

2013 NATIONAL SURVEY ON DRUG USE AND HEALTH

QUESTIONNAIRE DWELLING UNIT-LEVEL AND PERSON PAIR- LEVEL SAMPLING WEIGHT CALIBRATION

Substance Abuse and Mental Health Services Administration
Center for Behavioral Health Statistics and Quality
Rockville, Maryland

February 2015

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RTI Authors:

Matthew Westlake
Patrick Chen
Harper Gordek

SAMHSA Authors:

Art Hughes
Matthew Williams

RTI Project Director:

David Hunter

SAMHSA Project Officer:

Peter Tice

For questions about this report, please email Peter.Tice@samhsa.hhs.gov.

Prepared for Substance Abuse and Mental Health Services Administration,
Rockville, Maryland

Prepared by RTI International, Research Triangle Park, North Carolina

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Preface and Acknowledgments

This report documents the method of weight calibration used for producing the final set of questionnaire dwelling unit (QDU) and pair weights for the National Survey on Drug Use and Health (NSDUH) data from 2013. The weighting team faced several challenges in this task and was able to address them by resorting to innovative modifications of certain basic statistical ideas, which are listed below.

- Under Brewer's method, high weights may occur due to small pair selection probabilities. In any calibration exercise, some treatment of extreme value (ev) in weights is needed, but there is a danger of introducing too much bias by over-treatment. In the generalized exponential model (GEM), which is described in detail in the NSDUH Methodological Resource Book person-level sampling weight calibration report (Center for Behavioral Health Statistics and Quality, 2015b), extreme value control is built in, but one needs to define suitable ev domains so that not too many evs are defined. If too many design variables are used to define ev domains, then each domain will be very sparse and will not be of much use in defining thresholds for ev. As in past surveys, a hierarchy of domains was defined using pair age (each pair member being in one of the three categories: 12 to 25, 26 to 49, and 50+) and number of people aged 12 to 25 in the household, State, and clusters of States (see Section 5.2 for details).
- Control of extreme values in weights helps reduce instability of estimates to some extent, but there is a need for methods that do not introduce much bias. Following the famous suggestion of Hajek (1971) in his comments on Basu's fabled example of circus elephants, we performed ratio adjustment (a form of poststratification) to estimated totals obtained from the household data on the number of people belonging to the pair domain of interest. This was implemented in a multivariate manner to get one set of final weights.
- In the absence of a suitable source of poststratification controls for the person pair-level weights and the household-level weights, the inherent two-phase nature of the survey design was capitalized upon to estimate these controls from the first phase of the large screener sample. The first-phase sample weight was poststratified to person-level U.S. Census Bureau counts to get more efficient estimated counts for pair and household data.
- The problem of multiplicities complicated the issue of providing one set of final weights. When dealing with person-level parameters involving drug-related behaviors among members of the same household, it is possible for an individual to manifest himself or herself in the pair sample through different pairs. To avoid overcounting, the pair weights have to be divided by multiplicity factors, which tend to be domain specific. For this reason, multiplicity factors for a key set of pair analysis domains also are produced along with a set of final calibrated pair weights.
- Missing items in the respondent questionnaire led to imputation for deriving pair relationships, multiplicity factors, and household counts for Hajek adjustments.

The calibration task described in this report has been in place, with minor modifications, since the 1999 version of NSDUH, which was then called the National Household Survey on Drug Abuse (NHSDA).¹ Results from this calibration applied to an earlier survey year were presented at the 2001 Joint Statistical Meetings. The procedures described in the proceedings papers from these presentations can serve as useful supplemental reference material on estimation in the presence of multiplicities and extreme weights (Chromy & Singh, 2001) and on GEM calibration of pair weights (Penne, Chen, & Singh, 2001). The experience of using GEM with person weights is described in an earlier proceedings paper (Chen, Penne, & Singh, 2000).

This report was prepared for the Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, by RTI International (a registered trademark and a trade name of Research Triangle Institute). Contributors to this report at RTI include Debbie Bond, Jim Chromy, Claudia Clark, and Margaret Smith.

NSDUH Weighting Team
Ralph Folsom, Senior Advisor
Research Triangle Park, NC

¹ The National Household Survey on Drug Abuse (NHSDA) was renamed the National Survey on Drug Use and Health (NSDUH) in the 2002 survey year.

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List of Terms and Abbreviations

DU	Dwelling unit.
Ev	Extreme value. See Sections 5.1 and 5.2 for more detail.
GEM	Generalized exponential model. See Chapter 3 for more detail.
Household-level person count	The number of pairs associated with a given domain in a given household. These counts are used as control totals in the poststratification step. See Chapter 11 in the editing and imputation report (Center for Behavioral Health Statistics and Quality, 2015a) for details on how these counts are created, and Chapter 4 for details on their use in poststratification.
IQR	Interquartile range.
Multiplicity factor	The number of pairs associated with a given respondent in a given domain. See Center for Behavioral Health Statistics and Quality (2015a) for more detail.
Nr	Nonresponse.
Outwisor	The proportion of weights trimmed after extreme value adjustment via winsorization.
Pair domain	A pair relationship where the target population is defined by one of the pair members, conditional on the attributes of the other pair member.
Pair relationship	The relationship between selected pair members.
Parent-child	A pair relationship where either both pair members identify the other as part of a parent-child relationship, or both pair members otherwise are determined to form a parent-child pair (either through other evidence or through imputation).
ps	Poststratification.
QDU	Questionnaire dwelling unit: a household where at least one member responded to the questionnaire.
res.pr.nr	Respondent pair nonresponse adjustment step. See Section 6.3.3 for more detail.
res.qdu.nr	Respondent questionnaire dwelling unit nonresponse adjustment step. See Section 6.2.3 for more detail.
res.pr.ev	Respondent pair extreme value adjustment step. See Section 6.3.5 for more detail.
res.qdu.ev	Respondent questionnaire dwelling unit extreme value adjustment step. See Section 6.2.5 for more detail.

res.pr.ps	Respondent pair poststratification adjustment step. See Section 6.3.4 for more detail.
res.qdu.ps	Respondent questionnaire dwelling unit poststratification adjustment step. See Section 6.2.4 for more detail.
SDU	Screener dwelling unit: a household where screener information is available.
sel.pr.ps	Selected person pair poststratification adjustment step. See Section 6.3.2 for more detail.
sel.qdu.ps	Selected questionnaire dwelling unit poststratification adjustment step. See Section 6.2.2 for more detail.
Sibling-sibling	A pair relationship where the pair members are siblings (either reported to be so, or otherwise determined to be so).
Spouse-spouse	A pair relationship where the pair members are either married or living together as though married (either reported to be so, or otherwise determined to be so).
SS	State sampling.
UWE	Unequal weighting effect. It refers to the contribution in the design effect due to unequal selection probability and is defined as $1 + [(n - 1)/n]*CV^2$, where CV = coefficient of variation of weights and n is the sample size.
Winsorization	A method of extreme value adjustment that replaces extreme values with the critical values used for defining low and high extreme values.

1. Introduction

Traditionally, most household surveys have been designed either to measure characteristics of the entire household or to focus on a randomly selected respondent from among those determined to be eligible for the survey. Selecting more than one person from the same household is generally avoided since people from the same household often exhibit the same or similar characteristics and behavioral patterns. The intra-class correlation found among members of the same household leads to a clustering effect on the variance of estimates resulting in less precise estimates compared with estimates of the same sample size from a simple random sample. Selecting only one person per household avoids this clustering effect on the variance. The "one person per household" sampling approach, however, precludes the opportunity to gather information about the relationships among household members. In the National Survey on Drug Use and Health (NSDUH),² we allow for a richer analytic capability of a survey designed to ensure a positive pairwise probability of selection among all eligible household members in each sample household. Achieving positive probabilities for all pairs within sampled households permits unbiased estimation of the within-dwelling-unit component of variance. Besides providing efficient data collection, this sampling method also facilitates the study of the relationships of social behaviors among members of the same household. This report documents the methodology and development of calibrated weights for the second objective, the study of behavioral relationships among people residing in the same household. The report also describes the development of questionnaire dwelling unit (QDU) weights, which are of independent interest for studying household-level characteristics and also are needed for producing household count estimates of the number of people belonging to pair relationship domains for use as poststratification controls for pair weights.

NSDUH allows for estimating characteristics at the person level, pair level, and household or QDU level. This report describes the weight calibration methods used for the pair- and QDU-level respondents. As described in the person-level report, NSDUH is an annual survey of about 67,500 people selected from the civilian, noninstitutionalized population aged 12 or older from all 50 States and the District of Columbia. Based on a composite size measure, States were geographically partitioned into roughly equal-sized regions according to population. The 42 smaller States and the District of Columbia were partitioned into 12 State sampling (SS) regions, whereas the 8 largest States were divided into 48 SS regions. Therefore, the partitioning of the United States resulted in the formation of a total of 900 SS regions. Under a stratified design with States serving as the primary strata and SS regions serving as the secondary strata, census tracts, segments within census tracts, and dwelling units (DUs) within segments were each selected using probability proportional to size sampling. NSDUH is sometimes referred to as a two-phase sample where the first phase consisted of a large number of screener dwelling units (SDUs, about 200,000) selected to ensure that various age groups (five in all: 12 to 17, 18 to 25, 26 to 34, 35 to 49, and 50+) of eligible individuals were represented adequately in the second phase. Information collected from SDUs also provided estimates of population controls (as in two-phase sampling) for calibration at levels (such as pair and QDU) for which suitable U.S. Census Bureau-based controls were not available. The second phase consisted of the

² This report presents information from the 2013 National Survey on Drug Use and Health (NSDUH). Prior to 2002, the survey was called the National Household Survey on Drug Abuse (NHSDA).

selection of zero, one, or two people from each selected SDU using a modification of Brewer's method such that prescribed sampling rates for the five age groups in each State were achieved with high selection rates for youths (12 to 17) and young adults (18 to 25). Table 1.1 shows the eligible number of selected and responding SDUs, QDUs, pairs, and people for each of the 5 years (2009–2013). The distribution of pair data for different pairs of age groups may vary considerably (see Chapter 2 for details). It is seen that for certain age group domains, the realized sample size may not be sufficient to yield reliable estimates. Also, there may be problems of extreme weights due to small pair selection probabilities under Brewer's method that may cause instability of estimates. These and some other estimation issues related to pair data are discussed below, along with some adopted solutions.

Table 1.1 2009–2013 NSDUH Sample Sizes

Sample Unit		2009	2010	2011	2012	2013
SDU	Selected	161,377	166,532	179,293	178,586	190,067
	Completed	142,933	147,010	156,048	153,873	160,325
QDU	Selected	58,288	58,702	61,441	60,621	61,634
	Completed	48,088	48,113	50,133	48,850	48,896
Pair	Selected	26,497	26,295	27,095	27,035	27,108
	Completed	19,919	19,691	19,976	19,459	18,942
Person	Selected	84,785	84,997	88,536	87,656	88,742
	Completed	68,007	67,804	70,109	68,309	67,838

Note: The 2009–2010 sample sizes reflect the removal of falsified cases found in Pennsylvania and Maryland. The 2011–2013 samples were not affected. For additional information, see Section B.3.5 in Appendix B of the 2011, 2012, and 2013 national findings reports (Center for Behavioral Health Statistics and Quality, 2012; 2013; 2014b).

First, note that for studying drug-related behavioral relationships among members of the same household, pair data are required because the outcome variable generally is defined with respect to the specific other member selected from the household. However, the parameter of interest is generally at the person level and is not at the pair level. For example, in the parent-child pairs, one may be interested in the proportion of children who have used drugs in the past year who have parents who report talking to their child about drugs. Here the target population consists only of children, and not all possible pairs. Note that the pair-level (two people per QDU) sample forms a subsample of the larger person-level (one or two people per QDU) sample, with the QDUs themselves selected from the larger sample of SDUs. NSDUH has features of a two-phase design, which turns out to be useful for estimating calibration controls for poststratification of household-level weights and person pair-level weights. No other outside source is available for obtaining these controls. For this purpose, the screener-level household weights are poststratified to person-level census counts to obtain more efficient estimated controls for pair and household data.

In estimation for pair domains, two major problems arise: one is that of multiplicities because, for a given domain defined by the pair relationship, when the parameter of interest is at the person level, several pairs in the household could be associated with the same person. For example, analysts are interested in an outcome at the person level, the proportion of children who use drugs and whose parents report talking to them about drugs, where the focus is on the child in a parent-child pair. Several parent-child pairs in the household could be associated with the same child. If the household has two parents, the selected child has two inclusion possibilities

(one with each parent) in the set of all such parent-child pairs (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015a). The other problem is that of extreme weights that may arise due to small selection probabilities for certain pair age groups, which may lead to unstable estimates. Each of these issues is discussed in turn.

If several pairs in the household are associated with the same person, it is necessary to use the average measure of behavior relationships for each member, which gives rise to multiplicities. Thus, the pair weights need to be divided by the person-level multiplicity factors for each domain of interest, and, therefore, multiplicity factors need to be produced along with the final set of calibrated weights. Because it is not straightforward to create these multiplicities, analyses would have to be necessarily limited to pair relationships where the multiplicities were produced a priori. It was anticipated that analyses of interest would be limited to 14 pair domains, listed in Table 1.2. Since no multiplicity was necessary for the spouse-spouse/partner-partner pair relationships (by definition, each pair member could have only one partner or one spouse), multiplicity factors were produced for only 12 of these domains. Note that a single pair relationship might have two domains associated with it, since the parameter of interest might be associated with only one member of the pair (the "focus" member), and the multiplicity would differ depending upon which pair member was the focus member.

Table 1.2 Pair Domains

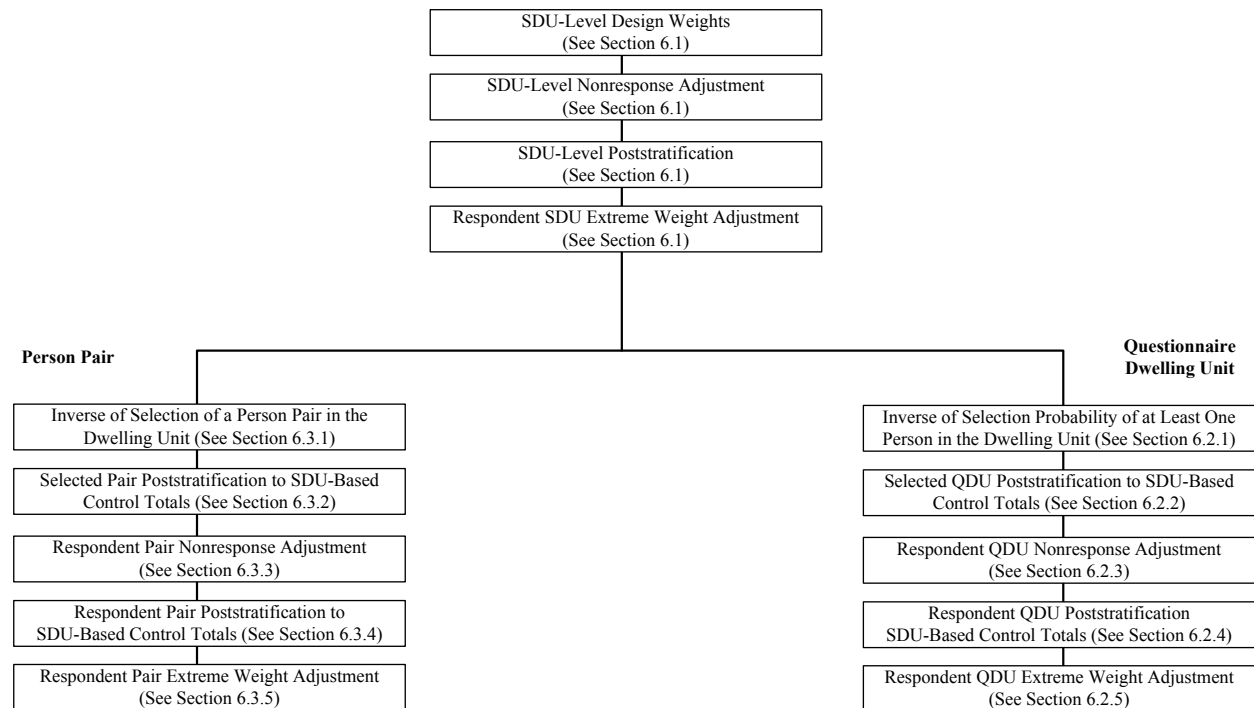
Pair Relationship	Focus
Parent-child: parent, child aged 12-14	Parent
Parent-child: parent, child aged 12-14	Child
Parent-child: parent, child aged 12-17	Parent
Parent-child: parent, child aged 12-17	Child
Parent-child: parent, child aged 12-20	Parent
Parent-child: parent, child aged 12-20	Child
Parent-child: parent, child aged 15-17	Parent
Parent-child: parent, child aged 15-17	Child
Sibling-sibling: older sibling 15-17, younger sibling 12-14	Older sibling
Sibling-sibling: older sibling 15-17, younger sibling 12-14	Younger sibling
Sibling-sibling: older sibling 18-25, younger sibling 12-17	Older sibling
Sibling-sibling: older sibling 18-25, younger sibling 12-17	Younger sibling
Spouse-spouse or partner-partner, with or without children	No multiplicity necessary
Spouse-spouse or partner-partner, with children aged 0-17	No multiplicity necessary

Some of the multiplicities, including counts of all possible pairs in a household for a given domain, were used for poststratification. Details are provided in Chapter 4. Prior editions of this report contained a chapter on editing and imputation of pair relationships, multiplicity factors, and household-level person counts for poststratification, but this information has been removed in the interest of consolidating the imputation documentation and can now be found in the NSDUH Methodological Resource Book editing and imputation report (CBHSQ, 2015a). Special consideration is required for analysis of pair-level data, and details can be found in *How To Prepare and Analyze Pair Data in the National Survey on Drug Use and Health* (CBHSQ, in press). See Appendix M for a draft excerpt from this manual on inferential population and multiplicities.

A resolution to the extreme weight problem is to use a Hajek-type modification (Hajek, 1971). This modification essentially entails calibration (like poststratification) to controls for the number of people in households belonging to each domain of interest. These controls can be obtained from the larger sample of singles and pairs (i.e., one or two people selected from DUs). Note, however, that the multiplicity factor, being domain specific, renders the calibration adjustment factor domain specific. This raises the question of finding one set of calibration weights for use with all domains or outcome variables. To get around this problem, we performed a multivariate calibration with respect to a key set of pair domains. This type of poststratification then was followed by a repeat poststratification to further control the extreme weights by imposing separate bound restrictions on the initially identified extreme weights.

The generalized exponential model (GEM) method (Folsom & Singh, 2000) was used for calibration of both QDU- and pair-level design weights through several steps of adjustment as shown in Exhibit 1.1. In GEM, treatment of extreme value (ev) weights is built in via the definition of lower and upper bounds for the extreme weights. For pair data, there was a problem defining suitable domains for defining extreme weights, as explained in the following paragraphs.

Exhibit 1.1 QDU and Pair Sampling Weight Calibration Steps



In dealing with extreme weights, it is assumed that they arise due to design (due to an imperfect frame, assignment of very small selection probabilities to some units, or a big weight adjustment factor after calibration) so that they make the sample representative of the population and, hence, do not introduce bias. The only problem is that they may lead to highly unstable

estimates similar to the problem of Basu's circus elephants³ (Hajek, 1971). So, we need to perform some treatment (such as winsorization⁴) within suitably defined extreme weight domains such that these domains contain units possibly from different strata but with similar sample selection probabilities to avoid the occurrence of extreme weights due to a mix of different designs. The domains must be large enough (e.g., at least size 30) to be able to define extreme values according to the domain-specific weight distribution. Any extreme value treatment to increase precision of estimates would introduce some bias. However, this bias can be reduced considerably if the ev treatment is performed under calibration controls. This is what the built-in ev control in GEM tries to accomplish.

It follows that the definition of extreme weight domains should depend on factors that affect the selection probabilities of units in the sample, such as State- and age-specific sampling rates, segment selection probabilities, pair age-specific selection probabilities, and household composition. If one tries to define extreme weight domains by taking account of all these factors via cross-classification, it will lead to too many domains with insufficient observations. That is why it is difficult to define suitable extreme weight domains for pair data. In the case of person-level weights, it was less difficult, since State by age group suitably captured the extreme weight domain requirements. The definition of extreme weight domains used in the 2013 survey was the same as the one used in the 1999–2012 surveys. The domains were defined as the cross-classification of State, pair age,⁵ and number of people aged 12 to 25 in a household. In particular, the pair age was defined by the age groups of each pair member according to the age categories of 12 to 25, 26 to 49, and 50 or older (resulting in six pair age categories), and the number of people aged 12 to 25 were categorically defined as zero, one, and two or more. For more details, see Chapter 5.

³ A circus owner had 50 elephants, and wanted to estimate the total weight to help him make arrangements for shipping. To save time, he only wanted to weigh Sambo (an average sized elephant), and use 50 times its weight as an estimate. However, the circus statistician, being highly conscious of the optimality and unbiasedness of the Horvitz-Thompson (HT) estimator, objected about the potential bias of his estimate because of the purposive selection. Instead, he suggested random selection of an elephant with a very high probability of 99/100 for Sambo, and the rest including Jumbo (the biggest in the herd) with probability 1/4900 each. The circus owner was very unhappy with the statistician's response of 100/99 times the Sambo's weight as the estimate if Sambo got selected in this random draw, and was outraged with the response of 4900 times the Jumbo's weight if Jumbo happened to get selected. It was obvious to the owner that this new estimator was extremely poor, although he didn't know anything about its unbiasedness. The story had an unhappy ending with the circus statistician losing his job. To alleviate the instability of the HT-estimator, Hajek suggested to multiply it by 50 divided by inverse of the selection probability, which reduces simply to 50 times the weight of the selected elephant.

⁴ Winsorization is a method of extreme value adjustment that replaces extreme values with the critical values used for defining low and high extreme values.

⁵ Pair age in this case should not be confused with the modeling term, which has a finer level breakdown.

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2. Questionnaire Dwelling Unit and Pair Selection Probabilities

Similar to the 1999–2001 National Household Surveys on Drug Abuse (NHSDAs) and the 2002–2012 National Surveys on Drug Use and Health (NSDUHs),⁶ the 2013 NSDUH had a two-phase design and used a computer-assisted interviewing (CAI) method. There were four stages of selection: census tracts, segments within census tracts, dwelling units (DUs) within segments, and people within dwelling units. Any two survey-eligible people had some nonzero chance of being selected and, when both were selected, they formed a within-household pair. This design feature is of interest to NSDUH researchers because, for example, it allows analysts to examine how the drug use propensity of an individual (in a family) relates to the drug use propensity of other members residing in the same dwelling unit (Center for Behavioral Health Statistics and Quality, 2014a).

For the 1999–2001 surveys, the method used for selecting pairs was as follows. For a given DU, if the sum of the age-specific selection probabilities was larger than 2, then the individual person-selection probabilities were ratio adjusted downward to make the sum equal to 2. If the sum was less than 2, the difference between 2 and the sum of the probabilities was evenly distributed over three dummy people so that the sum of the person probabilities was made to equal 2. Brewer's method was then applied to select a person pair. If the selected pair consisted of two real people, then both people were selected. If the selected pair consisted of one real person and one dummy person, then the real person was selected. If the selected pair consisted of two dummy people, no one was selected from that DU.

Starting with the 2002 NSDUH and continuing through 2013, the pair-sampling algorithm was modified to increase the number of pairs selected in the sample. Dwelling units with the sum of person selection probabilities greater than or equal to 2 were treated the same as in previous survey years. However, DUs where the sum of person-level selection probabilities was less than 2 received a slightly different treatment that increased the chance for selecting a pair of real people. Section 2.1 describes the selection process for both types of DUs.

Table 2.1 provides a summary of these NSDUH sampling units: eligible and completed screening dwelling units (SDUs), selected and completed questionnaire dwelling units (QDUs), selected and completed person interviews, and selected and completed person pairs, as well as their response rates. Using Brewer's method, zero, one, or two individuals were selected per household. Those SDUs where at least one person was selected were counted as the selected QDUs. A QDU where two people were selected and both had completed interviews was considered to be a completed person pair. The table provides a breakdown by age group at the person level and age group by selection group (none, single, or pair) at the person pair level.

⁶ This report presents information from the 2013 National Survey on Drug Use and Health (NSDUH). Prior to 2002, the survey was called the National Household Survey on Drug Abuse (NHSDA).

Table 2.1 Building Blocks of the QDU and Person Pair Samples: Dwelling Units and People in the 2009–2013 NSDUHs

Domain	2009			2010			2011			2012			2013		
	Sel. ¹	Resp. ²	% Rate ³	Sel. ¹	Resp. ²	% Rate ³	Sel. ¹	Resp. ²	% Rate ³	Sel. ¹	Resp. ²	% Rate ³	Sel. ¹	Resp. ²	% Rate ³
DUs															
Total DUs Screened	161,377	142,933	88.57	166,532	147,010	88.28	179,293	156,048	87.04	178,586	153,873	86.16	190,067	160,325	84.35
QDUs															
Total QDUs	58,288	48,088	82.50	58,702	48,113	81.96	61,441	50,133	81.60	60,621	48,850	80.58	61,634	48,896	79.33
People															
Total People	84,785	68,007	80.21	84,997	67,804	79.77	88,536	70,109	79.19	87,656	68,309	77.93	88,742	67,838	76.44
12-17	26,157	22,398	85.63	25,908	21,960	84.76	27,911	23,510	84.23	27,147	22,473	82.78	27,630	22,494	81.41
18-25	28,158	22,686	80.57	28,164	22,793	80.93	28,589	22,876	80.02	28,639	22,529	78.67	28,921	22,214	76.81
26-34	8,242	6,591	79.97	8,545	6,780	79.34	8,323	6,543	78.61	8,304	6,484	78.08	8,210	6,310	76.86
35-49	12,855	9,616	74.80	12,979	9,668	74.49	12,220	9,149	74.87	12,364	9,076	73.41	12,566	9,058	72.08
50+	9,373	6,716	71.65	9,401	6,603	70.24	11,493	8,031	69.88	11,202	7,747	69.16	11,415	7,762	68.00
Pairs															
Total Pairs ⁴	26,497	19,919	75.17	26,295	19,691	74.88	27,095	19,976	73.73	27,035	19,459	71.98	27,108	18,942	69.88
0,0 ⁵	84,645	N/A	N/A	88,308	N/A	N/A	94,607	N/A	N/A	93,252	N/A	N/A	98,691	N/A	N/A
0, 12-17	8,432	7,936	94.12	8,595	7,906	91.98	9,402	8,651	92.01	9,017	8,277	91.79	9,420	8,574	91.02
0, 18-25	9,870	9,081	92.01	10,093	9,270	91.85	10,306	9,497	92.15	10,325	9,461	91.63	10,535	9,475	89.94
0, 26-34	3,798	3,318	87.36	3,914	3,418	87.33	3,930	3,386	86.16	3,856	3,327	86.28	3,914	3,367	86.02
0, 35-49	4,565	3,810	83.46	4,659	3,843	82.49	4,431	3,704	83.59	4,368	3,645	83.45	4,506	3,736	82.91
0, 50+	5,126	4,042	78.85	5,146	3,998	77.69	6,277	4,919	78.37	6,020	4,681	77.76	6,151	4,802	78.07
12-17, 12-17	4,288	3,648	85.07	4,160	3,525	84.74	4,649	3,885	83.57	4,507	3,668	81.38	4,535	3,609	79.58
12-17, 18-25	3,595	2,852	79.33	3,444	2,718	78.92	3,756	2,921	77.77	3,627	2,759	76.07	3,662	2,754	75.20
12-17, 26-34	872	724	83.03	922	752	81.56	834	685	82.13	825	658	79.76	811	621	76.57
12-17, 35-49	3,979	3,061	76.93	3,948	3,044	77.10	3,855	2,918	75.69	3,813	2,812	73.75	3,834	2,756	71.88
12-17, 50+	703	532	75.68	679	493	72.61	766	565	73.76	851	631	74.15	833	571	68.55
18-25, 18-25	5,588	4,168	74.59	5,502	4,165	75.70	5,476	4,015	73.32	5,476	3,901	71.24	5,478	3,795	69.28
18-25, 26-34	1,102	820	74.41	1,140	851	74.65	1,049	768	73.21	1,079	794	73.59	1,034	690	66.73
18-25, 35-49	1,576	1,059	67.20	1,639	1,098	66.99	1,469	994	67.67	1,582	1,053	66.56	1,561	990	63.42
18-25, 50+	839	547	65.20	844	537	63.63	1,057	666	63.01	1,074	660	61.45	1,173	715	60.95
26-34, 26-34	886	635	71.67	903	621	68.77	858	599	69.81	880	604	68.64	822	581	70.68
26-34, 35-49	447	312	69.80	512	354	69.14	492	314	63.82	469	320	68.23	489	307	62.78
26-34, 50+	251	149	59.36	251	162	64.54	302	192	63.58	315	177	56.19	318	163	51.26
35-49, 35-49	917	569	62.05	886	542	61.17	748	474	63.37	833	487	58.46	857	512	59.74
35-49, 50+	454	239	52.64	449	245	54.57	477	271	56.81	466	272	58.37	462	245	53.03
50+, 50+	1,000	604	60.40	1,016	584	57.48	1,307	709	54.25	1,238	663	53.55	1,239	633	51.09

DU = dwelling unit; N/A = not applicable; QDU = questionnaire dwelling unit.

Note: The 2009–2010 sample sizes reflect the removal of falsified cases found in Pennsylvania and Maryland. The 2011–2013 samples were not affected. For additional information, see Section B.3.5 in Appendix B of the 2011, 2012, and 2013 national findings reports (Center for Behavioral Health Statistics and Quality, 2012; 2013; 2014b).

¹ Selected pairs are based on the screener age.

² Respondent pairs are based on the questionnaire age and comprise only respondent people.

³ These rates are unweighted and based only on the total selected and total responding counts of pairs.

⁴ Total pairs excludes dummy person pairs.

⁵ Among the completed screening dwelling units, no person was selected in this dwelling unit.

2.1 Pair Selection Probability

2.1.1 Case I: DUs with $S \geq 2$

For a given DU, if the sum of the age-specific person selection probabilities (S) was larger than 2, then the selection probability was ratio adjusted by a multiplicative adjustment factor so that all probabilities were scaled down to sum to exactly 2. Now, Brewer's method sets the pairwise selection probabilities at

$$P_{h(ij)} = \left[\frac{P_{h(i)}P_{h(j)}}{K} \right] \left[\frac{1}{1-P_{h(i)}} + \frac{1}{1-P_{h(j)}} \right] \quad (2.1)$$

by setting K at

$$K = 2 + \sum \frac{P_{h(i)}}{1-P_{h(i)}}, \quad (2.2)$$

where $i = i^{th}$ person in household h (whose selection probability depends on his or her age category: 1, 2, 3, 4, or 5) and

$j = j^{th}$ person in household h (whose selection probability depends on his or her age category: 1, 2, 3, 4, or 5),

where age category 1 corresponds to people aged 12 to 17, 2 to people aged 18 to 25, 3 to people aged 26 to 34, 4 to people aged 35 to 49, and 5 to people aged 50 or older.

The sum of the pairwise selection probabilities taken over all unique pairs will be guaranteed to be exactly 1.

$$\sum_i \sum_{j>i} P_{h(ij)} = 1 \quad (2.3)$$

It also guarantees that the sum of the pairwise selection probabilities for an individual is equal to the individual's selection probability

$$\sum_{j \neq i} P_{h(ij)} = P_{h(i)} \quad (2.4)$$

for all values of i .

Note that the above scheme always selects a pair of two eligible people.

2.1.2 Case II: DUs with $S < 2$

If the sum S of person-level selection probabilities was less than 2, the method used in survey years 1991 to 2001 consisted of dividing $2 - S$ equally among the three dummy people added to the household, and then used Brewer's method to select a pair, as in Case I. However, if the household had two or more people, we preferred a pair of real people to have a greater chance of being selected. To achieve this goal, the individual selection probabilities, $P_{h(i)}$, were scaled upward by the factor F_s such that their sum came close to but did not exceed 2 and such that each person selection probability did not exceed the maximum allowed probability of 0.99. Thus, denoting the revised person selection probabilities by $P'_{h(i)}$, the factor F_s is given by

$$F_s = \text{Min} \left\{ \frac{T(\lambda)}{S}, \frac{0.99}{\max \{P_{h(i)}\}} \right\}, \quad (2.5)$$

where $T(\lambda) = S + \lambda(2 - S)$ and λ is set to 0.5. Note that if λ is chosen as 0, then $F_s = 1$ and the selection scheme would follow that of Case I. The individual person probabilities are scaled upward by the factor F_s so they either sum to 2 or sum as close to 2 as possible. Denote S' as the sum of the selection probability after scale adjustment by F_s . If S' is exactly 2, then dummy people are not needed. If S' is less than 2, then three dummy people are added to the DU.

Now, for Brewer's method, set the pairwise selection probabilities similar to (2.1), as

$$P'_{h(ij)} = \left[\frac{P'_{h(i)} P'_{h(j)}}{K'} \right] \left[\frac{1}{1 - P'_{h(i)}} + \frac{1}{1 - P'_{h(j)}} \right] \quad (2.6)$$

by setting K' at

$$K' = 2 + \sum_i \frac{P'_{h(i)}}{1 - P'_{h(i)}}, \quad (2.7)$$

where $P'_{h(i)}$ and $P'_{h(j)}$ are the selection probabilities adjusted by the scaling factor F_s ,

where $i = i^{\text{th}}$ person in the household (whose selection probability depends on his or her age category: 0, 1, 2, 3, 4, or 5),

$j = j^{\text{th}}$ person in the household (whose selection probability depends on his or her age category: 0, 1, 2, 3, 4, or 5), and

where age category 0 corresponds to dummy people, and categories 1 to 5 are defined as in Case I.

Note that we now have $\sum_{j \neq i} P'_{h(ij)} = P'_{h(i)}$. To maintain the original person selection probabilities despite the scale adjustment by F_s , we modified Brewer's method as follows. First, draw a random number, R , from a uniform (0,1) distribution. If $R \leq 1/F_s$, then select a pair using Brewer's method based on formula (2.6). However, if $R > 1/F_s$, then no people are selected from the household. In this way, the probability for selecting a pair (i,j) in household h becomes $P^*_{h(ij)} = P'_{h(ij)}/F_s$, which, in turn, gives the original person selection probabilities, $P_{h(i)}$. Unlike Case I, where a pair of eligible people was always selected, this adjusted selection scheme allows for zero, one, or two people to be selected from a DU.

2.2 Questionnaire Dwelling Unit Selection Probability

A dwelling unit was considered a selected QDU if it had completed the screening interview and had at least one person selected for the questionnaire interview. QDUs with at least one respondent were considered respondent QDUs.

The QDU selection probability was defined as

$$P_h^* = (1 - P_{h(00)}^*), \quad (2.8)$$

where $P_{h(00)}^*$ is the probability of not selecting any person. For the DUs with an unadjusted sum of age-specific selection probabilities larger than or equal to 2 (Case I), $P_{h(00)}^*$ is 0. It follows from Section 2.1, under Case II, $P_{h(00)}^*$ can be calculated as

$$P_{h(00)}^* = \left(1 - \frac{1}{F_s}\right) + \frac{3}{F_s} \left[\frac{P'_{h(0)} P'_{h(0)}}{K'} \right] \left[\frac{1}{1 - P'_{h(0)}} + \frac{1}{1 - P'_{h(0)}} \right], \quad (2.9)$$

where $P'_{h(0)}$ is the selection probability of a dummy person when person selection probabilities are adjusted by F_s .

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3. Brief Description of the Generalized Exponential Model

In survey practice, design-based weights are typically adjusted in three steps: (1) for extreme values (ev) via winsorization, (2) for nonresponse (nr) via weighting classes, and (3) for poststratification (ps) via raking ratio adjustments. If weights are not treated for extreme values, the resulting estimates, although unbiased, will tend to have low precision. The bias introduced by winsorization is alleviated to some extent through ps. The nr adjustment is a correction for bias introduced in estimates based only on responding units, and ps is an adjustment for coverage (typically undercoverage) bias and variance reduction due to correlation between the study and control (usually demographic) variables.

There are limitations in the existing methods of weight adjustment for ev, nr, and ps. It would be desirable to adjust for bias introduced in the ev step (when extreme weights are treated via winsorization) in that the sample distribution for various demographic characteristics is preserved. For the nr step, there are general raking type methods, such as the scaled constrained exponential model developed by Folsom and Witt (1994), where the lower and upper bounds can be suitably chosen by use of a separate scaling factor. The factor is set as the inverse of the overall response propensity. It would be desirable to have a model for the nr adjustment factor so that the desired lower and upper bounds on the factor are part of the model. Note that the lower bound on the nr adjustment factor should be one, as it is interpreted as the inverse of the probability of response for a particular unit. For the ps step, on the other hand, the general calibration methods of Deville and Särndal (1992), such as the logit method, allow for built-in lower (L) and upper (U) bounds (for ps, typically $L < 1 < U$). However, it would be desirable to have nonuniform bounds (L_k, U_k) depending on the unit k such that the final adjusted weight, w_k , could be controlled within certain limits. An important application of this feature would be weight adjustments in the presence of ev to allow some control on the final adjustment of the initially identified extreme values.

A modification of the earlier method of the scaled constrained exponential model of Folsom and Witt (1994), termed as the method of the generalized exponential model (GEM) and proposed by Folsom and Singh (2000), provides a unified approach to the three weight adjustments for ev, nr, and ps, and it has the desired features mentioned above. The functional form of the GEM adjustment factor is provided in Appendix A. It generalizes the logit model of Deville and Särndal (1992), typically used for ps, such that the bounds (L, U) may depend on k . Thus, it provides a built-in control on ev during both ps and nr adjustments. In addition, the bounds are internal to the model and can be set to chosen values (e.g., $L_k = 1$ in the nr step). If there is a low frequency of ev in the final ps, then a separate ev step may not be necessary.

In fitting GEM to a particular problem, the choice of a large number of predictor variables along with tight bounds will have an impact on the resulting unequal weighting effect (UWE) and the proportion of extreme values. In practice, this leads to somewhat subjective considerations of trade-off between the target set of bounds for a given set of factor effects and the target UWE and the target proportion of extreme values. It also may be beneficial to look at

the proportion of "outwinsors" (a term coined to signify the extent of residual weights after winsorization), which is probably more realistic in determining the robustness of estimates in the presence of extreme values.

A large increase in the number of predictor variables in GEM typically would result in a higher UWE, thus indicating a possible loss in precision. This was checked by comparing SUDAAN-based standard errors of a key set of estimates computed from two sets of calibration models, one baseline using only the main effects and the other using the final model. The results are presented in Chapter 7.

To implement GEM, several steps need to be followed: (1) define and create all the covariates; (2) define the extreme weights; (3) fit the GEM model. The details of practical aspects of GEM implementation can be found in Chapters 4 and 5 of this report and Chapter 4 of the National Survey on Drug Use and Health Methodological Resource Book person-level sampling weight calibration report (Center for Behavioral Health Statistics and Quality, 2015b).

