

Published in final edited form as:

*J Clin Epidemiol.* 2014 January ; 67(1): 93–99. doi:10.1016/j.jclinepi.2013.07.011.

## More Common, but Less Severe: Differences between EQ-5D 3-Level, Youth, and 5-Level Versions

**Benjamin M. Craig, PhD\***,

Moffitt Cancer Center and University of South Florida

**A. Simon Pickard, PhD,** and

University of Illinois at Chicago

**Erica I. Lubetkin, MD, MPH**

The City College of New York (CUNY)

### Abstract

**Objective**—The EuroQol Group recently released youth (Y) and 5-level (5L) versions of its 3-level EQ-5D instrument (3L) that measures health-related quality of life (HRQoL). In this study, we (1) compare 3L, Y and 5L responses among US adults and (2) assess construct validity.

**Study Design**—Using a nationally representative sample of US adults (N=2619), we collected 3L, Y, and 5L responses in random order and estimated their associations as well as their relationship with a 0 to 100 numerical visual analogue scale.

**Results**—The prevalence of US adults in the best possible EQ-5D state (i.e., 11111) was lower for the Y (38%) and 5L (35%) than for the 3L (44%), capturing more health problems. However, the prevalence of extreme responses in Pain/Discomfort and Anxiety/Depression decreased substantially between the 3L and 5L (from 44% to 17% and from 29% to 13%, respectively).

**Conclusions**—Compared to the 3L, the Y, and 5L versions describe population health as having more, yet milder, health problems. While the 5L may have advantages in patient populations where extreme problems are more prevalent, population studies or studies that follow patients from childhood may consider using the Y.

### Keywords

EQ-5D; EQ-5D-3L; EQ-5D-5L; EQ-5D-Y; EuroQol; patient-reported outcomes; PRO

### Objectives

Measures of general health based on self-reported losses in health-related quality of life (HRQoL) provide a holistic approach to evaluate treatment effectiveness and to make comparisons across clinical populations. For this purpose, short-form patient-reported

\*Corresponding Author, Moffitt Cancer Center, 12902 Magnolia Drive, MRC-CANCONT, Tampa, FL 33612-9416; Phone: (813) 745-6710; Fax: (813) 745-6525; benjamin.craig@moffitt.org.

Support and Financial Disclosure Declaration  
The authors have no conflicts of interest.

outcome (PRO) instruments (often with less than a dozen items) have been developed for use across multiple disease areas, minimizing response burden. While long-form and disease-specific PRO instruments have advantages in terms of their reliability, short-form instruments (e.g., 1 item per domain) provide a broad-based measure of respondent health.

The EQ-5D is a generic measure of HRQoL that has been widely used in clinical and economic evaluations of health care as well as to capture the health of populations.<sup>1</sup> The measure is composed of a simple descriptive profile that may be converted into a single summary index (EQ-5D index) and a visual analogue scale (VAS). The measure is designed for self-completion, has a low respondent burden, and has been administered using a variety of modalities (e.g., postal surveys).

Widely used in adult populations, the EQ-5D 3-level version (EQ-5D-3L) has been translated into more than 150 languages. The EQ-5D-3L descriptive system consists of 5 domains (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) with each dimension having 3 levels (no problems, some problems, and extreme problems) (see Table 1). In an effort to improve the appropriateness of the EQ-5D in children, adolescents, and low literacy populations,<sup>2</sup> a youth version of the EQ-5D (EQ-5D-Y)—a modified but similar version of the EQ-5D—was constructed and examined through cognitive interviews.<sup>3</sup> With its simplified wording (e.g., “a lot” vs. “extremely”; see Table 1), the adjectival scales of the EQ-5D-Y may mitigate ceiling effects of the EQ-5D-3L, particularly among less educated adults. A multinational study concluded that the EQ-5D-Y was a feasible, reliable, and valid instrument to measure HRQOL in children and adolescents, but cautioned that the measure needed further testing in adult and clinical populations.<sup>4</sup>

