and newspaper or magazine postings. Volunteers are typically considered "Healthy Volunteers" if they are free of disease as ascertained by a medical history and physical exam. This population provides a large sample for evaluating trends in overweight and obesity over time using BTRIS.

Weight status can be assessed with BMI, which is typically used in population studies. In the US, the National Heart, Lung, and Blood Institute classifies weight status for adults as underweight (BMI <18.5), normal weight (BMI 18.5-24.9), overweight (BMI 25.0-29.9), or obese (BMI ≥ 30) [12]. To gain insight into the physical characteristics of healthy volunteers, this study aimed to describe trends in BMI and demographic characteristics among the population of healthy volunteers enrolled in clinical research at the NIH CC between 1976 and 2012 and compare these trends to US population data. We hypothesized that BMI trends at the NIH CC would follow the trends observed in the US population as described in reports of the National Health and Nutrition Examination Survey (NHANES).

2. Methods and Materials

2.1 Data Collection

Data with personal identifiers removed (de-identified coded format) were obtained from medical records through BTRIS [8, 9]. This study was considered “not human subjects research” based on a determination by the NIH Office of Human Subjects Research Protections. Cross-sectional data on weight, height, age, gender, race and ethnicity were obtained for 11 time points: 1976-80, 1981-87, 1988-94, 1995-98, and for all subsequent two-year periods through 2012 to facilitate crude comparisons with NHANES data. Summarized age-adjusted obesity prevalence data was obtained from publications on BMI trends from NHANES [13-15]. Because the National Center for Health Statistics did not collect data through these surveys from 1981-87 and 1995-98, BMI trends during these time periods were only examined for NIH CC volunteers. For both the NIH CC and NHANES samples, weight and height were measured by trained staff and BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2) [16].

2.2 Subjects

Since many NIH CC healthy volunteers participate in multiple research studies, only data from their first admission was obtained from BTRIS. Healthy volunteers were identified based on an ICD-9 discharge code of “control on clinical trial” (70.7) and/or a chief complaint free text entry including 214 different variants of the term “volunteer,” such as, “Family Study Volunteer,” “Healthy Control Volunteer,” “No Diagnosis Volunteer,” “Research Volunteer,” and “Study Volunteer: Outpatient.” The BTRIS query identified 24,897 unique subjects. Subjects were then excluded ($n=10,999$) based on: an age <20 yrs or >89 yrs; non-US residence; height reported as sitting height or recumbent length; BMI <15 or >70 due to apparent medical record entry errors or missing weight, height or gender data. Other reasons for exclusion included lack of approval from the principal investigator to use their data in this research project; or report from the principal investigator that the patients in their control group were not necessarily healthy. The remaining data set included 13,898 subjects from 50 US states, the District of Columbia, Puerto Rico, and the US Virgin Islands.

2.3 Statistical Analyses

Descriptive statistics for the NIH CC sample were calculated as means + SD for height, weight, BMI and age. Medians were reported for age and sex ratio (males/100 females) was calculated so that comparisons could be made with US Census data. Total numbers and percentages were calculated to describe gender, race, and ethnicity. In order to compare prevalence of overweight and obesity in the NIH CC population to NHANES data [13-15], the BMI prevalence data from the NIH CC sample was age adjusted using the 2000 projected US population according to previously published methods [17]. BMI was then classified as overweight ($25\text{--}29.9 \text{ kg/m}^2$), class I and II obesity ($30\text{--}39.9 \text{ kg/m}^2$) and class III obesity ($\geq 40 \text{ kg/m}^2$). Associations between categorical variables were analyzed using the χ^2 -test. Differences between BMI categories or time periods for continuous independent variables were assessed using Kruskal-Wallis and post-hoc Tamhane T2 tests. Data was analyzed using the Statistical Package for Social Sciences 21 (IBM, Chicago, Illinois).

3. Results

Mean age of the 13,898 NIH CC healthy volunteers was 37.7 ± 14.8 years, mean weight was 78.0 ± 19.5 kg, mean height was 170.3 ± 10.1 cm, and mean BMI was 26.9 ± 6.2 kg/m². Overall, the population of healthy volunteers included 7420 (53.4%) female, 9401 (67.6%) white, and 13,026 (93.7%) Non-Hispanic subjects (Table 1).