4. Predictor Variables for the Questionnaire Dwelling Unit and Pair Weight Calibration via the Generalized Exponential Model

We note that unlike the person-level weight calibration, the control totals for the questionnaire dwelling unit (QDU)-level and person pair-level poststratification are not available from the U.S. Census Bureau. A way around this problem is to take advantage of the two-phase nature of the design, in which the screener data provide a large sample containing demographic information that can be used to derive control totals for the QDU-level and person pair-level sampling weight calibrations, as well as for the selected person poststratification adjustment. The stability of control totals from the screener dwelling unit (SDU)-level data can be improved by poststratification of the SDU sample using person-level counts from the census. This was indeed done and is documented in the National Survey on Drug Use and Health Methodological Resource Book person-level sampling weight calibration report (Centers for Behavioral Health Statistics and Quality, 2015b).

4.1 Questionnaire Dwelling Unit Weight Calibration

After the nonresponse and poststratification adjustments at the SDU level, which are common to the person-level weight calibration, the QDU sample weights were adjusted in three steps: poststratification of selected QDUs, nonresponse adjustment of respondent QDUs, and poststratification of respondent QDUs. The set of initially proposed predictor variables for these adjustments using generalized exponential model (GEM) were set to be common and to correspond to those used for the SDU nonresponse and poststratification adjustments. The variables are of two types: Those used for SDU nonresponse adjustment are 0/1 indicators, while those used for SDU poststratification adjustment are counting variables. The variables of the first type (0/1 indicators) are population density, group quarters, race/ethnicity of householder, percentage of people in segment who are black or African American, percentage of people in segment who are Hispanic or Latino, percentage of owner-occupied dwelling units (DUs) in segment, segment-combined median rent and housing value, and household type. Variables of the second type (counting variables) represent the number of eligible people within each DU who fall into the various demographic categories of race, age group, Hispanicity, and gender. Note that the State and quarter variables are represented as both binary and counting variables. Thus, not only are DU counts within a specific State or quarter in the QDU sample controlled to the corresponding totals obtained from the SDU sample, but also counts of people living in the DUs in the QDU sample are controlled to totals from the SDU sample. These person-level totals match the census estimates because of the SDU-level poststratification to census counts. It may be noted that in the poststratification of selected QDUs and the nonresponse adjustment of the respondent QDUs steps, demographic information from screener data was used in defining covariates, whereas in the poststratification of the selected QDUs step, questionnaire demographic information was used.

[Exhibit 4.1](#) lists all predictor variables proposed for QDU-level calibration and identifies them as counting, binary, or both. Various main effects and higher level factor effects based on the predictor variables were included in the GEM modeling. As stated previously, all adjustment steps at the QDU level used a common set of proposed predictor variables.

4.2 Pair Weight Calibration

Like QDU, the initial set of weight components in pair weight calibration are the same as the set obtained from the SDU-level weight calibration. The SDU-calibrated weight is multiplied by the pair-level design weight, which in turn was adjusted in four steps: poststratification of selected pairs, nonresponse adjustment of respondent pairs, poststratification of respondent pairs, and the extreme weight adjustment of respondent pairs. All the adjustment steps for pair weights utilized the same set of initially proposed predictor variables, which included a subset of those used for the person-level nonresponse adjustment. This included segment characteristic variables, such as population density, percentage of people in segment who are black or African American, percentage of people in segment who are Hispanic or Latino, percentage of owner-occupied DUs in segment, and segment-combined median rent and housing value. Also included were pair-specific covariates, such as the demographic characteristics of pair age, pair race/ethnicity, and pair gender, as well as dwelling unit characteristics, such as race/ethnicity of householder, household type, household size, and group quarters indicators. State and quarter indicators were included as well. However, for two-factor effects, instead of individual State, State/region was used due to insufficient sample size. This resulted in a 12-level variable where the eight large sample States were kept separate, and the remainder of States were grouped according to the four census regions. All variables were defined as 0/1 indicators. These proposed predictor variables and their levels are shown in [Exhibit 4.2](#).

In the poststratification of selected pairs and the nonresponse adjustment of respondent pairs, screener data were used in the definition of the pair-specific variables such as pair age, pair race/ethnicity, and pair gender, whereas in the poststratification and extreme weight adjustment of respondent pairs, these variables were obtained from the questionnaire. For the latter case, in addition to the variables described above, indicator covariates corresponding to selected pair domains were included to perform Hajek-type ratio adjustments via weight calibration, as mentioned in Chapter 1. The selected pair domains were limited to 10 of the 14 pair domains listed in Chapter 1. (Parent-child pairs where the child was in the 15- to 17-year-old age range and sibling-sibling pairs with focus on the younger child were not included in the poststratification.) The inclusion of these pair domain covariates led to the use of two sets of control totals in the modeling. Details of the construction of these control totals can be found in Appendix B.

Exhibit 4.1 Definitions of Levels for QDU-Level Calibration Modeling Variables

Age^b

1: 12-17, 2: 18-25, 3: 26-34, 4: 35-49, 5: 50+¹

Gender^b

1: Male, 2: Female¹

Group Quarter Indicator^a

1: College Dorm, 2: Other Group Quarter, 3: Non-Group Quarter¹

Hispanicity^b

1: Hispanic or Latino, 2: Non-Hispanic or Latino¹

Household Size^b

Continuous Variable Count of Individuals Rostered with DU

Household Type (Ages of People Rostered within DU)^a

1: 12-17, 18-25, 26+; 2: 12-17, 18-25; 3: 12-17, 26+; 4: 18-25, 26+; 5: 12-17, 6: 18-25; 7: 26+¹

Percentage of Owner-Occupied Dwelling Units in Segment (% Owner-Occupied)^a

1: 50-100%,¹ 2: 10-<50%, 3: 0-<10%

Percentage of Segments That Are Black or African American^a

1: 50-100%, 2: 10-<50%, 3: 0-<10%¹

Percentage of Segments That Are Hispanic or Latino^a

1: 50-100%, 2: 10-<50%, 3: 0-<10%¹

Population Density^a

1: MSA 1,000,000 or More, 2: MSA Less than 1,000,000, 3: Non-MSA Urban, 4: Non-MSA Rural¹

Quarter^{a,b}

1: Quarter 1, 2: Quarter 2, 3: Quarter 3, 4: Quarter 4¹

Race (3 Levels)^b

1: White,¹ 2: Black or African American, 3: Other

Race (5 Levels)^b

1: White,¹ 2: Black or African American, 3: American Indian or Alaska Native, 4: Asian, 5: Two or More Races

Race/Ethnicity of Householder^a

1: Hispanic or Latino White,¹ 2: Hispanic or Latino Black or African American, 3: Hispanic or Latino Other, 4: Non-Hispanic or Latino White, 5: Non-Hispanic or Latino Black or African American, 6: Non-Hispanic or Latino Other

Relation to Householder^a

1: Householder or Spouse, 2: Child, 3: Other Relative, 4: Nonrelative¹

Segment-Combined Median Rent and Housing Value (Rent/Housing)^{a,2}

1: First Quintile, 2: Second Quintile, 3: Third Quintile, 4: Fourth Quintile, 5: Fifth Quintile¹

States^{a,b,3}

Model Group 1: 1: Connecticut, 2: Maine, 3: Massachusetts,¹ 4: New Hampshire, 5: New Jersey, 6: New York, 7: Pennsylvania, 8: Rhode Island, 9: Vermont

Model Group 2: 1: Illinois, 2: Indiana, 3: Iowa, 4: Kansas, 5: Michigan, 6: Minnesota, 7: Missouri, 8: Nebraska, 9: North Dakota, 10: Ohio, 11: South Dakota, 12: Wisconsin¹

Model Group 3: 1: Alabama, 2: Arkansas, 3: Delaware, 4: District of Columbia, 5: Florida, 6: Georgia, 7: Kentucky, 8: Louisiana, 9: Maryland, 10: Mississippi, 11: North Carolina,¹ 12: Oklahoma, 13: South Carolina, 14: Tennessee, 15: Texas, 16: Virginia, 17: West Virginia

Model Group 4: 1: Alaska, 2: Arizona,¹ 3: California, 4: Colorado, 5: Idaho, 6: Hawaii, 7: Montana, 8: Nevada, 9: New Mexico, 10: Oregon, 11: Utah, 12: Washington, 13: Wyoming

State/Region^{a,3}

Model Group 1: 1: New York, 2: Pennsylvania, 3: Other¹

Model Group 2: 1: Illinois, 2: Michigan, 3: Ohio, 4: Other¹

Model Group 3: 1: Florida, 2: Texas, 3: Other¹

Model Group 4: 1: California, 2: Other¹

DU = dwelling unit; MSA = metropolitan statistical area; QDU = questionnaire dwelling unit.

¹ The reference level for this variable. This is the level against which effects of other factor levels are measured.

² Segment-Combined Median Rent and Housing Value is a composite measure based on rent, housing value, and percentage owner-occupied.

³ The States or district assigned to a particular model is based on census regions.

^a Binary variable.

^b Counting variable.

Exhibit 4.2 Definitions of Levels for Pair-Level Calibration Modeling Variables

Group Quarter Indicator

1: College Dorm, 2: Other Group Quarter, 3: Non-Group Quarter¹

Household Size

1: DU with 2 People,¹ 2: DU with 3 People, 3: DU with \geq 4 People

Pair Age (15 Levels)

1: 12-17 and 12-17,¹ 2: 12-17 and 18-25, 3: 12-17 and 26-34, 4: 12-17 and 35-49, 5: 12-17 and 50+, 6: 18-25 and 18-25, 7: 18-25 and 26-34, 8: 18-25 and 35-49, 9: 18-25 and 50+, 10: 26-34 and 26-34, 11: 26-34 and 35-49,

12: 26-34 and 50+, 13: 35-49 and 35-49, 14: 35-49 and 50+, 15: 50+ and 50+

Pair Age (6 Levels)

1: 12-17 and 12-17,¹ 2: 12-17 and 18-25, 3: 12-17 and 26+, 4: 18-25 and 18-25, 5: 18-25 and 26+, 6: 26+ and 26+

Pair Age (3 Levels)

1: 12-17 and 12-17,¹ 2: 12-17 and 18+, 3: 18+ and 18+

Pair Gender

1: Male and Female,¹ 2: Female and Female, 3: Male and Male

Pair Race/Ethnicity (10 Levels)

1: White and White,¹ 2: White and Black or African American, 3: White and Hispanic or Latino, 4: White and Other, 5: Black or African American and Black or African American, 6: Black or African American and Hispanic or Latino, 7: Black or African American and Other, 8: Hispanic or Latino and Hispanic or Latino, 9: Hispanic or Latino and Other, 10: Other and Other

Pair Race/Ethnicity (5 Levels)

1: Two or More Races Pair, 2: Hispanic or Latino Pair, 3: Black or African-American Pair, 4: White Pair,¹ 5: Other Pair

Pair Race/Ethnicity (4 Levels)

1: Two or More Races Pair or Other and Other, 2: Hispanic or Latino Pair, 3: Black or African-American Pair, 4: White Pair¹

Percentage of Owner-Occupied Dwelling Units in Segment (% Owner-Occupied)

1: 50-100%,¹ 2: 10-<50%, 3: 0-<10%

Percentage of Segments That Are Black or African American

1: 50-100%, 2: 10-<50%, 3: 0-<10%¹

Percentage of Segments That Are Hispanic or Latino

1: 50-100%, 2: 10-<50%, 3: 0-<10%¹

Segment-Combined Median Rent and Housing Value (Rent/Housing)²

1: First Quintile, 2: Second Quintile, 3: Third Quintile, 4: Fourth Quintile, 5: Fifth Quintile¹

Population Density

1: MSA 1,000,000 or More, 2: MSA Less than 1,000,000, 3: Non-MSA Urban, 4: Non-MSA Rural¹

Quarter

1: Quarter 1, 2: Quarter 2, 3: Quarter 3, 4: Quarter 4¹

Race/Ethnicity of Householder

1: Hispanic or Latino White,¹ 2: Hispanic or Latino Black or African American, 3: Hispanic or Latino Other, 4: Non-Hispanic or Latino White, 5: Non-Hispanic or Latino Black or African American, 6: Non-Hispanic or Latino Other

Exhibit 4.2 Definitions of Levels for Pair-Level Calibration Modeling Variables (continued)

State/Region

Model Group 1: 1: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Rhode Island, Vermont;
2: Alabama, Arkansas, Delaware, District of Columbia, Georgia, Kentucky, Louisiana,
Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, West
Virginia;¹ 3: New York; 4: Pennsylvania; 5: Florida; 6: Texas

Model Group 2: 1: Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota,
Wisconsin;¹ 2: Alaska, Arizona, Colorado, Idaho, Hawaii, Montana, Nevada, New Mexico,
Oregon, Utah, Washington, Wyoming; 3: Michigan; 4: Illinois; 5: Ohio; 6: California

States³

Model Group 1: 1: Alabama, 2: Arkansas, 3: Connecticut, 4: Delaware, 5: District of Columbia, 6: Florida,
7: Georgia, 8: Kentucky, 9: Louisiana, 10: Maine, 11: Maryland,¹ 12: Massachusetts,
13: Mississippi, 14: New Hampshire, 15: New Jersey, 16: New York, 17: North Carolina,
18: Oklahoma, 19: Pennsylvania, 20: Rhode Island, 21: South Carolina, 22: Tennessee,
23: Texas, 24: Vermont, 25: Virginia, 26: West Virginia

Model Group 2: 1: Alaska, 2: Arizona,¹ 3: California, 4: Colorado, 5: Idaho, 6: Illinois, 7: Indiana, 8: Iowa,
9: Hawaii, 10: Kansas, 11: Michigan, 12: Minnesota, 13: Missouri, 14: Montana, 15:
Nebraska, 16: Nevada, 17: New Mexico, 18: North Dakota, 19: Ohio, 20: Oregon, 21: South
Dakota,
22: Utah, 23: Washington, 24: Wisconsin, 25: Wyoming

Pair Relationship Associated with Multiplicity

- 1: Parent-Child (12-14)*
- 2: Parent-Child (12-17)*
- 3: Parent-Child (12-10)*
- 4: Parent*-Child (12-14)
- 5: Parent*-Child (12-17)
- 6: Parent*-Child (12-20)
- 7: Sibling (12-14)-Sibling (15-17)*
- 8: Sibling (12-17)-Sibling (18-25)*
- 9: Spouse-Spouse/Partner-Partner
- 10: Spouse-Spouse/Partner-Partner with Children (Younger than 18)

DU = dwelling unit; MSA = metropolitan statistical area; QDU = questionnaire dwelling unit.

¹ The reference level for this variable. This is the level against which effects of other factor levels are measured.

² Segment-Combined Median Rent and Housing Value is a composite measure based on rent, housing value, and percentage owner-occupied.

³ The States or district assigned to a particular model is based on combined census regions.

* The pair member focused on.

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5. Definition of Extreme Weights

An important feature of the generalized exponential model (GEM) is the built-in provision of extreme value (ev) treatment. Sampling weights are often classified as extreme (high or low) if they fall outside the interval, median $\pm 3 \times$ interquartile range (IQR). The interval is set for prespecified domains defined usually by design variables corresponding to deep stratification.⁷ Similar to previous NSDUHs, for the GEM modeling used in the 2013 NSDUH, a more conservative (narrower) interval was defined, median $\pm 2.5 \times$ IQR. The narrower interval better prevents the adjusted weights from crossing the standard interval boundaries by treating weights near but not outside the commonly used boundaries (i.e., those that have the most potential to become extreme) as extreme as well.

Denote the interval boundaries (or critical values) for low and high extreme values by $b_{k(l)}$ and $b_{k(u)}$, respectively. For implementing extreme value control via GEM, the variable m_k was defined as the minimum of $b_{k(u)} / w_k$ and one for high extreme weights, and the maximum of $b_{k(l)} / w_k$ and one for low extreme weights, where w_k represents the sampling weight before adjustment, and $b_{k(u)}$ and $b_{k(l)}$ denote the critical values for the extreme weights. Note that under this definition, for high extreme weights, the more extreme the weight is, the smaller m_k will be, and, conversely, for low extreme weights, the more extreme the weight is, the bigger m_k will be. Nonextreme weights had a value of one for m_k . The upper and lower bounds for the adjustment factors were defined, respectively, as the product of m_k and the upper and lower boundary parameters of GEM. GEM allows inputs of up to three different upper and lower boundary parameters (L_1 and U_1 , L_2 and U_2 , L_3 and U_3) for high, non-, and low extreme weights. By applying a small upper boundary parameter for high extreme weights and a large lower boundary parameter for low extreme weights, the extreme weights can be controlled in the modeling process.

5.1 Questionnaire Dwelling Unit Extreme Weight Definition

For the questionnaire dwelling unit (QDU)-level weight adjustment, extreme weights were defined using a nested hierarchy of six domains:

1. State;
2. State sampling region;
3. State by household type;

Levels of household type indicate whether the household has members who are youths, young adults, or adults, where youth signifies 12- to 17-year-olds, young adult 18- to 25-year-olds, and adult 26 years or older.

⁷ Deep stratification refers to the stratification that was used in the sample design. In the case of the 2013 survey, deep stratification refers to the cross-classification of State sampling region by age group.

- a. Youth, Young Adult, Adult;
 - b. Youth, Young Adult;
 - c. Youth, Adult;
 - d. Young Adult, Adult;
 - e. Youth Only;
 - f. Young Adult Only; and
 - g. Adult Only.
4. State sampling region by household type;
 5. State by household type by household size (1, 2, 3, 4+); and
 6. State sampling region by household type by household size.

The hierarchy is used to satisfy the minimum of 30 observations for defining the boundaries for extreme values. If this sample size requirement is not met at the lower level, then the next level up in the hierarchy is used.

5.2 Person Pair Extreme Weight Definition

The pair selection probability is a function of the selection probability of each person in the pair given by formula (2.1) or (2.6), depending on the sum of the person selection probabilities within the household as discussed in Section 2.1. This probability can be very small if the selection probabilities of individual members are small. For example, consider a particular selected dwelling unit (DU) from the 2013 survey. This DU gave rise to a selected pair of respondents, both aged 50 or older. The selection probability in this DU was 0.07832 for a respondent aged 50 or older. Using the formula (2.6) in Chapter 2, the pair selection probability was computed to be 0.000130048. Therefore, the inverse of the selection probability, the pair-level design weight, was 7,689.46. Thus, a small pair selection probability can create a high initial weight, which is the product of the screener dwelling unit (SDU) weight and the person pair design-based weight.

As mentioned in the introduction, it turns out to be difficult to select suitable domains for defining extreme weights for pair-level data. However, as was done for the 1999–2012 surveys, the extreme weight definition was based on the following hierarchy of domains:

1. Pair age group⁸ (with three age categories, 12 to 25, 26 to 49, and 50+) by number (0, 1, 2+) of people aged 12 to 25 in the household;
2. State cluster (with five levels [explained below]) by pair age group by number (0, 1, 2+) of people aged 12 to 25 in the household;
3. State cluster (with three levels [explained below]) by pair age group by number (0, 1, 2+) of people aged 12 to 25 in the household; and
4. State by pair age group by number of people aged 12 to 25 (0, 1, 2+) in the household.

⁸ Pair age in this case should not be confused with the modeling term, which has a finer level breakdown.

The hierarchy was used to satisfy the minimum of 30 observations for defining the boundaries for extreme values. If this sample size requirement was not met at the lower level, then the next level up in the hierarchy was used.

We now briefly introduce the considerations behind the above definition for extreme weight domains. The sample design prespecified the person-level selection probability within State by five age groups (12 to 17, 18 to 25, 26 to 34, 35 to 49, 50+). Age groups 12 to 17 and 18 to 25 have a relatively similar selection probability, and the same is true for age groups 26 to 34 and 35 to 49. The 50+ group, however, has a quite different selection probability from the other groups. Furthermore, since the 12 to 17 and 18 to 25 age groups have large selection probabilities, they have a very high chance of being selected if the household has people in these age groups. Therefore, the number of people aged 12 to 25 in the household has a significant impact on the type of pair selected and the pair selection probability. Taking into consideration these design-related features, a suitable domain to define the pair-level extreme weight seems to be given by State by pair age group by number of people aged 12 to 25 in the household.

The hierarchy of domains mentioned above was used to satisfy the minimum of 30 observations. However, it was found that for many ev domains, the minimum sample size requirement was not met. To alleviate this problem, States were grouped into a small number of clusters, such as three or five. The assignment of States to clusters was determined by the clustering algorithm in PROC CLUSTER in SAS, where the clustering variable was defined as the average person-level weight (ANALWT) for each of the five age groups within each State. The choice of the average person-level weight for each group for each State was motivated from the objective of finding a single variable that would reflect the design-based difference in pair selection probabilities across States. Even with clustering of States, the ev domain sample size was insufficient in some cases, so the most general level of the hierarchy, the national level, was required. Furthermore, at the national level, we had to collapse some pair age categories in forming domains of reasonable sample size to define extreme weights. More specifically, for the national level, we collapsed all levels of number of people aged 12 to 25 for the pair age groups of 50+, 50+ and 26 to 49, 50+. In addition, levels 1 and 2+ of number of people aged 12 to 25 were combined for the pair age group of 26 to 49, 26 to 49.

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6. Weight Calibration at Questionnaire Dwelling Unit and Pair Levels

The 2013 National Survey on Drug Use and Health (NSDUH) was based on probability sampling so that valid inferences can be made from survey findings about the target population. Probability sampling refers to sampling in which every unit on the frame is given a known, nonzero probability for inclusion in the survey. This is required for unbiased estimation of the population total. The assumption of nonzero inclusion probability for every pair of units in the frame also is required for unbiased variance estimation. The basic sampling plan involved four stages of selection across two phases of design: within Phase I, (1) the selection of census tracts within each State sampling (SS) region, (2) the selection of subareas or segments (comprising U.S. Census Bureau blocks) within SS regions; (3) the selection of dwelling units (DUs) within these subareas; and, finally, within Phase II, (4) the selection of eligible individuals within DUs. Specific details of the sample design and selection procedures for the sample can be found in the 2013 NSDUH Methodological Resource Book (MRB) sample design report (Center for Behavioral Health Statistics and Quality [CBHSQ], 2014a).

As part of the postsurvey data-processing activities, analysis weights that reflected the selection probabilities from various stages of the sample design were calculated for respondents. These sample weights were adjusted at the DU (screening sample), questionnaire dwelling unit (QDU), person, and paired respondent levels (the latter three all based around the questionnaire sample) to account for bias due to extreme values (ev), nonresponse (nr), and coverage.

The final sample weights for Phase I screener dwelling units (SDU) and Phase II QDU, person, and pair levels for the 2013 samples consisted of products of several factors, each representing either a probability of selection at some particular stage or some form of ev, nr, or ps calibration adjustment. In the following sections, we describe the QDU and pair weight components in greater detail. In summary, the first 10 factors were defined for all SDUs and reflected the fully adjusted SDU sample weight. The remaining components branched to reflect QDU and pair selection probabilities, as well as additional adjustments for ev, nr, and ps. Note that the final QDU and pair weights for the 2013 survey sample are the product of all weight components for each type of sample, illustrated in [Exhibits 6.1](#) and [6.2](#).

For QDU data, generalized exponential modeling (GEM) calibration modeling was applied by partitioning the data into four groups of States: Northeast, South, Midwest, and West, based on census regions in the interest of computational feasibility. Previous experience showed that with current computing power, the large number of variables and records prevented any further reduction of modeling groups.

For pair data, GEM modeling was initially applied by partitioning the pair data into four groups based on census regions. However, there were not enough observations in each group to fit a comprehensive model to reduce bias. Alternatively, a single model was attempted for the whole pair data, but it was rejected as not practical due to computational limitations. A compromise approach was adopted by combining census regions into two groups: Northeast with South and Midwest with West. This grouping proved both manageable and desirable as it

assisted in bias reduction, ease of modeling, and workload reduction. [Exhibit 6.3](#) provides more details of the data partition for GEM modeling. The resulting sample sizes of selected and respondent units for the pair and QDU data partitions are shown for the 2009–2013 surveys in [Table 6.1](#).

It may be noted that for the pair data in the 1999, 2000, and 2001 surveys, the built-in ev control feature of GEM was not used until the final respondent pair ev adjustment step. The reason for this is that the definition for ev domain was not finalized before the pair data calibration process was begun. However, for the 2002–2013 survey pair data, the built-in ev control feature was used for each adjustment step.

Exhibit 6.1 Summary of 2013 NSDUH QDU Sample Weight Components

Phase I Screener Dwelling Unit Level

Design Weight Components	
#1	Inverse Probability of Selecting Census Tract
#2	Inverse Probability of Selecting Segment
#3	Quarter Segment Weight Adjustment
#4	Subsegmentation Inflation Adjustment
#5	Inverse Probability of Selecting SDU
#6	Subsampling of Added SDU Adjustment
#7	SDU Release Adjustment
Weight Adjustment*	
#8	SDU Nonresponse Adjustment (<i>res.sdu.nr</i>)
#9	SDU Poststratification Adjustment (<i>res.sdu.ps</i>)
#10	SDU Extreme Value Adjustment (<i>res.sdu.ev</i>)

Phase II Questionnaire Dwelling Unit Level

Design Weight Component	
#11	Inverse of Selection Probability of at Least One Person in the Dwelling Unit
Weight Adjustment*	
#12	Selected QDU Poststratification to SDU-Based Control Totals (<i>sel.qdu.ps</i>)
#13	Respondent QDU Nonresponse Adjustment (<i>res.qdu.nr</i>)
#14	Respondent QDU Poststratification to SDU-Based Control Totals (<i>res.qdu.ps</i>)
#15	Respondent QDU Extreme Value Adjustment (<i>res.qdu.ev</i>)

QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

* These adjustments use the generalized exponential model (GEM), which also involves pre- and post-processing in addition to running the GEM macro. See [Exhibit 4.1](#) in the NSDUH Methodological Resource Book person-level sampling weight calibration report (Center for Behavioral Health Statistics and Quality, 2015b). For computational feasibility, all weight adjustments were done using the four model groups based on census regions defined in [Exhibit 6.3](#).

Exhibit 6.2 Summary of 2013 NSDUH Person Pair Sample Weight Components

Phase I Screener Dwelling Unit Level

Design Weight Components	
#1	Inverse Probability of Selecting Census Tract
#2	Inverse Probability of Selecting Segment
#3	Quarter Segment Weight Adjustment
#4	Subsegmentation Inflation Adjustment
#5	Inverse Probability of Selecting SDU
#6	Subsampling of Added SDU Adjustment
#7	SDU Release Adjustment
Weight Adjustment*	
#8	SDU Nonresponse Adjustment (<i>res.sdu.nr</i>)
#9	SDU Poststratification Adjustment (<i>res.sdu.ps</i>)
#10	SDU Extreme Value Adjustment (<i>res.sdu.ev</i>)

Phase II Person Pair Level

Design Weight Component	
#11	Inverse of Selection Probability of a Person Pair in SDU
Weight Adjustment*	
#12	Selected Pair Poststratification to SDU-Based Control Totals (<i>sel.pr.ps</i>)
#13	Respondent Pair Nonresponse Adjustment (<i>res.pr.nr</i>)
#14	Respondent Pair Poststratification Adjustment to SDU-Based Control Totals (<i>res.per.ps</i>)
#15	Respondent Pair Extreme Value Adjustment (<i>res.per.ev</i>)

QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

* These adjustments use the generalized exponential model (GEM), which also involves pre- and post-processing in addition to running the GEM macro. See [Exhibit 4.1](#) in the NSDUH Methodological Resource Book person-level sampling weight calibration report (Center for Behavioral Health Statistics and Quality, 2015b). For computational feasibility, all weight adjustments were done using the four model groups based on census regions defined in [Exhibit 6.3](#).

Exhibit 6.3 U.S. Census Bureau Regions/Model Groups

Model Group	Census Region
QDU	
1	<p>Northeast (9 States) Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont</p>
2	<p>Midwest (12 States) Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin</p>
3	<p>South (16 States and the District of Columbia) Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia</p>
4	<p>West (13 States) Alaska, Arizona, California, Colorado, Idaho, Hawaii, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming</p>
Pair	
1	<p>Northeast + South (25 States and the District of Columbia) Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maine, Massachusetts, Maryland, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, West Virginia</p>
2	<p>Midwest + West (25 States) Alaska, Arizona, California, Colorado, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, North Dakota, Ohio, Oregon, South Dakota, Utah, Washington, Wisconsin, Wyoming</p>

Table 6.1 Sample Size, by Model Group at QDU and Pair Levels

Model Group	2009		2010		2011		2012		2013	
	Selected QDUs	Completed QDUs	Selected QDUs	Completed QDUs	Selected QDUs	Completed QDUs	Selected QDUs	Completed QDUs	Selected QDUs	Completed QDUs
QDU										
Northeast	11,605	9,340	11,627	9,339	11,997	9,456	12,616	9,917	12,791	9,954
South	17,756	14,909	17,880	14,857	19,690	16,487	18,345	15,019	18,766	15,073
Midwest	16,382	13,491	16,670	13,686	17,045	13,752	16,984	13,687	17,207	13,519
West	12,545	10,348	12,525	10,231	12,709	10,438	12,676	10,227	12,870	10,350
Total	58,288	48,088	58,702	48,113	61,441	50,133	60,621	48,850	61,634	48,896
Model Group	2009		2010		2011		2012		2013	
	Selected Pairs	Completed Pairs	Selected Pairs	Completed Pairs	Selected Pairs	Completed Pairs	Selected Pairs	Completed Pairs	Selected Pairs	Completed Pairs
Pair										
Northeast + South	13,058	9,806	12,872	9,590	13,686	10,127	13,619	9,723	13,535	9,416
Midwest + West	13,439	10,113	13,423	10,101	13,409	9,849	13,416	9,736	13,573	9,526
Total	26,497	19,919	26,295	19,691	27,095	19,976	27,035	19,459	27,108	18,942

QDU = questionnaire dwelling unit.

Note: The 2009–2010 sample sizes reflect the removal of falsified cases found in Pennsylvania and Maryland. The 2011–2013 samples were not affected. For additional information, see Section B.3.5 in Appendix B of the 2011, 2012, and 2013 national findings reports (Center for Behavioral Health Statistics and Quality, 2012; 2013; 2014b).

6.1 Phase I SDU-Level Weight Components

A total of 10 weight components for the SDU level correspond to selection probabilities and nonresponse, poststratification, and extreme value adjustment factors. Note that this differs from previous NHSDAs and NSDUHs in that a new design-based component was incorporated at the beginning of the process so that corresponding weight component numbers are incremented by one when compared to previous survey years with an otherwise similar weighting scheme. The first seven components in the Phase I sample weights reflect the probability of selecting the DUs. These components were derived from (1) the probability of selecting the census tract within each State sampling (SS) region, (2) the probability of selecting the geographic segment within each SS region, (3) a quarter segment weight adjustment, (4) a subsegmentation inflation factor, (5) the probability of selecting a DU from within each counted and listed sampled segment, (6) the probability of inclusion of added DUs, and (7) DU percent release adjustment. The three remaining weight components, #8 through #10, are GEM calibration adjustments accounting for (8) DU nonresponse at the screening level, (9) DU poststratification to census controls, and (10) DU-level extreme value adjustment, although in 2009 extreme value adjustment at this stage was deemed unnecessary, and thus Weight Component #10 was set to one for all respondent DUs. The person-level, QDU-level, and person pair-level weights use the product of the above 10 weight components as the common initial weight before further adjustments. For more detailed information on Weight Components #1, #2, and #4 through #7, refer to the 2013 NSDUH MRB sample design report (CBHSQ, 2014a), and for more detail on Weight Components #3 and #8 through #10, see the 2013 NSDUH MRB person-level sampling weight calibration report (CBHSQ, 2015b).

Note that from 2008 to 2010, there was an occasional second subsegmentation step when the initial partitioning of segments was insufficient due to out-of-date census counts or the segment was still too large to list after the original subsegmentation. This second partitioning was not accounted for in the weighting over these survey years. A comparison was done to evaluate the effect of this omission, and it was determined that the missing second subsegmenting factor in the analysis weight had minimal impact on estimates. Therefore, weights for these years were not re-created with a correcting factor. Additional detail can be found in CBHSQ (2014a).

6.2 QDU Weight Components

6.2.1 QDU Weight Component #11: Inverse of Selection Probability of at Least One Person in the Dwelling Unit

The selection of a QDU from all completed SDUs is based on the outcome of a variant of Brewer's method, which may select zero, one, or two people. Any pair of survey-eligible residents within the dwelling unit had some known, nonzero chance of being selected for the survey. The value for Weight Component #11 is equal to the inverse of the probability that at least one person in the dwelling unit is selected (see Section 2.2 for details).

6.2.2 QDU Weight Component #12: Selected QDU Poststratification to SDU-Based Control Totals

This poststratification factor adjusts the weights for selected QDUs to the SDU-based control totals. The SDU-based control totals are obtained by using the calibrated SDU weights. This adjustment step provides more stable controls for the subsequent nonresponse adjustment (Weight Component #13). [Exhibit 4.1](#) lists the initially proposed variables for GEM modeling. The predictor variables are either 0/1 indicators or counting variables representing the number of people who fall into a given demographic domain. The counting variables are derived from the screener demographic information. It may be noted that during screening, the only required demographic information was the age of each person rostered. Thus, other demographic information necessary for weight calibration, such as race/ethnicity and gender, may be missing for certain rostered eligible people, and so imputation was done to replace these missing data. For more details on the imputation of screener demographic information, see CBHSQ (2015b).

The details on the predictor variables retained in the model and model summary statistics can be found in Appendix C.

6.2.3 QDU Weight Component #13: Respondent QDU Nonresponse Adjustment

This nonresponse adjustment step accounts for the failure to obtain respondent person(s) from each and every selected QDU. The same set of initially proposed predictor variables were used as for the previous adjustment (#12).

See Appendix C for more details on the predictor variables retained in the model and model summary statistics.

6.2.4 QDU Weight Component #14: Respondent QDU Poststratification to SDU-Based Control Totals

This final poststratification for all respondent QDUs utilized the same set of initially proposed predictor variables as previous adjustments. The corresponding control totals were obtained from the SDU-level sample, as was done for Weight Component #12.

See Appendix C for more details on the predictor variables retained in the model and model summary statistics.

6.2.5 QDU Weight Component #15: Respondent QDU Extreme Value Adjustment

The extreme weight proportions for the final poststratified weights were acceptably low, eliminating the need for the extreme value adjustment. Weight Component #15 was set to one for each responding QDU. This adjustment has not been used since this design was implemented for the 1999 NSDUH but is entered as a placeholder in the event it may be required.

6.3 Pair-Level Weight Components

[Exhibit 4.2](#) lists the initially proposed predictor variables for the following adjustment steps via GEM.

6.3.1 Pair Weight Component #11: Inverse of Selection Probability of a Person Pair in the Dwelling Unit

Selection of pairs of individuals from all eligible people residing within the dwelling unit is based on the outcome of a variant of Brewer's method, which may select zero, one, or two people. Any pair of survey-eligible residents within the dwelling unit has some known, nonzero chance of being selected for the survey. When two people are selected, a pair is formed. The pair selection probability is determined by either formula (2.1) or formula (2.6) in Chapter 2. This weight component is the inverse of the selection probability discussed above.

6.3.2 Pair Weight Component #12: Selected Pair Poststratification to SDU-Based Control Totals

Similar to QDU Weight Component #12, this step was motivated by the consideration that the larger sample of all possible pairs provides more stable control totals for the respondent pair nonresponse adjustment. The weights of selected pairs were poststratified to the control totals that derived from calibrated SDU weights of all possible pairs. The pair-level demographic variables for all selected pairs, such as pair age group, pair race/ethnicity, etc., were derived from screener demographic information.

The details on the predictor variables retained in the model and model summary statistics can be found in Appendix H.

6.3.3 Pair Weight Component #13: Respondent Pair Nonresponse Adjustment

If both people in the selected pair completed interviews successfully, the pair then was considered a respondent pair. This adjustment step accounts for failure to obtain respondent pairs from all selected pairs. In this step, respondent pair weights were adjusted to the control totals based on the full sample of selected pairs. Due to the low response rate of person pairs, this step had a relatively large adjustment on the weights. The same set of proposed predictor variables was used as for Weight Component #12. Similar to Weight Component #12, the pair-level demographic variables for all selected pairs, such as pair age group, pair race/ethnicity, etc., were derived from screener demographic information.

See Appendix H for more details on the predictor variables retained in the model and model summary statistics.

6.3.4 Pair Weight Component #14: Respondent Pair Poststratification to SDU-Based Control Totals

This final poststratification utilized the same set of initially proposed predictor variables as previous adjustment steps. In addition, 10 pair relationship domain-level indicator variables were added to the set of covariates. The control totals for GEM calibration were derived from the SDU sample of all possible pairs of eligible people, as was done for Weight Component #12. The calibration control totals for these 10 domains used household-level person counts and the final QDU weights. As mentioned in the introduction, use of these household-level count totals for pair relationship domains in GEM calibration provided Hajek-type weight adjustment in the interest of obtaining more stable estimates. In setting up calibration covariates, multiplicity factors were needed. These factors, as discussed in the introduction, are used in constructing estimates for person-level parameters based on pair-related drug behavior. The factors depend on the pair domains of interest. For a selected set of pair domains, multiplicity factors are provided along with the pair-level analysis weights. See Chapter 11 in the NSDUH MRB editing and imputation report (CBHSQ, 2015a) for more detail on the creation of and imputation of missing values in the pair relationship, multiplicity, and household-level person counts. See Chapter 4 for more detail on the use of multiplicities and household-level person counts in poststratification.

Unlike Weight Components #12 and #13, demographic covariates were based on data from the questionnaire instead of information pulled from the dwelling unit screener.

For more details on the predictor variables retained in the GEM model and model summary statistics, see Appendix H.

6.3.5 Pair Weight Component #15: Respondent Pair Extreme Weight Adjustment

We checked the extreme weight proportions for the weights up to Weight Component #14, using the extreme weight domains (see Section 5.2). Even though the previous adjustment steps utilized the built-in extreme weight control feature of GEM, the extreme weight proportions were still high enough to cause concern that they might produce unreliable estimates. Therefore, the extreme weight adjustment via GEM was implemented, using the same final set of predictor variables kept in the model for Weight Component #15. This step was successful in reducing the extreme weight proportion in all model groups. For details, see Appendix J.

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7. Evaluation of Calibration Weights

During the weight calibration process, several criteria for quality control were implemented to assess model adequacy. In this chapter, we describe the individual procedures and a summary of their results. All tables referred to in this chapter can be found in Appendices D through G and I through L.

7.1 Response Rates

[Table D.1](#) in Appendix D displays the final selected and responding questionnaire dwelling unit (QDU) sample sizes from the 2013 National Survey on Drug Use and Health (NSDUH) for various national domains. This table also shows the weighted response rates. Most domains reflect the overall 74.82 percent response rate, with most rates relatively close to 80 percent, although the highest response rate is 95.40 percent, from the Household Type Age 12-17 category. The lowest response rate came from Household Type 26+, with 71.52 percent.