In addition to the EQ-5D-Y, a 5-level version of the EQ-5D (EQ-5D-5L) was recently developed to improve upon the measurement properties of the EQ-5D-3L, namely ceiling effects in the general population<sup>5</sup> and in a few clinical conditions.<sup>6</sup> By adding 2 levels (slight problems and severe problems) to the existing three levels, the 5-level version was designed to not only have reduced ceiling effects but also have greater reliability and discriminatory power. Upon finalizing the labels for the 5L descriptive system<sup>7</sup> a multi-country study generated evidence on the improved properties of the EQ-5D-5L compared to the EQ-5D-3L.<sup>8</sup> However, at present, no population study has simultaneously administered and compared the properties of the descriptive systems for the 3L, Y, and 5L.

For this study, we conducted a nationally representative survey of adults in the United States and examined the prevalence of the 3L, Y, and 5L responses. These results provide a general benchmark for the interpretation of EQ-5D responses across instruments. Furthermore, we assessed the external validity of these 3 instruments by estimating their relationship with a 101-point visual analogue scale (VAS). This study was designed to characterize general health in the United States and to inform researchers about the implications of their decision to utilize a given EQ instrument (3L, Y, or 5L). We hypothesized that the 5L and Y would perform better than the 3L in terms of discriminative ability and proportion of respondents susceptible to ceiling effects.

## Study Design

### Health Outcomes

As shown in Table 1, each item in the 3L and Y captures 2 potential losses in HRQoL (i.e., graded responses: 1 to 2 and 2 to 3), totaling up to 10 losses (5x2). The 5-level version is potentially more descriptive in that each item captures 4 possible losses (1 to 2, 2 to 3, 3 to 4, and 4 to 5), totaling up to 20 losses (5x4). For the 3L, Y, and 5L, the best possible health state is characterized by the absence of losses (i.e., level 1 on each item, 11111). The worst possible health state is characterized by all possible losses (i.e., 33333 or 55555) for the 3L and 5L versions, respectively.

In addition to the 3L, Y, and 5L, health was measured using a 0 to 100 numerical visual analogue scale (VAS) from worst (0) to best (100) health imaginable. We hypothesized that each of the losses in HRQoL captured by the EQ-5D instrument was negatively associated with overall health as captured by VAS responses.

### Survey Recruitment

Using quota sampling, respondents were recruited from a nationally representative sample of US adults, which was a panel assembled by a research company specializing in online data collection. The company invited subjects from their panel, managed the implementation of the survey (e.g., invitation to panelists), and maintained an invitee database. Each subject who met eligibility criteria was sent a generic e-mail invitation containing payment information and a member-specific hyperlink that provided immediate access to the online survey informed consent page. Once a respondent clicked on the link, the member-specific data (e.g., age) were “passed through” from the recruitment software and captured by the survey software in order to compare these data with demographic survey responses (i.e., automated respondent identity check). Consenting respondents were asked 12 questions, most of which were taken from the 2010 US Census,<sup>9</sup> about their demographic, geographic, and socioeconomic characteristics, including educational attainment and household income. If screener demographic responses were concordant with “pass through” data, respondents were categorized by gender (male, female), age in years (18-34; 35-54; 55 or older), and race/ethnicity (Hispanic; Black, non-Hispanic; Other, non-Hispanic). A minimum number of respondents were recruited for each demographic cross tabulation (e.g., at least 40 Hispanic women, age 18-34) to improve sample concordance with the 2010 US Census. If a respondent belonged to a filled demographic quota or met any of the 4 termination criteria (invalid country or state; discordant demographic responses; use of a proxy server; JavaScript disabled), the respondent was disqualified from further participation. No quota sampling was conducted on geographic and socioeconomic characteristics, which are more likely to change over time compared to date of birth, gender and race/ethnicity complicating the process of external validation.