Throughout the years, females tended to make up a slightly higher percentage of the population of healthy volunteers at the NIH CC compared to male volunteers (Table 1). The sex ratio in the NIH CC population from 1976-2012 was 87.9. The sex ratio fluctuated from a low of 48 in 2001-2002, indicating twice as many female as male healthy volunteers, to a high of 111 in 1988-1994, indicating more male than female healthy volunteers. Gender was related to BMI category ($P < 0.001$), such that among the 6478 male healthy volunteers, 38.8% had a BMI in the overweight category and 21.3% of males had a BMI in the obese category. By contrast, 24.3% of the 7420 females were in the overweight category and 25.2% of females were obese. The median age of healthy volunteers also increased over time, starting at a median age of 22 between 1976 and 1980 and increasing to a median age of 33 in 2011-2012 (Table 1).

A majority of the NIH CC healthy volunteers have been white; however, the proportion of black or African American participants has increased to 30.8% since 1999-2000 (Table 1). Other races such as Asian, American Indian or those with multiple races have made up less than 10% of the healthy volunteer population at the NIH CC thus far. Overweight and obesity were more prevalent in the black/African American and Hawaiian/Pacific Islander participants, whereas Asians had the highest proportion of normal weight participants within this study population (Figure 1).

From 1976-1980, 52.3% of NIH CC healthy volunteers had a mean BMI in the normal weight range (mean BMI 23.5 ± 3.9 kg/m²) (Figure 2). From 1981-1987, the BMI of the majority of volunteers (54.0%) remained in the normal range, but mean BMI (24.2 ± 4.6 kg/m²) increased significantly ($P = 0.02$) compared to 1976-1980 (Figure 2). From 1988-2012, mean BMI increased to the overweight range (ranging from 25.1 ± 5.4 to 28.7 ± 7.0 kg/m²). In 2007-2008, mean BMI plateaued at 27.6 ± 6.4 kg/m², and remained stable through 2012 (Figure 2).

The age-adjusted prevalence of overweight in the NIH CC healthy volunteers was similar to that of NHANES data from 1976 to 2012 with only small fluctuations (Figure 3A). There were also differences between the two data sets in Class I and II obesity, with NIH CC healthy volunteers consistently having a slightly lower age-adjusted prevalence of class I and II obesity throughout the years than the NHANES sample (Figure 3B). Age-adjusted prevalence of class III obesity was very similar throughout the years, with the exception of a small difference in prevalence of 3.8% in the 2001-2002 data where there was a higher prevalence within the NIH CC sample (Figure 3C).

4. Discussion

Over the past three decades, the prevalence of overweight and obesity and the associated risk for chronic diseases has steadily increased among all US demographic groups [14]. Any difference in BMI observed between the general population and healthy volunteers in the US could reflect actual differences in health and limit the generalizability of biomedical research. Furthermore, obesity has implications for the metabolism and effectiveness of drug therapies tested in phased clinical trials or longitudinal observational studies. Additionally, excess fat mass can affect drug distribution in plasma and tissues, due to a reduction in tissue blood flow and changes in cardiac function [18]. Drug clearance is also affected by obesity induced alterations in renal and hepatic physiology, such as non-alcoholic fatty liver disease. Because this cross-sectional study describes BMI in a large sample of research volunteers, it is an important step toward understanding whether these subjects accurately represent the general population in terms of weight and health.

This study demonstrates an increase in the mean BMI of NIH CC healthy volunteers over time. Across the entire sampling period, healthy volunteers at the NIH CC had a mean BMI in the overweight category. Whereas the mean BMI was within the normal category from 1976-1987, it has fluctuated but remained in the overweight category since 1988-94. Two recent changes in mean BMI in NIH CC healthy volunteers are noteworthy. The first was a significant decrease in BMI from 2001-2002 to 2005-2006, followed by an increase from 2005-2006 to 2007-2012. This drop does not parallel national trends in which mean BMI consistently increased over this period of time and therefore may be explained by the opening in 2007 of the NIH CC Metabolic Clinical Research Unit which is primarily utilized for obesity research. Metabolic Clinical Research Unit participants are classified as healthy volunteers, including those who are overweight or obese, thus these individuals are included in this data set. By contrast, in 2005-2006, intramural scientists focused on obesity and metabolism may have dedicated a larger portion of their time to protocol design, resulting in a decrease in recruitment of overweight and obese healthy volunteers during that time. Once the Metabolic Clinical Research Unit opened in 2007-2008, recruitment of overweight and obese healthy volunteers increased. Unfortunately, due to the nature of utilizing de-identified data, this hypothesis regarding the drop and then rise in BMI at this time cannot be further investigated.