[Table I.1](#) in Appendix I displays the final selected and responding pair-level sample sizes from the 2013 survey for various national domains. Due to the nature of the pair data, the response rates were lower in all domains examined than at the QDU level, with an overall response rate of 62.19 percent. The response rates range from a low of 44.64 percent in the Pair Age 35-49, 50+ category to a high of 84.28 percent from the Pair Race/Ethnicity Black or African American and Other category. This extreme range of response rates is probably due to a combination of small sample sizes and response burden as a result of selection of pairs within households among various domains. Like at the QDU level, the top response rates are among the younger respondents (as measured by household type for the QDU data and pair age for the pair data). This pattern may be related to the relatively high response rates in the group level of the variable group quarters since it includes college dormitories.

7.2 Proportions of Extreme Values and Outwinsors

During the stages of modeling adjustments (i.e., nonresponse [nr] and poststratification [ps]), one major issue of concern when deciding the adequacy of a particular model was the extent of the resulting proportions of extreme value (ev) and outwinsor weights (see Sections 5.1 and 5.2 for these definitions). For each weight adjustment step, these proportions are computed before and after the step for various domains. Prior to adjustment, the product of all weight components is used to compute proportions of evs and outwinsors, while after the adjustment, the product includes the new adjustment factor. If the proportion of evs and outwinsors is deemed high, a separate ev treatment step after ps could be performed. This was done for the pair-level weights. Details of this step are explained in Section 6.3.5. A separate ev treatment step was deemed unnecessary for the QDU-level weights.

[Tables E.1](#) and [E.2](#) and [Tables J.1](#) through [J.3](#) present percentages of evs at the QDU level and the pair level, respectively, for various domains. Unweighted percentages are the percentage of actual counts of units defined as evs relative to the total sample size. Weighted percentages reflect the percentage of total ev weights relative to the total sample weight, while outwinsor percentages represent the total amount of residual weight when the weights are

trimmed to the critical values (used for ev definition) relative to the total sample weight. For evaluation purposes, the outwisor percentage is considered the most important of the three percentages, as this gave a measure of the impact of winsorization (or trimming) of ev weights (if we performed this treatment). See Sections 5.1 and 5.2 for the domains that were used to define extreme values.

7.3 Slippage Rates

The slippage rate for a given domain is defined as the relative percentage difference between the sampling weights and the external control totals, both before and after ps. The control totals for QDU and person pair ps are derived from the screener dwelling unit (SDU) weights, which were poststratified to U.S. Census Bureau population estimates (Center for Behavioral Health Statistics and Quality, 2015b). [Table F.1](#) displays QDU national domain-specific weight sums for both before and after ps, as well as the desired totals to be met through ps. [Table K.1](#) shows the same for the pair sample. These tables also show the relative percentage difference, or the amount of adjustment necessary (positive or negative) to meet the desired totals. The first relative difference is used explicitly during the ps modeling procedure to identify potential problems for convergence. Large differences in domains with relatively small sample sizes are indicative of potential large adjustment factors, which may cause problems in convergence while satisfying bound constraints. The reason is that adjustments required for one domain may have an adverse effect on another domain when a unit belongs to both.

As an example, consider that [Table F.1](#), for the 2013 QDU domain household size of two, indicates a sample size of 16,806 with a total design-based weight of 54,672,497 and a census total of 54,941,498 with an initial slippage rate of -0.49 percent, which would imply a common weight adjustment approximately equal to 1.00492, if this were the only calibration control. Similarly, looking at pair data in [Table K.1](#), the pair domain category of pair age 18-25, 18-25 has a sample size of 3,795, a design-based weight of 12,764,146, and a census total of 12,670,602, showing an initial slippage of 0.74 percent. The resultant required adjustment would be approximately equal to 0.992671, if this were the only control. However, in the generalized exponential model (GEM), all controls are simultaneously satisfied under a complex algorithm that allows for different adjustment factors for different units.

7.4 Weight Adjustment Summary Statistics

[Tables G.1](#), [G.2](#), and [L.1](#) through [L.3](#) display summary statistics on the product of weight components before and after all stages of adjustment for the QDU and person pair, respectively. The summary statistics include sample size (n), minimum (min), maximum (max), median (med), 25th percentile (Q1), 75th percentile (Q3), and the unequal weighting effect (UWE). Note that in [Tables L.2](#) and [L.3](#) the sample size for pair age group, pair race/ethnicity, and pair gender are slightly different. This is because those variables were defined using screening demographic information in the nonresponse adjustment of respondent pairs, while in the poststratification of respondent pairs, they were defined from questionnaire demographic information. Because UWE is directly affected by weight adjustment factors and extreme weights, these values—along with the percentage of extreme weights as noted in Section 7.2—were used as guidelines for determining model adequacy.

7.5 Sensitivity Analysis of Drug Use Estimates

It is known that, in general, there is a trade-off between bias reduction and variance reduction. For instance, with GEM (for nr or ps), enlarging a simple model (such as the one with only main effects) has the potential of further reducing the bias. At the same time, this enlargement also may be associated with a corresponding increase in the variance of the estimate due to additional variability caused by estimating the model parameters. To check for possible overfitting of the GEM model, we conducted a sensitivity analysis for respondent QDU poststratification for the QDU weights, respondent pair poststratification, and extreme weight adjustment for the person pair weights. A simple baseline model was fitted with the same bounds and maximum number of iterations as was used for the chosen (more complex) final model. We then looked for substantial changes in point estimates and standard errors (SEs). For the QDU weights, some household-level characteristics were selected such as family income, number of youths in the household, whether the household had health insurance coverage, and number of elders living in the household. The estimates and SEs are displayed in [Table 7.1](#). For the person pair weights, selected licit and illicit drug use prevalence rates of 12- to 17-year-olds were calculated from parent-child pairs, and estimates and SEs of the estimates based on pair weights are shown in [7.2a](#) to [7.2b](#).

As seen in [Table 7.1](#), the estimates and their SEs for the two models (baseline and the final) are generally similar to each other for the QDU weights. However, among the person pair estimates and SEs, there are some differences, but they do not seem significant in general.

Since the sensitivity analyses for both QDU- and pair-level calibrated weights seem to indicate that adding more covariates does not introduce an undesirable degree of instability in the estimates or their SEs, the final, more complex GEM models were deemed reasonable.

Table 7.1 Estimates of Totals and SEs for Domains of Interest Based on QDU Sample: 2013

Domain	<i>n</i>	Baseline (B)¹	Final (F)²	(B-F)/F% (Estimate)	(B-F)/F% (SE)
<i>Households with Family Income</i>					
\$0 - < \$10,000	5,010	9,640,414 (296,541)	9,634,767 (295,920)	0.06	0.21
\$10,000 - < \$20,000	6,578	16,260,383 (403,703)	16,257,011 (405,607)	0.02	-0.47
\$20,000 - < \$30,000	5,629	13,623,546 (355,668)	13,617,833 (356,401)	0.04	-0.21
\$30,000 - < \$40,000	5,086	12,938,315 (351,496)	12,933,516 (350,964)	0.04	0.15
\$40,000 - < \$50,000	5,028	12,544,668 (320,009)	12,548,403 (320,446)	-0.03	-0.14
\$50,000 - < \$75,000	7,762	20,201,117 (435,315)	20,218,494 (436,134)	-0.09	-0.19
\$75,000 - < \$100,000	5,251	13,059,812 (324,027)	13,047,031 (323,808)	0.10	0.07
\$100,000+	8,552	22,010,498 (577,351)	22,021,698 (578,515)	-0.05	-0.20
<i>Households with Number of Youths (< 18)</i>					
0	20,558	78,494,989 (1,008,983)	78,505,803 (1,009,389)	-0.01	-0.04
1	11,636	18,218,390 (317,118)	18,222,562 (317,424)	-0.02	-0.10
2	9,693	14,732,506 (281,694)	14,723,563 (281,739)	0.06	-0.02
3	4,586	6,022,814 (151,961)	6,025,561 (152,611)	-0.05	-0.43
4+	2,423	2,810,054 (96,046)	2,801,265 (96,017)	0.31	0.03
<i>Households with Insurance Coverage</i>					
Yes	41,733	103,812,866 (1,106,630)	103,806,733 (1,106,172)	0.01	0.04
No	7,163	16,465,887 (341,191)	16,472,020 (341,742)	-0.04	-0.16
<i>Households with Number of Older Adults (65+)</i>					
0	43,295	90,221,592 (978,040)	90,221,553 (978,100)	0.00	-0.01
1	3,797	19,329,535 (524,163)	19,329,250 (524,776)	0.00	-0.12
2	1,766	10,565,576 (357,915)	10,565,480 (358,454)	0.00	-0.15
3+	38	162,051 (30,993)	162,471 (31,168)	-0.26	-0.56

QDU = questionnaire dwelling unit; SE = standard error.

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last step of calibration, res.qdu.ps, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.2a Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Alcohol and Tobacco among Mother-Child (12 to 17) Pairs, by Mother Use: 2013

Drug	Mother User	<i>n</i>	Baseline ¹	Final ²
Alcohol				
Lifetime	Yes	1,941	29.79 (1.67)	29.75 (1.68)
	No	267	15.81 (3.49)	16.62 (3.63)
	Overall	2,208	27.74 (1.55)	27.83 (1.57)
Past Year	Yes	1,641	26.04 (1.82)	25.98 (1.82)
	No	567	13.35 (2.17)	13.78 (2.26)
	Overall	2,208	22.48 (1.47)	22.54 (1.48)
Past Month	Yes	1,231	12.44 (1.48)	12.48 (1.47)
	No	977	6.90 (1.18)	7.03 (1.22)
	Overall	2,208	9.86 (0.96)	9.93 (0.97)
Cigarettes				
Lifetime	Yes	1,488	14.85 (1.36)	15.00 (1.38)
	No	720	6.91 (1.11)	7.03 (1.16)
	Overall	2,208	11.84 (0.96)	12.00 (0.98)
Past Year	Yes	638	11.94 (1.65)	12.35 (1.76)
	No	1,570	6.52 (0.86)	6.56 (0.88)
	Overall	2,208	7.77 (0.76)	7.90 (0.79)
Past Month	Yes	563	7.02 (1.18)	7.05 (1.20)
	No	1,645	3.35 (0.59)	3.38 (0.60)
	Overall	2,208	4.08 (0.52)	4.10 (0.53)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.2b Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Alcohol and Tobacco among Father-Child (12 to 17) Pairs, by Father Use: 2013

Drug	Father User	<i>n</i>	Baseline¹	Final²
Alcohol				
Lifetime	Yes	1,330	32.00 (2.22)	31.96 (2.23)
	No	92	19.04 (9.86)	19.02 (9.14)
	Overall	1,422	31.26 (2.15)	31.22 (2.15)
Past Year	Yes	1,129	27.32 (2.40)	27.16 (2.41)
	No	293	17.00 (3.46)	16.91 (3.45)
	Overall	1,422	25.07 (2.02)	24.91 (2.02)
Past Month	Yes	932	17.09 (2.50)	17.00 (2.50)
	No	490	7.80 (2.25)	8.00 (2.33)
	Overall	1,422	13.75 (1.83)	13.74 (1.84)
Cigarettes				
Lifetime	Yes	1,064	17.05 (1.93)	17.19 (1.94)
	No	358	12.82 (3.20)	13.12 (3.20)
	Overall	1,422	15.90 (1.66)	16.09 (1.67)
Past Year	Yes	396	12.74 (2.58)	12.27 (2.34)
	No	1,026	9.87 (1.68)	10.00 (1.70)
	Overall	1,422	10.60 (1.44)	10.57 (1.43)
Past Month	Yes	352	5.81 (1.56)	5.70 (1.52)
	No	1,070	3.77 (1.00)	3.85 (1.03)
	Overall	1,422	4.22 (0.86)	4.26 (0.88)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.3a Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Any Illicit Drug or Marijuana among Mother-Child (12 to 17) Pairs, by Mother Use: 2013

Drug	Mother User	<i>n</i>	Baseline¹	Final²
Any Illicit				
Lifetime	Yes	1,169	25.50 (2.09)	25.50 (2.09)
	No	1,039	19.22 (2.10)	19.49 (2.14)
	Overall	2,208	22.21 (1.50)	22.34 (1.51)
Past Year	Yes	245	33.45 (4.84)	33.40 (4.83)
	No	1,963	15.50 (1.40)	15.49 (1.40)
	Overall	2,208	17.15 (1.35)	17.12 (1.35)
Past Month	Yes	132	18.13 (5.65)	16.56 (4.84)
	No	2,076	7.17 (0.88)	7.01 (0.83)
	Overall	2,208	7.70 (0.88)	7.46 (0.82)
Marijuana				
Lifetime	Yes	1,039	18.95 (2.01)	18.79 (1.98)
	No	1,169	10.75 (1.35)	10.68 (1.32)
	Overall	2,208	14.23 (1.17)	14.13 (1.15)
Past Year	Yes	159	26.45 (5.85)	24.90 (5.33)
	No	2,049	11.46 (1.09)	11.38 (1.08)
	Overall	2,208	12.24 (1.09)	12.08 (1.07)
Past Month	Yes	84	28.45 (9.74)	25.63 (8.38)
	No	2,124	5.89 (0.75)	5.75 (0.71)
	Overall	2,208	6.39 (0.78)	6.18 (0.73)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.3b Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Any Illicit Drug or Marijuana among Father-Child (12 to 17) Pairs, by Father Use: 2013

Drug	Father User	<i>n</i>	Baseline¹	Final²
Any Illicit				
Lifetime	Yes	867	26.85 (2.80)	27.00 (2.83)
	No	555	14.20 (2.25)	13.96 (2.21)
	Overall	1,422	21.54 (1.88)	21.47 (1.89)
Past Year	Yes	191	24.06 (5.97)	24.58 (5.96)
	No	1,231	15.77 (1.75)	15.47 (1.73)
	Overall	1,422	16.80 (1.69)	16.58 (1.67)
Past Month	Yes	115	17.91 (7.26)	18.25 (7.12)
	No	1,307	7.34 (1.32)	7.40 (1.35)
	Overall	1,422	8.12 (1.34)	8.18 (1.36)
Marijuana				
Lifetime	Yes	808	19.88 (2.55)	20.10 (2.56)
	No	614	8.88 (1.84)	8.67 (1.78)
	Overall	1,422	14.90 (1.62)	14.88 (1.61)
Past Year	Yes	145	22.00 (6.08)	23.06 (6.23)
	No	1,277	11.63 (1.55)	11.40 (1.52)
	Overall	1,422	12.61 (1.50)	12.47 (1.49)
Past Month	Yes	87	9.69 (3.72)	10.32 (3.92)
	No	1,335	5.83 (1.22)	5.91 (1.25)
	Overall	1,422	6.06 (1.16)	6.16 (1.19)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.4 Percentages of Youths (12 to 17) Living with a Parent Reporting Lifetime, Past Year, and Past Month Use of Alcohol and Tobacco among Parent-Child (12 to 17) Pairs, Asked Whether Their Parents Had Spoken to Them about the Dangers of Tobacco, Alcohol, or Drug Use within the Past 12 Months: 2013

Drug	Parent Talked about Dangers with Child	<i>n</i>	Baseline¹	Final²
Alcohol				
Lifetime	Yes	2,041	29.02 (1.82)	29.07 (1.85)
	No	1,523	30.65 (2.19)	30.82 (2.19)
	Overall	3,564	29.73 (1.38)	29.84 (1.39)
Past Year	Yes	2,041	24.93 (1.77)	24.89 (1.79)
	No	1,523	22.91 (2.00)	22.98 (1.99)
	Overall	3,564	24.05 (1.31)	24.05 (1.31)
Past Month	Yes	2,041	11.66 (1.27)	11.82 (1.30)
	No	1,523	10.73 (1.28)	10.74 (1.27)
	Overall	3,564	11.25 (0.90)	11.35 (0.92)
Cigarettes				
Lifetime	Yes	2,041	13.62 (1.21)	13.75 (1.23)
	No	1,523	14.91 (1.38)	15.19 (1.40)
	Overall	3,564	14.18 (0.91)	14.38 (0.92)
Past Year	Yes	2,041	8.94 (1.00)	9.08 (1.02)
	No	1,523	10.15 (1.26)	10.19 (1.25)
	Overall	3,564	9.47 (0.79)	9.57 (0.79)
Past Month	Yes	2,041	3.77 (0.58)	3.81 (0.60)
	No	1,523	5.47 (0.86)	5.48 (0.85)
	Overall	3,564	4.52 (0.51)	4.54 (0.51)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.5 Percentages of Youths (12 to 17) Living with a Parent Reporting Lifetime, Past Year, and Past Month Use of Any Illicit Drug and Marijuana among Parent-Child (12 to 17) Pairs, Asked Whether Their Parents Had Spoken to Them about the Dangers of Tobacco, Alcohol, or Drug Use within the Past 12 Months: 2013

Drug	Parent Talked about Dangers with Child	<i>n</i>	Baseline¹	Final²
Any Illicit				
Lifetime	Yes	2,041	22.71 (1.73)	22.71 (1.75)
	No	1,523	24.29 (1.83)	24.24 (1.81)
	Overall	3,564	23.41 (1.25)	23.38 (1.25)
Past Year	Yes	2,041	18.01 (1.58)	17.86 (1.57)
	No	1,523	18.16 (1.64)	17.89 (1.59)
	Overall	3,564	18.08 (1.12)	17.88 (1.10)
Past Month	Yes	2,041	9.50 (1.21)	9.34 (1.18)
	No	1,523	6.97 (1.01)	6.82 (0.96)
	Overall	3,564	8.39 (0.81)	8.23 (0.79)
Marijuana				
Lifetime	Yes	2,041	15.83 (1.44)	15.72 (1.43)
	No	1,523	15.36 (1.50)	15.21 (1.45)
	Overall	3,564	15.62 (1.04)	15.49 (1.02)
Past Year	Yes	2,041	13.87 (1.32)	13.63 (1.27)
	No	1,523	12.44 (1.42)	12.19 (1.36)
	Overall	3,564	13.24 (0.96)	13.00 (0.93)
Past Month	Yes	2,041	8.04 (1.08)	7.87 (1.05)
	No	1,523	5.11 (0.86)	5.00 (0.84)
	Overall	3,564	6.75 (0.72)	6.61 (0.69)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.6a Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Alcohol and Tobacco among Mother-Child (12 to 17) Pairs, for Mother in the Pair, Asked Whether She Had Spoken to Her Children about the Dangers of Tobacco, Alcohol, or Drug Use within the Past 12 Months: 2013

Drug	Mother Talked about Dangers with Child	<i>n</i>	Baseline¹	Final²
Alcohol				
Lifetime	0 times	185	19.73 (4.35)	19.85 (4.39)
	1-2 times	324	24.27 (4.47)	24.95 (4.60)
	A few times	561	25.18 (2.93)	24.99 (2.93)
	Many times	1,059	33.75 (2.25)	33.86 (2.27)
	Overall	2,129	28.29 (1.60)	28.38 (1.61)
Past Year	0 times	185	15.65 (3.89)	15.47 (3.82)
	1-2 times	324	20.59 (4.29)	21.16 (4.40)
	A few times	561	19.80 (2.76)	19.83 (2.76)
	Many times	1,059	27.50 (2.15)	27.55 (2.16)
	Overall	2,129	22.95 (1.51)	23.03 (1.52)
Past Month	0 times	185	8.78 (3.24)	8.66 (3.20)
	1-2 times	324	4.38 (1.44)	4.57 (1.57)
	A few times	561	10.46 (2.16)	10.38 (2.11)
	Many times	1,059	12.38 (1.49)	12.56 (1.53)
	Overall	2,129	10.10 (0.99)	10.18 (1.00)
Cigarettes				
Lifetime	0 times	185	8.60 (2.48)	8.67 (2.53)
	1-2 times	324	8.22 (2.16)	8.80 (2.31)
	A few times	561	8.52 (1.55)	8.29 (1.51)
	Many times	1,059	16.45 (1.63)	16.81 (1.69)
	Overall	2,129	11.98 (0.99)	12.16 (1.01)
Past Year	0 times	185	3.37 (1.32)	3.53 (1.46)
	1-2 times	324	4.66 (1.56)	5.04 (1.71)
	A few times	561	5.55 (1.23)	5.37 (1.19)
	Many times	1,059	11.52 (1.40)	11.82 (1.46)
	Overall	2,129	7.83 (0.78)	7.97 (0.81)
Past Month	0 times	185	1.85 (0.94)	1.77 (0.89)
	1-2 times	324	1.24 (0.54)	1.35 (0.58)
	A few times	561	3.11 (1.00)	3.08 (0.97)
	Many times	1,059	6.35 (0.98)	6.45 (1.00)
	Overall	2,129	4.10 (0.54)	4.14 (0.54)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.6b Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Alcohol and Tobacco among Father-Child (12 to 17) Pairs, for Father in the Pair, Asked Whether He Had Spoken to His Child about the Dangers of Tobacco, Alcohol, or Drug Use within the Past 12 Months: 2013

Drug	Father Talked about Dangers with Child	<i>n</i>	Baseline¹	Final²
Alcohol				
Lifetime	0 times	167	24.57 (6.88)	24.70 (6.95)
	1-2 times	289	29.16 (4.63)	28.92 (4.68)
	A few times	428	35.30 (3.97)	35.32 (4.02)
	Many times	446	30.80 (3.38)	30.52 (3.36)
	Overall	1,330	30.96 (2.21)	30.87 (2.21)
Past Year	0 times	167	21.73 (6.84)	21.69 (6.91)
	1-2 times	289	22.83 (4.38)	22.85 (4.43)
	A few times	428	29.25 (3.76)	28.83 (3.76)
	Many times	446	24.57 (3.02)	24.40 (3.04)
	Overall	1,330	25.28 (2.11)	25.11 (2.11)
Past Month	0 times	167	12.14 (6.24)	12.73 (6.50)
	1-2 times	289	10.49 (3.81)	10.03 (3.65)
	A few times	428	18.54 (3.45)	18.48 (3.45)
	Many times	446	13.40 (2.62)	13.36 (2.65)
	Overall	1,330	14.26 (1.91)	14.25 (1.92)
Cigarettes				
Lifetime	0 times	167	12.37 (4.34)	11.91 (4.03)
	1-2 times	289	11.53 (3.66)	11.46 (3.55)
	A few times	428	17.30 (3.18)	17.52 (3.25)
	Many times	446	18.83 (2.83)	19.34 (2.91)
	Overall	1,330	15.92 (1.71)	16.08 (1.72)
Past Year	0 times	167	9.90 (4.14)	9.22 (3.75)
	1-2 times	289	6.71 (3.41)	6.54 (3.26)
	A few times	428	11.31 (2.42)	11.24 (2.45)
	Many times	446	12.58 (2.49)	12.85 (2.55)
	Overall	1,330	10.60 (1.48)	10.54 (1.46)
Past Month	0 times	167	2.42 (1.45)	2.51 (1.49)
	1-2 times	289	2.34 (0.93)	2.32 (0.91)
	A few times	428	6.04 (1.79)	5.99 (1.82)
	Many times	446	4.83 (1.63)	4.95 (1.70)
	Overall	1,330	4.36 (0.89)	4.40 (0.91)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.7a Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Any Illicit Drug and Marijuana among Mother-Child (12 to 17) Pairs, for Mother in the Pair, Asked Whether She Had Spoken to Her Child about the Dangers of Tobacco, Alcohol, or Drug Use within the Past 12 Months: 2013

Drug	Mother Talked about Dangers with Child	<i>n</i>	Baseline¹	Final²
Any Illicit				
Lifetime	0 times	185	16.38 (4.26)	16.29 (4.27)
	1-2 times	324	18.04 (3.91)	18.92 (4.04)
	A few times	561	20.19 (3.11)	20.23 (3.15)
	Many times	1,059	26.87 (2.17)	26.95 (2.15)
	Overall	2,129	22.41 (1.54)	22.58 (1.55)
Past Year	0 times	185	10.24 (3.47)	9.71 (3.30)
	1-2 times	324	10.65 (2.86)	11.22 (3.01)
	A few times	561	17.32 (3.05)	17.43 (3.10)
	Many times	1,059	21.58 (2.05)	21.45 (2.00)
	Overall	2,129	17.38 (1.38)	17.39 (1.38)
Past Month	0 times	185	1.55 (0.79)	1.42 (0.74)
	1-2 times	324	3.76 (1.32)	3.48 (1.20)
	A few times	561	7.78 (2.06)	7.50 (1.92)
	Many times	1,059	10.82 (1.47)	10.64 (1.39)
	Overall	2,129	7.84 (0.91)	7.61 (0.85)
Marijuana				
Lifetime	0 times	185	7.30 (2.54)	7.04 (2.43)
	1-2 times	324	8.18 (2.13)	8.64 (2.22)
	A few times	561	10.94 (1.93)	10.95 (1.93)
	Many times	1,059	20.88 (2.07)	20.60 (2.01)
	Overall	2,129	14.51 (1.20)	14.42 (1.18)
Past Year	0 times	185	6.29 (2.45)	5.96 (2.33)
	1-2 times	324	5.04 (1.52)	5.04 (1.50)
	A few times	561	9.90 (1.86)	9.92 (1.86)
	Many times	1,059	18.52 (2.03)	18.30 (1.97)
	Overall	2,129	12.53 (1.13)	12.38 (1.10)
Past Month	0 times	185	1.35 (0.76)	1.23 (0.71)
	1-2 times	324	3.46 (1.30)	3.17 (1.18)
	A few times	561	5.42 (1.48)	5.30 (1.43)
	Many times	1,059	9.61 (1.44)	9.38 (1.34)
	Overall	2,129	6.55 (0.80)	6.34 (0.75)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

Table 7.7b Percentages of Youths (12 to 17) Reporting Lifetime, Past Year, and Past Month Use of Any Illicit Drug and Marijuana among Father-Child (12 to 17) Pairs, for Father in the Pair, Asked Whether He Had Spoken to His Child about the Dangers of Tobacco, Alcohol, or Drug Use within the Past 12 Months: 2013

Drug	Father Talked about Dangers with Child	<i>n</i>	Baseline¹	Final²
Any Illicit				
Lifetime	0 times	167	20.58 (6.79)	19.86 (6.81)
	1-2 times	289	13.69 (2.97)	13.07 (2.77)
	A few times	428	21.72 (3.53)	21.96 (3.60)
	Many times	446	26.16 (3.36)	26.32 (3.38)
	Overall	1,330	21.42 (1.95)	21.33 (1.96)
Past Year	0 times	167	12.47 (4.32)	11.85 (3.98)
	1-2 times	289	10.44 (2.78)	9.85 (2.53)
	A few times	428	18.05 (3.37)	18.02 (3.38)
	Many times	446	21.76 (3.24)	21.72 (3.25)
	Overall	1,330	16.92 (1.75)	16.70 (1.74)
Past Month	0 times	167	4.92 (2.38)	5.27 (2.57)
	1-2 times	289	2.75 (0.98)	2.65 (0.95)
	A few times	428	12.23 (3.08)	12.22 (3.09)
	Many times	446	9.75 (2.70)	9.80 (2.73)
	Overall	1,330	8.41 (1.39)	8.48 (1.41)
Marijuana				
Lifetime	0 times	167	11.66 (4.30)	10.62 (3.85)
	1-2 times	289	8.94 (2.48)	8.69 (2.31)
	A few times	428	17.37 (3.41)	17.56 (3.47)
	Many times	446	17.27 (2.77)	17.48 (2.83)
	Overall	1,330	14.80 (1.67)	14.74 (1.65)
Past Year	0 times	167	10.55 (4.17)	10.00 (3.79)
	1-2 times	289	6.32 (2.09)	6.01 (1.85)
	A few times	428	15.10 (3.25)	14.94 (3.24)
	Many times	446	15.06 (2.62)	15.21 (2.66)
	Overall	1,330	12.65 (1.56)	12.52 (1.54)
Past Month	0 times	167	4.36 (2.34)	4.69 (2.54)
	1-2 times	289	1.68 (0.81)	1.64 (0.79)
	A few times	428	10.38 (2.98)	10.27 (2.97)
	Many times	446	5.94 (1.93)	6.20 (2.06)
	Overall	1,330	6.27 (1.21)	6.37 (1.24)

Note: Standard errors of prevalence estimates are provided in parentheses.

¹ Baseline refers to the weight obtained from using a main effects only model for the last two steps of calibration, res.pr.ps and res.pr.ev, and a full model for preceding steps.

² Final refers to the weight obtained using a full model throughout all steps of calibration.

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Appendix A: Technical Details about the Generalized Exponential Model

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Appendix A: Technical Details about the Generalized Exponential Model

A.1 Distance Function

Let $\Delta(w, d)$ denote the distance between the initial weights $d = \{d_k : k \in s\}$ and the adjusted weights w , with k being the k^{th} unit in the sample and s being the sample selected. The distance function minimized under the generalized exponential model (GEM), subject to calibration constraints, is given by

$$\Delta(w, d) = \sum_{k \in s} \frac{d_k}{A_k} \left\{ (a_k - \ell_k) \log \frac{a_k - \ell_k}{c_k - \ell_k} + (u_k - a_k) \log \frac{u_k - a_k}{u_k - c_k} \right\}, \quad (\text{A.1.1})$$

where $a_k = w_k / d_k$, $A_k = (u_k - \ell_k) / [(u_k - c_k)(c_k - \ell_k)]$ and ℓ_k , c_k , and u_k are prescribed real numbers. Let T_x denote the p -vector of control totals corresponding to predictor variables (x_1, \dots, x_p) . Then, the calibration constraints for the above minimization problem are

$$\sum_{k \in s} x_k d_k a_k = T_x. \quad (\text{A.1.2})$$

The solution for the above minimization problem, if it exists, is given by a GEM with model parameters λ ; that is,

$$a_k(\lambda) = \frac{\ell_k (u_k - c_k) + u_k (c_k - \ell_k) \exp\{A_k x'_k \lambda\}}{(u_k - c_k) + (c_k - \ell_k) \exp\{A_k x'_k \lambda\}}. \quad (\text{A.1.3})$$

Note that the number of parameters in the GEM should be $\leq n$, where n is the size of the sample s . This is also the dimension of vectors d and w . It follows from equation A.1.3 that

$$\ell_k < a_k < u_k, \quad k = 1, \dots, n. \quad (\text{A.1.4})$$

The weight adjustment factor achieved by the usual raking ratio algorithm (Singh & Mohl, 1996) can also be derived as a special case of the GEM, noting that for $\ell_k = 0$, $u_k = \infty$, $c_k = 1$, and $k = 1, \dots, n$, we have

$$\Delta(w, d) = \sum_{k \in s} d_k a_k \log a_k - \sum_{k \in s} d_k (a_k - 1) \quad (\text{A.1.5})$$

and $a_k(\lambda) = \exp(x'_k \lambda)$.

The logit model of Deville and Särndal (1992) is also a special case of the GEM, by setting $\ell_k = \ell$, $u_k = u$, and $c_k = 1$ for all k . The new method was introduced by Folsom and Singh (2000).

A.2 GEM Adjustments for Extreme Value Treatment, Nonresponse, and Poststratification

By choosing the user-specified parameters ℓ_k , c_k , and u_k appropriately, the unified GEM formula (A.1.3) can be justified for all three types of adjustment: extreme value treatment, nonresponse, and poststratification. For extreme value treatment via winsorization, denote the winsorized weights by $\{b_k\}$, where $b_k = d_k$ if d_k is not an extreme weight, and

$b_k = \text{med}\{d_k\} \pm 3 * \text{IQR}$ if d_k is an extreme weight, where IQR denotes the interquartile range, and the median and quartiles for the weights are defined with respect to a suitable design-based stratum.

For the nonresponse adjustment, the sample is first divided into two parts: the nonextreme weight subsample and the extreme weight subsample. For nonextreme weights, the following are set: $\ell_2 = 1$, $c_2 = \rho^{-1}$, $u_2 = u > \rho^{-1}$, where ρ is the overall response propensity. For extreme weights with high weights, $\ell_k = \ell_1 m_k$, $c_k = \rho^{-1} m_k$, and $u_k = u_1 m_k$, where $m_k = b_k / d_k$ and $1 \leq \ell_1 < \rho^{-1} = c_1 < u_1$ are prescribed numbers. Similarly, for extreme weights with low weights, $\ell_k = \ell_3 m_k$, $c_k = \rho^{-1} m_k$, $u_k = u_3 m_k$, and $1 \leq \ell_3 < \rho^{-1} = c_3 < u_3$.

For the poststratification adjustment, the following weights are set: for nonextreme weights, $\ell_k = \ell_2$, $c_k = c_2 = 1$, and $u_k = u_2$; for high extreme weights, $\ell_k = \ell_1 m_k$, $c_k = m_k$, and $u_k = u_1 m_k$; and similarly, for low extreme weights, $\ell_k = \ell_3 m_k$, $c_k = m_k$, and $u_k = u_3 m_k$. The extreme value adjustment is identical to poststratification, except for tighter bounds on extreme weights resulting from the final poststratification.

Notice that the GEM allows the flexibility of specifying different bounds for different subsamples. In addition, the lower bound (in the case of nonresponse adjustments) can be made to equal one by choosing the center $c_k > 1$.

A.3 Newton-Raphson Steps

Let X denote the $n \times p$ matrix of predictor values, and for the v^{th} iteration,

$$\Gamma_{\phi_v} = \text{diag}(d_k \phi_k^{(v)}), \phi_k^{(o)} = 1,$$

where $\phi_k^{(v)} = \left[(u_k - a_k^{(v)}) (a_k^{(v)} - \ell_k) \right] / \left[(u_k - c_k) (c_k - \ell_k) \right]$.

Then, for the Newton-Raphson iteration v , the value of the p -vector λ is adjusted as

$$\lambda^{(v)} = \lambda^{(v-1)} + (X' \Gamma_{\phi, v-1} X)^{-1} (T_x - \hat{T}_x^{(v-1)}),$$

where $\lambda^{(0)} = \mathbf{0}$, and \hat{T}_x is calculated by using equation A.1.2, in which a_k is calculated by plugging the current λ into equation A.1.3.

The convergence criterion is based on the Euclidean distance $\|T_x - \hat{T}_x^{(v)}\|$, which is defined as $\sqrt{(T_x - \hat{T}_x^{(v)})' (T_x - \hat{T}_x^{(v)})}$. At each iteration, it is checked to determine whether it is decreasing. If it is not, a half step is used in the iteration increment for λ .

A.4 Scaled Constrained Exponential Model

In National Household Surveys on Drug Abuse (NHSDAs)¹ prior to 1999, constrained exponential models (CEMs) were used for poststratification, and scaled CEMs were used for nonresponse adjustments. The CEM refers to the logit model of Deville and Särndal (1992), in which lower and upper bounds do not vary with k ; that is, $\ell_k = \ell$, $u_k = u$, and $c_k = c = 1$, such that $\ell < 1 < u$. Thus, the CEM is a special case of the GEM. For the nonresponse adjustment, Folsom and Witt (1994) modified the CEM estimating equations by a scaling factor (ρ^{-1} , the inverse of the overall response propensity), such that $1 < \rho^{-1} a_k < \rho^{-1} u$. This implies that choosing ℓ in the CEM as ρ ensures that the scaled adjustment factor for nonresponse is at least one.

¹ The National Household Survey on Drug Abuse (NHSDA) was renamed the National Survey on Drug Use and Health (NSDUH) in the 2002 survey year.

Appendix B: Derivation of Poststratification Control Totals

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Appendix B: Derivation of Poststratification Control Totals

Unlike the person-level poststratification adjustment, the control totals for questionnaire dwelling unit (QDU)-level and person pair-level weight calibration could not be derived from the U.S. Bureau of the Census directly. Estimates of the number of households and person pairs were not available at the domains that we wanted to control, and person pair population estimates were not available even at a national level. However, by taking advantage of the two-phase design of the National Survey on Drug Use and Health (NSDUH), the screener dwelling unit (SDU) sample weights could be poststratified to census population estimates. The calibrated SDU weights then could be used as stable control totals for the QDU- and person pair-level sample weights. In addition to the SDU weights, the person pair-level weights were calibrated to a second set of controls derived from the questionnaire, called household-level person counts. These controls were applied to pairs that were members of the 10 selected pair domains given below.

1. Parent-child pairs, child aged 12 to 14, target population is parents whose children aged 12 to 14 live with them;
2. Parent-child pairs, child aged 12 to 14, target population is children aged 12 to 14 living with their parents;
3. Parent-child pairs, child aged 12 to 17, target population is parents whose children aged 12 to 17 live with them;
4. Parent-child pairs, child aged 12 to 17, target population is children aged 12 to 17 living with their parents;
5. Parent-child pairs, child aged 12 to 20, target population is parents whose children aged 12 to 20 live with them;
6. Parent-child pairs, child aged 12 to 20, target population is children aged 12 to 20 living with their parents;
7. Sibling-sibling pairs, older sibling aged 15 to 17, younger sibling aged 12 to 14, target population is siblings aged 15 to 17 whose siblings are aged 12 to 14;
8. Sibling-sibling pairs, older sibling aged 18 to 25, younger sibling aged 12 to 17, target population is siblings aged 18 to 25 whose siblings are aged 12 to 17;
9. Spouse-spouse and partner-partner pairs; and
10. Spouse-spouse and partner-partner pairs with children younger than the age of 18 living in the household.

B.1 Derivation of QDU-Level Poststratification Controls

The derivation of QDU-level poststratification controls was not directly possible. Instead, it had to be based on work done for the person-level calibration. At the person level, weights were calibrated to the control totals that we wished to reach. These weights then were altered in order to conform to use with QDU-level data.

B.1.1 Person Level

B.1.1.1 Receiving and Deriving Person-Level Poststratification Control Totals

Civilian, noninstitutionalized population estimates for ages 12 or older were provided by the Population Estimates Branch of the U.S. Bureau of the Census. We received two files, one at the national level and the other at the State level, each containing estimates of the population broken down by levels of month (12), Hispanicity (2), race (6), gender (2), and age (11).

The breakdown received from the census did not match the levels of the domains that we wanted to control. To account for this, we collapsed levels. From this altered data, we created datasets with model group-specific control totals. Observations in these datasets corresponded to a breakdown by quarter (4), Hispanicity (2), race (5), gender (2), age (11), and number of States¹ in the model group (number of States varied according to which census region was represented in the model group).

B.1.1.2 Adjusting SDU Data to the Control Totals

In the person-level weighting, the SDU weights were poststratified to meet control totals based on the population estimates received from the census. For NSDUH weighting, GEM was utilized to calibrate sample weights to multiple control totals. In doing so, each SDU received an adjustment factor, which, when multiplied by the initial weight, produced a final weight. The sum of all final weights corresponded to the civilian, noninstitutionalized population estimate for ages 12 or older, and the sum of all final weights in a domain corresponded to the control total for that domain. Note that there were a number of controls being calibrated to for each SDU, depending upon the domains to which the SDU belonged. The adjusted SDU weight reflected the civilian, noninstitutionalized population estimates for ages 12 or older and could be utilized as a basis for constructing controls at the QDU and person pair levels.