### Survey Design

After passing the screener, respondents were asked to complete a health component consisting of 46 questions: 1 PROMIS Global question (In general, would you say your health is: Excellent, Very good, Good, Fair or Poor),<sup>10</sup> 29 questions from the PROMIS-29

instrument,<sup>10</sup> 15 questions from the 3 EQ-5D instruments (3L, Y, and 5L; See Table 1) and a VAS. The PROMIS-29 and EQ-5D questions were presented on separate pages in random order. The VAS was the final question and included similar wording as the EQ-VAS: “We would like to know how good or bad your health is TODAY. The scale is numbered from 0 to 100. 100 means the best health you can imagine. 0 means the worst health you can imagine. Move the slider on the scale to indicate how your health is TODAY.” The scale was placed horizontally with a numeric indicator that was centered above the scale stating, “YOUR HEALTH TODAY=” followed by the numeric location of the slider. Respondents were not allowed to proceed to the next page unless all questions on a page were answered. Except for the VAS, pages automatically advanced upon complete response; however, respondents were allowed to go back to change previous responses. Instrument screenshots are available at <http://labpages.moffitt.org/craigb/>.

### Statistical Analysis

Due to the potential of bias related to drop out and disruption to internet connections, differences between complete and incomplete respondents in the distributions of categorical responses to demographic, socioeconomic, and geographic questions were evaluated using chi-squared tests. Sampling weights were applied to EQ-5D and VAS responses to improve concordance between the sample quotas and the 2010 US Census. To assess convergent construct validity of the EQ-5D instruments, we estimated 3 weighted linear regression models on VAS responses, 1 for each instrument, using ordinal least squares estimation. In addition to a constant, the 3L and Y regressions had 10 coefficients each, 1 for each loss in HRQoL. Likewise, the 5L regression had 20 coefficients. Due to the use of quotas and sampling weights, coefficient p-values were estimated using stratified bootstrap with replacement.

### Results

Between August 7, 2012 and August 23, 2012, 5978 respondents were recruited for this study. One hundred (2%) did not consent, 777 (13%) dropped out during the screener, and 2221 (37%) were terminated based on study criteria, including over quota. Among the 2877 qualifying respondents, 2614 (91%) completed the 3 EQ-5D instruments and VAS. Incomplete responses (Table 2) were associated with Hispanic ethnicity and household income—particularly households earning less than \$15,000 per year. By construction, recruitment quotas were used so respondent demographic characteristics are in accordance with the 2010 US Census. Although quotas were not applied to socioeconomic status, respondent educational attainment and household income largely agreed with national estimates, with the exception of an underrepresentation of professionals in households earning more than \$100,000 per year. Similarly, the sample included respondents from all 50 states and the District of Columbia. Specifically, we examined the prevalence of each state/district in the sample relative to the 2010 US Census (e.g.,  $p_{FL}/P_{FL}$ ). The 51 prevalence ratios were distributed with a median of 1.04 and an interquartile range from 0.78 to 1.24.

To improve national representativeness, sampling weights were applied to all health outcome estimates in Tables 3, 4, and 5. According to Table 3, the prevalence of the best

possible EQ-5D health state (11111) appeared slightly lower for the Y and 5L than for the 3L. Although the worst possible EQ-5D state for the 5L (55555) was less severe than the worst possible state for the 3L (33333; e.g., “unable to walk about” was less severe than “confined to bed”), no respondents reported 55555. All who reported 33333 in the 3L also did so in the Y, but none of them reported 55555 in the 5L.

For all items, the prevalence of item responses (Table 4) fell monotonically by HRQoL severity grade. In terms of descriptive capacity for population health measurement, 1 level in the Y, 2 levels in the 3L, and 5 levels in the 5L each included less than 1% of the sample. The least frequent response was 3L level-3 Mobility (0.18%; “confined to bed”), which was replaced with “a lot of problems walking about” in the Y and “unable to walk about” in the 5L, which increased the prevalence to 2.65% and 0.49%, respectively. The most frequent response was 3L level-1 Self-Care (94.51%; “no problems with self-care”), which was replaced with “no problems washing and dressing myself” in the Y and 5L, which slightly decreased its prevalence to 93.85% and 92.55%, respectively.