In our population of healthy volunteers, the sex ratio indicated that we had more female healthy volunteers than males over the three decades and the sex of the healthy volunteers varied at multiple time points. Variation in the sex ratio of NIH CC healthy volunteers likely reflects changing protocols that may recruit more males during one period of time and more females during another. US Census data demonstrate a gradual increase in the sex ratio of the US population from 94.5 in 1980 to 96.7 in 2010 suggesting that the male population is increasing [19, 20]. Compared to the US population during the study timeframe, females were over-represented among the healthy volunteers at the NIH CC.

Median age of NIH CC healthy volunteers steadily increased until 2004 and then fluctuated until 2012. US Census data demonstrate a steady increase in median age of the US population from 33.0, 32.9, 35.3 and 37.2 in 1980, 1990, 2000 and 2010, respectively [19,

20]. Thus, for most time periods, NIH CC healthy volunteers have a younger median age than the US population possibly due to recruitment strategies or due to study requirements. In early years, recruitment was done mainly on college campuses in the DC Metro area. In later years recruitment has been done using the internet and newspaper advertisements making it easier to reach a broader audience.

The racial and ethnic profile of the participants at the NIH CC is not similar to that of the general population in the US as reported by the US Census Bureau [19, 21]. At the NIH CC, a majority of the healthy volunteers are white or black/African American with less than 10% of other races. This disparity decreases the generalizability of this research. However, an almost four fold increase in the number of black/African American healthy volunteers has been observed since 1999. This may be due to changes in the recruitment criteria of the research studies. For example, an investigator may have started a large observational study looking at sickle cell disease, a disease that is only prevalent in black people. This difference may also be related to the racial makeup of the Washington D.C. metro area, which was 26.8% black according to 2000 US Census data, where a majority of the healthy volunteers who participate in NIH CC studies live [19]. Additionally, the percent of NIH CC healthy volunteers who are Hispanic has increased over the past three decades however; this ethnic group remains under-represented compared to the US population.

In this study, we hypothesized that BMI trends at the NIH CC would follow the trends observed in the US population as described in reports of NHANES. We accept this hypothesis as the mean BMI of the NIH CC healthy volunteers appeared to mirror the pattern of the overall US population with an increase in overweight and obesity over time. One exception however, when looking at data on individual classes of BMI, was in the Class I and Class II obese subjects where the NIH CC had a lower prevalence at all time points compared to the NHANES population [13-15]. Since the data had been de-identified, it is difficult to understand the reasons for why this discrepancy existed. These subtle differences may be reflective of the types of studies recruiting healthy volunteers at these time points and the study inclusion criteria. For example, studies may be recruiting participants who are only at a healthy BMI or obese class III. Further exploration of study requirements for healthy volunteers at the NIH CC would need to be explored in order to examine these discrepancies in further detail.

A major strength of this study is the large sample size available from more than three decades of research at the NIH CC. Obtaining this data was made possible due to the development of the BTRIS repository which collects data directly from electronic medical records [9]. This database eliminates the human element of hand entry, increasing the accuracy of the study's data. Further, intramural scientists at the NIH CC conduct research across all medical disciplines using a variety of research designs. Therefore, this study was able to aggregate data from the many types of healthy volunteers that may participate in studies nationwide, enhancing external validity.

This study was also subject to some limitations. The NIH CC currently recruits healthy volunteers through local advertisements and online. Prior to widespread use of the internet, recruitment involved disseminating fliers throughout the local community resulting in a

large number of college-aged adults participating as healthy volunteers. Thus, BMI in this sample may appear lower than the national average due to a younger age distribution. Furthermore, use of de-identified medical records allowed access to more recent data, but prevented exploration of differences by the type of research study or specific inclusion/exclusion criteria. Therefore, whether an increase in obesity-related studies over time could have contributed to the observed increase in mean BMI is not known.

In conclusion, this study characterized adult healthy research volunteers at the NIH CC as primarily overweight, non-Hispanic, and white. These volunteers appeared to have a lower prevalence of class I and II obesity than the general population, but mean BMI consistently followed the national trends with the prevalence of overweight and obesity increasing throughout the years. The current study represents an important first step toward characterizing temporal trends in weight status within a large, diverse subset of US healthy volunteers in biomedical research studies.