B.1.2 QDU Level

B.1.2.1 Deriving QDU-Level Poststratification Control Totals from Adjusted SDU Weights

Since there were no controls for QDU-level poststratification available directly, we used the adjusted SDU weights. For these weights to be applicable at the QDU level, the SDU-level data had to be restructured by sorting and summing over the domains to be used in the QDU-level calibration. This provided a dataset where the summed weight, which still added up to the proper population, was available for every domain to be utilized in the QDU calibration and thus could be used as a control total.

¹ The District of Columbia is included among States.

B.1.2.2 Adjusting QDU-Level Data to the Control Totals

As was done for the SDU data, the QDU-level data was adjusted via calibration in GEM of sample weights to multiple control totals. Each QDU received an adjustment factor, similar to that described for the SDU weight in B.1.1.2. The controls utilized in this calibration were based on the SDU weight as described in B.1.2.1 above. The adjusted weight was representative of the civilian, noninstitutionalized population estimates for ages 12 or older for all domains controlled within the modeling.

B.2 Derivation of Person Pair-Level Poststratification Controls

B.2.1 Deriving Person Pair-Level Poststratification Control Totals from Adjusted SDU Weights and Household-Level Person Counts

Analogous to the QDU weights, some of the person pair controls were based on the SDU weights. However, two sets of control totals were utilized in the modeling, with one set based on the SDU weights and the other set based on the questionnaire roster.

For most pair data domains—those other than the 10 pair domains based on relationship—the control totals for the poststratification adjustments were obtained from SDU data and were based on the number of possible pairs within SDUs. In order to obtain these pair counts belonging to various sociodemographic domains, the screener roster information was used to calculate all possible pairs within SDUs. For example, consider an SDU with two people aged 12 to 17 and three people aged 26 to 34. From this household composition, one can construct one pair of people aged 12 to 17, three pairs of people aged 26 to 34, and six pairs of people aged 12 to 17 and 26 to 34. It follows that the total number of possible pairs in this SDU is 10, from which the number of pairs belonging to the domain of interest can be obtained.

On the other hand, for the 10 selected pair domains based on relationship, the control totals for the poststratification adjustments were obtained from the questionnaire roster. This involved calibrating the pair weights to the number of people in households belonging to each domain of interest. These controls were obtained from the larger sample of singles and pairs (i.e., one or two people selected from dwelling units) and were calculated at the QDU (household) level. The pair weights were adjusted by the appropriate multiplicity. See Chapter 11 in the NSDUH Methodological Resource Book editing and imputation report (Center for Behavioral Health Statistics and Quality, 2015a) for details on the multiplicity counts and household-level control totals, which are referred to as household-level person counts.

B.2.2 Adjusting Person-Pair Level Data to the Control Totals

Like the SDU- and QDU-level data, the person pair-level data was adjusted via GEM. The use of two different types of controls required a minor modification to the GEM macro so that both sets of controls might be addressed simultaneously. Similar to the SDU- and QDU-level poststratification steps, each pair received an adjustment factor, which, when multiplied by the initial weight, produced a final weight. The sum of all final weights corresponded to the civilian, noninstitutionalized population estimate for ages 12 or older, and the sum of all final weights in a domain corresponded to the control total for that domain.

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Appendix C: GEM Modeling Summary for the Questionnaire Dwelling Unit Weights

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Appendix C: GEM Modeling Summary for the Questionnaire Dwelling Unit Weights

This appendix summarizes each questionnaire dwelling unit (QDU) model group throughout all stages of weight calibration modeling. Unlike much of the other information presented in this report, this appendix provides a model-specific overview of weight calibration, as opposed to a State- or domain-specific one.

For 2013, modeling involved taking four model groups through three adjustment steps: (1) selected dwelling unit poststratification, (2) respondent dwelling unit nonresponse adjustment, and (3) respondent dwelling unit poststratification. After the final poststratification, the adjusted sampling weights were reasonably distributed and did not require the additional treatment of the extreme value step.

Model-specific summary statistics are shown in [Tables C.1a](#) through [C.4b](#). Included in these tables, for each stage of modeling, are the number of factor effects included; the high, low, and nonextreme weight bounds set to provide the upper and lower limits for the generalized exponential model (GEM) macro; weighted, unweighted, and winsorized weight proportions; the unequal weighting effect (UWE); and weight distributions. The UWE provides an approximate partial measure of variance and provides a summary of how much impact a particular stage of modeling has on the distribution of the new product of weights. For more details on bounds, see [Section 4.1](#). At each stage in the modeling, these summary statistics were calculated and utilized to help evaluate the quality of the current weight component under the model chosen.

Occurrences of small sample sizes and exact linear combinations in the realized data led to situations whereby inclusion of all originally proposed levels of covariates in the model was not possible. The text and exhibits in [Sections C.1](#) through [C.4](#) summarize the decisions made with regard to final covariates included in each model. For a list of the proposed initial covariates considered at each stage of modeling, see [Exhibit C.2](#), and for the list of realized final model covariates, see [Exhibits C.1.1](#) through [C.4.3](#). The following sections establish a series of guidelines to assist in their interpretation.

C.1 Final Model Explanatory Variables

For brevity, numeric abbreviations for factor levels are established in [Exhibit 4.1](#) (included here as [Exhibit C.1](#) for easy reference) in [Chapter 4](#). There, a complete list is provided of all variables and associated levels used at any stage of modeling. Note that not all factors or levels were present in all stages of modeling, and the initial set of variables was the same across model groups but may change over stages of modeling. The initial candidates are found in any of the proposed variables columns for a particular stage of weight adjustment. [Exhibits C.1.1](#) through [C.4.3](#) provide lists of the proposed and realized covariates.

To help understand what effects were controlled for at each stage of the modeling, it was useful to create cross-classification tables as shown in [Section C.3](#). [Sections C.2](#) and [C.3](#) explain how to use various exhibits for selected model variables to construct these tables.

Exhibit C.1 Definitions of Levels for QDU-Level Calibration Modeling Variables

<p>Age^b 1: 12-17, 2: 18-25, 3: 26-34, 4: 35-49, 5: 50+¹</p> <p>Gender^b 1: Male, 2: Female¹</p> <p>Group Quarter Indicator^a 1: College Dorm, 2: Other Group Quarter, 3: Non-Group Quarter¹</p> <p>Hispanicity^b 1: Hispanic or Latino, 2: Non-Hispanic or Latino¹</p> <p>Household Size^b Continuous Variable Count of Individuals Rostered with DU</p> <p>Household Type (Ages of People Rostered within DU)^a 1: 12-17, 18-25, 26+; 2: 12-17, 18-25; 3: 12-17, 26+; 4: 18-25, 26+; 5: 12-17; 6: 18-25; 7: 26+¹</p> <p>Percentage of Owner-Occupied Dwelling Units in Segment (% Owner-Occupied)^a 1: 50-100%,¹ 2: 10-<50%, 3: 0-<10%</p> <p>Percentage of Segments That Are Black or African American^a 1: 50-100%, 2: 10-<50%, 3: 0-<10%¹</p> <p>Percentage of Segments That Are Hispanic or Latino^a 1: 50-100%, 2: 10-<50%, 3: 0-<10%¹</p> <p>Population Density^a 1: MSA 1,000,000 or More, 2: MSA Less than 1,000,000, 3: Non-MSA Urban, 4: Non-MSA Rural¹</p> <p>Quarter^{a,b} 1: Quarter 1, 2: Quarter 2, 3: Quarter 3, 4: Quarter 4¹</p> <p>Race (3 Levels)^b 1: White¹, 2: Black or African American, 3: Other</p> <p>Race (5 Levels)^b 1: White,¹ 2: Black or African American, 3: American Indian or Alaska Native, 4: Asian, 5: Two or More Races</p> <p>Race/Ethnicity of Householder^a 1: Hispanic or Latino White,¹ 2: Hispanic or Latino Black or African American, 3: Hispanic or Latino Other, 4: Non-Hispanic or Latino White, 5: Non-Hispanic or Latino Black or African American, 6: Non-Hispanic or Latino Other</p> <p>Relation to Householder^a 1: Householder or Spouse, 2: Child, 3: Other Relative, 4: Nonrelative¹</p> <p>Segment-Combined Median Rent and Housing Value (Rent/Housing)^{a,2} 1: First Quintile, 2: Second Quintile, 3: Third Quintile, 4: Fourth Quintile, 5: Fifth Quintile¹</p> <p>State^{a,b,3} Model Group 1: 1: Connecticut, 2: Maine, 3: Massachusetts,¹ 4: New Hampshire, 5: New Jersey, 6: New York, 7: Pennsylvania, 8: Rhode Island, 9: Vermont Model Group 2: 1: Illinois, 2: Indiana, 3: Iowa, 4: Kansas, 5: Michigan, 6: Minnesota, 7: Missouri, 8: Nebraska, 9: North Dakota, 10: Ohio, 11: South Dakota, 12: Wisconsin¹ Model Group 3: 1: Alabama, 2: Arkansas, 3: Delaware, 4: District of Columbia, 5: Florida, 6: Georgia, 7: Kentucky, 8: Louisiana, 9: Maryland, 10: Mississippi, 11: North Carolina,¹ 12: Oklahoma, 13: South Carolina, 14: Tennessee, 15: Texas, 16: Virginia, 17: West Virginia Model Group 4: 1: Alaska, 2: Arizona,¹ 3: California, 4: Colorado, 5: Idaho, 6: Hawaii, 7: Montana, 8: Nevada, 9: New Mexico, 10: Oregon, 11: Utah, 12: Washington, 13: Wyoming</p> <p>State/Region^{a,3} Model Group 1: 1: New York, 2: Pennsylvania, 3: Other¹ Model Group 2: 1: Illinois, 2: Michigan, 3: Ohio, 4: Other¹ Model Group 3: 1: Florida, 2: Texas, 3: Other¹ Model Group 4: 1: California, 2: Other¹</p>
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DU = dwelling unit; MSA = metropolitan statistical area; QDU = questionnaire dwelling unit.

¹ The reference level for this variable. This is the level against which effects of other factor levels are measured.

² Segment-Combined Median Rent and Housing Value is a composite measure based on rent, housing value, and percentage owner-occupied.

³ The States or district assigned to a particular model is based on census regions.

^a Binary variable.

^b Counting variable. A count of all people in the household.

C.2 Glossary of Terms Used in the Description of the Variables in the Final Model

This glossary provides a list of general terms. Certain other terms are sometimes used within a particular section.

All levels present. All effects and all levels of the factor under consideration are in the model.

Coll. (*levels*). Collapse these factor effects together. Factor effects that have been collapsed with others manifest themselves jointly in the model.

Conv. If the model is not convergent, dropping or collapsing of variables is performed.

Do the same for (*effects*). Repeat the previous step for all effect levels listed.

Drop all levels. All factor effects are completely removed from the model for all levels and any combinations involving this factor.

Drop level(s). Collapse these factor effects into the reference set. The factor effects comprising the dropped levels are manifested jointly with either some or all of the factor effects in the reference set.

Drop level(s); sing. During the modeling process, the factor effects listed are removed from the model due to singularity.

Drop level(s); zero cnts. During the modeling process, the factor effects listed are removed from the model due to zero sample.

Drop or collapse using*. The asterisk is used as a wild card character to indicate all levels of the factor for that effect.

Factor effect. The factor effect represents the effects of levels considered for one factor, two factors, and higher order factors.

Hier. One or more of the factor effects in a higher order interaction is collapsed or dropped in an interaction at a lower order and the hierarchical effect carries up, either eliminating or combining factors of higher order interactions with that effect.

Reference/reference set. Factor effects composed of reference levels are not explicitly listed in the set of model variables. However, these effects manifest themselves either separately or in combination with other factors depending on the presence of other factors in the model.

C.3 How to Interpret Collapsing and Dropping of Factor Effects

To help visualize what effects are directly controlled for in our model, one can construct the table that reflects the collapsing scheme employed. The following is a complex example from the 2004 person-level modeling (Chen et al., 2006).

1. Locate the Factor Effect—Model 9 Person Nonresponse Adjustment.

Three-Factor Effects	Comments
State × Age × Race (3 Levels)	Coll. (2,1,2) & (2,1,3); hier. Repeat for all levels of age in State (2); hier. Coll. (1,4,2) & (1,4,3); conv. Drop (3,4,2); sing. Drop (3,*,*); conv. Coll. (5,1,2) & (5,1,3); conv. Repeat for all levels of age in State (5).

2. Determine the initial range of possible levels for the variables by referring to the variable definitions. See Exhibits C.1 and H.1 for QDU- and pair-level variable definitions. In addition, the columns "Levels," "Proposed," and "Final" will provide counts of all factor effects, all explicitly proposed factors, and all explicitly controlled factors, but these are not necessary for construction of the cross-classification table. The following example is based upon person-level variables, but the process is the same.

State (for the model group in question, in this case, Model Group 9)
 Model Group 9: 1: Alaska, 2: Hawaii, 3: Oregon, 4: Washington,¹ 5: California

Age
 1: 12 to 17, 2: 18 to 25, 3: 26 to 34, 4: 35 to 49, 5: 50+¹

Race (3 Levels)
 1: White,¹ 2: Black or African American, 3: Other

3. Construct the cross-classification table.

For example, the initial proposed set of covariates in Race (4 Levels) is defined this way:

Race (4 Levels)	White	Black or African American	Asian	American Indian or Alaska Native

Shading indicates the reference-level set.

¹ This is the reference level for this variable. This is the level against which effects of other factor levels are measured.

This is the cross-classification table for the initial proposed set of covariates in State × Race (4 Levels):

State × Race (4 Levels)	White	Black or African American	Asian	American Indian or Alaska Native
AK				
HI				
OR				
WA				
CA				

Shading indicates the reference-level set.

The cross-classification table of interest for the initial proposed set of covariates in State × Age × Race (3 Levels) is as follows:

State × Age × Race (3 Levels)	White	Black or African American	Other	
AK × 12-17				
18-25				
26-34				
35-49				
50+				
HI × 12-17				
18-25				
26-34				
35-49				
50+				
OR × 12-17				
18-25				
26-34				
35-49				
50+				
WA × 12-17				
18-25				
26-34				
35-49				
50+				
CA × 12-17				
18-25				
26-34				
35-49				
50+				

Shading indicates the reference-level set.

The number of respondents in the class State × Age × Race (3 Levels) at this stage of modeling would appear within each cell of the table. Construction of the other cross-classification tables follows the same logic and is only necessary to the point of providing understanding of the final table.

4. Use the information under the "Comments" column definition to determine the combination of factors controlled.

One-Factor Effects	Comments
State	All levels present.
Race (4 Levels)	All levels present.
Age	All levels present.

Two-Factor Effects	Comments
State × Age	All levels present.
State × Race (4 Levels)	Coll. (1,3) & (1,4). Do the same for all other States except (2). Coll. (2,2), (2,3), & (2,4).
Age × Race (3 Levels)	All levels present.

The reason for the hier. instruction in the three-factor effect directions is the State × Race (4 Levels) interaction. It indicates a need to maintain the collapsing scheme when setting up any three-factor crosses involving State × Race. Following these directions, the resulting two-factor table we would then have to work with is as follows:

State × Race (4 Levels)	White	Black or African American	Asian	American Indian or Alaska Native
AK				
HI				
OR				
WA				
CA				

Shading indicates the reference-level set.

Returning to our instructions, we see that several other factor crosses have been affected by modeling:

Three-Factor Effects	Comments
State × Age × Race (3 Levels)	Coll. (2,1,2) & (2,1,3); hier. Repeat for all levels of age in State (2); hier. Coll. (1,4,2) & (1,4,3); conv. Drop (3,4,2); sing. Drop (3,*,*); conv. Coll. (5,1,2) & (5,1,3); conv. Repeat for all levels of age in State (5).

Construct the complete table, and then begin combining blocks as directed. The unshaded cells represent the factors directly controlled for by the model. The shaded cells represent the composite reference set, whose values may be obtained by utilizing the marginal sums, although when changes to the initially proposed set occur, it can make certain reference cell counts indistinguishable.

After following the directions, the resulting post-modeling cross-classification table should appear as follows:

State × Age × Race (3 Levels)	White	Black or African American	Other	
AK × 12-17				
18-25				
26-34				
35-49				
50+				
HI × 12-17				
18-25				
26-34				
35-49				
50+				
OR × 12-17				
18-25				
26-34				
35-49				
50+				
WA × 12-17				
18-25				
26-34				
35-49				
50+				
CA × 12-17				
18-25				
26-34				
35-49				
50+				

Shading indicates the reference-level set.

Exhibit C.2 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights

Variables	Binary	Counting	Level	Proposed
One-Factor Effects				
Intercept	Yes		1	1
Population Density	Yes		4	3
Group Quarter	Yes		3	2
Race/Ethnicity of Householder	Yes		6	5
Rent/Housing	Yes		5	4
Segment % Black or African American	Yes		3	2
Segment % Hispanic or Latino	Yes		3	2
Segment % Owner-Occupied	Yes		3	2
Household Type	Yes		7	6
State	Yes	Yes	Model-specific	
Quarter	Yes	Yes	4	3
Age Group		Yes	5	4
Race		Yes	5	4
Hispanicity		Yes	2	1
Gender		Yes	2	1
Household Size		Yes	1	1
Two-Factor Effects				
Age × Race (3 Levels)		Yes	5 × 3	8
Age × Hispanicity		Yes	5 × 2	4
Age × Gender		Yes	5 × 2	4
Race (3 Levels) × Hispanicity		Yes	3 × 2	2
Race (3 Levels) × Gender		Yes	3 × 2	2
Hispanicity × Gender		Yes	2 × 2	1
State × Age		Yes	Model-specific	
State × Race (5 Levels)		Yes	Model-specific	
State × Gender		Yes	Model-specific	
State × Hispanicity		Yes	Model-specific	
% Black or African American × % Owner-Occupied	Yes			
% Black or African American × Rent/Housing		Yes	3 × 5	8
% Hispanicity × % Owner-Occupied		Yes	3 × 3	4
% Hispanicity × Rent/Housing		Yes	3 × 5	8
% Owner × Rent/Housing	Yes		3 × 5	8
Three-Factor Effects				
Race (3 Levels) × Age × Gender		Yes	8	8
State/Region × Age × Gender		Yes		
State/Region × Age × Hispanicity		Yes		
State/Region × Age × Race (3 Levels)		Yes		
State/Region × Hispanicity × Gender		Yes		
State/Region × Race (3 Levels) × Hispanicity		Yes		
State/Region × Race (3 Levels) × Gender		Yes		

Appendix C.1: Model Group 1: Northeast

(Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York,
Pennsylvania, Rhode Island, Vermont)

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Table C.1a 2013 QDU Weight GEM Modeling Summary (Model Group 1: Northeast)

Modeling Step ¹	Extreme Weight Proportions			UWE ²	# Covariates ³	Bounds ⁴	
	% Unweighted	% Weighted	% Outwisor			Nominal	Realized
<i>sel.qdu.ps</i>	1.95	3.33	0.98	2.8441	243	(0.20, 1.90)	(0.20, 1.90)
	1.93	3.67	0.83	2.7870	242	(0.20, 2.13)	(0.20, 2.13)
						(0.90, 1.27)	(0.90, 1.27)
<i>res.qdu.nr</i>	2.10	3.80	0.88	2.8639	243	(1.00, 2.90)	(1.00, 2.90)
	1.47	2.83	0.55	3.1314	241	(1.00, 5.00)	(1.00, 5.00)
						(1.30, 5.00)	(1.30, 5.00)
<i>res.qdu.ps</i>	1.47	2.83	0.55	3.1314	243	(0.94, 1.90)	(0.97, 1.90)
	1.55	2.89	0.44	3.1297	241	(0.44, 1.90)	(0.49, 1.23)
						(0.90, 1.65)	(0.90, 1.63)

GEM = generalized exponential model; QDU = questionnaire dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

² Unequal weighting effect (UWE) defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

³ Number of proposed covariates on top line and number finalized after modeling.

⁴ There are six sets of bounds for each modeling step. Nominal bounds are used in defining maximum/minimum values for the GEM adjustment factors. The realized bound is the actual adjustment produced by the modeling. The set of three bounds listed for each step correspond to the high extreme values, the nonextreme values, and the low extreme values.

Table C.1b 2013 Distribution of Weight Adjustment Factors and Weight Products (Model Group 1: Northeast)

	SDU Weight	QDU Design Weight		sel.qdu.ps ¹		res.qdu.nr ¹		res.qdu.ps ¹	
	1-10	duwght11	1-11	duwght12	1-12	duwght13	1-13	duwght14	1-14
Minimum	29	1.00	29	0.11	7	0.60	15	0.49	14
1%	76	1.00	93	0.52	83	1.00	90	0.94	89
5%	120	1.00	154	0.73	157	1.03	174	0.98	173
10%	166	1.00	223	0.82	219	1.07	248	0.99	247
25%	302	1.00	527	0.92	508	1.15	570	1.00	569
Median	584	1.22	830	1.00	836	1.25	997	1.00	998
75%	815	3.88	1,883	1.10	1,921	1.37	2,265	1.00	2,264
90%	1,244	7.19	4,154	1.20	4,292	1.52	5,845	1.01	5,845
95%	1,507	8.53	6,106	1.29	6,267	1.66	8,537	1.02	8,503
99%	2,178	12.52	11,185	1.54	11,301	2.06	16,236	1.06	16,267
Maximum	7,890	16.01	34,654	2.29	25,509	6.84	37,539	1.63	37,215
<i>n</i>	12,791	-	12,791	-	12,791	-	9,954	-	9,954
Mean	658	5.94	1,690	1.01	1,702	1.29	2,187	1.00	2,187
Max/Mean	12	-	21	2.27	15	5.30	17	1.63	17

QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

Model Group 1 Overview

Selected Questionnaire Dwelling Unit-Level Poststratification

Out of 243 proposed effects, 242 were kept in the model, with the exception of State × Race, which combined American Indian or Alaska Native and Asian for Connecticut.

Respondent Questionnaire Dwelling Unit-Level Nonresponse

Out of 243 proposed effects, 241 were kept in the model, with the exception of State × Race, which combined American Indian or Alaska Native and Asian for Connecticut and Vermont.

Respondent Questionnaire Dwelling Unit-Level Poststratification

This step used exactly the same variables as in the respondent questionnaire dwelling unit-level nonresponse step.

**Exhibit C.1.1 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (sel.qdu.ps)
Model Group 1: Northeast**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		60	60	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	9	8	8	All levels present.
State (Binary)	9	8	8	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		133	132	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	9 × 5	32	32	All levels present.
State × Race	9 × 5	32	31	Coll. (1,3) & (1,4); conv.
State × Gender	9 × 2	8	8	All levels present.
State × Hispanicity	9 × 2	8	8	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		50	50	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Hispanicity	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Race (3 Levels)	3 × 5 × 3	16	16	All levels present.
State/Region × Hispanicity × Gender	3 × 2 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Hispanicity	3 × 3 × 2	4	4	All levels present.
State/Region × Race (3 Levels) × Gender	3 × 3 × 2	4	4	All levels present.
Total		243	242	

**Exhibit C.1.2 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.nr)
Model Group 1: Northeast**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		60	60	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	9	8	8	All levels present.
State (Binary)	9	8	8	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		133	131	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	9 × 5	32	32	All levels present.
State × Race	9 × 5	32	30	Coll. (1,3) & (1,4), (9,3) & (9,4); conv.
State × Gender	9 × 2	8	8	All levels present.
State × Hispanicity	9 × 2	8	8	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		50	50	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Hispanicity	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Race (3 Levels)	3 × 5 × 3	16	16	All levels present.
State/Region × Hispanicity × Gender	3 × 2 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Hispanicity	3 × 3 × 2	4	4	All levels present.
State/Region × Race (3 Levels) × Gender	3 × 3 × 2	4	4	All levels present.
Total		243	241	

**Exhibit C.1.3 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.ps)
Model Group 1: Northeast**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		60	60	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	9	8	8	All levels present.
State (Binary)	9	8	8	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		133	131	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	9 × 5	32	32	All levels present.
State × Race	9 × 5	32	30	Coll. (1,3) & (1,4), (9,3) & (9,4); conv.
State × Gender	9 × 2	8	8	All levels present.
State × Hispanicity	9 × 2	8	8	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		50	50	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Hispanicity	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Race (3 Levels)	3 × 5 × 3	16	16	All levels present.
State/Region × Hispanicity × Gender	3 × 2 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Hispanicity	3 × 3 × 2	4	4	All levels present.
State/Region × Race (3 Levels) × Gender	3 × 3 × 2	4	4	All levels present.
Total		243	241	

Appendix C.2: Model Group 2: Midwest

(Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska,
North Dakota, Ohio, South Dakota, Wisconsin)

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Table C.2a 2013 QDU Weight GEM Modeling Summary (Model Group 2: Midwest)

Modeling Step ¹	Extreme Weight Proportions			UWE ²	# Covariates ³	Bounds ⁴	
	% Unweighted	% Weighted	% Outwisor			Nominal	Realized
<i>sel.qdu.ps</i>	1.34	1.50	0.29	2.5882	300	(0.69, 2.70)	(0.71, 2.70)
	1.12	1.83	0.47	2.6806	300	(0.31, 4.15)	(0.33, 4.15)
						(0.90, 1.67)	(0.90, 1.67)
<i>res.qdu.nr</i>	1.09	2.00	0.50	2.7731	300	(1.00, 2.80)	(1.01, 2.80)
	0.94	1.60	0.37	2.9327	299	(1.00, 5.00)	(1.00, 5.00)
						(1.00, 3.83)	(1.00, 3.70)
<i>res.qdu.ps</i>	0.94	1.60	0.37	2.9327	300	(0.20, 2.60)	(0.96, 2.60)
	0.98	1.57	0.25	2.9352	300	(0.20, 5.00)	(0.66, 1.86)
						(0.90, 5.00)	(0.91, 1.43)

GEM = generalized exponential model; QDU = questionnaire dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

² Unequal weighting effect (UWE) defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

³ Number of proposed covariates on top line and number finalized after modeling.

⁴ There are six sets of bounds for each modeling step. Nominal bounds are used in defining maximum/minimum values for the GEM adjustment factors. The realized bound is the actual adjustment produced by the modeling. The set of three bounds listed for each step correspond to the high extreme values, the nonextreme values, and the low extreme values.

Table C.2b 2013 Distribution of Weight Adjustment Factors and Weight Products (Model Group 2: Midwest)

	SDU Weight	QDU Design Weight		sel.qdu.ps ¹		res.qdu.nr ¹		res.qdu.ps ¹	
	1-10	duwght11	1-11	duwght12	1-12	duwght13	1-13	duwght14	1-14
Minimum	18	1.00	18	0.33	15	0.50	15	0.39	15
1%	78	1.00	94	0.66	86	1.00	100	0.92	99
5%	135	1.00	194	0.79	196	1.03	213	0.98	213
10%	235	1.00	340	0.85	321	1.07	363	0.99	365
25%	444	1.00	517	0.92	502	1.15	600	1.00	601
Median	548	1.15	718	0.99	729	1.25	889	1.00	891
75%	697	3.58	1,778	1.08	1,794	1.36	2,145	1.01	2,135
90%	1,068	6.90	3,821	1.18	3,813	1.49	5,091	1.01	5,081
95%	1,267	8.04	5,479	1.26	5,518	1.59	7,425	1.02	7,407
99%	1,826	11.82	9,567	1.59	9,905	1.92	13,587	1.09	13,628
Maximum	4,281	14.33	22,954	4.15	26,650	5.00	28,368	2.49	28,354
<i>n</i>	17,207	-	17,207	-	17,207	-	13,519	-	13,519
Mean	613	5.62	1,522	1.01	1,554	1.28	1,978	1.00	1,978
Max/Mean	7	-	15	-	17.15	-	14.34	-	14

QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

Model Group 2 Overview

Selected Questionnaire Dwelling Unit-Level Poststratification

All 300 proposed effects were kept in the model.

Respondent Questionnaire Dwelling Unit-Level Nonresponse

All main and two-factor effects were maintained at proposed levels. Three-factor effects were modified for State/Region \times Race \times Hispanicity, combining percent Black or African American and Other for Illinois.

Respondent Questionnaire Dwelling Unit-Level Poststratification

All 300 proposed effects were kept in the model.

**Exhibit C.2.1 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (sel.qdu.ps)
Model Group 2: Midwest**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		66	66	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	9	11	11	All levels present.
State (Binary)	9	11	11	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		163	163	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	12 × 5	44	44	All levels present.
State × Race	12 × 5	44	44	All levels present.
State × Gender	12 × 2	11	11	All levels present.
State × Hispanicity	12 × 2	11	11	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity or Latino × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity or Latino × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		71	71	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	4 × 5 × 2	12	12	All levels present.
State/Region × Age × Hispanicity	4 × 5 × 2	12	12	All levels present.
State/Region × Age × Race (3 Levels)	4 × 5 × 3	24	24	All levels present.
State/Region × Hispanicity × Gender	4 × 2 × 2	3	3	All levels present.
State/Region × Race (3 Levels) × Hispanicity	4 × 3 × 2	6	6	All levels present.
State/Region × Race (3 Levels) × Gender	4 × 3 × 2	6	6	All levels present.
Total		300	300	

**Exhibit C.2.2 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.nr)
Model Group 2: Midwest**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		66	66	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	9	11	11	All levels present.
State (Binary)	9	11	11	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		163	163	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	12 × 5	44	44	All levels present.
State × Race	12 × 5	44	44	All levels present.
State × Gender	12 × 2	11	11	All levels present.
State × Hispanicity	12 × 2	11	11	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		71	70	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	4 × 5 × 2	12	12	All levels present.
State/Region × Age × Hispanicity	4 × 5 × 2	12	12	All levels present.
State/Region × Age × Race (3 Levels)	4 × 5 × 3	24	24	All levels present.
State/Region × Hispanicity × Gender	4 × 2 × 2	3	3	All levels present.
State/Region × Race (3 Levels) × Hispanicity	4 × 3 × 2	6	5	Coll. (1,2,1) & (1,3,1); conv.
State/Region × Race (3 Levels) × Gender	4 × 3 × 2	6	6	All levels present.
Total		300	299	

**Exhibit C.2.3 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.ps)
Model Group 2: Midwest**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		66	66	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	9	11	11	All levels present.
State (Binary)	9	11	11	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		163	163	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	12 × 5	44	44	All levels present.
State × Race	12 × 5	44	44	All levels present.
State × Gender	12 × 2	11	11	All levels present.
State × Hispanicity	12 × 2	11	11	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		71	71	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	4 × 5 × 2	12	12	All levels present.
State/Region × Age × Hispanicity	4 × 5 × 2	12	12	All levels present.
State/Region × Age × Race (3 Levels)	4 × 5 × 3	24	24	All levels present.
State/Region × Hispanicity × Gender	4 × 2 × 2	3	3	All levels present.
State/Region × Race (3 Levels) × Hispanicity	4 × 3 × 2	6	6	All levels present.
State/Region × Race (3 Levels) × Gender	4 × 3 × 2	6	6	All levels present.
Total		300	300	

Appendix C.3: Model Group 3: South

(Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia)

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Table C.3a 2013 QDU Weight GEM Modeling Summary (Model Group 3: South)

Modeling Step ¹	Extreme Weight Proportions			UWE ²	# Covariates ³	Bounds ⁴	
	% Unweighted	% Weighted	% Outwisor			Nominal	Realized
<i>sel.qdu.ps</i>	1.54	1.88	0.32	2.5291	339	(0.31, 2.10)	(0.32, 2.10)
	1.15	1.88	0.36	2.6502	339	(0.27, 4.22)	(0.28, 4.20)
						(0.90, 2.02)	(0.90, 2.02)
<i>res.qdu.nr</i>	1.19	2.27	0.40	2.7093	339	(1.00, 2.30)	(1.00, 2.30)
	1.00	1.67	0.32	3.0011	336	(1.00, 4.37)	(1.00, 4.37)
						(1.30, 2.29)	(1.30, 2.29)
<i>res.qdu.ps</i>	1.00	1.67	0.32	3.0011	339	(0.20, 2.70)	(0.85, 2.70)
	0.98	1.44	0.21	2.9995	338	(0.20, 5.00)	(0.56, 3.34)
						(0.90, 5.00)	(0.90, 1.06)

GEM = generalized exponential model; QDU = questionnaire dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

² Unequal weighting effect (UWE) defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

³ Number of proposed covariates on top line and number finalized after modeling.

⁴ There are six sets of bounds for each modeling step. Nominal bounds are used in defining maximum/minimum values for the GEM adjustment factors. The realized bound is the actual adjustment produced by the modeling. The set of three bounds listed for each step correspond to the high extreme values, the nonextreme values, and the low extreme values.

Table C.3b 2013 Distribution of Weight Adjustment Factors and Weight Products (Model Group 3: South)

	SDU Weight	QDU Design Weight		sel.qdu.ps ¹		res.qdu.nr ¹		res.qdu.ps ¹	
	1-10	duwght11	1-11	duwght12	1-12	duwght13	1-13	duwght14	1-14
Minimum	11	1.00	11	0.24	3	0.38	24	0.36	21
1%	63	1.00	72	0.62	73	1.00	80	0.90	79
5%	125	1.00	223	0.77	220	1.03	252	0.97	250
10%	244	1.00	430	0.83	406	1.06	452	0.99	446
25%	630	1.00	780	0.91	759	1.13	891	1.00	890
Median	869	1.19	1,274	0.99	1,268	1.21	1,474	1.00	1,478
75%	1,278	3.62	2,810	1.07	2,822	1.32	3,164	1.01	3,164
90%	1,712	6.94	6,016	1.17	5,913	1.46	7,589	1.01	7,587
95%	2,129	8.59	8,440	1.26	8,449	1.55	11,258	1.02	11,279
99%	3,071	12.88	14,217	1.58	15,183	1.86	21,050	1.06	21,171
Maximum	9,346	17.73	39,837	4.20	42,358	12.05	60,553	3.34	62,200
<i>n</i>	18,766	-	18,766	-	18,766	-	15,073	-	15,073
Mean	988	2.65	2,411	1.00	2,417	1.25	3,009	1.00	3,009
Max/Mean	9	-	17	-	18	-	20	-	21

QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

Model Group 3 Overview

Selected Questionnaire Dwelling Unit-Level Poststratification

All 339 proposed effects were kept in the model.

Respondent Questionnaire Dwelling Unit-Level Nonresponse

Out of 339 proposed effects, 336 were kept in the model. Two-factor effects were modified for State \times Race, combining American Indian or Alaska Native and Asian for Alabama, Mississippi, and South Carolina.

Respondent Questionnaire Dwelling Unit-Level Poststratification

Out of 339 proposed effects, 338 were kept in the model. Two-factor effects were modified for State \times Race, combining American Indian or Alaska Native and Asian for Mississippi.

**Exhibit C.3.1 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (sel.qdu.ps)
Model Group 3: South**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		76	76	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	17	16	16	All levels present.
State (Binary)	17	16	16	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		213	213	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	17 × 5	64	64	All levels present.
State × Race	17 × 5	64	64	All levels present.
State × Gender	17 × 2	16	16	All levels present.
State × Hispanicity	17 × 2	16	16	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		50	50	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Hispanicity	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Race (3 Levels)	3 × 5 × 3	16	16	All levels present.
State/Region × Hispanicity × Gender	3 × 2 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Hispanicity	3 × 3 × 2	4	4	All levels present.
State/Region × Race (3 Levels) × Gender	3 × 3 × 2	4	4	All levels present.
Total		339	339	

**Exhibit C.3.2 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.nr)
Model Group 3: South**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		76	76	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	17	16	16	All levels present.
State (Binary)	17	16	16	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		213	210	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	17 × 5	64	64	All levels present.
State × Race	17 × 5	64	61	Coll. (1,3) & (1,4), (10,3) & (10,4), (13,3) & (13,4); conv.
State × Gender	17 × 2	16	16	All levels present.
State × Hispanicity	17 × 2	16	16	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		50	50	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Hispanicity	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Race (3 Levels)	3 × 5 × 3	16	16	All levels present.
State/Region × Hispanicity × Gender	3 × 2 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Hispanicity	3 × 3 × 2	4	4	All levels present.
State/Region × Race (3 Levels) × Gender	3 × 3 × 2	4	4	All levels present.
Total		339	336	

**Exhibit C.3.3 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.ps)
Model Group 3: South**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		76	76	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	17	16	16	All levels present.
State (Binary)	17	16	16	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		213	212	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	17 × 5	64	64	All levels present.
State × Race	17 × 5	64	63	Coll. (10,3) & (10,4); conv.
State × Gender	17 × 2	16	16	All levels present.
State × Hispanicity	17 × 2	16	16	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	4	All levels present.
% Black or African American × Rent/Housing	3 × 5	8	8	All levels present.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		50	50	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Hispanicity	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Race (3 Levels)	3 × 5 × 3	16	16	All levels present.
State/Region × Hispanicity × Gender	3 × 2 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Hispanicity	3 × 3 × 2	4	4	All levels present.
State/Region × Race (3 Levels) × Gender	3 × 3 × 2	4	4	All levels present.
Total		339	338	

Appendix C.4: Model Group 4: West

(Alaska, Arizona, California, Colorado, Idaho, Hawaii, Montana, Nevada,
New Mexico, Oregon, Utah, Washington, Wyoming)

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Table C.4a 2013 QDU Weight GEM Modeling Summary (Model Group 4: West)

Modeling Step ¹	Extreme Weight Proportions			UWE ²	# Covariates ³	Bounds ⁴	
	% Unweighted	% Weighted	% Outwisor			Nominal	Realized
<i>sel.qdu.ps</i>	1.90	2.97	0.93	3.1278	270	(0.20, 3.00)	(0.20, 3.00)
	1.72	3.82	0.98	3.2528	267	(0.20, 2.97)	(0.20, 2.95)
						(0.90, 3.64)	(0.90, 3.64)
<i>res.qdu.nr</i>	1.82	4.50	1.14	3.3548	270	(1.00, 3.00)	(1.00, 3.00)
	1.33	3.64	0.83	3.8020	260	(1.00, 4.41)	(1.00, 4.33)
						(1.30, 4.40)	(1.30, 4.40)
<i>res.qdu.ps</i>	1.33	3.64	0.83	3.8020	270	(0.59, 2.90)	(0.59, 2.90)
	1.55	3.80	0.73	3.7945	267	(0.23, 2.90)	(0.23, 2.70)
						(0.50, 5.00)	(0.50, 0.95)

GEM = generalized exponential model; QDU = questionnaire dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

² Unequal weighting effect (UWE) defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

³ Number of proposed covariates on top line and number finalized after modeling.

⁴ There are six sets of bounds for each modeling step. Nominal bounds are used in defining maximum/minimum values for the GEM adjustment factors. The realized bound is the actual adjustment produced by the modeling. The set of three bounds listed for each step correspond to the high extreme values, the nonextreme values, and the low extreme values.