For Mobility, Self-Care, and Usual Activities items, the 3L and Y responses largely agreed; proportions of agreement were 94% (Mobility), 98% (Self-Care) and 89% (Usual Activities). For these items, a few level-1 3L responses shifted to level-2 5L responses (2% to 7%), and level-2 3L responses were distributed over the full 5L range. It is particularly noteworthy that respondents in the level-5 of the 5L Mobility mostly reported level-2 on the 3L Mobility, which again implies that the 5L “unable to walk about” was a less severe than the 3L “confined to bed.”

The lower prevalence of the best EQ-5D state (11111) in the Y and 5L (Table 3) was largely attributable to differences in Pain/Discomfort and Anxiety/Depression responses. For these symptomatic items, a few level-1 3L shifted down to level-2 Y (7% and 12%) and to level-2 5L (10% and 8%). A few level-2 3L shifted to down level-3 Y (2% and 2%); however, most shifted up to level-2 5L (26% and 15%), referring to the item as “slight” instead of “moderate.” Furthermore, most level-3 3L shifted up to level-4 5L (2% and 1%), which is less severe than level-3 3L or level-4 5L. In summary, the Y and 5L increased the prevalence of Pain/Discomfort and Anxiety/Depression responses compared to the 3L, but the 5L dramatically reduced their severity. Specifically, the prevalence of moderate to extreme shifts in scale plummeted between the 3L and 5L (from 44% to 17% and from 29% to 13%, respectively). Although the labels for level-2 and level-3 3L were in the 5L (Table 1), the 5L described a greater prevalence of milder symptoms.

Based on the regression results showing the association between EQ-5D responses and VAS score (Table 5), the expected score for the best EQ-5D state (11111) was lower for the 3L than the Y or 5L (88.80 compared to 89.16 and 89.40, respectively), and the expected score for the worst EQ-5D state (i.e., sum of all coefficients and constant) was higher for the 3L than the Y and 5L (24.35 compared to 21.66 and 18.80, respectively). However, these differences across instruments were not significant.

In the 3L, 7 of its 10 losses in HRQoL significantly reduced the VAS score, suggesting that respondents with these problems reported lower overall health. The remaining 3

insignificant coefficients represented losses in Mobility, Self-Care, and Usual Activities from level 2 to level 3, which may be attributable to small sample sizes. In the Y, 8 of its 10 losses significantly reduced the VAS score, and the 2 insignificant coefficients represented losses in Self-Care and Usual Activities. The constant and coefficients of the 3L and Y were insignificantly different at a p-value of 0.05, except for 3 coefficients: level-3 Mobility (3L “confined to bed” Y “a lot of problems walking about”), level-3 Pain/Discomfort (3L “extreme pain or discomfort” Y “a lot of pain or discomfort”), and level-2 Anxiety/Depression (3L “moderately anxious or depressed” Y “a bit worried, sad or unhappy”).

Out of the 20 losses in HRQoL captured by the 5L, 12 significantly reduced the VAS score. Among the 8 insignificant coefficients, 2 described slight problems in Mobility and Self-Care, 2 described moderate problems in Self-Care and Usual Activities and 4 described extreme problems (4 to 5) in all domains except Mobility. Similar results were found using a generalized linear model with a log link to describe the proportional association between the VAS and EQ-5D instruments.

## Conclusions

Using a nationally representative sample of US adults, we found that the Y and 5L slightly reduced the prevalence of the best possible EQ-5D state, mitigating the ceiling effect in the 3L. However, the use of the 5L instead of the 3L reduced the prevalence of moderate to extreme health problems by more than half, particularly Pain/Discomfort and Anxiety/Depression. While item level descriptions (e.g., “confined to bed” vs. “unable to walking about”) appear to have altered the association between EQ-5D responses and overall health, the range of VAS scores from the best to worst possible EQ-5D states did not significantly differ between the 3 instruments.

This study describes the distribution of health states for the EQ-5D-5L, EQ-5D-3L, and EQ-5D-Y based on a representative sample of the US general population using a web survey. Between 2000 and 2003 the EQ-5D-3L was administered in the US general population as part of the Medical Expenditure Panel Survey using a paper-and-pencil questionnaire; however, Bansback and colleagues similarly used a web survey in their Canadian valuation studies of the EQ-5D-3L.<sup>11</sup> Compared with their performance on the EQ-5D-3L, the current sample demonstrated reduced ceiling effects on the EQ-5D-5L, resembling patterns seen in a multi-country study of patients with chronic conditions<sup>8</sup> and, thereby, providing evidence that the EQ-5D-5L also has a role in measuring population health.