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List of Abbreviations

BMI	body mass index
BTRIS	Biomedical Translational Research Information System
NHANES	National Health and Nutrition Examination Survey
NIH	National Institutes of Health
NIH CC	National Institutes of Health Clinical Center

References

1. Ball C, McLaren P, Morrison P. The personality structure of “normal” volunteers. *Br J Clin Pharmacol*. 1993; 36:369–71. [PubMed: 12959318]
2. Drici M, Raybaud F, Lunardo CD, Iacono P, Gustovic P. Influence of the behaviour pattern on the nocebo response of healthy volunteers. *Br J Clin Pharmacol*. 1995; 39:204–6. [PubMed: 7742165]
3. Farre M, Lamas X, Cami J. Sensation seeking amongst healthy volunteers participating in phase I clinical trials. *Br J Clin Pharmacol*. 1995; 39:405–9. [PubMed: 7640147]
4. Halbreich U, Bakhai Y, Bacon K, Goldstein S, Asnis G, Endicott J, et al. The normalcy of self-proclaimed “normal volunteers”. *Am J Psychiatry*. 1989; 146:1052–5. [PubMed: 2750979]
5. Almeida L, Kashdan T, Coelho R, Albino-Teixeira A, Soares-da-Silva P. Healthy subjects volunteering for phase I studies: influence of curiosity, exploration tendencies and perceived self-efficacy. *Int J Clin Pharmacol Ther*. 2008; 46:109–18. [PubMed: 18397681]
6. Almeida L, Kashdan T, Nunes T, Coelho R, Albino-Teixeira A, Soares-da-Silva P. Who volunteers for phase I clinical trials? Influences of anxiety, social anxiety and depressive symptoms on self-selection and the reporting of adverse events. *Eur J Clin Pharmacol*. 2008; 64:575–82. [PubMed: 18320183]
7. Thomson C, Harris R, Craft N, Hakim I. A cross-sectional analysis demonstrated the healthy volunteer effect in smokers. *J Clin Epidemiol*. 2005; 58:378–82. [PubMed: 15868696]

8. Cimino J, Ayres E. The clinical research data repository of the US National Institutes of Health. *Studies in health technology and informatics*. 2010; 160:1299–303. [PubMed: 20841894]
9. Cimino JJ, Ayres EJ, Beri A, Freedman R, Oberholtzer E, Rath S. Developing a self-service query interface for re-using de-identified electronic health record data. *Studies in health technology and informatics*. 2013; 192:632–6. [PubMed: 23920633]
10. McNeese, P. Building Ten at Fifty. National Institutes of Health Clinical Center; 2003. http://www.cc.nih.gov/about/_pdf/Building-10-At-Fifty.pdf. [December 23, 2013]
11. NIH. NIH Clinical Center: There's No Hospital Like It. NIH Medline Plus: The Magazine. National Institutes of Health and Friends of the National Library of Medicine; 2011. <http://www.nlm.nih.gov/medlineplus/magazine/issues/spring11/articles/spring11pg15-17.htm>. [December 23, 2013]
12. NHLBI. Executive summary of the clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. *Arch Intern Med*. 1998; 158:1855. [PubMed: 9759681]
13. Flegal K, Carroll M, Kit B, Ogden C. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *Jama*. 2012; 307:491–7. [PubMed: 22253363]
14. Ogden, CL.; Carroll, MD. Statistics NCfH. Jun. 2010 Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960-1962 Through 2007-2008.. ed2010
15. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama*. 2014; 311:806–14. [PubMed: 24570244]
16. CDC. [October 1, 2014] National Health and Nutrition Examination Survey (NHANES): Anthropometry Procedures Manual. 2007. http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/manual_an.pdf
17. Klein RJ, Schoenborn CA. Age Adjustment Using the 2000 Projected U.S. Population. National Center for Health Statistics. 2001
18. Hanley M, Abernethy D, Greenblatt D. Effect of obesity on the pharmacokinetics of drugs in humans. *Clin Pharmacokinet*. 2010; 49:71–87. [PubMed: 20067334]
19. Hobbs, F.; Stoops, N. Demographic Trends in the 20th Century. US Census Bureau, Census 2000 Special Reports, Series CENSR-4. U.S. Government Printing Office; Washington, DC: 2002.
20. Howden, LM.; Meyer, JA. Age and Sex Composition, 2010. US Census Bureau, 2010 Census Briefs. U.S. Government Printing Office; Washington, DC: 2011.
21. Humes, KR.; Jones, NA.; Ramirez, RR. Overview of Race and Hispanic Origin: 2010. US Census Bureau 2010 Census Briefs. U.S. Government Printing Office; Washington DC: 2011.