Table C.4b 2013 Distribution of Weight Adjustment Factors and Weight Products (Model Group 4: West)

	SDU Weight	QDU Design Weight		sel.qdu.ps ¹		res.qdu.nr ¹		res.qdu.ps ¹	
	1-10	duwght11	1-11	duwght12	1-12	duwght13	1-13	duwght14	1-14
Minimum	23	1.00	23	0.13	12	0.38	12	0.23	9
1%	76	1.00	81	0.53	71	1.00	79	0.81	78
5%	100	1.00	129	0.74	125	1.03	147	0.95	144
10%	127	1.00	167	0.81	165	1.06	198	0.97	195
25%	257	1.00	398	0.90	400	1.12	453	0.99	447
Median	645	1.14	1,129	1.00	1,085	1.21	1,235	1.00	1,233
75%	1,423	3.41	2,079	1.11	2,132	1.33	2,495	1.01	2,501
90%	1,830	6.22	5,099	1.23	5,169	1.49	6,178	1.02	6,175
95%	2,088	8.01	8,046	1.31	8,253	1.60	10,960	1.04	10,917
99%	2,866	13.11	15,132	1.60	15,674	1.93	21,915	1.13	22,155
Maximum	8,564	15.75	38,622	5.35	48,720	6.85	78,324	2.86	72,313
<i>n</i>	12,870	-	12,870	-	12,870	-	10,350	-	10,350
Mean	880	2.43	2,022	1.01	2,052	1.25	2,552	1.00	2,552
Max/Mean	10	-	19	-	24	-	31	-	28

QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

Model Group 4 Overview

Selected Questionnaire Dwelling Unit-Level Poststratification

Out of 270 proposed effects, 267 were kept in the model. All main effects were maintained in full. Two-factor effects were modified for percent Black or African American \times Rent/Housing, combining 50-100 percent and 10-<50 percent for the first and the fourth quintiles. Also combined were \times 50-100 percent and 10-<50 percent Black or African American \times 0-<10 percent Owner-Occupied.

Respondent Questionnaire Dwelling Unit-Level Nonresponse

Out of 270 proposed effects, 260 were kept in the model. All main effects were maintained in full. Two-factor effects were modified for percent Black or African American \times Rent/Housing, combining 50-100 percent and 10-<50 percent for the first and the fourth quintiles. Also combined were 50-100 percent and 10-<50 percent Black or African American \times 0-<10 percent Owner-Occupied. State \times Race was modified by collapsing percent Black or African American with Two or More Races for Utah. American Indian or Alaska Native was combined with Asian for Idaho. All non-White races were collapsed into a single category for Montana. The State \times Hispanicity variable for Montana was dropped to collapse with the reference State Arizona.

Three-factor effects were modified for State/Region \times Race \times Hispanicity, combining Black or African American with Other for California.

Respondent Questionnaire Dwelling Unit-Level Poststratification

This step used the same set of effects as the selected questionnaire dwelling unit-level poststratification.

**Exhibit C.4.1 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (sel.qdu.ps)
Model Group 4: West**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		68	68	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	13	12	12	All levels present.
State (Binary)	13	12	12	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		173	170	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	13 × 5	48	48	All levels present.
State × Race	13 × 5	48	48	All levels present.
State × Gender	13 × 2	12	12	All levels present.
State × Hispanicity	13 × 2	12	12	All levels present.
% Black or African American × % Owner-Occupied	3 × 3	4	3	Coll. (1,3) & (2,3); sing.
% Black or African American × Rent/Housing	3 × 5	8	6	Coll. (1,1) & (2,1), (1,4) & (2,4); sing.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		29	29	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	2 × 5 × 2	4	4	All levels present.
State/Region × Age × Hispanicity	2 × 5 × 2	4	4	All levels present.
State/Region × Age × Race (3 Levels)	2 × 5 × 3	8	8	All levels present.
State/Region × Hispanicity × Gender	2 × 2 × 2	1	1	All levels present.
State/Region × Race (3 Levels) × Hispanicity	2 × 3 × 2	2	2	All levels present.
State/Region × Race (3 Levels) × Gender	2 × 3 × 2	2	2	All levels present.
Total		270	267	

**Exhibit C.4.2 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.nr)
Model Group 4: West**

Variables	Levels	Proposed	Final	Comments
One-Factor Effects		68	68	
Intercept	1	1	1	All levels present.
Group Quarter	3	2	2	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Household Type	7	6	6	All levels present.
Household Size	1	1	1	All levels present.
Rent/Housing	5	4	4	All levels present.
Population Density	4	3	3	All levels present.
% Black or African American	3	2	2	All levels present.
% Hispanic or Latino	35	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
State (Count)	13	12	12	All levels present.
State (Binary)	13	12	12	All levels present.
Quarter (Count)	4	3	3	All levels present.
Quarter (Binary)	4	3	3	All levels present.
Age Group	5	4	4	All levels present.
Race	5	4	4	All levels present.
Hispanicity	2	1	1	All levels present.
Gender	2	1	1	All levels present.
Two-Factor Effects		173	164	
Age × Race (3 Levels)	5 × 3	8	8	All levels present.
Age × Hispanicity	5 × 2	4	4	All levels present.
Age × Gender	5 × 2	4	4	All levels present.
Race (3 Levels) × Hispanicity	3 × 2	2	2	All levels present.
Race (3 Levels) × Gender	3 × 2	2	2	All levels present.
Hispanicity × Gender	2 × 2	1	1	All levels present.
State × Age	13 × 5	48	48	All levels present.
State × Race	13 × 5	48	43	Coll. (5,3) & (5,4), (7,2), (7,3), (7,4) & (7,5), (11,2) & (11,5); conv.
State × Gender	13 × 2	12	12	All levels present.
State × Hispanicity	13 × 2	12	11	Drop (7,1); conv.
% Black or African American × % Owner-Occupied	3 × 3	4	3	Coll. (1,3) & (2,3); sing.
% Black or African American × Rent/Housing	3 × 5	8	6	Coll. (1,1) & (2,1); zero Coll. (1,4) & (2,4); sing.
% Hispanicity × % Owner-Occupied	3 × 3	4	4	All levels present.
% Hispanicity × Rent/Housing	3 × 5	8	8	All levels present.
% Owner-Occupied × Rent/Housing	3 × 5	8	8	All levels present.
Three-Factor Effects		29	28	
Race (3 Levels) × Age × Gender	3 × 5 × 2	8	8	All levels present.
State/Region × Age × Gender	2 × 5 × 2	4	4	All levels present.
State/Region × Age × Hispanicity	2 × 5 × 2	4	4	All levels present.
State/Region × Age × Race (3 Levels)	2 × 5 × 3	8	8	All levels present.
State/Region × Hispanicity × Gender	2 × 2 × 2	1	1	All levels present.
State/Region × Race (3 Levels) × Hispanicity	2 × 3 × 2	2	1	Coll. (3,2,1) & (3,3,1); conv.
State/Region × Race (3 Levels) × Gender	2 × 3 × 2	2	2	All levels present.
Total		270	260	

**Exhibit C.4.3 Covariates for 2013 NSDUH Questionnaire Dwelling Unit Weights (res.qdu.ps)
Model Group 4: West**

This step used the same set of covariates as the selected questionnaire dwelling unit poststratification.

**Appendix D: Evaluation of Calibration Weights:
Questionnaire Dwelling Unit-Level Response Rates**

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Table D.1 2013 NSDUH QDU-Level Response Rates

Domain	Selected QDU	Respondent QDU	% Interview Response Rate¹
Total	61,634	48,896	74.82
<i>Census Region</i>			
Northeast	12,791	9,954	72.75
South	18,766	15,073	75.78
Midwest	17,207	13,519	74.77
West	12,870	10,350	74.94
<i>Quarter</i>			
Quarter 1	14,293	11,381	74.76
Quarter 2	16,591	13,208	74.74
Quarter 3	15,829	12,636	75.49
Quarter 4	14,921	11,671	74.31
<i>Household Type</i>			
12-17, 18-25, 26+	5,936	5,032	85.32
12-17, 18-25	73	67	92.67
12-17, 26+	17,697	14,716	83.12
18-25, 26+	12,963	10,284	79.01
12-17	43	37	95.40
18-25	6,495	5,391	82.14
26+	18,427	13,369	71.52
<i>Race/Ethnicity of Householder</i>			
Hispanic or Latino White	8,283	6,754	76.90
Hispanic or Latino Black or African American	180	147	82.79
Hispanic or Latino Other	424	360	76.79
Non-Hispanic or Latino White	40,844	31,781	73.39
Non-Hispanic or Latino Black or African American	7,374	6,279	81.77
Non-Hispanic or Latino Other	4,529	3,575	72.25
<i>% Hispanic or Latino in Segment</i>			
50-100%	4,143	3,349	76.00
10-<50%	11,151	8,905	75.46
<10%	46,340	36,642	74.52
<i>% Black or African American in Segment</i>			
50-100%	4,618	3,878	79.36
10-<50%	9,663	7,927	78.18
<10%	47,353	37,091	73.60
<i>% Owner-Occupied DUs in Segment</i>			
50-100%	46,452	36,576	74.33
10-<50%	11,774	9,541	75.84
<10%	3,408	2,779	78.07
<i>Combined Median Rent/Housing Value</i>			
1st Quintile	10,291	8,503	78.22
2nd Quintile	12,934	10,443	76.40
3rd Quintile	13,547	10,796	74.95
4th Quintile	13,577	10,623	74.21
5th Quintile	11,285	8,531	71.55
<i>Population Density</i>			
Large MSA	26,421	20,575	73.75
Medium to Small MSA	30,374	24,379	75.81
Non-MSA, Urban	1,459	1,210	80.60
Non-MSA, Rural	3,380	2,732	75.18
<i>Group Quarters</i>			
Group	771	724	86.77
Non-Group	60,863	48,172	74.75
<i>Household Size</i>			
One	7,339	5,678	74.97
Two	21,915	16,806	71.98
Three	17,767	14,260	77.33
Four or More	14,613	12,152	82.28

DU = dwelling unit; MSA = metropolitan statistical area; QDU = questionnaire dwelling unit; SDU = screener dwelling unit.

¹ The weight used for calculating the response rate includes SDU- and QDU-level design weights, SDU nonresponse and poststratification adjustments, and selected QDU poststratification adjustment. This weight is the product of WT1*...*WT9*DUWT10*DUWT11.

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**Appendix E: Evaluation of Calibration Weights:
Questionnaire Dwelling Unit-Level Proportions of Extreme
Values and Outwinsors**

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Table E.1 2013 NSDUH Selected QDU-Level Proportions of Extreme Values and Outwinors

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)			Before sel.qdu.ps ¹ (SDUWT*DUWT11)			After sel.qdu.ps ¹ (SDUWT*DUWT11*DUWT12)		
		% Unweighted	% Weighted ²	% Outwinor ³	% Unweighted	% Weighted ²	% Outwinor ³	% Unweighted	% Weighted ²	% Outwinor ³
Total	61,634	2.30	4.76	1.13	1.65	2.30	0.57	1.42	2.62	0.61
<i>Census Region</i>										
Northeast	12,791	2.46	5.93	1.70	1.95	3.33	0.98	1.93	3.67	0.83
South	18,766	2.56	4.44	0.79	1.54	1.88	0.32	1.15	1.88	0.36
Midwest	17,207	1.71	3.48	0.68	1.34	1.50	0.29	1.12	1.83	0.47
West	12,870	2.55	5.59	1.70	1.90	2.97	0.93	1.72	3.82	0.98
<i>Quarter</i>										
Quarter 1	14,293	2.86	5.38	1.31	1.91	2.89	0.81	1.65	2.89	0.65
Quarter 2	16,591	2.01	4.24	0.91	1.40	1.83	0.40	1.08	2.25	0.54
Quarter 3	15,829	2.00	4.30	0.97	1.50	2.10	0.46	1.33	2.28	0.48
Quarter 4	14,921	2.40	5.12	1.35	1.81	2.38	0.60	1.68	3.05	0.75
<i>Household Type</i>										
12-17, 18-25, 26+	5,936	2.46	6.05	1.61	2.46	6.05	1.61	2.24	6.04	1.67
12-17, 18-25	73	6.85	15.50	2.32	0.00	0.00	0.00	0.00	0.00	0.00
12-17, 26+	17,697	2.28	4.44	1.10	2.26	4.42	1.10	1.87	4.75	1.25
18-25, 26+	12,963	2.12	4.62	1.07	1.84	4.12	0.95	1.64	4.82	1.21
12-17	43	2.33	14.19	3.82	0.00	0.00	0.00	0.00	0.00	0.00
18-25	6,495	2.79	5.16	1.11	2.48	4.69	1.12	1.68	3.74	1.01
26+	18,427	2.20	4.49	1.03	0.37	1.22	0.31	0.50	1.59	0.30
<i>Race/Ethnicity of Householder</i>										
Hispanic or Latino White	8,283	2.37	3.59	0.75	1.64	2.10	0.43	1.24	2.58	0.41
Hispanic or Latino Black or African American	180	57.78	78.95	28.64	50.00	59.29	19.09	57.78	68.99	24.76
Hispanic or Latino Other	424	31.37	63.24	22.21	24.53	42.08	13.38	23.11	43.64	13.96
Non-Hispanic or Latino White	40,844	1.15	2.27	0.40	0.74	0.93	0.17	0.45	0.65	0.10
Non-Hispanic or Latino Black or African American	7,374	3.70	6.50	1.44	2.82	3.82	0.98	2.62	4.34	0.74
Non-Hispanic or Latino Other	4,529	5.34	9.52	1.91	3.84	5.03	1.21	4.31	8.31	1.93

Table E.1 2013 NSDUH Selected QDU-Level Proportions of Extreme Values and Outwinsors (continued)

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)			Before sel.qdu.ps ¹ (SDUWT*DUWT11)			After sel.qdu.ps ¹ (SDUWT*DUWT11*DUWT12)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
<i>% Hispanic or Latino in Segment</i>										
50-100%	4,143	2.66	6.44	2.01	1.83	4.03	1.26	1.96	5.49	1.73
10-<50%	11,151	3.20	6.09	1.56	2.34	3.24	0.88	2.34	3.78	0.92
<10%	46,340	2.05	4.10	0.88	1.46	1.85	0.41	1.15	2.00	0.40
<i>% Black or African American in Segment</i>										
50-100%	4,618	3.51	6.92	1.55	2.90	3.87	0.80	2.34	3.72	0.83
10-<50%	9,663	3.37	6.14	1.58	2.43	2.71	0.73	2.37	4.03	0.96
<10%	47,353	1.96	4.17	0.98	1.36	2.04	0.51	1.14	2.18	0.50
<i>% Owner-Occupied DUs in Segment</i>										
50-100%	46,452	1.88	3.99	0.93	1.31	1.95	0.46	1.15	2.26	0.49
10-<50%	11,774	3.31	6.46	1.60	2.47	3.02	0.82	1.89	3.25	0.88
<10%	3,408	4.49	8.56	2.07	3.32	4.63	1.24	3.52	5.34	1.25
<i>Combined Median Rent/Housing Value</i>										
1 st Quintile	10,291	2.67	6.14	1.59	2.06	3.29	0.84	1.57	2.85	0.74
2 nd Quintile	12,934	1.82	3.85	0.97	1.40	1.71	0.43	1.35	2.64	0.59
3 rd Quintile	13,547	2.02	4.07	0.95	1.51	2.03	0.41	1.45	2.76	0.67
4 th Quintile	13,577	2.64	5.25	1.35	1.83	2.75	0.83	1.44	2.85	0.69
5 th Quintile	11,285	2.43	4.74	0.90	1.50	1.91	0.37	1.32	2.06	0.39
<i>Population Density</i>										
Large MSA ¹	26,421	2.60	5.54	1.38	1.88	2.84	0.74	1.80	3.32	0.74
Medium to Small MSA ¹	30,374	2.14	3.96	0.90	1.52	1.77	0.40	1.15	2.00	0.50
Non-MSA, ¹ Urban	1,459	2.26	3.79	0.97	1.37	1.19	0.36	0.96	1.05	0.43
Non-MSA, ¹ Rural	3,380	1.39	3.29	0.36	1.04	1.67	0.35	1.12	1.24	0.15
<i>Group Quarters</i>										
Group	771	2.08	3.28	0.52	1.95	2.32	0.50	1.82	5.66	0.92
Non-Group	60,863	2.30	4.77	1.14	1.64	2.30	0.57	1.42	2.60	0.60
<i>Household Size</i>										
One	7,339	2.11	4.25	0.82	0.99	0.76	0.18	0.72	0.94	0.18
Two	21,915	2.29	4.52	1.02	1.29	1.93	0.39	1.08	2.24	0.45
Three	17,767	2.32	4.87	1.21	2.04	4.22	1.23	1.62	4.37	1.12
Four or More	14,613	2.38	5.15	1.33	2.03	4.56	1.21	2.05	5.48	1.47

¹ DU = dwelling unit, MSA = metropolitan statistical area, PS = poststratification adjustment, QDU = questionnaire dwelling unit, SDU = screener dwelling unit, Sel = selected.

² Weighted extreme value proportion: $100 * \sum_k w_{ek} / \sum_k w_k$, where w_{ek} denotes the weight for extreme values, and w_k denotes the weight for both extreme values and nonextreme values.

³ Outwinsor weight proportion: $100 * \sum_k (w_{ek} - b_k) / \sum_k w_k$, where b_k denotes the winsorized weight.

Table E.2 2013 NSDUH Respondent QDU-Level Proportions of Extreme Values and Outwinors

Domain	n	Before res.qdu.nr ¹ (SDUWT*DUWT11*DUWT12)			After res.qdu.nr ¹ (SDUWT*DUWT11*...*DUWT13)			Final Weight: After res.qdu.ps ¹ (SDUWT*DUWT11*...*DUWT14)		
		% Unweighted	% Weighted ²	% Outwinor ³	% Unweighted	% Weighted ²	% Outwinor ³	% Unweighted	% Weighted ²	% Outwinor ³
Total	48,896	1.48	2.97	0.67	1.15	2.30	0.49	1.22	2.25	0.37
<i>Census Region</i>										
Northeast	9,954	2.10	3.80	0.88	1.47	2.83	0.55	1.55	2.89	0.44
South	15,073	1.19	2.27	0.40	1.00	1.67	0.32	0.98	1.44	0.21
Midwest	13,519	1.09	2.00	0.50	0.94	1.60	0.37	0.98	1.57	0.25
West	10,350	1.82	4.50	1.14	1.33	3.64	0.83	1.55	3.80	0.73
<i>Quarter</i>										
Quarter 1	11,381	1.73	3.36	0.80	1.25	2.20	0.43	1.30	2.24	0.35
Quarter 2	13,208	1.08	2.36	0.55	0.95	2.12	0.42	1.02	2.03	0.34
Quarter 3	12,636	1.50	2.86	0.57	1.05	2.07	0.47	1.12	2.19	0.41
Quarter 4	11,671	1.68	3.29	0.76	1.37	2.80	0.62	1.47	2.53	0.40
<i>Household Type</i>										
12-17, 18-25, 26+	5,032	2.09	5.88	1.67	1.31	3.59	0.82	1.55	3.91	0.73
12-17, 18-25	67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12-17, 26+	14,716	1.96	5.08	1.35	1.56	4.42	1.11	1.61	4.43	0.90
18-25, 26+	10,284	1.71	5.30	1.38	1.36	4.45	1.12	1.52	4.62	0.87
12-17	37	2.70	43.90	17.15	2.70	43.42	8.49	2.70	49.28	14.08
18-25	5,391	1.48	3.49	0.87	1.32	3.49	0.86	1.34	3.45	0.81
26+	13,369	0.55	1.84	0.30	0.40	1.40	0.22	0.38	1.27	0.14
<i>Race/Ethnicity of Householder</i>										
Hispanic or Latino White	6,754	1.17	2.56	0.43	0.89	1.57	0.24	0.99	1.47	0.15
Hispanic or Latino Black or African American	147	57.82	64.91	25.75	44.22	53.76	16.29	48.98	54.15	15.43
Hispanic or Latino Other	360	22.78	46.07	13.43	20.56	42.27	12.24	22.78	42.90	9.57
Non-Hispanic or Latino White	31,781	0.53	1.06	0.15	0.45	0.70	0.11	0.40	0.72	0.10
Non-Hispanic or Latino Black or African American	6,279	2.39	4.19	0.82	1.04	2.25	0.28	1.02	1.89	0.16
Non-Hispanic or Latino Other	3,575	4.48	8.55	1.85	4.28	10.19	2.21	5.15	9.90	1.44
<i>% Hispanic or Latino in Segment</i>										
50-100%	3,349	2.03	6.17	1.79	1.70	5.28	1.33	1.79	5.19	1.12
10-<50%	8,905	2.46	3.99	1.04	1.76	3.00	0.69	1.93	3.13	0.58
<10%	36,642	1.19	2.35	0.45	0.95	1.80	0.34	0.99	1.70	0.24

Table E.2 2013 NSDUH Respondent QDU-Level Proportions of Extreme Values and Outwinsors (continued)

Domain	n	Before res.qdu.nr ¹ (SDUWT*DUWT11*DUWT12)			After res.qdu.nr ¹ (SDUWT*DUWT11*...*DUWT13)			Final Weight: After res.qdu.ps ¹ (SDUWT*DUWT11*...*DUWT14)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
<i>% Black or African American in Segment</i>										
50-100%	3,878	2.24	3.63	0.93	1.44	2.87	0.47	1.50	2.59	0.30
10-<50%	7,927	2.45	4.25	1.05	1.61	2.95	0.70	1.69	2.70	0.53
<10%	37,091	1.19	2.59	0.55	1.02	2.09	0.44	1.09	2.11	0.35
<i>% Owner-Occupied DUs in Segment</i>										
50-100%	36,576	1.23	2.64	0.55	0.98	2.04	0.41	1.01	1.91	0.32
10-<50%	9,541	1.91	3.54	0.97	1.38	2.76	0.68	1.55	2.98	0.54
<10%	2,779	3.27	5.35	1.21	2.52	4.17	0.83	2.77	4.45	0.64
<i>Combined Median Rent/Housing Value</i>										
1 st Quintile	8,503	1.65	3.38	0.84	1.13	2.06	0.49	1.28	2.21	0.42
2 nd Quintile	10,443	1.30	2.84	0.63	0.82	2.14	0.50	0.99	2.15	0.37
3 rd Quintile	10,796	1.44	3.22	0.73	1.13	2.46	0.54	1.24	2.30	0.44
4 th Quintile	10,623	1.53	3.07	0.79	1.18	2.18	0.51	1.18	2.10	0.43
5 th Quintile	8,531	1.51	2.42	0.40	1.55	2.58	0.38	1.45	2.48	0.23
<i>Population Density</i>										
Large MSA ¹	20,575	1.91	3.55	0.81	1.52	2.86	0.60	1.58	2.88	0.43
Medium to Small MSA ¹	24,379	1.19	2.51	0.57	0.92	1.84	0.39	0.98	1.69	0.34
Non-MSA, ¹ Urban	1,210	0.99	1.38	0.43	0.50	0.34	0.02	0.91	1.09	0.28
Non-MSA, ¹ Rural	2,732	1.10	1.63	0.19	0.62	1.09	0.28	0.77	0.93	0.10
<i>Group Quarters</i>										
Group	724	1.80	4.14	0.35	1.93	4.99	0.91	1.93	4.10	0.67
Non-Group	48,172	1.48	2.96	0.67	1.14	2.28	0.48	1.21	2.24	0.37
<i>Household Size</i>										
One	5,678	0.69	0.84	0.18	0.56	0.94	0.21	0.56	0.73	0.13
Two	16,806	1.17	2.89	0.56	0.98	2.01	0.34	1.07	2.01	0.26
Three	14,260	1.67	4.41	1.08	1.23	3.55	0.83	1.31	3.53	0.66
Four or More	12,152	2.07	5.73	1.52	1.56	4.78	1.19	1.62	4.86	0.98

¹ DU = dwelling unit, MSA = metropolitan statistical area, NR = nonresponse adjustment, PS = poststratification adjustment, QDU = questionnaire dwelling unit, Res = Respondent, SDU = screener dwelling unit.

² Weighted extreme value proportion: $100 * \sum_k w_{ek} / \sum_k w_k$, where w_{ek} denotes the weight for extreme values, and w_k denotes the weight for both extreme values and nonextreme values.

³ Outwinsor weight proportion: $100 * \sum_k (w_{ek} - b_k) / \sum_k w_k$, where b_k denotes the winsorized weight.

**Appendix F: Evaluation of Calibration Weights:
Questionnaire Dwelling Unit-Level Slippage Rates**

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Table F.1 2013 NSDUH QDU-Level Slippage Rates

Domain	<i>n</i>	Initial Total (<i>I</i>)¹	Final Total (<i>F</i>)²	Control from SDU Weights (<i>C</i>)	(<i>I</i> - <i>C</i>)/<i>C</i>%	(<i>F</i> - <i>C</i>)/<i>C</i>%
Total	48,896	120,278,753	120,278,753	120,278,753	0.00	0.00
<i>Census Region</i>						
Northeast	9,954	21,767,160	21,767,160	21,767,160	0.00	0.00
South	15,073	45,350,872	45,350,872	45,350,872	0.00	-0.00
Midwest	13,519	26,746,310	26,746,310	26,746,310	-0.00	-0.00
West	10,350	26,414,411	26,414,411	26,414,411	0.00	0.00
<i>Quarter</i>						
Quarter 1	11,381	30,090,555	30,090,555	30,090,555	0.00	-0.00
Quarter 2	13,208	29,991,137	29,991,137	29,991,137	0.00	-0.00
Quarter 3	12,636	29,991,072	29,991,072	29,991,072	0.00	-0.00
Quarter 4	11,671	30,205,989	30,205,989	30,205,989	0.00	0.00
<i>Household Type</i>						
12-17, 18-25, 26+	5,032	5,151,478	5,151,478	5,151,478	0.00	-0.00
12-17, 18-25	67	59,776	59,776	59,776	-0.00	0.00
12-17, 26+	14,716	13,616,443	13,616,443	13,616,443	0.00	-0.00
18-25, 26+	10,284	13,930,971	13,930,971	13,930,971	-0.00	-0.00
12-17	37	33,524	33,524	33,524	0.00	0.00
18-25	5,391	5,850,974	5,850,974	5,850,974	0.00	-0.00
26+	13,369	81,635,587	81,635,587	81,635,587	0.00	0.00
<i>Race/Ethnicity of Householder</i>						
Hispanic or Latino White	6,754	13,664,762	13,664,762	13,664,762	0.00	-0.00
Hispanic or Latino Black or African American	147	753,844	753,844	753,844	0.00	0.00
Hispanic or Latino Other	360	1,040,791	1,040,791	1,040,791	-0.00	0.00
Non-Hispanic or Latino White	31,781	82,270,630	82,270,630	82,270,630	0.00	-0.00
Non-Hispanic or Latino Black or African American	6,279	14,688,999	14,688,999	14,688,999	0.00	-0.00
Non-Hispanic or Latino Other	3,575	7,859,727	7,859,727	7,859,727	0.00	-0.00
<i>% Hispanic or Latino in Segment</i>						
50-100%	3,349	8,590,628	8,590,628	8,590,628	-0.00	0.00
10-<50%	8,905	25,073,426	25,073,426	25,073,426	0.00	-0.00
<10%	36,642	86,614,699	86,614,699	86,614,699	0.00	0.00
<i>% Black or African American in Segment</i>						
50-100%	3,878	8,951,530	8,951,530	8,951,530	0.00	-0.00
10-<50%	7,927	20,854,754	20,854,754	20,854,754	0.00	-0.00
<10%	37,091	90,472,469	90,472,469	90,472,469	0.00	0.00
<i>% Owner-Occupied DUs in Segment</i>						
50-100%	36,576	91,178,748	91,178,748	91,178,748	0.00	0.00
10-<50%	9,541	22,311,647	22,311,647	22,311,647	0.00	-0.00
<10%	2,779	6,788,358	6,788,358	6,788,358	0.00	-0.00

Table F.1 2013 NSDUH QDU-Level Slippage Rates (continued)

Domain	<i>n</i>	Initial Total (<i>I</i>)¹	Final Total (<i>F</i>)²	Control from SDU Weights (<i>C</i>)	(<i>I</i> - <i>C</i>)/<i>C</i>%	(<i>F</i> - <i>C</i>)/<i>C</i>%
<i>Combined Median Rent/Housing Value</i>						
1 st Quintile	8,503	18,129,538	18,129,538	18,129,538	0.00	-0.00
2 nd Quintile	10,443	24,037,869	24,037,869	24,037,869	0.00	0.00
3 rd Quintile	10,796	24,473,384	24,473,384	24,473,384	0.00	0.00
4 th Quintile	10,623	27,454,316	27,454,316	27,454,316	0.00	-0.00
5 th Quintile	8,531	26,183,647	26,183,647	26,183,647	0.00	-0.00
<i>Population Density</i>						
Large MSA	20,575	61,320,689	61,320,689	61,320,689	0.00	-0.00
Medium to Small MSA	24,379	50,909,222	50,909,222	50,909,222	0.00	0.00
Non-MSA, Urban	1,210	2,380,019	2,380,019	2,380,019	0.00	0.00
Non-MSA, Rural	2,732	5,668,823	5,668,823	5,668,823	0.00	0.00
<i>Group Quarters</i>						
Group	724	723,238	723,238	723,238	0.00	0.00
Non-Group	48,172	119,555,515	119,555,515	119,555,515	0.00	0.00
<i>Household Size</i>						
One	5,678	32,059,407	32,041,363	31,769,033	0.91	0.86
Two	16,806	54,672,497	54,686,018	54,941,498	-0.49	-0.47
Three	14,260	19,346,368	19,356,828	19,514,374	-0.86	-0.81
Four or More	12,152	14,200,481	14,194,544	14,053,848	1.04	1.00

DU = dwelling unit, MSA = metropolitan statistical area, QDU = questionnaire dwelling unit, SDU = screener dwelling unit.

¹ WT1*...*WT9*DUWT10*...*DUWT12 (before QDU poststratification).

² WT1*...*WT9*DUWT10*...*DUWT13 (after QDU poststratification).

**Appendix G: Evaluation of Calibration Weights:
Questionnaire Dwelling Unit-Level Weight Summary
Statistics**

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Table G.1 2013 NSDUH Selected QDU-Level Weight Summary Statistics

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)						Before sel.qdu.ps ¹ (SDUWT*DUWT11)						After sel.qdu.ps ¹ (SDUWT*DUWT11*DUWT12)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
Total	61,634	11	428	644	1,062	9,346	1.55	11	554	999	2,095	39,837	2.81	3	540	991	2,141	48,720	2.90
<i>Census Region</i>																			
Northeast	12,791	29	302	584	815	7,890	1.52	29	527	830	1,883	34,654	2.84	7	508	836	1,921	25,509	2.79
South	18,766	11	630	869	1,278	9,346	1.41	11	780	1,274	2,810	39,837	2.53	3	759	1,268	2,822	42,358	2.65
Midwest	17,207	18	444	548	697	4,281	1.33	18	517	718	1,778	22,954	2.59	15	502	729	1,794	26,650	2.68
West	12,870	23	257	645	1,423	8,564	1.73	23	398	1,129	2,079	38,622	3.13	12	400	1,085	2,132	48,720	3.25
<i>Quarter</i>																			
Quarter 1	14,293	12	465	687	1,170	9,177	1.54	12	599	1,067	2,221	39,837	2.79	11	592	1,072	2,300	42,358	2.85
Quarter 2	16,591	11	388	620	1,021	8,097	1.50	11	528	971	2,006	38,622	2.73	3	506	939	2,003	33,684	2.82
Quarter 3	15,829	12	430	604	984	8,139	1.59	12	538	940	2,047	33,024	2.91	8	538	954	2,112	32,011	2.95
Quarter 4	14,921	13	456	656	1,109	9,346	1.56	20	568	1,045	2,135	36,690	2.81	6	545	1,029	2,178	48,720	2.96
<i>Household Type</i>																			
12-17, 18-25, 26+	5,936	11	450	678	1,168	8,564	1.61	11	450	678	1,168	8,564	1.61	15	429	677	1,157	9,447	1.64
12-17, 18-25	73	54	359	613	1,003	4,301	1.84	54	359	613	1,003	4,301	1.84	39	212	585	802	6,509	2.54
12-17, 26+	17,697	11	400	618	1,027	9,346	1.55	11	403	621	1,031	9,410	1.55	3	388	620	1,021	8,974	1.60
18-25, 26+	12,963	13	477	690	1,154	9,177	1.55	30	571	862	1,423	11,031	1.51	11	553	869	1,411	13,355	1.60
12-17	43	95	200	726	926	4,707	1.96	96	202	734	935	4,755	1.96	32	188	346	636	14,039	8.22
18-25	6,495	13	355	632	1,031	5,309	1.58	20	436	758	1,221	7,046	1.55	6	416	736	1,214	10,267	1.62
26+	18,427	18	437	633	1,018	8,139	1.49	83	1,944	3,491	5,706	39,837	1.68	27	1,938	3,454	5,729	48,720	1.73
<i>Race/Ethnicity of Householder</i>																			
Hispanic or Latino White	8,283	11	499	801	1,274	7,383	1.39	11	612	1,105	1,767	27,132	2.44	17	589	1,067	1,771	28,801	2.48
Hispanic or Latino Black or African American	180	30	773	1,520	2,317	8,564	1.71	43	939	1,964	4,121	22,078	2.47	57	1,191	2,512	4,585	25,509	2.34
Hispanic or Latino Other	424	11	188	559	1,698	9,177	2.56	11	237	842	2,502	21,848	3.41	3	276	1,036	2,797	30,267	3.48
Non-Hispanic or Latino White	40,844	23	405	607	978	6,467	1.50	23	547	972	2,199	39,837	2.82	12	537	972	2,246	42,358	2.90
Non-Hispanic or Latino Black or African American	7,374	25	524	739	1,116	9,346	1.50	25	639	1,043	2,154	34,654	2.83	22	604	1,021	2,211	29,036	2.88
Non-Hispanic or Latino Other	4,529	18	225	584	1,151	8,097	1.83	18	351	863	1,958	38,622	3.05	7	346	862	2,026	48,720	3.29
<i>% Hispanic or Latino in Segment</i>																			
50-100%	4,143	61	596	1,019	1,365	8,139	1.35	61	782	1,309	2,047	36,690	2.51	58	734	1,255	2,079	48,720	2.74
10-<50%	11,151	11	554	843	1,388	8,564	1.43	11	708	1,299	2,350	34,654	2.52	3	704	1,297	2,458	28,619	2.55
<10%	46,340	12	361	594	934	9,346	1.58	12	518	889	2,038	39,837	2.93	7	502	886	2,058	42,358	3.02

Table G.1 2013 NSDUH Selected QDU-Level Weight Summary Statistics (continued)

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)						Before sel.qdu.ps ¹ (SDUWT*DUWT11)						After sel.qdu.ps ¹ (SDUWT*DUWT11*DUWT12)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
<i>% Black or African American in Segment</i>																			
50-100%	4,618	11	502	696	1,001	6,395	1.58	11	600	951	2,107	33,790	3.08	3	564	938	2,129	30,713	3.15
10-<50%	9,663	12	541	803	1,254	9,346	1.44	12	681	1,203	2,311	27,654	2.56	8	670	1,182	2,387	30,267	2.67
<10%	47,353	13	376	608	1,025	9,177	1.57	18	531	956	2,055	39,837	2.85	6	520	956	2,103	48,720	2.93
<i>% Owner-Occupied DUs¹ in Segment</i>																			
50-100%	46,452	11	434	630	1,040	9,177	1.54	11	553	987	2,110	39,837	2.79	3	542	987	2,169	48,720	2.88
10-<50%	11,774	12	400	673	1,118	9,346	1.58	12	551	1,016	2,072	34,654	2.91	6	518	970	2,040	30,713	2.99
<10%	3,408	12	451	753	1,193	7,357	1.56	12	583	1,078	1,967	33,790	2.79	30	575	1,134	2,156	39,621	2.89
<i>Combined Median Rent/Housing Value</i>																			
1 st Quintile	10,291	22	339	573	926	8,139	1.67	26	494	877	1,953	39,837	2.94	8	481	868	1,972	42,358	3.04
2 nd Quintile	12,934	12	400	618	979	9,346	1.57	12	527	942	1,970	36,690	2.89	14	508	938	2,011	48,720	3.03
3 rd Quintile	13,547	12	363	596	993	7,089	1.60	12	514	904	1,967	33,024	2.89	11	500	886	1,995	29,036	2.98
4 th Quintile	13,577	11	466	685	1,121	8,564	1.52	11	591	1,057	2,167	38,622	2.74	3	583	1,050	2,250	33,684	2.77
5 th Quintile	11,285	13	536	783	1,223	7,890	1.42	20	655	1,228	2,466	27,804	2.62	6	651	1,240	2,537	39,621	2.69
<i>Population Density</i>																			
Large MSA ¹	26,421	11	579	803	1,291	9,346	1.40	11	713	1,286	2,505	38,622	2.51	3	705	1,281	2,582	48,720	2.58
Medium to Small MSA ¹	30,374	18	293	544	873	9,177	1.62	23	456	807	1,782	29,825	3.02	12	438	804	1,787	38,701	3.12
Non-MSA, ¹ Urban	1,459	46	244	521	830	3,394	1.59	46	412	765	1,689	23,390	3.14	19	375	699	1,629	30,713	3.34
Non-MSA, ¹ Rural	3,380	18	189	463	809	6,266	1.93	18	309	740	1,783	39,837	3.59	15	318	744	1,729	42,358	3.66
<i>Group Quarters</i>																			
Group	771	18	202	535	797	3,749	1.74	25	271	671	977	20,651	3.20	30	266	653	1,033	25,052	3.65
Non-Group	60,863	11	432	645	1,066	9,346	1.55	11	557	1,009	2,112	39,837	2.80	3	543	998	2,163	48,720	2.89
<i>Household Size</i>																			
One	7,339	18	374	601	947	5,309	1.50	27	964	2,704	6,169	39,837	2.10	31	941	2,629	6,286	48,720	2.17
Two	21,915	16	428	632	1,025	9,346	1.50	34	686	1,497	3,498	32,664	2.19	8	668	1,502	3,449	33,684	2.26
Three	17,767	12	433	646	1,074	9,177	1.56	12	479	751	1,347	38,622	2.22	6	460	752	1,344	27,697	2.22
Four or More	14,613	11	444	687	1,171	8,564	1.60	11	462	723	1,270	21,106	1.75	3	441	715	1,252	15,977	1.83

¹ DU = dwelling unit, MSA = metropolitan statistical area, PS = poststratification adjustment, QDU = questionnaire dwelling unit, SDU = screener dwelling unit, Sel = selected.

² Q1 and Q3 refer to the first and third quartile of the weight distribution.