The 5L evidence demonstrates a key limitation in the 3L Pain/Discomfort and Anxiety/Depression items, where a few respondents rather report slight instead of moderate problems. Also, respondents preferred to report severe instead of extreme problems. The interpretation of moderate and extreme responses may be more accurate when these milder categories are available, improving measurement in clinical populations where moderate to extreme health problems are more prevalent. In other words, having 5 levels permits the respondent not to have to “upcode” their health problems.

In comparison to the 3L and 5L, the Y did surprisingly well by mitigating ceiling effects, addressing issues with level descriptions, and predicting overall health. While it was designed for pediatric populations and may not capture extreme health problems as well as the 5L, this evidence suggests that it may substitute for the 3L when surveying across ages and literacy levels or in longitudinal studies that start in childhood.<sup>2</sup> For example, the Y may be more appropriate to track the impact of developmental disorders or diseases diagnosed in childhood, such as Type I diabetes and asthma,<sup>12,13</sup> because researchers would not have to shift to the 3L or 5L in adulthood.

This study is the first to apply the EQ-5D-Y to a US adult population, venturing beyond youth applications. A recent health valuation study collected discrete choice experiment (DCE) responses from US adults to estimate the value of the EQ-5D-Y outcomes for children (ages 7 and 10) on a quality-adjusted life year scale.<sup>14</sup> An ongoing DCE study is valuing EQ-5D-Y outcomes for adults, which may facilitate longitudinal studies starting in childhood. With increasing valuation and psychometric evidence, the EQ-5D-Y may replace the 3L for certain studies; however, this choice is not simple. For example, 3L items may have low response frequencies (e.g., confined to bed) that are extremely important, particularly when comparing outcomes among older, institutionalized adults (e.g., nursing home).

With regard to limitations, while great effort was expended to control for observable differences in demographic characteristics, unobservable differences between computer and non-computer users may introduce selection biases relating to population health. It was not feasible to quota sample on health questions (in addition to demographic characteristics) and future research may target clinical populations and respondents with specific health conditions. Furthermore, no efforts were taken to survey non-English speaking, low literacy, and institutionalized adults. However, even without the aid of recruitment quotas, the respondents were from all 50 states and the District of Columbia, and their socioeconomic characteristics largely agreed with national estimates.

This study describes the prevalence and distribution of EQ-5D responses in a nationally representative sample of US adults recruited via the internet from an established panel.

Our results provide further evidence that the EQ-5D-Y and EQ-5D-5L may be used for measuring population health. Building from this study, future work will examine the mapping between instrument responses, psychometric analyses will assess item functioning in relation to other instruments, and valuation studies will translate adult Y and 5L responses into quality-adjusted life years.

## Acknowledgments

The authors thank Michelle Owens (survey coordination) and Carol Templeton (copy editing) at Lee H. Moffitt Cancer Center & Research Institute for their contributions to the research and creation of this paper.

Funding support for this research was provided by Dr. Craig's R01-CA160104, HRQoL Values for Cancer Survivors: Enhancing PROMIS Measures for Comparative Effectiveness Research (CER). In addition, all persons in the acknowledgments have given their written permission to be named in the manuscript.