Figure 1. Body Mass Index¹ of National Institutes of Health Clinical Center Healthy Volunteers Stratified by Race

¹Body mass index reported as underweight (<18.5 kg/m²), normal weight (18.5 to 24.9 kg/m²), overweight (25 to 29.9 kg/m²) and obese (≥ 30 kg/m²). N=13,898.

Figure 2. BMI of National Institutes of Health Clinical Center Healthy Volunteers by Time Period*

*Data are presented as means. Data points with different numbers are significantly different ($p < 0.05$). $N = 13,898$

Figure 3. Age-adjusted¹ prevalence of overweight and obesity in NIH CC Healthy Volunteers and NHANES² participants

¹Age-adjustment was done according to the direct method to the 2000 Census population, using the age groups 20-39, 40-59 and 60 years and older. BMI prevalence (%) was compared between National Institutes of Health Clinical Center healthy volunteers and the National Center for Health Statistics, National Health and Nutrition Examination Survey participants across 11 time periods with (A) overweight (BMI 25-29.9) participants, (B) obese class I and II (BMI 30-39.9) and (C) obese class III (BMI ≥ 40).

²NHANES data obtained from previously published results [13-15]

Table 1

Cross-sectional Data on Characteristics of National Institutes of Health Clinical Center Healthy Volunteers by Year^{*}

	1976-1980	1981-1987	1988-1994	1995-1998	1999-2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2011-2012	Entire Sample
Gender												
Male	274 (47.4)	556 (49.3)	583 (53.0)	326 (46.4)	225 (40.0)	210 (33.0)	203 (38.7)	368 (44.3)	945 (42.7)	1441 (48.1)	1347 (51.2)	6478 (46.6)
Female	304 (52.6)	571 (50.7)	518 (47.0)	376 (53.6)	338 (60.0)	426 (67.0)	321 (61.3)	462 (55.7)	1269 (57.3)	1553 (51.9)	1282 (48.8)	7420 (53.4)
Median Age (years)	22	25	29	31	34	36	37.5	34	45	39	33	34
Race												
White	516 (89.3)	1001 (88.8)	910 (82.7)	561 (79.9)	324 (57.5)	414 (65.1)	357 (68.1)	567 (68.3)	1500 (67.8)	1810 (60.5)	1441 (54.8)	9401 (67.6)
Black/African American	38 (6.6)	75 (6.7)	131 (11.9)	76 (10.8)	186 (33.0)	156 (24.5)	97 (18.5)	154 (18.6)	449 (20.3)	745 (24.9)	811 (30.8)	2918 (21.0)
Asian	1 (0.2)	4 (0.4)	29 (2.6)	37 (5.3)	25 (4.4)	29 (4.6)	31 (5.9)	66 (8.0)	108 (4.9)	195 (6.5)	153 (5.8)	678 (4.9)
American Indian/Alaskan	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.2)	1 (0.2)	3 (0.6)	0 (0)	12 (0.5)	11 (0.4)	6 (0.2)	34 (0.2)
Hawaiian/Pacific Islander	0 (0)	1 (0.1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.2)	8 (0.4)	0 (0)	10 (0.4)	21 (0.2)
Multiple Races	0 (0)	1 (0.1)	0 (0)	0 (0)	0 (0)	2 (0.3)	4 (0.8)	2 (0.2)	20 (0.9)	69 (2.3)	92 (3.5)	190 (1.4)
Unknown	23 (4.0)	45 (4.0)	31 (2.8)	28 (4.0)	27 (4.8)	34 (5.3)	32 (6.1)	39 (4.7)	117 (5.3)	164 (5.5)	116 (4.4)	656 (4.7)
Ethnicity												
Non-Hispanic	554 (95.9)	1075 (95.4)	1066 (96.8)	674 (96.0)	535 (95.0)	598 (94.0)	488 (93.1)	778 (93.7)	2050 (92.6)	2798 (93.5)	2410 (91.7)	13026 (93.7)
Hispanic	0 (0)	1 (0.09)	7 (0.6)	25 (3.6)	18 (3.2)	29 (4.6)	30 (5.7)	44 (5.3)	95 (4.3)	153 (5.11)	183 (7.0)	585 (4.2)
Unknown	24 (4.2)	47 (4.2)	25 (2.3)	2 (0.3)	10 (1.8)	9 (1.4)	6 (1.1)	8 (1.0)	53 (2.4)	41 (1.4)	35 (1.3)	260 (1.9)

All values are expressed as number (%) unless otherwise noted. N=13,898.