³ Unequal weighting effect (UWE) is defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

Table G.2 2013 NSDUH Respondent QDU-Level Weight Summary Statistics

Domain	n	Before res.qdu.nr ¹ (SDUWT*DUWT11*DUWT12)						After res.qdu.nr ¹ (SDUWT*DUWT11*...*DUWT13)						Final Weight: After res.qdu.ps ¹ (SDUWT*DUWT11*...*DUWT14)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
Total	48,896	3	526	946	1,976	48,720	2.98	12	635	1,155	2,540	78,324	3.28	9	633	1,157	2,543	72,313	3.28
<i>Census Region</i>																			
Northeast	9,954	7	481	787	1,733	25,509	2.86	15	570	997	2,265	37,539	3.13	14	569	998	2,264	37,215	3.13
South	15,073	3	743	1,220	2,551	42,358	2.71	24	891	1,474	3,164	60,553	3.00	21	890	1,478	3,164	62,200	3.00
Midwest	13,519	15	492	708	1,652	26,650	2.77	15	600	889	2,145	28,368	2.93	15	601	891	2,135	28,354	2.94
West	10,350	12	385	1,021	1,989	48,720	3.35	12	453	1,235	2,495	78,324	3.80	9	447	1,233	2,501	72,313	3.79
<i>Quarter</i>																			
Quarter 1	11,381	11	571	1,022	2,120	42,358	2.90	15	686	1,271	2,728	58,620	3.16	9	683	1,271	2,720	58,729	3.16
Quarter 2	13,208	3	494	887	1,838	33,684	2.86	14	591	1,080	2,356	46,150	3.19	13	590	1,081	2,346	45,199	3.19
Quarter 3	12,636	8	523	919	1,959	32,011	3.01	18	625	1,110	2,506	41,838	3.33	17	624	1,112	2,505	41,805	3.33
Quarter 4	11,671	12	532	970	2,010	48,720	3.10	12	651	1,198	2,609	78,324	3.39	11	652	1,201	2,606	72,313	3.37
<i>Household Type</i>																			
12-17, 18-25, 26+	5,032	15	422	681	1,172	9,447	1.66	15	495	809	1,368	11,067	1.62	14	494	807	1,372	11,629	1.63
12-17, 18-25	67	39	206	585	800	6,509	2.60	39	268	585	902	7,373	2.65	52	261	590	891	7,379	2.72
12-17, 26+	14,716	3	385	620	1,020	8,974	1.62	12	448	754	1,223	19,290	1.64	12	447	753	1,225	17,908	1.63
18-25, 26+	10,284	11	544	863	1,403	13,355	1.62	24	658	1,089	1,783	15,275	1.63	24	660	1,089	1,784	18,948	1.63
12-17	37	32	188	347	691	14,039	7.75	33	188	347	876	14,555	7.60	9	121	196	859	16,520	9.59
18-25	5,391	30	411	733	1,188	8,916	1.61	30	478	871	1,456	9,067	1.65	10	475	870	1,460	8,584	1.65
26+	13,369	27	1,884	3,390	5,629	48,720	1.75	94	2,531	4,635	7,878	78,324	1.80	96	2,529	4,632	7,889	72,313	1.80
<i>Race/Ethnicity of Householder</i>																			
Hispanic or Latino White	6,754	17	573	1,039	1,691	28,801	2.49	17	685	1,251	2,043	45,406	2.81	17	685	1,252	2,043	46,082	2.82
Hispanic or Latino Black or African American	147	57	1,252	2,510	4,652	25,509	2.32	250	1,517	2,855	5,939	37,539	2.53	256	1,513	2,761	5,346	37,215	2.53
Hispanic or Latino Other	360	3	283	984	2,720	20,941	3.08	15	331	1,201	3,514	38,499	3.60	21	335	1,153	3,456	38,153	3.53
Non-Hispanic or Latino White	31,781	12	522	911	2,047	42,358	3.00	12	639	1,141	2,712	60,553	3.26	11	639	1,144	2,709	62,200	3.26
Non-Hispanic or Latino Black or African American	6,279	22	596	988	2,075	29,036	2.95	22	683	1,148	2,448	43,994	3.18	9	677	1,146	2,468	45,199	3.18
Non-Hispanic or Latino Other	3,575	7	325	815	1,911	48,720	3.21	15	377	985	2,375	78,324	3.94	14	375	989	2,366	72,313	3.84
<i>% Hispanic or Latino in Segment</i>																			
50-100%	3,349	58	715	1,229	1,933	48,720	2.82	66	864	1,461	2,407	78,324	3.23	68	866	1,459	2,394	72,313	3.22
10-<50%	8,905	3	683	1,223	2,277	28,619	2.62	21	816	1,484	2,894	47,694	2.89	20	812	1,480	2,902	45,199	2.90
<10%	36,642	7	487	843	1,892	42,358	3.10	12	586	1,043	2,454	58,620	3.39	9	586	1,045	2,454	58,729	3.39

Table G.2 2013 NSDUH Respondent QDU-Level Weight Summary Statistics (continued)

Domain	n	Before res.qdu.nr ¹ (SDUWT*DUWT11*DUWT12)						After res.qdu.nr ¹ (SDUWT*DUWT11*...*DUWT13)						Final Weight: After res.qdu.ps ¹ (SDUWT*DUWT11*...*DUWT14)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
% Black or African American in Segment																			
50-100%	3,878	3	558	915	1,957	29,036	3.15	24	649	1,088	2,377	38,229	3.39	24	645	1,087	2,364	38,351	3.39
10-<50%	7,927	8	657	1,134	2,232	28,801	2.70	24	770	1,347	2,729	47,694	3.00	21	769	1,347	2,721	46,082	2.99
<10%	37,091	7	501	901	1,925	48,720	3.03	12	609	1,120	2,514	78,324	3.33	9	608	1,121	2,515	72,313	3.33
% Owner-Occupied DUs¹ in Segment																			
50-100%	36,576	3	529	940	1,995	48,720	2.96	12	642	1,155	2,588	78,324	3.26	9	641	1,158	2,585	72,313	3.25
10-<50%	9,541	12	499	925	1,880	26,827	3.03	21	585	1,121	2,363	43,758	3.35	18	583	1,122	2,365	41,805	3.36
<10%	2,779	31	543	1,094	2,063	39,621	3.01	36	646	1,306	2,542	60,553	3.35	21	645	1,306	2,554	62,200	3.37
Combined Median Rent/Housing Value																			
1 st Quintile	8,503	8	470	835	1,810	42,358	3.10	15	551	1,009	2,248	57,347	3.32	14	550	1,010	2,244	57,244	3.33
2 nd Quintile	10,443	14	497	898	1,865	48,720	3.07	17	595	1,096	2,330	78,324	3.38	9	597	1,098	2,335	72,313	3.35
3 rd Quintile	10,796	11	484	842	1,852	29,036	3.07	12	582	1,034	2,342	43,141	3.36	11	581	1,037	2,338	42,592	3.35
4 th Quintile	10,623	3	565	1,001	2,071	33,684	2.85	14	690	1,241	2,669	49,986	3.14	13	688	1,238	2,664	50,220	3.15
5 th Quintile	8,531	19	632	1,183	2,300	39,621	2.77	20	786	1,492	3,109	60,553	3.05	20	788	1,493	3,107	62,200	3.06
Population Density																			
Large MSA ¹	20,575	3	689	1,221	2,384	48,720	2.65	24	848	1,505	3,149	78,324	2.92	24	850	1,505	3,152	72,313	2.92
Medium to Small MSA ¹	24,379	12	422	771	1,660	38,701	3.20	12	503	938	2,090	58,620	3.50	11	501	939	2,087	58,729	3.50
Non-MSA, ¹ Urban	1,210	19	370	673	1,528	23,586	3.32	21	412	794	1,822	26,499	3.49	21	414	792	1,864	26,612	3.49
Non-MSA, ¹ Rural	2,732	15	310	722	1,631	42,358	3.65	15	361	903	2,099	57,347	3.96	9	362	904	2,086	57,244	3.95
Group Quarters																			
Group	724	30	264	628	1,010	15,464	2.92	30	289	683	1,123	23,383	3.76	9	281	685	1,111	23,570	3.80
Non-Group	48,172	3	529	953	1,997	48,720	2.97	12	639	1,167	2,570	78,324	3.26	11	639	1,169	2,572	72,313	3.26
Household Size																			
One	5,678	31	901	2,420	6,052	48,720	2.24	33	1,108	3,126	8,033	78,324	2.36	9	1,107	3,117	8,016	72,313	2.36
Two	16,806	8	640	1,372	3,205	33,684	2.32	24	778	1,713	4,355	47,694	2.51	11	778	1,709	4,355	43,561	2.51
Three	14,260	15	450	734	1,309	19,047	2.13	15	536	913	1,616	30,634	2.41	17	534	913	1,623	29,248	2.40
Four or More	12,152	3	434	713	1,246	15,977	1.82	12	511	864	1,492	22,823	1.98	12	509	863	1,490	22,120	1.99

¹ DU = dwelling unit, MSA = metropolitan statistical area, NR = nonresponse adjustment, PS = poststratification adjustment, QDU = questionnaire dwelling unit, Res = respondent, SDU = screener dwelling unit, Sel = selected.

² Q1 and Q3 refer to the first and third quartile of the weight distribution.

³ Unequal weighting effect (UWE) is defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

Appendix H: GEM Modeling Summary for the Pair Weights

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Appendix H: GEM Modeling Summary for the Pair Weights

This appendix summarizes each model group throughout all stages of weight calibration modeling. Unlike much of the other information presented in this report, this section provides a model-specific overview of weight calibration, as opposed to a domain-specific one.

For 2013, modeling involved taking two model groups through four adjustment steps: (1) selected pair poststratification, (2) pair nonresponse adjustment, (3) responding pair poststratification, and (4) responding pair extreme value adjustment.

Model-specific summary statistics are shown in [Tables H.1a](#) through [H.2b](#). Included in these tables, for each stage of modeling, are the number of factor effects included in the final model; the high, low, and nonextreme weight bounds set to provide the upper and lower limits for the generalized exponential model (GEM) macro; the weighted, unweighted, and winsorized weight proportions; the unequal weighting effect (UWE); and weight distributions. The UWE provides an approximate partial measure of variance and provides a summary of how much impact a particular stage of modeling has on the distribution of the new product of weights. At each stage in the modeling, these summary statistics were calculated and utilized to help evaluate the quality of the weight component under the model chosen.

Occurrences of small sample sizes and exact linear combinations in the realized data led to situations whereby modeling inclusion of all originally proposed levels of covariates in the model was not possible. The text and exhibits in Sections H.1 and H.2 summarize the decisions made with regard to final covariates included in each model. For the list of proposed initial covariates considered at each stage of modeling, see [Exhibit H.2](#). For the list of realized final model covariates, see [Exhibits H.1.1](#) to [H.2.4](#). For guidelines on interpreting these exhibits, see Appendix C.

Final Model Explanatory Variables

For brevity, numeric abbreviations for factor levels are established in [Exhibit 4.2](#) (included here as [Exhibit H.1](#) for easy reference). A complete list of all variables and associated levels used at any stage of modeling is provided. Note that not all factors or levels are present in all stages of modeling, and the initial set of variables is the same across model groups but may change for an adjustment step of modeling. The initial candidates are found in any of the proposed variables columns for a particular stage of weight adjustment.

Exhibit H.1 Definitions of Levels for Pair-Level Calibration Modeling Variables

Group Quarter Indicator

1: College Dorm, 2: Other Group Quarter, 3: Non-Group Quarter¹

Household Size

2: DU with 2 People,¹ 3: DU with 3 People, 4: DU with ≥ 4 People

Pair Age (15 Levels)

1: 12-17 and 12-17,¹ 2: 12-17 and 18-25, 3: 12-17 and 26-34, 4: 12-17 and 35-49, 5: 12-17 and 50+, 6: 18-25 and 18-25, 7: 18-25 and 26-34, 8: 18-25 and 35-49, 9: 18-25 and 50+, 10: 26-34 and 26-34, 11: 26-34 and 35-49, 12: 26-34 and 50+, 13: 35-49 and 35-49, 14: 35-49 and 50+, 15: 50+ and 50+

Pair Age (6 Levels)

1: 12-17 and 12-17,¹ 2: 12-17 and 18-25, 3: 12-17 and 26+, 4: 18-25 and 18-25, 5: 18-25 and 26+, 6: 26+ and 26+

Pair Age (3 Levels)

1: 12-17 and 12-17,¹ 2: 12-17 and 18+, 3: 18+ and 18+

Pair Gender

1: Male and Female,¹ 2: Female and Female, 3: Male and Male

Pair Race/Ethnicity (10 Levels)

1: White and White,¹ 2: White and Black or African American, 3: White and Hispanic or Latino, 4: White and Other, 5: Black or African American and Black or African American, 6: Black or African American and Hispanic or Latino, 7: Black or African American and Other, 8: Hispanic or Latino and Hispanic or Latino, 9: Hispanic or Latino and Other, 10: Other and Other

Pair Race/Ethnicity (5 Levels)

1: Two or More Races Pair, 2: Hispanic or Latino Pair, 3: Black or African American Pair, 4: White Pair,¹ 5: Other Pair

Pair Race/Ethnicity (4 Levels)

1: Two or More Races Pair or Other and Other, 2: Hispanic or Latino Pair, 3: Black or African American Pair, 4: White Pair¹

Percentage of Owner-Occupied Dwelling Units in Segment (% Owner-Occupied)

1: 50-100%,¹ 2: 10-<50%, 3: 0-<10%

Percentage of Segments That Are Black or African American

1: 50-100%, 2: 10-<50%, 3: 0-<10%¹

Percentage of Segments That Are Hispanic or Latino

1: 50-100%, 2: 10-<50%, 3: 0-<10%¹

Segment-Combined Median Rent and Housing Value (Rent/Housing)²

1: First Quintile, 2: Second Quintile, 3: Third Quintile, 4: Fourth Quintile, 5: Fifth Quintile¹

Population Density

1: MSA 1,000,000 or More, 2: MSA Less than 1,000,000, 3: Non-MSA Urban, 4: Non-MSA Rural¹

Quarter

1: Quarter 1, 2: Quarter 2, 3: Quarter 3, 4: Quarter 4¹

Race/Ethnicity of Householder

1: Hispanic or Latino White,¹ 2: Hispanic or Latino Black or African American, 3: Hispanic or Latino Other, 4: Non-Hispanic or Latino White, 5: Non-Hispanic or Latino Black or African American, 6: Non-Hispanic or Latino Other

State/Region

Model Group 1: 1: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Rhode Island, Vermont;
2: Alabama, Arkansas, Delaware, District of Columbia, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, West Virginia;¹
3: New York; 4: Pennsylvania; 5: Florida; 6: Texas

Model Group 2: 1: Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin;¹ 2: Alaska, Arizona, Colorado, Idaho, Hawaii, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming; 3: Michigan; 4: Illinois; 5: Ohio; 6: California

Exhibit H.1 Definitions of Levels for Pair-Level Calibration Modeling Variables (continued)

States³

Model Group 1: 1: Alabama, 2: Arkansas, 3: Connecticut, 4: Delaware, 5: District of Columbia, 6: Florida, 7: Georgia, 8: Kentucky, 9: Louisiana, 10: Maine, 11: Maryland,¹ 12: Massachusetts, 13: Mississippi, 14: New Hampshire, 15: New Jersey, 16: New York, 17: North Carolina, 18: Oklahoma, 19: Pennsylvania, 20: Rhode Island, 21: South Carolina, 22: Tennessee, 23: Texas, 24: Vermont, 25: Virginia, 26: West Virginia

Model Group 2: 1: Alaska, 2: Arizona,¹ 3: California, 4: Colorado, 5: Idaho, 6: Illinois, 7: Indiana, 8: Iowa, 9: Hawaii, 10: Kansas, 11: Michigan, 12: Minnesota, 13: Missouri, 14: Montana, 15: Nebraska, 16: Nevada, 17: New Mexico, 18: North Dakota, 19: Ohio, 20: Oregon, 21: South Dakota, 22: Utah, 23: Washington, 24: Wisconsin, 25: Wyoming

Pair Relationship Associated with Multiplicity

- 1: Parent-Child (12-14)*
- 2: Parent-Child (12-17)*
- 3: Parent-Child (12-10)*
- 4: Parent*-Child (12-14)
- 5: Parent*-Child (12-17)
- 6: Parent*-Child (12-20)
- 7: Sibling (12-14)-Sibling (15-17)*
- 8: Sibling (12-17)-Sibling (18-25)*
- 9: Spouse-Spouse/Partner-Partner
- 10: Spouse-Spouse/Partner-Partner with Children (Younger than 18)

DU = dwelling unit, MSA = metropolitan statistical area.

¹ The reference level for this variable. This is the level against which effects of other factor levels are measured.

² Segment-Combined Median Rent and Housing Value is a composite measure based on rent, housing value, and percentage owner-occupied.

³ The States or district assigned to a particular model is based on combined census regions.

* The pair member focused on.

Exhibit H.2 Covariates for 2013 NSDUH Pair Weights

Variables	Level	Proposed
One-Factor Effects		
Intercept	1	1
State	Model-specific	
Quarter	4	3
Population Density	3	2
Group Quarter	3	2
Household Size	3	2
Pair Age	15	14
Pair Gender	4	2
Pair Race/Ethnicity	10	9
Race/Ethnicity of Householder	6	5
Rent/Housing	5	4
Segment % Black or African American	3	2
Segment % Hispanic or Latino	3	2
% Owner-Occupied	3	2
Pair Relationship	Model-specific	
Two-Factor Effects		
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8
Pair Gender × Pair Age (6 Levels)	3 × 6	10
State/Region × Pair Race/Ethnicity (5 Levels)	Model-specific	
State/Region × Pair Age (6 Levels)	Model-specific	
State/Region × Pair Gender	Model-specific	
Rent/Housing × % Black or African American	5 × 3	8
Rent/Housing × % Hispanic or Latino	5 × 3	8
Rent/Housing × % Owner-Occupied	5 × 3	8
% Owner-Occupied × % Black or African American	3 × 3	4
% Owner-Occupied × % Hispanic or Latino	3 × 3	4
Three-Factor Effects		
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12

Appendix H.1: Model Group 1: Northeast and South

(Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maine, Massachusetts, Maryland, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, West Virginia)

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Table H.1a 2013 Pair Weight GEM Modeling Summary (Model Group 1: Northeast and South)

Modeling Step ¹	Extreme Weight Proportions			UWE ²	# Covariates ³	Bounds ⁴	
	% Unweighted	% Weighted	% Winsorized			Nominal	Realized
<i>sel.pr.ps</i>	5.08	18.44	6.83	12.1281	213	(0.20, 2.20)	(0.20, 2.20)
	2.42	7.46	1.38	9.1207	205	(0.20, 4.24)	(0.20, 4.24)
						(0.90, 1.91)	(0.90, 1.91)
<i>res.pr.nr</i>	2.67	12.28	2.31	9.3593	213	(1.00, 1.90)	(1.00, 1.90)
	2.39	11.44	2.93	10.7409	213	(1.00, 4.94)	(1.00, 4.94)
						N/A	N/A
<i>res.pr.ps</i>	2.38	10.49	2.37	10.7409	223	(0.27, 1.60)	(0.27, 1.60)
	2.37	9.95	1.06	10.1747	215	(0.20, 1.97)	(0.20, 1.94)
						N/A	N/A
<i>res.pr.ev</i>	2.37	9.95	1.06	10.1747	223	(0.94, 1.60)	(0.97, 1.59)
	1.18	5.49	0.37	9.9902	215	(0.73, 1.68)	(0.84, 1.43)
						N/A	N/A

GEM = generalized exponential model; N/A = not applicable.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

² Unequal weighting effect (UWE) defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

³ Number of proposed covariates on top line and number finalized after modeling.

⁴ Nominal bounds are used in defining maximum/minimum values for the GEM adjustment factors. The realized bound is the actual adjustment produced by the modeling. The first set of bounds listed is for high extreme values, the second is for nonextreme values, and the third is for low extreme values.

Table H.1b 2013 Distribution of Weight Adjustment Factors and Weight Products (Model Group 1: Northeast and South)

	SDU Weight	Pair Selection Prob		sel.pr.ps ¹		res.pr.nr ¹		res.pr.ps ¹		res.pr.ev ¹	
	1-10	pairwt11	1-11	pairwt12	1-12	pairwt13	1-13	pairwt14	1-14	pairwt15	1-15
Minimum	11	1.02	15	0.05	7	0.53	8	0.16	3	0.60	3
1%	67	1.15	156	0.20	70	0.88	65	0.26	41	0.87	38
5%	131	1.21	383	0.24	209	1.00	211	0.45	154	0.93	147
10%	202	1.32	710	0.37	378	1.01	384	0.58	302	0.95	299
25%	526	1.56	1,312	0.63	1,090	1.06	1,157	0.80	992	0.97	976
Median	763	5.73	3,356	0.97	3,222	1.20	3,760	0.98	3,538	0.99	3,497
75%	1,155	12.16	8,775	1.35	8,657	1.51	11,003	1.13	10,506	1.01	10,507
90%	1,617	21.70	18,173	1.78	20,833	2.00	30,192	1.28	29,956	1.03	29,924
95%	2,055	29.48	27,424	2.10	34,330	2.47	53,187	1.40	54,877	1.05	55,080
99%	3,071	54.16	60,772	2.76	81,576	3.96	142,402	1.69	143,601	1.08	144,945
Maximum	7,890	2,507.17	1,577,269	4.24	923,484	4.94	1,685,485	1.94	1,271,216	1.43	1,195,456
<i>n</i>	13,535	-	13,535	-	13,535	-	9,416	-	9,416	-	9,416
Mean	892	9.80	8,239	1.04	8,954	1.39	12,870	0.96	12,870	0.99	12,870
Max/Mean	9	-	191	-	103	-	131	-	99	-	93

SDU = screener dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

Model Group 1 Overview

Selected Pair-Level Poststratification

In the selected pair-level poststratification step, 205 of 213 proposed factors were retained in the final model. All 76 proposed main effects were included in the model. In addition, all 125 proposed two-factor effects were included in the model.

The three-factor interaction of Pair Race/Ethnicity \times Pair Gender \times Pair Age was simplified by collapsing over Pair Race/Ethnicity. Two or More Races Pair or Other and Other, Hispanic or Latino Pair, and Black or African American Pair were combined for all combinations of age and gender. As a result, out of 12 three-factor effects, 4 were kept in the model.

Respondent Pair-Level Nonresponse

In the respondent pair-level nonresponse step, all proposed factors were retained in the final model.

Respondent Pair-Level Poststratification

In the respondent pair-level poststratification step, 215 of 223 proposed factors were retained in the final model. All main and two-factor effects were retained.

The three-factor interaction of Pair Race/Ethnicity \times Pair Gender \times Pair Age was simplified by collapsing over Pair Race/Ethnicity. Two or More Races Pair or Other and Other, Hispanic or Latino Pair, and Black or African American Pair were combined for all combinations of age and gender. As a result, out of 12 three-factor effects, 4 were kept in the model.

Respondent Pair-Level Extreme Value Adjustment

This step used exactly the same variables as in the respondent pair-level nonresponse and poststratification steps.

Exhibit H.1.1 Covariates for 2013 NSDUH Pair Weights (sel.pr.ps) Model Group 1: Northeast and South

Variables	Level	Proposed	Final	Comments
One-Factor Effects		76	76	
Intercept	1	1	1	All levels present.
State	26	25	25	All levels present.
Quarter	4	3	3	All levels present.
Population Density	4	3	3	All levels present.
Group Quarter	3	2	2	All levels present.
Household Size	3	2	2	All levels present.
Pair Age	15	14	14	All levels present.
Pair Gender	3	2	2	All levels present.
Pair Race/Ethnicity	10	9	9	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Rent/Housing	5	4	4	All levels present.
Segment % Black or African American	3	2	2	All levels present.
Segment % Hispanic or Latino	3	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
Two-Factor Effects		125	125	
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20	20	All levels present.
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8	8	All levels present.
Pair Gender × Pair Age (6 Levels)	3 × 6	10	10	All levels present.
State/Region × Pair Race/Ethnicity (5 Levels)	6 × 5	20	20	All levels present.
State/Region × Pair Age (6 Levels)	6 × 6	25	25	All levels present.
State/Region × Pair Gender	6 × 3	10	10	All levels present.
Rent/Housing × % Black or African American	5 × 3	8	8	All levels present.
Rent/Housing × % Hispanic or Latino	5 × 3	8	8	All levels present.
Rent/Housing × % Owner-Occupied	5 × 3	8	8	All levels present.
% Owner-Occupied × % Black or African American	3 × 3	4	4	All levels present.
% Owner-Occupied × % Hispanic or Latino	3 × 3	4	4	All levels present.
Three-Factor Effects		12	4	
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12	4	Coll. (1,1,1), (2,1,1) & (3,1,1); conv. Repeat for all levels of Pair Gender and Pair Age.
Total		213	205	

Exhibit H.1.2 Covariates for 2013 NSDUH Pair Weights (res.pr.nr) Model Group 1: Northeast and South

Variables	Level	Proposed	Final	Comments
One-Factor Effects		76	76	
Intercept	1	1	1	All levels present.
State	26	25	25	All levels present.
Quarter	4	3	3	All levels present.
Population Density	4	3	3	All levels present.
Group Quarter	3	2	2	All levels present.
Household Size	3	2	2	All levels present.
Pair Age	15	14	14	All levels present.
Pair Gender	3	2	2	All levels present.
Pair Race/Ethnicity	10	9	9	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Rent/Housing	5	4	4	All levels present.
Segment % Black or African American	3	2	2	All levels present.
Segment % Hispanic or Latino	3	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
Two-Factor Effects		125	125	
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20	20	All levels present.
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8	8	All levels present.
Pair Gender × Pair Age (6 Levels)	3 × 6	10	10	All levels present.
State/Region × Pair Race/Ethnicity (5 Levels)	6 × 5	20	20	All levels present.
State/Region × Pair Age (6 Levels)	6 × 6	25	25	All levels present.
State/Region × Pair Gender	6 × 3	10	10	All levels present.
Rent/Housing × % Black or African American	5 × 3	8	8	All levels present.
Rent/Housing × % Hispanic or Latino	5 × 3	8	8	All levels present.
Rent/Housing × % Owner-Occupied	5 × 3	8	8	All levels present.
% Owner-Occupied × % Black or African American	3 × 3	4	4	All levels present.
% Owner-Occupied × % Hispanic or Latino	3 × 3	4	4	All levels present.
Three-Factor Effects		12	12	
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12	12	All levels present.
Total		213	213	

Exhibit H.1.3 Covariates for 2013 NSDUH Pair Weights (res.pr.ps) Model Group 1: Northeast and South

Variables	Level	Proposed	Final	Comments
One-Factor Effects		86	86	
Intercept	1	1	1	All levels present.
State	26	25	25	All levels present.
Quarter	4	3	3	All levels present.
Population Density	4	3	3	All levels present.
Group Quarter	3	2	2	All levels present.
Household Size	3	2	2	All levels present.
Pair Age	15	14	14	All levels present.
Pair Gender	3	2	2	All levels present.
Pair Race/Ethnicity	10	9	9	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Rent/Housing	5	4	4	All levels present.
Segment % Black or African American	3	2	2	All levels present.
Segment % Hispanic or Latino	3	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
Pair Relationship	10	10	10	All levels present.
Two-Factor Effects		125	125	
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20	20	All levels present.
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8	8	All levels present.
Pair Gender × Pair Age (6 Levels)	3 × 6	10	10	All levels present.
State/Region × Pair Race/Ethnicity (5 Levels)	6 × 5	20	20	All levels present.
State/Region × Pair Age (6 Levels)	6 × 6	25	25	All levels present.
State/Region × Pair Gender	6 × 3	10	10	All levels present.
Rent/Housing × % Black or African American	5 × 3	8	8	All levels present.
Rent/Housing × % Hispanic or Latino	5 × 3	8	8	All levels present.
Rent/Housing × % Owner-Occupied	5 × 3	8	8	All levels present.
% Owner-Occupied × % Black or African American	3 × 3	4	4	All levels present.
% Owner-Occupied × % Hispanic or Latino	3 × 3	4	4	All levels present.
Three-Factor Effects		12	4	
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12	4	Coll. (1,1,1), (2,1,1) & (3,1,1); conv. Repeat for all levels of Pair Gender and Pair Age.
Total		223	215	

Exhibit H.1.4 Covariates for 2013 NSDUH Pair Weights (res.pr.ev) Model Group 1: Northeast and South

This step used the same variables as the respondent pair-level poststratification step in [Exhibit H.1.3](#).

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Appendix H.2: Model Group 2: Midwest and West

(Alaska, Arizona, California, Colorado, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, North Dakota, Ohio, Oregon, South Dakota, Utah, Washington, Wisconsin, Wyoming)

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Table H.2a 2013 Pair Weight GEM Modeling Summary (Model Group 2: Midwest and West)

Modeling Step ¹	Extreme Weight Proportions			UWE ²	# Covariates ³	Bounds ⁴	
	% Unweighted	% Weighted	% Winsorized			Nominal	Realized
<i>sel.pr.ps</i>	5.22	24.82	15.47	113.3841	212	(0.20, 1.91)	(0.20, 1.90)
	2.63	9.28	1.75	10.8298	200	(0.20, 3.37)	(0.20, 3.37)
						(0.90, 1.26)	(0.90, 1.26)
<i>res.pr.nr</i>	2.66	12.07	2.50	10.4904	212	(1.00, 3.00)	(1.00, 3.00)
	3.26	14.92	2.95	11.0104	212	(1.00, 5.00)	(1.00, 5.00)
						N/A	N/A
<i>res.pr.ps</i>	3.24	16.10	4.04	11.0104	222	(0.45, 2.00)	(0.46, 2.00)
	2.62	14.88	1.98	10.6584	210	(0.34, 2.00)	(0.35, 1.92)
						(0.83, 1.10)	(0.83, 0.83)
<i>res.pr.ev</i>	2.62	14.88	1.98	10.6584	222	(0.80, 2.00)	(0.95, 1.96)
	1.27	5.72	0.47	10.5083	210	(0.70, 2.00)	(0.79, 1.34)
						N/A	N/A

GEM = generalized exponential model; N/A = not applicable.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

² Unequal weighting effect (UWE) defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

³ Number of proposed covariates on top line and number finalized after modeling.

⁴ Nominal bounds are used in defining maximum/minimum values for the GEM adjustment factors. The realized bound is the actual adjustment produced by the modeling. The first set of bounds listed is for high extreme values, the second is for nonextreme values, and the third is for low extreme values.

Table H.2b 2013 Distribution of Weight Adjustment Factors and Weight Products (Model Group 2: Midwest and West)

	SDU Weight	Pair Selection		sel.pr.ps ¹		res.pr.nr ¹		res.pr.ps ¹		res.pr.ev ¹	
	1-10	pairwt11	1-11	pairwt12	1-12	pairwt13	1-13	pairwt14	1-14	pairwt15	1-15
Minimum	22	1.02	27	0.07	16	0.36	16	0.11	7	0.52	6
1%	77	1.08	144	0.24	72	0.92	69	0.41	48	0.83	44
5%	120	1.20	300	0.37	233	1.00	249	0.52	194	0.88	181
10%	164	1.33	525	0.47	402	1.01	419	0.60	358	0.90	342
25%	378	1.51	929	0.74	902	1.03	1,030	0.82	989	0.95	964
Median	570	5.44	2,559	1.00	2,454	1.15	2,789	1.01	2,785	0.99	2,766
75%	1,025	11.57	7,009	1.26	6,730	1.46	8,041	1.16	8,089	1.02	8,022
90%	1,578	23.19	15,897	1.60	16,961	1.99	22,362	1.36	22,427	1.05	22,428
95%	1,875	29.24	25,621	1.86	28,431	2.51	43,106	1.53	42,205	1.08	42,969
99%	2,625	58.06	60,247	2.69	79,498	3.94	142,749	1.74	150,408	1.13	150,126
Maximum	8,564	7,689.46	7,171,488	3.66	1,129,922	5.00	1,157,049	1.92	919,973	1.34	870,469
<i>n</i>	13,573	-	13,573	-	13,573	-	9,526	-	9,526	-	9,526
Mean	759	10.81	8,192	1.04	7,593	1.37	10,819	1.00	10,819	0.98	10,819
Max/Mean	11	-	875	-	149	-	107	-	85	-	80

SDU = screener dwelling unit.

¹ For a key to modeling abbreviations, see Chapter 6, [Exhibit 6.1](#).

Model Group 2 Overview

Selected Pair-Level Poststratification

In the selected pair-level poststratification step, 200 of 212 proposed factors were retained in the final model. All main and two-factor effects were retained at proposed levels. None of the 12 three-factor effects were kept in the model because of convergence problems.

Respondent Pair-Level Nonresponse

In the respondent pair-level nonresponse step, all 212 proposed factors were retained in the final model.

Respondent Pair-Level Poststratification

In the respondent pair-level poststratification step, 210 of 222 proposed factors were retained in the final model, as in the selected pair-level poststratification step.

Respondent Pair-Level Extreme Value Adjustment

In the respondent pair-level extreme value adjustment step, 210 of 222 proposed factors were retained in the final model, as in the respondent pair-level poststratification step.

Exhibit H.2.1 Covariates for 2013 NSDUH Pair Weights (sel.pr.ps) Model Group 2: Midwest and West

Variables	Level	Proposed	Final	Comments
One-Factor Effects		75	75	
Intercept	1	1	1	All levels present.
State	25	24	24	All levels present.
Quarter	4	3	3	All levels present.
Population Density	4	3	3	All levels present.
Group Quarter	3	2	2	All levels present.
Household Size	3	2	2	All levels present.
Pair Age	15	14	14	All levels present.
Pair Gender	3	2	2	All levels present.
Pair Race/Ethnicity	10	9	9	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Rent/Housing	5	4	4	All levels present.
Segment % Black or African American	3	2	2	All levels present.
Segment % Hispanic or Latino	3	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
Two-Factor Effects		125	125	
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20	20	All levels present.
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8	8	All levels present.
Pair Gender × Pair Age (6 Levels)	3 × 6	10	10	All levels present.
State/Region × Pair Race/Ethnicity (5 Levels)	6 × 5	20	20	All levels present.
State/Region × Pair Age (6 Levels)	6 × 6	25	25	All levels present.
State/Region × Pair Gender	6 × 3	10	10	All levels present.
Rent/Housing × % Black or African American	5 × 3	8	8	All levels present.
Rent/Housing × % Hispanic or Latino	5 × 3	8	8	All levels present.
Rent/Housing × % Owner-Occupied	5 × 3	8	8	All levels present.
% Owner-Occupied × % Black or African American	3 × 3	4	4	All levels present.
% Owner-Occupied × % Hispanic or Latino	3 × 3	4	4	All levels present.
Three-Factor Effects		12	0	
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12	0	Drop all; conv.
Total		212	200	

Exhibit H.2.2 Covariates for 2013 NSDUH Pair Weights (res.pr.nr) Model Group 2: Midwest and West

Variables	Level	Proposed	Final	Comments
One-Factor Effects		75	75	
Intercept	1	1	1	All levels present.
State	25	24	24	All levels present.
Quarter	4	3	3	All levels present.
Population Density	4	3	3	All levels present.
Group Quarter	3	2	2	All levels present.
Household Size	3	2	2	All levels present.
Pair Age	15	14	14	All levels present.
Pair Gender	3	2	2	All levels present.
Pair Race/Ethnicity	10	9	9	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Rent/Housing	5	4	4	All levels present.
Segment % Black or African American	3	2	2	All levels present.
Segment % Hispanic or Latino	3	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
Two-Factor Effects		125	125	
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20	20	All levels present.
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8	8	All levels present.
Pair Gender × Pair Age (6 Levels)	3 × 6	10	10	All levels present.
State/Region × Pair Race/Ethnicity (5 Levels)	6 × 5	20	20	All levels present.
State/Region × Pair Age (6 Levels)	6 × 6	25	25	All levels present.
State/Region × Pair Gender	6 × 3	10	10	All levels present.
Rent/Housing × % Black or African American	5 × 3	8	8	All levels present.
Rent/Housing × % Hispanic or Latino	5 × 3	8	8	All levels present.
Rent/Housing × % Owner-Occupied	5 × 3	8	8	All levels present.
% Owner-Occupied × % Black or African American	3 × 3	4	4	All levels present.
% Owner-Occupied × % Hispanic or Latino	3 × 3	4	4	All levels present.
Three-Factor Effects		12	12	
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12	12	All levels present.
Total		212	212	

Exhibit H.2.3 Covariates for 2013 NSDUH Pair Weights (res.pr.ps) Model Group 2: Midwest and West

Variables	Level	Proposed	Final	Comments
One-Factor Effects		85	85	
Intercept	1	1	1	All levels present.
State	26	24	24	All levels present.
Quarter	4	3	3	All levels present.
Population Density	4	3	3	All levels present.
Group Quarter	3	2	2	All levels present.
Household Size	3	2	2	All levels present.
Pair Age	15	14	14	All levels present.
Pair Gender	3	2	2	All levels present.
Pair Race/Ethnicity	10	9	9	All levels present.
Race/Ethnicity of Householder	6	5	5	All levels present.
Rent/Housing	5	4	4	All levels present.
Segment % Black or African American	3	2	2	All levels present.
Segment % Hispanic or Latino	3	2	2	All levels present.
% Owner-Occupied	3	2	2	All levels present.
Pair Relationship	10	10	10	All levels present.
Two-Factor Effects		125	125	
Pair Race/Ethnicity (5 Levels) × Pair Age (6 Levels)	5 × 6	20	20	All levels present.
Pair Race/Ethnicity (5 Levels) × Pair Gender	5 × 3	8	8	All levels present.
Pair Gender × Pair Age (6 Levels)	3 × 6	10	10	All levels present.
State/Region × Pair Race/Ethnicity (5 Levels)	6 × 5	20	20	All levels present.
State/Region × Pair Age (6 Levels)	6 × 6	25	25	All levels present.
State/Region × Pair Gender	6 × 3	10	10	All levels present.
Rent/Housing × % Black or African American	5 × 3	8	8	All levels present.
Rent/Housing × % Hispanic or Latino	5 × 3	8	8	All levels present.
Rent/Housing × % Owner-Occupied	5 × 3	8	8	All levels present.
% Owner-Occupied × % Black or African American	3 × 3	4	4	All levels present.
% Owner-Occupied × % Hispanic or Latino	3 × 3	4	4	All levels present.
Three-Factor Effects		12	0	
Pair Race/Ethnicity (4 Levels) × Pair Gender × Pair Age (3 Levels)	4 × 3 × 3	12	0	Drop all; conv.
Total		222	210	

Exhibit H.2.4 Covariates for 2013 NSDUH Pair Weights (res.pr.ev) Model Group 2: Midwest and West

This step used the same variables as the respondent pair-level poststratification step in [Exhibit H.2.3](#).