## References

1. The EuroQol Group. EuroQol—a new facility for the measurement of health-related quality of life. *Health Policy*. 1990; 16(3):199–208. [PubMed: 10109801]
2. Burstrom K, Egmar AC, Lugner A, Eriksson M, Svartengren M. A Swedish child-friendly pilot version of the EQ-5D instrument—the development process. *European Journal of Public Health*. Apr; 2011 21(2):171–177. [PubMed: 20430804]
3. Wille N, Badia X, Bonsel G, et al. Development of the EQ-5D-Y: a child-friendly version of the EQ-5D. *Qual. Life Res*. Aug; 2010 19(6):875–886. [PubMed: 20405245]
4. Ravens-Sieberer U, Wille N, Badia X, et al. Feasibility, reliability, and validity of the EQ-5D-Y: results from a multinational study. *Qual. Life Res*. Aug; 2010 19(6):887–897. [PubMed: 20401552]
5. Bharmal M, Thomas J. Comparing the EQ-5D and the SF-6D descriptive systems to assess their ceiling effects in the US general population. *Value Health*. Jul-Aug;2006 9(4):262–271. [PubMed: 16903996]
6. Brazier J, Roberts J, Tsuchiya A, Busschbach J. A comparison of the EQ-5D and SF-6D across seven patient groups. *Health Econ*. Sep; 2004 13(9):873–884. [PubMed: 15362179]
7. Herdman M, Gudex C, Lloyd A, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Qual. Life Res*. Dec; 2011 20(10):1727–1736. [PubMed: 21479777]
8. Janssen MF, Pickard AS, Golicki D, et al. Measurement properties of the EQ-5D-5L compared to the EQ-5D-3L across eight patient groups: a multi-country study. *Quality of life research: an international journal of quality of life aspects of treatment, care and rehabilitation*. Nov 25.2012
9. U.S. Census Bureau. [Accessed December 2012] United States Census 2010. 2010. [http://www.census.gov/2010census/pdf/2010\\_Questionnaire\\_Info.pdf](http://www.census.gov/2010census/pdf/2010_Questionnaire_Info.pdf)
10. [Accessed June 06, 2012] PROMIS-29 Profile v1.0. 2008-2012. <https://www.assessmentcenter.net/ac1/files/pdf/44b7636201a34267a9213db7f69f2c6d.pdf>
11. Bansback N, Tsuchiya A, Brazier J, Anis A. Canadian Valuation of EQ-5D Health States: Preliminary Value Set and Considerations for Future Valuation Studies. *PLoS One*. Feb.2012 7(2)
12. Eidt-Koch D, Mittendorf T, Greiner W. Cross-sectional validity of the EQ-5D-Y as a generic health outcome instrument in children and adolescents with cystic fibrosis in Germany. *BMC Pediatr*. Aug.2009 :9. [PubMed: 19193235]
13. Velasco MJM, Martin ED, Diez FJA, Perez PM, Amigo JGD. Health related quality of life in type 1 diabetes mellitus. *Anales De Pediatria*. Nov; 2012 77(5):329–333. [PubMed: 22542635]
14. Craig, BM.; Pickard, AS.; Lubetkin, EI. Population Health Based on the 3-Level, Youth, and 5-Level Versions of the EQ-5D; EuroQol Plenary Meeting; Montreal, Canada. Sept 2013, 2013;

Table 1

## Comparison of 3 EQ-5D Instruments

3 Level (3L)	Youth (Y)	5 Level (5L)
<u>Mobility</u>	<u>Mobility</u>	<u>Mobility</u>
I have no problems in walking about	I have no problems walking about	I have no problems in walking about
I have some problems in walking about	I have some problems walking about	I have slight problems in walking about
I am confined to bed	I have a lot of problems walking about	I have moderate problems in walking about
<u>Self-Care</u>	<u>Looking after myself</u>	<u>Self-Care</u>
I have no problems with self-care	I have no problems washing or dressing myself	I have severe problems in walking about
I have some problems washing or dressing myself	I have some problems washing or dressing myself	I am unable to walk about
I am unable to wash or dress myself	I have a lot of problems washing or dressing myself	I have no problems washing or dressing myself
<u>Usual Activities</u>	<u>Doing usual activities</u>	<u>Usual Activities</u>
I have no problems with performing my usual activities	I have no problems doing my usual activities	I have slight problems washing or dressing myself
I have some problems with performing my usual activities	I have some problems doing my usual activities	I have moderate problems washing or dressing myself
I am unable to perform my usual activities	I have a lot of problems doing my usual activities	I have severe problems washing or dressing myself
<u>Pain/Discomfort</u>	<u>Having pain or discomfort</u>	<u>Pain/Discomfort</u>
I have no pain or discomfort	I have no pain or discomfort	I am unable to do my usual activities
I have moderate pain or discomfort	I have some pain or discomfort	I have no pain or discomfort
I have extreme pain or discomfort	I have a lot of pain or discomfort	I have slight pain or discomfort
<u>Anxiety/Depression</u>	<u>Feeling worried, sad or unhappy</u>	<u>Anxiety/Depression</u>
I am not anxious or depressed	I am not worried, sad or unhappy	I have moderate pain or discomfort
I am moderately anxious or depressed	I am a bit worried, sad or unhappy	I have severe pain or discomfort
I am extremely anxious or depressed	I am very worried, sad or unhappy	I have extreme pain or discomfort