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**Appendix I: Evaluation of Calibration Weights: Pair-Level
Response Rates**

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Table I.1 2013 NSDUH Person Pair-Level Response Rates

Domain	Selected Pairs	Respondent Pairs	% Interview Response Rate¹
Total	27,108	18,942	62.19
<i>Pair Age Group</i>			
12-17, 12-17	4,535	3,623	81.26
12-17, 18-25	3,662	2,763	76.70
12-17, 26-34	811	604	72.07
12-17, 35-49	3,834	2,763	72.74
12-17, 50+	833	564	67.17
18-25, 18-25	5,478	3,866	70.03
18-25, 26-34	1,034	654	61.86
18-25, 35-49	1,561	998	65.90
18-25, 50+	1,173	713	61.75
26-34, 26-34	822	546	59.31
26-34, 35-49	489	308	75.30
26-34, 50+	318	155	49.36
35-49, 35-49	857	514	62.86
35-49, 50+	462	235	44.64
50+, 50+	1,239	636	50.23
<i>Pair Race/Ethnicity</i>			
Hispanic or Latino	4,280	3,064	62.97
Black or African American	2,760	2,162	70.93
White	15,917	10,841	61.84
Other	1,886	1,220	50.58
White & Black or African American	219	173	79.51
White & Hispanic or Latino	907	637	51.90
White & Other	728	529	61.39
Black or African American & Hispanic or Latino	112	84	62.51
Black or African American & Other	132	106	84.28
Hispanic or Latino & Other	167	126	78.79
<i>Pair Gender</i>			
Male, Male	6,032	4,165	60.98
Female, Female	5,782	4,287	67.82
Male, Female	15,294	10,490	60.93
<i>Household Size</i>			
Two	6,834	4,488	58.12
Three	7,472	5,155	57.03
Four or More	12,802	9,299	66.95

Table I.1 2013 NSDUH Person Pair-Level Response Rates (continued)

Domain	Selected Pairs	Respondent Pairs	% Interview Response Rate¹
<i>Census Region</i>			
Northeast	5,543	3,707	59.44
South	7,992	5,709	63.65
Midwest	7,635	5,303	61.39
West	5,938	4,223	62.69
<i>Quarter</i>			
Quarter 1	6,262	4,448	61.45
Quarter 2	7,206	5,065	65.10
Quarter 3	7,074	4,940	59.04
Quarter 4	6,566	4,489	63.22
<i>% Hispanic or Latino in Segment</i>			
50-100%	2,154	1,532	63.57
10-<50%	5,043	3,542	61.87
<10%	19,911	13,868	62.08
<i>% Black or African American in Segment</i>			
50-100%	1,858	1,440	69.00
10-<50%	4,247	3,089	64.44
<10%	21,003	14,413	61.01
<i>% Owner-Occupied DUs in Segment</i>			
50-100%	20,832	14,429	61.68
10-<50%	4,887	3,526	64.85
<10%	1,389	987	61.27
<i>Combined Median Rent/Housing Value</i>			
1 st Quintile	4,435	3,345	70.65
2 nd Quintile	5,633	4,027	62.43
3 rd Quintile	5,931	4,164	59.41
4 th Quintile	6,080	4,154	65.03
5 th Quintile	5,029	3,252	55.83
<i>Population Density</i>			
Large MSA	11,963	8,152	61.16
Medium to Small MSA	13,217	9,390	63.32
Non-MSA, Urban	559	418	58.96
Non-MSA, Rural	1,369	982	66.70
<i>Group Quarters</i>			
Group	370	316	84.16
Non-Group	26,738	18,626	62.13

DU = dwelling unit, MSA = metropolitan statistical area.

¹ The weight used for calculating the response rate includes screener dwelling unit (SDU)- and pair-level design weights, SDU nonresponse and poststratification adjustments, and selected pair poststratification adjustment. This weight is the product of WT1*...*WT9*PRWT10*PRWT11.

Appendix J: Evaluation of Calibration Weights: Pair-Level Proportions of Extreme Values and Outwinsors

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Table J.1 2013 NSDUH Selected Pair-Level Proportions of Extreme Values and Outwinsors

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)			Before sel.pr.ps ¹ (SDUWT*PRWT11)			After sel.pr.ps ¹ (SDUWT*PRWT11*PRWT12)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
Total	27,108	2.04	4.96	1.32	5.38	29.41	18.67	2.74	17.14	8.22
<i>Pair Age Group</i>										
12-17, 12-17	4,535	1.63	3.97	1.29	3.44	15.85	5.53	1.50	9.07	1.56
12-17, 18-25	3,662	2.32	5.93	1.58	7.67	29.61	12.12	1.91	7.14	1.25
12-17, 26-34	811	2.71	7.47	2.55	1.97	5.87	1.64	1.36	5.07	1.25
12-17, 35-49	3,834	1.72	3.99	0.81	1.72	6.90	2.35	1.04	5.08	1.03
12-17, 50+	833	1.20	3.68	1.15	1.92	12.93	4.82	1.08	4.03	0.55
18-25, 18-25	5,478	2.19	4.98	1.15	8.36	31.38	14.07	4.29	13.91	1.86
18-25, 26-34	1,034	2.80	6.65	2.03	3.38	11.21	2.90	3.09	8.21	1.49
18-25, 35-49	1,561	2.31	5.21	1.44	6.85	25.10	10.17	3.27	12.13	2.39
18-25, 50+	1,173	2.39	4.17	1.08	3.84	19.07	9.58	1.53	3.94	0.54
26-34, 26-34	822	1.22	4.24	1.30	5.47	31.60	18.99	4.01	26.33	14.28
26-34, 35-49	489	3.27	8.53	1.65	10.02	56.65	39.41	6.75	52.46	26.87
26-34, 50+	318	1.26	6.70	3.54	3.77	19.94	10.14	2.20	10.09	4.76
35-49, 35-49	857	2.22	7.21	2.52	7.00	45.89	29.51	6.88	46.42	29.54
35-49, 50+	462	2.81	6.79	1.39	4.76	59.28	52.42	3.46	29.81	20.87
50+, 50+	1,239	1.61	2.60	0.21	7.34	38.15	27.60	5.00	19.64	9.18
<i>Pair Race/Ethnicity</i>										
Hispanic or Latino	4,280	3.39	8.89	3.07	5.75	27.23	13.44	3.81	19.36	8.04
Black or African American	2,760	2.97	6.12	1.37	6.59	26.76	12.03	4.75	19.13	5.15
White	15,917	0.82	1.74	0.24	4.69	26.85	17.64	1.68	14.90	8.70
Other	1,886	4.29	9.33	2.25	7.32	31.00	15.38	2.60	16.17	7.25
White & Black or African American	219	3.20	3.19	0.55	6.85	13.66	6.57	10.96	17.47	2.36
White & Hispanic or Latino	907	4.41	8.40	2.07	5.95	60.06	55.51	4.74	25.63	13.35
White & Other	728	2.34	4.90	1.15	5.63	26.53	15.76	3.98	23.60	10.79
Black or African American & Hispanic or Latino	112	19.64	36.34	13.35	13.39	46.20	23.64	18.75	35.13	11.29
Black or African American & Other	132	6.82	13.27	4.21	6.06	27.32	13.33	3.79	20.67	2.09
Hispanic or Latino & Other	167	11.38	34.12	12.53	7.78	27.91	11.82	6.59	28.60	4.87
<i>Pair Gender</i>										
Male, Male	6,032	2.16	5.81	1.48	6.55	34.09	23.17	3.95	14.74	4.68
Female, Female	5,782	2.14	4.57	1.12	5.79	22.01	9.08	2.20	9.26	1.93
Male, Female	15,294	1.95	4.77	1.34	4.77	30.00	19.92	2.48	20.06	11.01
<i>Household Size</i>										
Two	6,834	1.64	3.83	0.96	0.69	1.91	0.52	0.88	3.34	0.87
Three	7,472	1.90	4.70	1.21	2.62	32.72	24.08	2.36	17.53	8.30
Four or More	12,802	2.33	5.64	1.56	9.50	41.14	24.73	3.97	23.78	11.83

Table J.1 2013 NSDUH Selected Pair-Level Proportions of Extreme Values and Outwinsors (continued)

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)			Before sel.pr.ps ¹ (SDUWT*PRWT11)			After sel.pr.ps ¹ (SDUWT*PRWT11*PRWT12)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
<i>Census Region</i>										
Northeast	5,543	2.36	6.37	2.17	5.48	21.10	9.69	2.69	14.95	6.65
South	7,992	1.86	3.97	0.74	5.12	26.38	15.35	2.58	17.47	8.79
Midwest	7,635	1.47	3.36	0.72	5.44	37.68	26.73	3.00	21.70	10.83
West	5,938	2.69	6.86	2.15	5.57	30.94	21.17	2.69	14.70	6.52
<i>Quarter</i>										
Quarter 1	6,262	2.41	5.80	1.60	5.92	25.14	13.90	3.21	17.57	8.23
Quarter 2	7,206	1.39	3.46	0.84	4.94	23.88	12.60	2.12	17.21	8.62
Quarter 3	7,074	2.08	4.96	1.23	4.88	39.65	30.24	2.60	17.59	9.14
Quarter 4	6,566	2.35	5.62	1.64	5.89	26.42	15.08	3.14	16.19	6.88
<i>% Hispanic or Latino in Segment</i>										
50-100%	2,154	2.18	5.92	2.11	5.57	29.21	14.33	2.79	16.12	5.76
10-<50%	5,043	2.56	6.20	1.91	5.51	34.86	25.66	3.39	20.29	10.44
<10%	19,911	1.89	4.37	0.99	5.33	27.39	16.72	2.58	16.22	7.86
<i>% Black or African American in Segment</i>										
50-100%	1,858	3.50	8.24	2.20	6.89	25.99	11.22	4.84	20.92	6.09
10-<50%	4,247	2.83	6.52	1.94	6.15	29.10	16.29	3.91	17.41	8.43
<10%	21,003	1.75	4.24	1.08	5.09	29.74	19.77	2.32	16.71	8.38
<i>% Owner-Occupied DUs¹ in Segment</i>										
50-100%	20,832	1.75	4.36	1.13	5.02	30.64	20.41	2.53	17.60	9.01
10-<50%	4,887	3.03	6.64	1.75	6.69	24.64	11.43	4.17	16.11	5.05
<10%	1,389	2.88	7.32	2.46	6.19	21.72	10.11	0.86	5.84	1.28
<i>Combined Median Rent/Housing Value</i>										
1 st Quintile	4,435	2.73	7.20	2.20	5.66	26.18	14.24	3.27	19.76	7.66
2 nd Quintile	5,633	1.74	4.29	1.16	4.99	33.69	23.76	2.66	17.89	8.94
3 rd Quintile	5,931	1.89	4.37	1.03	5.06	31.34	21.82	2.65	14.09	5.94
4 th Quintile	6,080	2.34	5.55	1.56	5.82	29.19	17.44	2.66	19.52	10.51
5 th Quintile	5,029	1.57	3.86	0.86	5.43	25.58	14.71	2.59	15.03	7.68
<i>Population Density</i>										
Large MSA ¹	11,963	2.22	5.60	1.63	5.74	28.93	17.46	3.13	16.89	7.90
Medium to Small MSA ¹	13,217	1.91	4.29	1.02	5.19	31.14	21.19	2.44	18.07	9.02
Non-MSA, ¹ Urban	559	1.79	3.99	0.90	3.22	21.63	14.02	1.25	16.42	7.96
Non-MSA, ¹ Rural	1,369	1.83	3.45	0.41	4.97	19.31	8.98	2.92	11.89	5.00
<i>Group Quarters</i>										
Group	370	2.70	3.06	0.38	4.86	14.35	4.91	8.65	21.61	4.20
Non-Group	26,738	2.03	4.98	1.34	5.39	29.45	18.71	2.66	17.13	8.23

¹ This step used demographic variables from screener data for all selected person pairs; DU = dwelling unit, MSA = metropolitan statistical area, PR = pair, PS = poststratification adjustment, SDU = screener dwelling unit, Sel = selected.

² Weighted extreme value proportion: $100 * \frac{\sum_k w_{ek}}{\sum_k w_k}$, where w_{ek} denotes the weight for extreme values, and w_k denotes the weight for both extreme values and nonextreme values.

³ Outwinsor weight proportion: $100 * \frac{\sum_k (w_{ek} - b_k)}{\sum_k w_k}$, where b_k denotes the winsorized weight.

Table J.2 2013 NSDUH Respondent Pair-Level Proportions of Extreme Values and Outwinsors

Domain	n	Before res.pr.nr ¹ (SDUWT*PRWT11*PRWT12)			After res.pr.nr ¹ (SDUWT*PRWT11*...*PRWT13)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
Total	18,942	2.87	20.52	8.85	2.95	17.51	6.88
<i>Pair Age Group</i>							
12-17, 12-17	3,623	1.46	9.57	1.89	0.75	5.67	1.57
12-17, 18-25	2,763	1.70	6.51	1.19	2.24	10.27	1.90
12-17, 26-34	604	0.99	4.37	0.79	1.49	5.95	1.08
12-17, 35-49	2,763	1.19	7.08	1.52	1.01	5.06	0.88
12-17, 50+	564	0.71	3.12	0.20	0.53	1.43	0.46
18-25, 18-25	3,866	4.24	13.55	1.94	4.86	18.47	3.98
18-25, 26-34	654	3.52	9.28	1.39	4.59	17.41	3.76
18-25, 35-49	998	3.91	16.57	3.79	4.71	12.53	2.68
18-25, 50+	713	1.40	4.24	0.95	2.38	7.38	1.46
26-34, 26-34	546	4.76	20.00	4.92	6.78	27.09	8.13
26-34, 35-49	308	7.79	65.56	35.93	4.87	45.89	19.90
26-34, 50+	155	7.10	28.62	12.92	2.58	14.45	5.83
35-49, 35-49	514	7.78	51.86	34.02	10.12	53.53	27.53
35-49, 50+	235	4.68	31.67	17.73	2.13	13.53	6.74
50+, 50+	636	8.33	31.52	12.15	5.35	21.03	9.78
<i>Pair Race/Ethnicity</i>							
Hispanic or Latino	3,064	4.05	24.25	8.21	4.70	20.01	6.18
Black or African American	2,162	4.76	26.55	7.50	2.78	11.65	2.76
White	10,841	1.68	17.35	9.58	1.90	16.16	7.92
Other	1,220	2.87	28.39	14.39	6.48	39.68	12.95
White & Black or African American	173	13.29	25.35	5.08	1.16	5.90	0.29
White & Hispanic or Latino	637	4.87	14.36	3.58	5.34	11.28	2.38
White & Other	529	3.02	9.59	0.76	2.65	8.88	2.01
Black or African American & Hispanic or Latino	84	16.67	38.43	10.69	16.67	20.03	3.74
Black or African American & Other	106	4.72	24.52	3.30	0.00	0.00	0.00
Hispanic or Latino & Other	126	8.73	36.31	8.66	3.97	6.99	1.13
<i>Pair Gender</i>							
Male, Male	4,165	3.99	16.60	3.91	3.94	16.54	4.06
Female, Female	4,287	2.26	12.00	3.03	2.03	8.30	1.82
Male, Female	10,490	2.68	24.32	12.09	2.93	20.40	9.11
<i>Household Size</i>							
Two	4,488	1.20	7.47	1.40	1.27	6.18	1.28
Three	5,155	2.19	17.77	8.02	3.10	17.37	5.41
Four or More	9,299	4.05	27.38	12.43	3.67	23.20	10.43

Table J.2 2013 NSDUH Respondent Pair-Level Proportions of Extreme Values and Outwinsors (continued)

Domain	n	Before res.pr.nr ¹ (SDUWT*PRWT11*PRWT12)			After res.pr.nr ¹ (SDUWT*PRWT11*...*PRWT13)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
<i>Census Region</i>							
Northeast	3,707	2.72	18.97	9.27	2.35	16.16	8.32
South	5,709	2.93	20.36	8.24	2.61	15.31	6.24
Midwest	5,303	2.64	19.67	9.96	3.02	20.02	7.75
West	4,223	3.22	22.40	8.60	3.84	19.57	6.10
<i>Quarter</i>							
Quarter 1	4,448	3.21	19.77	8.40	3.73	16.88	6.09
Quarter 2	5,065	2.29	22.72	11.20	1.97	18.37	8.74
Quarter 3	4,940	2.69	16.35	5.83	3.10	16.26	4.58
Quarter 4	4,489	3.39	22.93	9.72	3.10	18.55	8.13
<i>% Hispanic or Latino in Segment</i>							
50-100%	1,532	3.07	24.10	9.13	3.39	19.77	6.73
10-<50%	3,542	3.59	22.43	9.43	4.09	20.57	7.02
<10%	13,868	2.67	19.27	8.61	2.60	16.09	6.85
<i>% Black or African American in Segment</i>							
50-100%	1,440	4.65	27.83	8.76	3.13	14.30	3.16
10-<50%	3,089	3.98	18.04	5.24	3.33	14.49	4.21
<10%	14,413	2.46	20.32	9.75	2.84	18.52	7.86
<i>% Owner-Occupied DUs¹ in Segment</i>							
50-100%	14,429	2.74	21.22	9.73	2.76	18.09	7.57
10-<50%	3,526	4.00	18.71	5.51	4.00	15.61	3.95
<10%	987	0.81	5.86	0.97	1.93	8.67	2.35
<i>Combined Median Rent/Housing Value</i>							
1 st Quintile	3,345	3.11	25.19	10.01	2.27	15.74	6.68
2 nd Quintile	4,027	2.63	19.45	7.87	2.41	16.31	5.84
3 rd Quintile	4,164	2.74	14.23	3.89	3.72	15.63	4.46
4 th Quintile	4,154	3.13	26.47	14.36	3.01	21.83	10.24
5 th Quintile	3,252	2.77	16.47	6.95	3.23	16.93	6.63
<i>Population Density</i>							
Large MSA ¹	8,152	3.39	21.78	9.10	3.62	18.96	7.18
Medium to Small MSA ¹	9,390	2.51	18.85	8.61	2.45	15.78	6.88
Non-MSA, ¹ Urban	418	0.72	12.86	3.04	3.35	12.76	2.59
Non-MSA, ¹ Rural	982	2.95	22.49	9.79	1.93	16.10	4.30
<i>Group Quarters</i>							
Group	316	9.18	23.18	3.48	3.48	16.47	2.90
Non-Group	18,626	2.76	20.51	8.87	2.94	17.51	6.89

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¹ This step used demographic variables from screener data for all responding person pairs; DU = dwelling unit, MSA = metropolitan statistical area, NR = nonresponse adjustment, PR = pair, Res = respondent, SDU = screener dwelling unit.

² Weighted extreme value proportion: $100 * \sum_k w_{ek} / \sum_k w_k$, where w_{ek} denotes the weight for extreme values, and w_k denotes the weight for both extreme values and nonextreme values.

³ Outwinsor weight proportion: $100 * \sum_k (w_{ek} - b_k) / \sum_k w_k$, where b_k denotes the winsorized weight.

Table J.3 2013 NSDUH Respondent Pair-Level Proportions of Extreme Values and Outwinors

Domain	n	Before res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT13)			After res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT14)			Final Weight: After res.pr.ev ¹ (SDUWT*PRWT11*...*PRWT15)		
		% Unweighted	% Weighted ²	% Outwinors ³	% Unweighted	% Weighted ²	% Outwinors ³	% Unweighted	% Weighted ²	% Outwinors ³
Total	18,942	2.81	13.07	3.14	2.50	12.22	1.48	1.22	5.60	0.41
<i>Pair Age Group</i>										
12-17, 12-17	3,609	0.75	5.67	1.57	0.80	5.21	0.85	0.44	3.17	0.67
12-17, 18-25	2,754	2.25	10.20	1.91	1.56	6.88	1.03	1.05	4.96	0.55
12-17, 26-34	621	1.45	5.82	1.07	1.29	5.45	1.22	0.97	3.24	0.67
12-17, 35-49	2,756	1.02	5.31	1.06	1.09	3.94	0.63	0.62	2.13	0.27
12-17, 50+	571	0.70	2.16	0.51	1.05	4.09	0.60	0.88	2.12	0.24
18-25, 18-25	3,795	4.87	18.55	4.52	4.11	13.36	1.67	1.42	4.67	0.57
18-25, 26-34	690	3.48	14.89	3.37	3.77	14.92	1.99	1.45	5.98	0.63
18-25, 35-49	990	5.35	16.24	5.93	4.65	15.17	1.98	2.32	6.79	0.45
18-25, 50+	715	2.24	6.65	1.20	2.10	6.62	0.61	0.98	3.15	0.11
26-34, 26-34	581	5.85	19.71	5.91	4.65	14.85	1.81	2.75	6.04	0.41
26-34, 35-49	307	2.93	4.92	1.87	2.61	4.91	1.07	1.63	1.45	0.16
26-34, 50+	163	2.45	14.70	1.99	5.52	19.90	1.86	2.45	9.70	0.33
35-49, 35-49	512	8.20	24.27	6.08	4.10	24.01	2.16	2.34	10.20	0.29
35-49, 50+	245	1.63	16.86	3.06	3.67	13.48	2.09	1.63	5.94	0.54
50+, 50+	633	5.06	17.12	4.03	6.32	17.28	2.00	3.79	8.29	0.59
<i>Pair Race/Ethnicity</i>										
Hispanic or Latino	3,105	4.12	14.95	4.20	2.87	12.73	1.75	1.84	6.20	0.69
Black or African American	2,107	2.90	8.61	1.51	2.75	10.99	1.59	1.66	7.36	0.50
White	10,486	1.80	11.01	2.70	1.81	10.59	1.00	0.35	2.82	0.06
Other	1,173	5.97	34.33	7.27	6.99	25.75	3.45	6.05	20.63	1.94
White & Black or African American	181	2.76	8.43	0.89	4.97	13.87	1.50	2.21	6.21	0.59
White & Hispanic or Latino	664	4.52	9.75	2.45	4.37	15.00	3.23	2.71	10.32	0.96
White & Other	743	3.50	9.59	2.59	0.81	10.95	1.83	0.27	5.15	0.52
Black or African American & Hispanic or Latino	119	10.08	14.79	3.13	3.36	2.82	0.71	2.52	1.78	0.44
Black or African American & Other	202	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hispanic or Latino & Other	162	7.41	16.45	2.54	3.70	7.70	1.15	3.09	5.28	0.55
<i>Pair Gender</i>										
Male, Male	4,162	3.77	14.51	3.40	3.20	15.71	2.21	1.51	9.16	0.78
Female, Female	4,283	2.08	8.46	2.03	2.29	11.57	1.27	1.14	5.18	0.32
Male, Female	10,497	2.73	13.97	3.38	2.31	11.41	1.34	1.14	4.71	0.34
<i>Household Size</i>										
Two	4,488	1.27	6.24	1.33	1.14	6.13	0.89	0.82	3.64	0.34
Three	5,155	3.01	13.97	3.17	2.75	14.76	1.89	1.51	7.78	0.60
Four or More	9,299	3.45	15.98	4.02	3.01	13.89	1.56	1.26	5.41	0.35

Table J.3 2013 NSDUH Respondent Pair-Level Proportions of Extreme Values and Outwinors (continued)

Domain	n	Before res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT13)			After res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT14)			Final Weight: After res.pr.ev ¹ (SDUWT*PRWT11*...*PRWT15)		
		% Unweighted	% Weighted ²	% Outwinor ³	% Unweighted	% Weighted ²	% Outwinor ³	% Unweighted	% Weighted ²	% Outwinor ³
<i>Census Region</i>										
Northeast	3,707	2.27	10.97	3.33	2.48	10.70	1.01	1.35	7.52	0.28
South	5,709	2.45	10.26	1.89	2.29	9.58	1.08	1.07	4.49	0.41
Midwest	5,303	2.94	16.70	3.83	1.90	11.60	1.41	0.79	3.89	0.28
West	4,223	3.62	15.64	4.20	3.53	17.39	2.42	1.87	7.11	0.61
<i>Quarter</i>										
Quarter 1	4,448	3.62	13.13	3.04	2.95	11.76	1.12	1.15	3.87	0.27
Quarter 2	5,065	1.84	14.12	3.19	1.80	11.03	1.78	1.09	6.45	0.54
Quarter 3	4,940	3.02	11.45	2.50	2.39	9.05	1.06	1.15	3.77	0.28
Quarter 4	4,489	2.90	13.60	3.83	2.96	17.08	1.97	1.54	8.29	0.56
<i>% Hispanic or Latino in Segment</i>										
50-100%	1,532	2.74	12.22	3.86	3.00	16.37	2.14	1.37	6.79	0.67
10-<50%	3,542	3.92	16.28	3.87	3.27	15.30	1.51	1.84	6.62	0.53
<10%	13,868	2.54	12.10	2.77	2.24	10.49	1.37	1.05	5.05	0.33
<i>% Black or African American in Segment</i>										
50-100%	1,440	2.99	9.08	1.50	2.78	11.14	1.58	1.88	7.23	0.52
10-<50%	3,089	3.11	10.69	2.32	3.04	11.85	1.50	1.68	7.17	0.66
<10%	14,413	2.73	14.01	3.49	2.35	12.41	1.47	1.06	5.07	0.35
<i>% Owner-Occupied DUs¹ in Segment</i>										
50-100%	14,429	2.63	13.04	2.96	2.25	12.26	1.49	1.12	5.65	0.41
10-<50%	3,526	3.86	13.75	4.12	3.74	12.36	1.45	1.64	5.25	0.39
<10%	987	1.82	8.08	2.31	1.72	9.13	1.38	1.32	6.27	0.85
<i>Combined Median Rent/Housing Value</i>										
1 st Quintile	3,345	2.03	10.67	2.89	2.36	9.14	1.47	1.32	4.37	0.49
2 nd Quintile	4,027	2.36	11.58	3.19	1.91	9.73	1.37	0.97	5.31	0.35
3 rd Quintile	4,164	3.55	11.89	2.71	2.55	15.26	1.91	1.32	8.74	0.52
4 th Quintile	4,154	2.84	13.95	3.15	3.30	15.12	1.32	1.40	5.36	0.42
5 th Quintile	3,252	3.20	16.19	3.64	2.28	10.53	1.36	1.11	3.96	0.30
<i>Population Density</i>										
Large MSA ¹	8,152	3.50	14.96	3.56	3.03	14.84	1.80	1.57	6.94	0.50
Medium to Small MSA ¹	9,390	2.32	10.99	2.69	2.14	9.21	1.09	0.98	3.79	0.31
Non-MSA, ¹ Urban	418	3.11	10.15	2.71	3.11	11.49	1.84	1.67	7.49	0.37
Non-MSA, ¹ Rural	982	1.73	8.29	1.88	1.22	5.74	0.84	0.51	3.89	0.28
<i>Group Quarters</i>										
Group	316	3.48	16.47	3.11	5.06	16.05	1.96	2.22	8.93	1.12
Non-Group	18,626	2.80	13.06	3.14	2.45	12.21	1.48	1.21	5.59	0.41

Table J.3 2013 NSDUH Respondent Pair-Level Proportions of Extreme Values and Outwinsors (continued)

Domain	n	Before res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT13)			After res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT14)			Final Weight: After res.pr.ev ¹ (SDUWT*PRWT11*...*PRWT15)		
		% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³	% Unweighted	% Weighted ²	% Outwinsor ³
<i>Pair Relationship Domain⁴</i>										
Parent-Child (12-14)	1,929	1.14	4.98	0.80	1.50	4.85	0.92	0.88	2.49	0.39
Parent-Child (12-17)	3,630	1.02	4.08	0.72	1.24	4.48	0.74	0.80	2.44	0.33
Parent-Child (12-20)	4,327	1.71	6.45	1.27	1.96	7.81	1.10	1.06	3.53	0.31
Sibling (12-14)-Sibling (15-17)	2,127	0.56	4.20	1.05	0.75	4.08	0.44	0.19	1.01	0.26
Sibling (12-17)-Sibling (18-25)	2,454	2.24	10.42	2.05	1.67	7.44	1.11	1.10	5.31	0.59
Spouse-Spouse/Partner-Partner	3,477	2.82	16.31	3.95	2.76	13.24	1.51	1.50	6.09	0.32
Spouse-Spouse/Partner-Partner with Children (Younger Than 18)	1,559	2.69	11.65	2.01	4.11	16.61	2.23	2.18	8.80	0.42

¹ This step used demographic variables from questionnaire data for all responding person pairs; DU = dwelling unit, EV = extreme value adjustment, MSA = metropolitan statistical area, PR = pair, PS = poststratification adjustment, Res = respondent, SDU = screener dwelling unit.

² Weighted extreme value proportion: $100 * \sum_k w_{ek} / \sum_k w_k$, where w_{ek} denotes the weight for extreme values, and w_k denotes the weight for both extreme values and nonextreme values.

³ Outwinsor weight proportion: $100 * \sum_k (w_{ek} - b_k) / \sum_k w_k$, where b_k denotes the winsorized weight.

⁴ Parent-child (15-17) was not included here since extreme values were not controlled with this domain.

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Appendix K: Evaluation of Calibration Weights: Pair-Level Slippage Rates

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Table K.1 2013 NSDUH Respondent Pair-Level Slippage Rates

Domain	<i>n</i>	Initial Total (<i>I</i>) ¹	Final Total (<i>F</i>) ²	Control Total from SDU (<i>C</i>)	(<i>I</i> - <i>C</i>)/ <i>C</i> %	(<i>F</i> - <i>C</i>)/ <i>C</i> %
Total	18,942	224,250,147	224,250,147	224,250,147	-0.00	-0.00
<i>Pair Age Group</i>						
12-17, 12-17	3,609	7,162,813	7,154,343	7,154,343	0.12	-0.00
12-17, 18-25	2,754	8,249,527	8,301,416	8,301,416	-0.63	-0.00
12-17, 26-34	621	5,448,416	5,329,821	5,329,821	2.23	-0.00
12-17, 35-49	2,756	28,871,175	29,009,935	29,009,935	-0.48	-0.00
12-17, 50+	571	12,191,032	12,210,975	12,210,975	-0.16	-0.00
18-25, 18-25	3,795	12,764,146	12,670,602	12,670,602	0.74	-0.00
18-25, 26-34	690	7,023,978	7,379,912	7,379,912	-4.82	-0.00
18-25, 35-49	990	17,831,473	17,282,314	17,282,314	3.18	0.00
18-25, 50+	715	19,235,291	19,282,629	19,282,629	-0.25	0.00
26-34, 26-34	581	11,049,258	10,736,852	10,736,852	2.91	0.00
26-34, 35-49	307	7,905,848	8,504,123	8,504,123	-7.04	-0.00
26-34, 50+	163	11,682,466	11,887,317	11,887,317	-1.72	0.00
35-49, 35-49	512	18,296,937	18,216,678	18,216,678	0.44	0.00
35-49, 50+	245	19,332,403	17,086,029	17,086,029	13.15	0.00
50+, 50+	633	37,205,383	39,197,202	39,197,202	-5.08	0.00
<i>Pair Race/Ethnicity</i>						
Hispanic or Latino	3,105	41,135,219	39,874,939	39,874,939	3.16	-0.00
Black or African American	2,107	23,740,259	24,651,888	24,651,888	-3.70	0.00
White	10,486	118,877,555	123,204,078	123,204,078	-3.51	0.00
Other	1,173	16,819,348	16,426,903	16,426,903	2.39	-0.00
White & Black or African American	181	1,916,380	2,139,445	2,139,445	-10.43	0.00
White & Hispanic or Latino	664	7,950,749	8,347,150	8,347,150	-4.75	-0.00
White & Other	743	8,458,585	5,926,848	5,926,848	42.72	0.00
Black or African American & Hispanic or Latino	119	1,787,100	1,482,241	1,482,241	20.57	-0.00
Black or African American & Other	202	2,143,233	909,890	909,890	135.55	0.00
Hispanic or Latino & Other	162	1,421,719	1,286,764	1,286,764	10.49	-0.00
<i>Pair Gender</i>						
Male, Male	4,162	40,658,887	40,460,863	40,460,863	0.49	-0.00
Female, Female	4,283	40,657,572	40,661,162	40,661,162	-0.01	-0.00
Male, Female	10,497	142,933,688	143,128,122	143,128,122	-0.14	-0.00
<i>Pair Relationship Domain</i> ^{3,4,5}						
Parent-Child (12-14)*	1,929	11,306,872	12,852,303	12,852,303	-12.02	-0.00
Parent-Child (12-17)*	3,630	23,658,375	25,301,722	25,301,722	-6.50	-0.00
Parent-Child (15-17)*	1,701	12,351,503	12,449,419	12,449,419	-0.79	-0.00
Parent-Child (12-20)*	4,327	31,974,106	34,479,477	34,479,477	-7.27	-0.00
Parent*-Child (12-14)	1,929	18,049,164	19,558,702	19,558,702	-7.72	-0.00
Parent*-Child (12-17)	3,630	30,666,109	32,524,739	32,524,739	-5.71	-0.00
Parent*-Child (15-17)	1,701	18,969,494	19,102,681	19,164,330	-1.02	-0.32
Parent*-Child (12-20)	4,327	38,281,040	40,354,274	40,354,274	-5.14	-0.00
Sibling (12-14)-Sibling (15-17)*	2,127	3,735,337	3,985,542	3,985,542	-6.28	0.00
Sibling (12-17)-Sibling (18-25)*	2,454	6,132,096	6,198,101	6,198,101	-1.06	-0.00
Spouse-Spouse/Partner-Partner	3,477	70,528,847	71,675,874	71,675,874	-1.60	-0.00
Spouse-Spouse/Partner-Partner with Children (Younger Than 18)	1,559	23,683,589	28,837,157	28,837,157	-17.87	-0.00

Table K.1 2013 NSDUH Respondent Pair-Level Slippage Rates (continued)

Domain	<i>n</i>	Initial Total (<i>I</i>)¹	Final Total (<i>F</i>)²	Control Total from SDU (<i>C</i>)	(<i>I</i> - <i>C</i>)/<i>C</i>%	(<i>F</i> - <i>C</i>)/<i>C</i>%
<i>Household Size</i>						
Two	4,488	54,941,498	54,941,498	54,941,498	-0.00	-0.00
Three	5,155	58,543,122	58,543,122	58,543,122	-0.00	-0.00
Four or More	9,299	110,765,528	110,765,528	110,765,528	0.00	-0.00
<i>Census Region</i>						
Northeast	3,707	40,306,807	40,306,807	40,306,807	-0.00	0.00
South	5,709	80,879,360	80,879,360	80,879,360	-0.00	-0.00
Midwest	5,303	44,742,842	44,742,842	44,742,842	0.00	-0.00
West	4,223	58,321,138	58,321,138	58,321,138	-0.00	-0.00
<i>Quarter</i>						
Quarter 1	4,448	55,221,415	55,221,415	55,221,415	-0.00	-0.00
Quarter 2	5,065	56,180,433	56,180,433	56,180,433	-0.00	-0.00
Quarter 3	4,940	56,916,096	56,916,096	56,916,096	-0.00	-0.00
Quarter 4	4,489	55,932,203	55,932,203	55,932,203	-0.00	-0.00
<i>% Hispanic or Latino in Segment</i>						
50-100%	1,532	24,056,202	24,056,202	24,056,202	-0.00	0.00
10-<50%	3,542	51,184,207	51,184,207	51,184,207	-0.00	-0.00
<10%	13,868	149,009,737	149,009,737	149,009,737	0.00	-0.00
<i>% Black or African American in Segment</i>						
50-100%	1,440	16,494,619	16,494,619	16,494,619	-0.00	-0.00
10-<50%	3,089	39,161,607	39,161,607	39,161,607	-0.00	-0.00
<10%	14,413	168,593,921	168,593,921	168,593,921	-0.00	-0.00
<i>% Owner-Occupied DUs in Segment</i>						
50-100%	14,429	183,305,060	183,305,060	183,305,060	-0.00	-0.00
10-<50%	3,526	36,958,484	36,958,484	36,958,484	-0.00	-0.00
<10%	987	3,986,603	3,986,603	3,986,603	-0.00	-0.00
<i>Combined Median Rent/Housing Value</i>						
1 st Quintile	3,345	33,270,182	33,270,182	33,270,182	-0.00	-0.00
2 nd Quintile	4,027	43,423,350	43,423,351	43,423,351	-0.00	-0.00
3 rd Quintile	4,164	46,214,553	46,214,553	46,214,553	-0.00	-0.00
4 th Quintile	4,154	52,393,430	52,393,430	52,393,430	-0.00	-0.00
5 th Quintile	3,252	48,948,630	48,948,630	48,948,630	-0.00	-0.00
<i>Population Density</i>						
Large MSA	8,152	124,159,885	124,159,885	124,159,885	-0.00	-0.00
Medium to Small MSA	9,390	87,771,007	87,771,007	87,771,007	-0.00	-0.00
Non-MSA, Urban	418	3,303,042	3,303,042	3,303,042	0.00	-0.00
Non-MSA, Rural	982	9,016,213	9,016,213	9,016,213	0.00	0.00
<i>Group Quarters</i>						
Group	316	662,076	662,076	662,076	-0.00	-0.00
Non-Group	18,626	223,588,071	223,588,071	223,588,071	-0.00	-0.00

DU = dwelling unit, MSA = metropolitan statistical area, SDU = screener dwelling unit.

¹ WT1*...*WT10*PRWT11*...*PRWT13 (before person pair poststratification).

² WT1*...*WT10*PRWT11*...*PRWT14 (after person pair poststratification).

³ The member of the pair that is the focus is designated with an asterisk (*).

⁴ The parent-child (15-17) pair domains were not controlled for within the modeling and thus have higher slippage rates than the other domains listed. However, since these domains are a subset of other controlled domains, the rates are not large.

⁵ Slippage rates were not calculated for the sibling-sibling domains with the younger child as the focus since no household counts for this domain were calculated and are required to construct the appropriate controls totals.