**Table 2**

Respondent Characteristics by Completion and Compared to 2010 US Population \*

	Incomplete N=263	Complete N=2614		2010 US Census
Respondent Characteristics	# (%)	# (%)	P- value	%
Age in years				
18 to 34	81 (31)	715 (27)	0.285	30.58
35 to 54	86 (33)	976 (37)		36.70
55 and older	96 (37)	923 (35)		32.72
Sex				
Male	124 (47)	1321 (51)	0.295	48.53
Female	139 (53)	1293 (49)		51.47
Race				
White	208 (79)	2140 (82)	0.083	74.66
Black or African American	34 (13)	322 (12)		11.97
American Indian or Alaska Native	0 (0)	13 (0)		0.87
Asian	12 (5)	52 (2)		4.87
Native Hawaiian or other Pacific Islander	2 (1)	34 (1)		0.16
Some other race	0 (0)	0 (0)		5.39
Two or more races	7 (3)	53 (2)		2.06
Hispanic ethnicity				
Hispanic or Latino	42 (16)	309 (12)	0.050	14.22
Not Hispanic or Latino	221 (84)	2305 (88)		85.78
Educational attainment among age 25 or older				
Less than high school	30 (11)	323 (12)	0.326	14.42
High school graduate	68 (26)	697 (27)		28.50
Some college, no degree	48 (18)	433 (17)		21.28
Associate's degree	20 (8)	227 (9)		7.61
Bachelor's degree	59 (22)	665 (25)		17.74
Graduate or professional degree	11 (4)	53 (2)		10.44
Refused/Don't know	1 (0)	7 (0)		-
Household income				
\$14,999 or less	40 (15)	250 (10)	0.003	13.46
\$15,000 to \$24,999	35 (13)	361 (14)		11.49
\$25,000 to \$34,999	20 (8)	416 (16)		10.76
\$35,000 to \$49,999	56 (21)	565 (22)		14.24
\$50,000 to \$74,999	34 (13)	364 (14)		18.28
\$75,000 to \$99,999	26 (10)	201 (8)		11.81
\$100,000 to \$149,999	12 (5)	155 (6)		11.82
\$150,000 or more	14 (5)	101 (4)		8.14
Refused/Don't know	26 (10)	201 (8)		-

\* Age, Sex, Race, and Ethnicity estimates for the US are based on 2010 Census Summary File 1. Educational attainment and household income are based on 2010 American Community Survey 1-Year Estimates. Unlike the US Census, the American Community Survey excluded adults not in the community (e.g., institutionalized) and describes income by the proportion of households, not adults.

**Table 3**

Prevalence of Best and Worst EQ-5D Responses, %

<b>3 Level (3L)</b>	<b>All States</b>	<b>Youth (Y)</b>		<b>5 Level (5L)</b>	
		<b>Best (11111)</b>	<b>Worst (33333)</b>	<b>Best (11111)</b>	<b>Worst (55555)</b>
Best (11111)	43.62	33.92	0.00	32.52	0.00
Worst (33333)	0.03	0.00	0.03	0.00	0.00
All States	100.00	37.61	0.16	34.92	0.00