**Appendix L: Evaluation of Calibration Weights: Pair-Level
Weight Summary Statistics**

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Table L.1 2013 NSDUH Selected Pair-Level Weight Summary Statistics

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*...*WT10)						Before sel.pr.ps ¹ (SDUWT*PRWT11)						After sel.pr.ps ¹ (SDUWT*PRWT11*PRWT12)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
Total	27,108	11	442	662	1,102	8,564	1.57	15	1,110	2,900	7,854	7,171,488	62.54	7	978	2,809	7,696	1,129,922	9.90
<i>Pair Age Group</i>																			
12-17, 12-17	4,535	11	368	603	1,014	8,564	1.66	15	573	971	1,836	39,580	2.64	7	321	814	1,958	36,200	2.99
12-17, 18-25	3,662	33	466	678	1,166	7,600	1.60	55	760	1,357	2,420	59,901	3.05	19	733	1,486	2,807	21,668	2.21
12-17, 26-34	811	45	383	637	1,100	7,114	1.66	254	2,445	4,241	7,459	62,409	2.06	129	2,002	4,298	7,790	55,960	2.38
12-17, 35-49	3,834	29	453	643	1,067	5,339	1.49	183	3,009	5,092	9,053	192,028	2.51	93	2,392	4,617	9,103	175,466	2.69
12-17, 50+	833	42	470	667	1,109	4,085	1.50	611	6,062	9,356	16,610	273,990	2.90	278	4,946	9,290	17,345	179,352	2.54
18-25, 18-25	5,478	16	449	706	1,170	7,890	1.59	73	808	1,390	2,512	104,818	3.27	18	628	1,285	2,978	29,987	2.46
18-25, 26-34	1,034	58	468	723	1,206	4,356	1.52	411	2,848	4,782	7,739	70,429	2.37	121	2,021	4,031	8,463	78,517	2.75
18-25, 35-49	1,561	38	472	696	1,166	7,298	1.53	329	3,181	6,165	10,957	264,097	3.52	115	2,711	6,095	12,947	135,431	2.83
18-25, 50+	1,173	22	505	689	1,165	4,102	1.48	287	6,284	9,975	17,235	422,122	3.46	491	5,465	10,080	19,777	194,109	2.42
26-34, 26-34	822	32	447	661	1,055	6,149	1.54	618	5,387	7,737	12,795	939,298	10.41	306	3,678	6,782	12,702	781,737	8.81
26-34, 35-49	489	33	429	655	1,070	4,766	1.51	443	5,660	9,239	15,833	1,577,269	15.22	305	2,979	5,411	11,496	522,477	8.65
26-34, 50+	318	60	451	693	1,102	8,139	1.75	1,641	12,486	18,802	32,475	456,118	2.84	684	11,831	24,505	48,241	594,761	2.56
35-49, 35-49	857	30	468	636	1,050	7,383	1.59	391	5,724	8,762	14,584	704,399	9.19	296	4,610	9,020	17,458	927,441	10.29
35-49, 50+	462	50	464	676	1,040	3,344	1.47	1,491	9,809	16,420	27,144	6,732,583	53.66	642	9,039	16,626	37,075	830,933	5.53
50+, 50+	1,239	37	456	634	1,002	3,953	1.44	1,360	13,265	18,864	31,332	7,171,488	42.53	585	12,919	21,278	36,444	1,129,922	3.64
<i>Pair Race/Ethnicity</i>																			
Hispanic or Latino	4,280	11	511	862	1,344	8,564	1.53	15	1,395	3,339	8,258	939,298	8.50	7	1,216	3,290	8,446	786,562	8.63
Black or African American	2,760	36	533	767	1,146	7,890	1.50	60	1,224	2,931	7,673	422,122	6.37	13	1,024	2,865	7,943	340,506	5.87
White	15,917	42	432	620	990	6,266	1.51	52	1,039	2,817	7,756	7,171,488	61.79	16	938	2,695	7,305	1,129,922	11.20
Other	1,886	29	234	604	1,230	7,567	1.85	38	858	2,407	7,703	589,039	8.29	8	614	2,366	7,208	830,933	10.22
White & Black or African American	219	54	500	702	1,230	3,749	1.47	80	1,082	3,913	9,284	65,734	2.64	54	1,344	4,574	11,647	126,752	3.54
White & Hispanic or Latino	907	22	472	711	1,251	4,288	1.49	99	1,393	3,358	8,672	6,732,583	196.06	44	1,111	3,146	8,229	719,450	12.22
White & Other	728	33	273	544	925	4,172	1.69	67	1,016	2,805	7,489	571,202	11.89	27	913	2,683	8,192	629,043	11.62
Black or African American & Hispanic or Latino	112	33	562	917	1,668	8,139	1.81	195	1,271	2,992	10,703	336,292	10.62	50	1,357	3,612	10,613	136,754	4.24
Black or African American & Other	132	37	405	634	1,236	5,667	1.76	62	1,572	3,473	7,063	176,741	6.43	44	1,114	3,062	6,227	106,047	4.42
Hispanic or Latino & Other	167	45	287	631	1,332	6,436	2.26	103	1,107	2,359	7,566	108,727	4.66	67	939	2,625	6,448	104,508	4.83

Table L.1 2013 NSDUH Selected Pair-Level Weight Summary Statistics (continued)

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*... ² WT10)						Before sel.pr.ps ¹ (SDUWT*PRWT11)						After sel.pr.ps ¹ (SDUWT*PRWT11*PRWT12)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
<i>Pair Gender</i>																			
Male, Male	6,032	11	430	655	1,101	8,564	1.64	37	984	2,383	6,381	6,732,583	147.01	17	917	2,504	6,377	719,450	7.52
Female, Female	5,782	25	445	684	1,118	7,357	1.54	52	1,099	2,642	7,038	422,122	5.91	16	889	2,589	6,740	204,261	5.21
Male, Female	15,294	11	443	657	1,097	8,139	1.56	15	1,192	3,257	8,859	7,171,488	51.55	7	1,055	3,083	8,678	1,129,922	11.08
<i>Household Size</i>																			
Two	6,834	16	444	648	1,050	7,383	1.49	73	1,342	4,382	11,077	88,628	2.48	18	849	2,798	9,396	186,299	3.60
Three	7,472	17	433	648	1,074	7,567	1.58	27	1,194	3,127	6,953	7,171,488	130.90	8	1,183	3,157	7,102	1,129,922	11.74
Four or More	12,802	11	445	680	1,159	8,564	1.60	15	994	2,319	7,038	6,732,583	57.13	7	952	2,592	7,177	923,484	11.89
<i>Census Region</i>																			
Northeast	5,543	29	356	603	825	7,890	1.58	38	993	2,626	7,182	577,157	6.61	8	822	2,533	6,975	923,484	9.37
South	7,992	11	650	909	1,326	7,089	1.41	15	1,528	4,051	10,260	1,577,269	13.15	7	1,315	3,824	9,728	830,933	8.73
Midwest	7,635	22	447	551	708	4,281	1.34	32	874	2,306	6,148	7,171,488	154.32	28	890	2,230	5,566	1,129,922	15.45
West	5,938	23	281	724	1,477	8,564	1.72	27	1,108	2,913	8,866	6,732,583	82.38	16	924	2,885	9,057	719,450	7.72
<i>Quarter</i>																			
Quarter1	6,262	22	468	706	1,218	7,890	1.58	37	1,158	3,086	8,251	909,645	9.65	8	1,038	3,112	8,240	927,441	9.50
Quarter2	7,206	11	403	645	1,056	6,395	1.50	15	1,072	2,745	7,531	589,039	8.67	7	954	2,616	7,151	923,484	10.58
Quarter3	7,074	16	440	622	1,020	8,139	1.61	39	1,078	2,815	7,525	7,171,488	166.20	8	931	2,683	7,327	1,129,922	11.95
Quarter4	6,566	23	462	671	1,162	8,564	1.58	27	1,162	3,006	8,176	1,577,269	15.54	14	1,018	2,909	8,062	726,673	7.64
<i>% Hispanic or Latino in Segment</i>																			
50-100%	2,154	97	614	1,054	1,430	8,139	1.35	148	1,801	4,323	9,802	422,122	6.21	30	1,529	3,833	9,802	399,096	5.66
10-<50%	5,043	11	570	865	1,441	8,564	1.45	15	1,532	3,849	9,640	6,732,583	86.03	7	1,366	3,642	9,334	781,737	9.48
<10%	19,911	16	368	604	954	7,890	1.61	32	975	2,581	7,202	7,171,488	58.29	8	870	2,500	7,007	1,129,922	10.69
<i>% Black or African American in Segment</i>																			
50-100%	1,858	11	514	730	1,043	6,395	1.60	15	1,248	3,083	7,741	245,928	5.09	7	1,062	2,969	7,899	340,506	6.01
10-<50%	4,247	33	548	829	1,304	7,567	1.46	38	1,388	3,305	8,569	939,298	10.53	9	1,208	3,244	8,508	786,562	9.21
<10%	21,003	22	395	627	1,065	8,564	1.59	27	1,047	2,808	7,738	7,171,488	78.06	8	931	2,698	7,456	1,129,922	10.47
<i>% Owner-Occupied DUs¹ in Segment</i>																			
50-100%	20,832	11	444	645	1,077	8,564	1.57	15	1,117	3,015	8,162	7,171,488	71.56	7	1,070	3,044	8,209	1,129,922	10.26
10-<50%	4,887	23	414	696	1,169	8,139	1.59	27	1,091	2,612	7,145	574,927	7.56	13	939	2,709	6,964	441,560	6.26
<10%	1,389	17	483	798	1,291	7,357	1.55	38	1,112	2,249	6,253	345,535	6.32	13	465	1,006	2,670	87,382	6.06
<i>Combined Median Rent/Housing Value</i>																			
1 st Quintile	4,435	26	345	598	1,018	8,139	1.72	38	995	2,579	6,889	577,157	10.04	8	855	2,443	6,913	923,484	9.49
2 nd Quintile	5,633	23	419	639	1,030	7,279	1.59	32	1,051	2,762	7,220	7,171,488	138.52	13	880	2,547	6,957	1,129,922	11.12
3 rd Quintile	5,931	17	370	612	1,042	7,089	1.62	27	1,000	2,619	7,248	6,732,583	124.32	8	863	2,583	7,065	786,562	8.86
4 th Quintile	6,080	11	475	700	1,163	8,564	1.55	15	1,194	2,985	8,111	1,577,269	15.51	7	1,066	2,880	7,871	927,441	11.53
5 th Quintile	5,029	29	538	782	1,237	7,890	1.42	41	1,398	3,706	10,002	1,397,929	11.81	16	1,309	3,725	9,691	830,933	8.15

Table L.1 2013 NSDUH Selected Pair-Level Weight Summary Statistics (continued)

Domain	n	SDU-Level Weights ¹ (SDUWT: WT1*... ² WT10)						Before sel.pr.ps ¹ (SDUWT*PRWT11)						After sel.pr.ps ¹ (SDUWT*PRWT11*PRWT12)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
<i>Population Density</i>																			
Large MSA¹	11,963	11	588	822	1,343	8,564	1.42	15	1,557	3,980	9,806	6,732,583	45.62	7	1,492	3,955	9,947	927,441	7.83
Medium to Small MSA¹	13,217	22	302	552	897	7,279	1.66	27	887	2,257	6,417	7,171,488	92.01	8	745	2,124	6,053	1,129,922	13.08
Non-MSA,¹ Urban	559	50	252	533	876	3,394	1.61	67	797	1,806	5,354	455,771	13.22	18	575	1,608	4,892	323,285	9.89
Non-MSA,¹ Rural	1,369	26	191	464	828	6,266	2.01	40	745	1,966	5,675	295,614	7.38	19	678	2,054	6,040	357,833	7.74
<i>Group Quarters</i>																			
Group	370	25	233	541	810	3,749	1.82	132	674	1,064	1,583	22,493	2.69	63	531	915	1,767	47,079	4.43
Non-Group	26,738	11	446	664	1,107	8,564	1.57	15	1,127	2,954	7,957	7,171,488	62.01	7	994	2,863	7,801	1,129,922	9.82

¹ This step used demographic variables from screener data for all selected person pairs; DU = dwelling unit, MSA = metropolitan statistical area, PR = pair, PS = poststratification, SDU = screener dwelling unit, Sel = selected.

² Q1 and Q3 refer to the first and third quartile of the weight distribution.

³ Unequal weighting effect (UWE) is defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

Table L.2 2013 NSDUH Respondent Pair-Level Weight Summary Statistics (res.pr.nr)

Domain	n	Before res.pr.nr ¹ (SDUWT*PRWT11*PRWT12)						After res.pr.nr ¹ (SDUWT*PRWT11*...*PRWT13)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
Total	18,942	7	906	2,529	6,823	927,441	9.91	8	1,083	3,197	9,482	1,685,485	10.93
<i>Pair Age Group</i>													
12-17, 12-17	3,623	7	321	831	1,991	36,200	3.04	8	371	1,017	2,412	43,236	3.07
12-17, 18-25	2,763	19	758	1,509	2,908	21,668	2.20	19	932	1,915	3,653	48,569	2.42
12-17, 26-34	604	129	1,937	4,170	7,572	55,960	2.37	130	2,211	5,384	10,239	115,240	2.71
12-17, 35-49	2,763	93	2,376	4,617	9,154	175,466	2.77	93	2,852	6,238	12,528	245,631	2.84
12-17, 50+	564	283	4,758	9,248	17,413	150,818	2.47	283	6,037	12,768	26,332	187,422	2.44
18-25, 18-25	3,866	18	619	1,255	2,930	29,987	2.51	18	686	1,553	4,239	48,416	2.80
18-25, 26-34	654	202	1,944	3,785	8,334	78,517	2.79	202	2,265	5,130	12,813	182,153	3.32
18-25, 35-49	998	115	2,710	6,115	13,479	135,431	2.92	115	3,518	9,162	22,217	216,853	2.68
18-25, 50+	713	491	5,532	10,339	20,118	194,109	2.31	502	7,966	16,834	33,106	214,781	2.27
26-34, 26-34	546	306	3,591	6,796	13,104	271,894	3.41	400	4,266	8,514	18,247	457,803	4.69
26-34, 35-49	308	305	2,710	5,077	11,253	522,477	9.06	329	2,772	5,566	14,211	752,363	10.02
26-34, 50+	155	714	11,126	23,473	47,391	594,761	3.26	969	16,558	43,805	96,493	848,047	2.65
35-49, 35-49	514	296	4,104	8,839	17,323	927,441	10.97	408	4,779	11,727	26,598	1,497,014	10.53
35-49, 50+	235	642	8,427	16,659	34,889	830,933	5.00	643	15,283	36,453	98,434	1,139,233	3.01
50+, 50+	636	585	11,859	20,704	34,818	923,484	3.47	705	20,697	40,115	74,997	1,685,485	3.57
<i>Pair Race/Ethnicity</i>													
Hispanic or Latino	3,064	7	1,132	2,980	7,858	399,096	6.52	8	1,375	3,716	10,583	752,363	8.02
Black or African American	2,162	13	942	2,632	6,938	340,506	6.68	13	1,076	3,089	8,480	441,587	6.79
White	10,841	16	875	2,405	6,565	927,441	12.09	16	1,074	3,122	9,253	1,685,485	13.48
Other	1,220	8	495	1,852	5,291	830,933	18.27	8	555	2,359	8,234	1,139,233	12.68
White & Black or African American	173	54	1,341	4,494	12,062	126,752	3.38	54	1,346	4,727	11,700	154,974	4.40
White & Hispanic or Latino	637	44	975	2,849	7,727	102,424	3.73	44	1,297	4,308	12,190	236,861	4.77
White & Other	529	27	855	2,546	7,440	115,548	4.06	27	992	2,936	9,305	234,811	5.89
Black or African American & Hispanic or Latino	84	50	1,415	3,417	8,663	113,622	4.32	50	1,645	4,485	13,474	241,927	5.86
Black or African American & Other	106	44	1,106	2,659	6,408	106,047	4.66	49	1,254	2,944	7,268	133,130	5.50
Hispanic or Latino & Other	126	67	902	2,728	6,303	104,508	5.00	68	1,028	3,625	8,340	134,814	4.69
<i>Pair Gender</i>													
Male, Male	4,165	19	853	2,259	5,720	340,506	5.76	19	1,026	2,829	8,167	441,587	7.28
Female, Female	4,287	16	857	2,424	6,208	204,261	5.27	16	998	3,000	8,247	283,706	6.54
Male, Female	10,490	7	945	2,706	7,603	927,441	11.58	8	1,141	3,458	10,813	1,685,485	12.11
<i>Household Size</i>													
Two	4,488	18	775	2,237	7,941	186,299	4.02	18	835	2,420	10,467	264,397	5.54
Three	5,155	8	1,056	2,828	6,341	927,441	10.56	8	1,320	3,959	9,440	908,081	8.74
Four or More	9,299	7	914	2,448	6,724	923,484	11.80	8	1,108	3,147	9,141	1,685,485	14.78

Table L.2 2013 NSDUH Respondent Pair-Level Weight Summary Statistics (res.pr.nr) (continued)

Domain	n	Before res.pr.nr ¹ (SDUWT*PRWT11*PRWT12)						After res.pr.nr ¹ (SDUWT*PRWT11*...*PRWT13)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
<i>Census Region</i>													
Northeast	3,707	8	704	2,134	5,939	923,484	12.63	8	838	2,908	8,689	1,685,485	14.56
South	5,709	7	1,217	3,295	8,991	830,933	7.97	8	1,397	4,417	12,417	1,497,014	9.05
Midwest	5,303	28	850	2,016	4,837	927,441	14.22	49	1,042	2,561	6,549	1,157,049	14.36
West	4,223	16	859	2,607	7,981	599,773	7.87	16	1,003	3,154	10,539	848,047	8.51
<i>Quarter</i>													
Quarter1	4,448	8	946	2,748	7,153	927,441	9.80	8	1,151	3,565	10,157	908,081	8.80
Quarter2	5,065	7	884	2,386	6,506	923,484	13.28	8	1,016	2,893	8,339	1,685,485	14.90
Quarter3	4,940	8	869	2,405	6,494	399,096	6.69	8	1,054	3,185	9,548	752,363	7.56
Quarter4	4,489	16	940	2,619	6,975	726,673	9.33	16	1,118	3,290	9,672	1,497,014	12.56
<i>% Hispanic or Latino in Segment</i>													
50-100%	1,532	30	1,444	3,509	8,956	399,096	6.44	30	1,758	4,480	11,887	752,363	8.27
10-<50%	3,542	7	1,224	3,288	8,580	726,673	8.21	8	1,464	4,338	12,076	1,497,014	9.28
<10%	13,868	8	808	2,242	6,167	927,441	11.12	8	965	2,847	8,541	1,685,485	11.89
<i>% Black or African American in Segment</i>													
50-100%	1,440	7	983	2,676	6,958	340,506	7.20	8	1,102	3,144	8,566	441,587	7.41
10-<50%	3,089	9	1,123	3,041	7,905	340,265	5.41	9	1,253	3,760	10,673	859,316	7.12
<10%	14,413	8	864	2,400	6,570	927,441	11.46	8	1,043	3,079	9,342	1,685,485	12.22
<i>% Owner-Occupied DUs¹ in Segment</i>													
50-100%	14,429	7	981	2,736	7,296	927,441	10.31	8	1,196	3,479	10,214	1,685,485	11.24
10-<50%	3,526	13	882	2,442	6,256	309,611	6.13	13	995	3,006	8,433	513,167	7.00
<10%	987	13	408	917	2,429	77,684	6.04	13	439	1,096	3,020	225,581	8.51
<i>Combined Median Rent/Housing Value</i>													
1 st Quintile	3,345	8	820	2,245	6,019	923,484	11.78	8	934	2,664	7,794	1,685,485	15.57
2 nd Quintile	4,027	13	840	2,326	6,247	399,096	7.59	13	992	2,925	8,339	859,316	10.06
3 rd Quintile	4,164	8	812	2,354	6,377	481,964	6.18	8	977	2,984	9,182	997,377	8.24
4 th Quintile	4,154	7	970	2,636	7,178	927,441	13.97	8	1,141	3,316	9,665	1,497,014	13.40
5 th Quintile	3,252	16	1,154	3,208	8,500	830,933	7.92	16	1,489	4,398	13,567	1,157,049	8.26
<i>Population Density</i>													
Large MSA ¹	8,152	7	1,349	3,542	8,927	927,441	8.33	8	1,679	4,684	12,837	1,157,049	8.50
Medium to Small MSA ¹	9,390	8	708	1,942	5,357	923,484	11.76	8	818	2,395	7,319	1,685,485	14.67
Non-MSA, ¹ Urban	418	18	556	1,453	4,194	127,044	6.33	18	678	2,074	6,331	156,883	6.21
Non-MSA, ¹ Rural	982	19	608	1,834	5,414	357,833	9.68	19	679	2,229	7,258	459,626	9.21
<i>Group Quarters</i>													
Group	316	76	531	915	1,720	47,079	4.69	78	560	924	1,806	57,649	5.18
Non-Group	18,626	7	921	2,589	6,915	927,441	9.81	8	1,108	3,279	9,626	1,685,485	10.81

¹ This step used demographic variables from screener data for all selected person pairs; DU = dwelling unit, MSA = metropolitan statistical area, NR = nonresponse adjustment, PR = pair, Res = respondent, SDU = screener dwelling unit.

² Q1 and Q3 refer to the first and third quartile of the weight distribution.

³ Unequal weighting effect (UWE) is defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

Table L.3 2013 NSDUH Respondent Pair-Level Weight Summary Statistics (res.pr.ps and res.pr.ev)

Domain	n	Before res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT13)						After res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT14)						Final Weight: After res.pr.ev ¹ (SDUWT*PRWT11*...*PRWT15)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
Total	18,942	8	1,083	3,197	9,482	1,685,485	10.93	3	990	3,096	9,308	1,271,216	10.45	3	968	3,080	9,337	1,195,456	10.28
<i>Pair Age Group</i>																			
12-17, 12-17	3,609	8	373	1,025	2,442	43,236	3.06	3	322	966	2,489	37,003	3.15	3	317	955	2,465	38,543	3.16
12-17, 18-25	2,754	19	924	1,900	3,652	48,569	2.44	8	877	1,852	3,647	37,261	2.44	8	860	1,845	3,677	35,732	2.43
12-17, 26-34	621	69	2,300	5,306	10,232	115,240	2.69	30	2,135	4,976	9,962	117,854	2.75	27	2,027	4,983	9,928	119,655	2.75
12-17, 35-49	2,756	93	2,832	6,202	12,454	245,631	2.86	53	2,722	6,185	12,654	176,205	2.81	44	2,683	6,121	12,521	152,154	2.84
12-17, 50+	571	283	6,035	12,602	26,170	187,422	2.45	110	5,652	11,960	27,411	216,255	2.67	90	5,513	11,649	27,395	222,049	2.69
18-25, 18-25	3,795	18	685	1,543	4,208	235,679	4.12	9	584	1,477	4,298	165,972	3.35	8	553	1,460	4,357	162,763	3.31
18-25, 26-34	690	102	2,093	4,551	10,853	182,153	3.54	62	1,941	4,338	12,210	160,535	3.64	57	1,855	4,296	12,499	166,719	3.66
18-25, 35-49	990	115	3,473	9,235	22,459	513,167	3.37	56	2,933	8,212	22,237	209,587	2.95	44	2,922	8,218	22,612	193,297	2.86
18-25, 50+	715	151	7,851	16,532	32,655	214,781	2.32	94	7,083	15,844	33,364	215,336	2.40	79	6,957	15,742	33,538	222,488	2.39
26-34, 26-34	581	400	4,016	8,373	18,069	457,803	4.71	179	3,509	8,090	17,844	620,068	5.17	151	3,344	7,991	17,823	641,490	5.36
26-34, 35-49	307	329	2,796	5,565	14,415	752,363	9.92	181	2,237	6,616	15,790	867,033	11.16	146	2,074	6,227	15,327	880,626	11.33
26-34, 50+	163	969	15,145	37,322	92,373	848,047	2.82	502	12,670	38,850	88,492	709,551	2.71	454	12,782	38,097	90,085	730,214	2.69
35-49, 35-49	512	408	4,832	11,727	26,586	1,497,014	10.46	156	3,766	9,818	24,628	1,271,216	11.02	126	3,560	9,730	24,444	1,195,456	10.70
35-49, 50+	245	643	15,222	36,741	98,434	1,685,485	4.35	352	8,960	27,723	97,556	1,096,589	3.83	295	8,612	28,527	98,943	1,080,852	3.71
50+, 50+	633	705	20,017	39,878	73,150	1,157,049	2.62	174	21,438	43,564	74,519	919,973	2.34	165	20,795	44,172	75,467	870,469	2.28
<i>Pair Race/Ethnicity</i>																			
Hispanic or Latino	3,105	8	1,376	3,730	10,694	752,363	7.93	5	1,327	3,740	10,429	814,954	8.20	5	1,321	3,650	10,439	814,540	8.25
Black or African American	2,107	13	1,080	3,054	8,560	441,587	6.67	5	986	3,074	8,925	438,441	7.06	4	964	3,083	8,971	437,442	7.07
White	10,486	16	1,074	3,110	9,253	1,685,485	13.68	11	1,057	3,163	9,295	1,271,216	11.96	11	1,030	3,138	9,258	1,195,456	11.66
Other	1,173	8	622	2,668	9,250	1,139,233	11.71	3	613	2,463	9,716	1,096,589	12.05	3	585	2,470	9,867	1,080,852	11.95
White & Black or African American	181	71	1,334	3,206	9,812	147,066	4.47	20	1,246	3,054	9,770	194,598	4.80	19	1,165	3,129	10,073	191,032	4.85
White & Hispanic or Latino	664	44	1,183	4,017	11,438	236,861	4.87	18	1,015	3,755	13,295	315,768	5.64	16	1,007	3,762	13,003	276,392	5.23
White & Other	743	19	873	2,959	9,042	280,720	7.17	7	436	1,454	5,728	343,850	10.64	6	408	1,388	5,526	326,062	10.61
Black or African American & Hispanic or Latino	119	50	1,382	3,712	12,441	241,927	6.11	20	872	2,681	11,787	211,553	6.88	16	827	2,486	10,308	220,002	7.37
Black or African American & Other	202	49	897	2,635	6,553	283,706	8.55	10	282	917	2,638	88,595	9.14	10	271	872	2,657	90,196	9.14
Hispanic or Latino & Other	162	58	799	3,295	8,612	134,814	4.71	24	619	2,110	8,442	186,417	6.25	21	597	2,097	8,062	193,769	6.53

Table L.3 2013 NSDUH Respondent Pair-Level Weight Summary Statistics (res.pr.ps and res.pr.ev) (continued)

Domain	n	Before res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT13)						After res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT14)						Final Weight: After res.pr.ev ¹ (SDUWT*PRWT11*...*PRWT15)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
<i>Pair Gender</i>																			
Male, Male	4,162	19	1,026	2,840	8,163	441,587	7.38	10	958	2,732	8,244	418,184	7.64	9	943	2,732	8,212	422,095	7.52
Female, Female	4,283	16	998	2,992	8,247	283,706	6.55	9	892	2,883	8,162	291,431	6.82	8	864	2,859	8,145	265,910	6.75
Male, Female	10,497	8	1,141	3,455	10,813	1,685,485	12.11	3	1,065	3,356	10,360	1,271,216	11.33	3	1,032	3,303	10,353	1,195,456	11.14
<i>Household Size</i>																			
Two	4,488	18	835	2,420	10,467	264,397	5.54	9	699	2,277	9,659	343,850	5.87	8	652	2,169	9,505	291,719	5.95
Three	5,155	8	1,320	3,959	9,440	908,081	8.74	3	1,263	3,853	9,450	867,033	8.58	3	1,259	3,885	9,496	880,626	8.43
Four or More	9,299	8	1,108	3,147	9,141	1,685,485	14.78	4	1,068	3,074	9,019	1,271,216	13.72	3	1,057	3,091	9,090	1,195,456	13.41
<i>Census Region</i>																			
Northeast	3,707	8	838	2,908	8,689	1,685,485	14.56	3	749	2,712	8,610	1,271,216	12.38	3	739	2,710	8,533	1,195,456	11.77
South	5,709	8	1,397	4,417	12,417	1,497,014	9.05	5	1,216	4,115	12,107	1,165,611	9.11	4	1,189	4,072	11,916	1,118,032	9.10
Midwest	5,303	49	1,042	2,561	6,549	1,157,049	14.36	20	1,030	2,569	6,794	919,973	12.29	19	1,005	2,545	6,715	870,469	12.11
West	4,223	16	1,003	3,154	10,539	848,047	8.51	7	905	3,159	10,541	902,878	9.00	6	884	3,142	10,648	838,802	8.87
<i>Quarter</i>																			
Quarter1	4,448	8	1,151	3,565	10,157	908,081	8.80	5	1,102	3,431	10,024	902,878	8.94	4	1,085	3,410	10,088	838,802	8.85
Quarter2	5,065	8	1,016	2,893	8,339	1,685,485	14.90	6	895	2,716	8,332	1,096,589	12.42	6	876	2,703	8,341	1,080,852	12.23
Quarter3	4,940	8	1,054	3,185	9,548	752,363	7.56	3	967	3,108	9,296	814,954	8.46	3	938	3,090	9,342	814,540	8.63
Quarter4	4,489	16	1,118	3,290	9,672	1,497,014	12.56	8	1,038	3,234	9,658	1,271,216	11.96	7	1,015	3,201	9,736	1,195,456	11.40
<i>% Hispanic or Latino in Segment</i>																			
50-100%	1,532	30	1,758	4,480	11,887	752,363	8.27	17	1,795	4,491	12,018	814,954	8.55	16	1,790	4,478	12,138	814,540	8.49
10-<50%	3,542	8	1,464	4,338	12,076	1,497,014	9.28	5	1,354	4,103	11,906	1,165,611	9.31	4	1,315	4,093	11,724	1,118,032	9.12
<10%	13,868	8	965	2,847	8,541	1,685,485	11.89	3	886	2,759	8,443	1,271,216	11.02	3	866	2,744	8,402	1,195,456	10.83
<i>% Black or African American in Segment</i>																			
50-100%	1,440	8	1,102	3,144	8,566	441,587	7.41	5	985	3,036	8,750	438,441	7.85	5	954	2,976	8,827	437,442	7.89
10-<50%	3,089	9	1,253	3,760	10,673	859,316	7.12	5	1,098	3,586	10,369	820,216	7.42	4	1,062	3,504	10,461	823,924	7.46
<10%	14,413	8	1,043	3,079	9,342	1,685,485	12.22	3	979	3,028	9,139	1,271,216	11.45	3	958	3,003	9,149	1,195,456	11.21
<i>% Owner-Occupied DUs¹ in Segment</i>																			
50-100%	14,429	8	1,196	3,479	10,214	1,685,485	11.24	3	1,127	3,375	9,952	1,271,216	10.75	3	1,102	3,335	9,970	1,195,456	10.56
10-<50%	3,526	13	995	3,006	8,433	513,167	7.00	6	854	2,934	8,760	438,441	6.62	6	833	2,879	8,628	437,442	6.60
<10%	987	13	439	1,096	3,020	225,581	8.51	5	330	933	2,870	226,197	9.21	4	315	897	2,868	228,699	9.42
<i>Combined Median Rent/Housing Value</i>																			
1 st Quintile	3,345	8	934	2,664	7,794	1,685,485	15.57	5	880	2,554	7,692	1,040,075	11.71	5	860	2,527	7,693	994,633	11.60
2 nd Quintile	4,027	13	992	2,925	8,339	859,316	10.06	5	913	2,877	8,303	820,216	10.25	4	878	2,845	8,188	823,924	10.31
3 rd Quintile	4,164	8	977	2,984	9,182	997,377	8.24	3	868	2,832	8,941	1,271,216	9.55	3	842	2,818	9,017	1,195,456	9.12
4 th Quintile	4,154	8	1,141	3,316	9,665	1,497,014	13.40	6	1,049	3,254	9,492	1,165,611	12.63	6	1,027	3,240	9,525	1,118,032	12.52
5 th Quintile	3,252	16	1,489	4,398	13,567	1,157,049	8.26	11	1,414	4,388	13,144	1,096,589	7.92	11	1,379	4,348	13,018	1,080,852	7.72

Table L.3 2013 NSDUH Respondent Pair-Level Weight Summary Statistics (res.pr.ps and res.pr.ev) (continued)

Domain	n	Before res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT13)						After res.pr.ps ¹ (SDUWT*PRWT11*...*PRWT14)						Final Weight: After res.pr.ev ¹ (SDUWT*PRWT11*...*PRWT15)					
		Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³	Min	Q1 ²	Med	Q3 ²	Max	UWE ³
<i>Population Density</i>																			
Large MSA¹	8,152	8	1,679	4,684	12,837	1,157,049	8.50	4	1,578	4,601	12,794	1,271,216	8.52	3	1,566	4,604	12,819	1,195,456	8.30
Medium to Small MSA¹	9,390	8	818	2,395	7,319	1,685,485	14.67	3	737	2,327	7,273	1,165,611	12.99	3	718	2,302	7,239	1,118,032	12.94
Non-MSA,¹ Urban	418	18	678	2,074	6,331	156,883	6.21	9	574	2,148	6,596	147,850	6.30	8	556	2,129	6,516	150,916	6.26
Non-MSA,¹ Rural	982	19	679	2,229	7,258	459,626	9.21	10	616	2,042	6,763	398,377	9.88	9	592	1,988	6,712	408,176	9.96
<i>Group Quarters</i>																			
Group	316	78	560	924	1,806	57,649	5.18	46	419	876	1,611	81,788	7.66	40	385	841	1,588	86,920	8.35
Non-Group	18,626	8	1,108	3,279	9,626	1,685,485	10.81	3	1,025	3,172	9,458	1,271,216	10.34	3	1,003	3,150	9,483	1,195,456	10.17
<i>Pair Relationship Domain⁴</i>																			
Parent-Child (12-14)	1,929	58	2,600	6,056	12,394	174,285	2.98	54	2,797	6,634	13,648	187,654	3.07	47	2,786	6,592	13,669	181,721	3.06
Parent-Child (12-17)	3,630	54	2,875	6,465	13,531	187,422	2.97	28	2,856	6,687	13,958	216,255	3.06	25	2,820	6,642	13,968	222,049	3.08
Parent-Child (12-20)	4,327	54	3,013	6,903	15,000	216,853	3.01	28	2,986	7,130	15,752	216,255	3.16	25	2,945	7,131	15,695	222,049	3.12
Sibling (12-14)- Sibling (15-17)	2,127	8	373	1,017	2,385	25,539	2.91	5	334	1,011	2,617	29,126	3.00	5	329	984	2,604	29,500	2.99
Sibling (12-17)- Sibling (18-25)	2,454	19	950	1,912	3,633	48,569	2.44	8	913	1,887	3,607	37,261	2.44	8	899	1,873	3,622	35,732	2.42
Spouse-Spouse/ Partner-Partner	3,477	50	1,087	4,013	15,590	1,685,485	11.45	16	993	3,673	15,387	1,271,216	10.90	16	942	3,575	15,302	1,195,456	10.72
Spouse-Spouse/ Partner-Partner with Children (Younger Than 18)	1,559	50	1,048	3,108	9,530	1,139,233	18.44	16	1,372	3,861	11,593	1,271,216	17.71	16	1,343	3,816	11,437	1,195,456	17.50

¹ This step used demographic variables from questionnaire data for all selected person pairs; DU = dwelling unit, EV = extreme value adjustment, MSA = metropolitan statistical area, PR = pair, PS = poststratification adjustment, Res = respondent, SDU = screener dwelling unit.

² Q1 and Q3 refer to the first and third quartile of the weight distribution.

³ Unequal weighting effect (UWE) is defined as $1 + [(n - 1)/n] * CV^2$, where CV = coefficient of variation of weights.

⁴ Parent-child (15-17) was not included here since extreme values were not controlled with this domain.

Appendix M: Pair Analysis Manual Excerpt

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Appendix M: Pair Analysis Manual Excerpt

This appendix provides background information on pair data analysis for the National Survey on Drug Use and Health (NSDUH). This draft excerpt is from Section 3.2 in *How To Prepare and Analyze Pair Data in the National Survey on Drug Use and Health* by Center for Behavioral Health Statistics and Quality (in press).

Inferential Population and Multiplicities

There are different perspectives through which pair data can be analyzed: (1) with pairs as the focus (e.g., where the focus of the analysis, or dependent variable, is on how the parent and child jointly report behaviors of interest), or (2) with one member of the pair as the focus (e.g., the child's behavior as the dependent variables and his or her parent's behavior as the independent variable). When the focus is on the pair, the *PRANALWT* variable can be used to weight the data directly with no adjustments. However, when the focus is on one member of the pair, an adjustment often needs to be made to the weight to account for the fact that this member of the pair may be a member of more than one pair of this type (Chromy & Singh, 2001).

Section 2.4.2 describes the weights for the three examples introduced in Section 1.6. The first two of these three examples – example (a) and (b) - have the focus on one member of the pair (i.e., behavior of one member of the pair is the dependent variable and the other is the independent variable). The third of these examples has the focus on the pair itself (i.e., the behaviors of both members of the pairs are jointly the dependent variable). When the focus is on the pair itself, as is the case in example (c), no multiplicity is needed and the *PRANALWT* variable can be used directly.

Since the focuses of examples (a) and (b) introduced in Section 1.6 are on one member of the pair, there is potential for the need of an adjustment to be made to the *PRANALWT* variable due to a multiple counting problem. The *PRANALWT* variable weights each pair member by the number of pairs of that type that the respondent represents. In example (a), we are treating the father's behavior as the focus, or dependent variable. The *PRANALWT* variable weights each father-child pair by the number of father-child pairs there are in the household. When we are focused on the father's behavior, however, we do not want fathers who have more children to be more heavily weighted than fathers with only one child. This introduces a multiple counting problem.

Adjustments for this multiple counting problem are done using "multiplicities" (Chromy & Singh, 2001). Many multiplicities have been computed and are on the data file; in analyses these can be accounted for by simply adjusting the weight variable. Analysts should exercise care or seek assistance through a data request (samhda-support@icpsr.umich.edu) in computing multiplicities for any pair types not listed. The process by which the multiplicities are created is described in detail in Chapter 11 of Laufenberg et al. (2014). Table 5 lists the pair domains for which multiplicities can be used to perform person-level analyses. These multiplicity variables are used in conjunction with the *PRANALWT* variable when adjusting the weight. The new weight is assigned the value of *PRANALWT* divided by the multiplicity variable.

Table 5. Pair Domains and Multiplicities

Pair Domain		Multiplicity Variable		
<i>IRPRREL</i> Levels	Description	Focus ¹	Name	Description
1	Parent-child, child aged 12-14	Parent	<i>IRMPCP14</i>	Number of children aged 12-14 living with responding parent
		Child	<i>IRMPCC14</i>	Number of parents living with responding child aged 12-14
1,2	Parent-child, child aged 12-17	Parent	<i>IRMPCP17</i>	Number of children aged 12-17 living with responding parent
		Child	<i>IRMPCC17</i>	Number of parents living with responding child aged 12-17
1,2,3	Parent-child, child aged 12-20	Parent	<i>IRMPCP20</i>	Number of children aged 12-20 living with responding parent
		Child	<i>IRMPCC20</i>	Number of parents living with responding child aged 12-20
2	Parent-child, child aged 15-17	Parent	<i>IRMPCP57</i>	Number of children aged 15-17 living with responding parent
		Child	<i>IRMPCC57</i>	Number of parents living with responding child aged 15-17
5	Sibling-sibling, older sibling aged 15-17, younger sibling aged 12-14	Older sibling	<i>IRMS1417</i>	Number of siblings aged 12-14 living with responding sibling aged 15-17
		Younger sibling	<i>IRMS1714</i>	Number of siblings aged 15-17 living with responding sibling aged 12-14
6	Sibling-sibling, older sibling aged 18-25, younger sibling aged 12-17	Older sibling	<i>IRMS1725</i>	Number of siblings aged 12-17 living with responding sibling aged 18-25
		Younger sibling	<i>IRMS2517</i>	Number of siblings aged 18-25 living with responding sibling aged 12-17
8,9	Spouse-spouse and partner-partner	No multiplicity necessary: assume only one spouse per person		
8	Spouse-spouse and partner-partner, with children aged 0-17	No multiplicity necessary: assume only one spouse per person		

¹ No weight adjustment is needed when the inferential focus is on the pair.