**Table 4**

Prevalence of EQ-5D Item Responses, %

3 Level (3L)	Youth (Y)				5 Level (5L)				
	All	1	2	3	1	2	3	4	5
Mobility									
1	78.10	76.01	2.09	0.00	73.36	4.26	0.40	0.04	0.04
2	21.72	2.00	17.21	2.51	1.11	11.80	6.35	2.14	0.31
3	0.18	0.00	0.04	0.14	0.00	0.00	0.04	0.00	0.14
All	100.00	78.01	19.34	2.65	74.47	16.06	6.79	2.18	0.49
Self-Care									
1	94.51	93.20	1.19	0.12	91.95	2.16	0.33	0.00	0.06
2	5.16	0.61	4.30	0.25	0.56	2.51	1.69	0.37	0.04
3	0.33	0.04	0.07	0.22	0.04	0.00	0.04	0.00	0.25
All	100.00	93.85	5.56	0.59	92.55	4.67	2.06	0.37	0.35
Usual Activities									
1	76.05	70.57	5.43	0.05	68.93	6.67	0.36	0.05	0.04
2	22.58	3.83	16.85	1.90	1.92	12.64	6.53	1.31	0.17
3	1.39	0.04	0.36	0.99	0.00	0.16	0.20	0.33	0.69
All	100.00	74.44	22.64	2.94	70.85	19.47	7.09	1.69	0.90
Pain/Discomfort									
1	56.08	48.90	7.14	0.04	45.88	10.00	0.20	0.00	0.00
2	41.15	2.78	36.35	2.02	2.00	25.53	12.40	1.12	0.09
3	2.78	0.00	0.51	2.27	0.03	0.04	0.41	1.91	0.39
All	100.00	51.68	44.00	4.33	47.91	35.57	13.01	3.03	0.48
Anxiety/Depression									
1	71.35	58.81	12.45	0.09	63.13	7.65	0.48	0.08	0.00
2	25.63	3.85	19.62	2.16	1.24	14.71	8.77	0.84	0.07
3	3.02	0.16	0.71	2.15	0.20	0.07	0.47	1.21	1.07
All	100.00	62.82	32.78	4.40	64.57	22.43	9.72	2.13	1.14

**Table 5**Association between Visual Analog Scale (VAS) and 3 EQ-5D Instruments<sup>\*</sup>

Domain	3 Level (3L)		Youth (Y)		5 Level (5L)			
	1 to 2	2 to 3	1 to 2	2 to 3	1 to 2	2 to 3	3 to 4	4 to 5
Mobility	-8.76 <sup>*</sup>	31.34	-7.00 <sup>*</sup>	-3.80	-5.46 <sup>*</sup>	-2.87	-6.36 <sup>*</sup>	15.73 <sup>*</sup>
Self-Care	-9.88 <sup>*</sup>	-26.01	-8.59 <sup>*</sup>	1.13	-6.60 <sup>*</sup>	-0.65	-9.52	1.30
Usual Activities	-8.50 <sup>*</sup>	-5.08	-8.87 <sup>*</sup>	-10.86 <sup>*</sup>	-5.95 <sup>*</sup>	-4.16 <sup>*</sup>	4.09	-8.21
Pain/Discomfort	-5.90 <sup>*</sup>	-14.29 <sup>*</sup>	-5.76 <sup>*</sup>	-8.28 <sup>*</sup>	-4.64 <sup>*</sup>	-5.63 <sup>*</sup>	-10.02 <sup>*</sup>	-5.37
Anxiety/Depression	-7.43 <sup>*</sup>	-9.94 <sup>*</sup>	-5.49 <sup>*</sup>	-9.96 <sup>*</sup>	-4.74 <sup>*</sup>	-3.80 <sup>*</sup>	-8.76 <sup>*</sup>	1.03
Constant <sup>**</sup>	88.80 <sup>*</sup>		89.16 <sup>*</sup>		89.40 <sup>*</sup>			

<sup>\*</sup> p-value <0.05

<sup>\*\*</sup> Constant represents the best EQ-5D state (11111) on a 101-point VAS where 0 represents the worst imaginable health and 100 represents the best imaginable health. For example, the predicted VAS response for EQ-5D-Y state 32111 is 69.77 (89.16-7.00-3.80-8.59).