



2018 Workplace and Gender Relations Survey of Active Duty Members

Statistical Methodology Report

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Policy officials contributing to the development of this survey include Dr. Nathan Galbreath, Dr. Aubrey Hilbert, Ms. Laura Crane, Mr. Zachary Gitlin, and Sarah Newman (Office of the Under Secretary of Defense, Personnel and Readiness, Sexual Assault Prevention and Response Office), Mr. Clarence Johnson (Diversity Management Operations Center), and Ms. Shirley Raguindin (Office of the Under Secretary of Defense, Personnel and Readiness, Office for Diversity Equity and Inclusion). Service officials contributing to the development and administration of this assessment include Dr. Jessica Zabecki, Dr. John Foubert, Ms. LeWonnice Belcher, and Dr. Nathan Evans (Army), Dr. Paul Garst (Department of Navy), Dr. Paul Rosen, Ms. Cynthia Stewart, and Lieutenant Emanuel Abell (Navy), Dr. Bradley Brick (Marine Corps), Dr. Jessica Gallus, Colonel Melanie Prince, and Major Ebony Cook (Air Force), and Captain John Garofolo and Mr. Paul Redmond (Coast Guard).

OPA's Statistical Methods Branch, under the guidance of Mr. David McGrath, Branch Chief, is responsible for all statistical aspects of this survey, including, sampling, weighting, nonresponse bias analysis, and the implementation of statistical hypothesis testing used in the survey program. Mr. Eric Falk, Team Lead of the Statistical Methods Branch, and Mr. Jeff McLeod, Fors Marsh Group (FMG), designed the *2018 WGRA* sample using OPA's Sample Planning Tool. Dr. Joseph Luchman and Mr. Stephen Busselberg, FMG, performed the statistical weighting process for the survey. Ms. Sue Reinhold provided the data processing support. Data Recognition Corporation (DRC) performed data collection and editing.

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2018 WORKPLACE AND GENDER RELATIONS SURVEY OF ACTIVE DUTY MEMBERS: STATISTICAL METHODOLOGY REPORT

Introduction

The Office of People Analytics (OPA) conducts both web-based and paper-and-pen surveys to support the personnel information needs of the Under Secretary of Defense for Personnel and Readiness (USD[P&R]). These surveys assess the attitudes and opinions of the entire Department of Defense (DoD) community on a wide range of personnel issues. Health and Resilience (H&R) Surveys are in-depth studies of topics which impact the health and well-being of military populations.

This report describes the statistical methodologies for the *2018 Workplace and Gender Relations Survey of Active Duty Members (2018 WGRA)*. The first section describes the sample design and selection of the sample. The second section describes weighting and variance estimation. The third section describes the statistical tests used for the *2018 WGRA*. The fourth section describes the calculation of cooperation, completion, and response rates for the full sample and population subgroups. The fifth section provides an overview of the nonresponse bias analysis that will be done at a later date. Estimates for all survey questions are found in the *2018 Workplace and Gender Relations Survey of Active Duty Members: Results and Trends* (OPA, 2019a).

Sample Design and Selection

Target Population

The *2018 WGRA* was designed to represent individuals meeting the following criteria:

- Active duty members of the Army, Navy, Marine Corps, Air Force and Coast Guard excluding Public Health and NOAA members
- Paygrades E1 to O6
- Reside on the April 2018 *Active Duty Master File (ADMF)*
- Valid Personnel status (Not a prisoner, deserter, or unknown)

National Guard and Reserve members in active duty programs were excluded. Data were collected between August 24 and November 5, 2018.

Sampling Frame

The sampling frame consisted of 1,327,194 active duty members (1,285,990 DoD and 41,204 Coast Guard) determined from using the April 2018 *ADMF*. Auxiliary frame data were obtained from the following files:

- April 2018 *Active Duty Family Database (ADFD)*
- April 2018 *Basic Allowance for Housing (BAH) File*
- March 2018 *Contingency Tracking System (CTS) Deployment File*
- April 2018 *Defense Enrollment Eligibility Reporting System (DEERS) Medical Point-in-Time Extract (PITE)*
- April 2018 *Unit Identification Code (UIC) Address File*
- June 2018 *Database Extract (DBE) File*
- April 2018 *Reserve Components Common Personnel Data System (RCCPDS) Master File (Dual Spouse Variable)*

After selecting the sample, OPA performed additional checks to verify the member was still eligible. To save costs, OPA excluded ineligible sample members from mailings and notifications. Individuals were included on the frame based on membership in both the April 2018 *ADMF* and the May 2018 *PITE*; sample members no longer in the May 2018 *DEERS Medical PITE* were recorded as record ineligible. There were 9,800 (1.3%) members determined to be record ineligible from this process (SAMP_DC=1 in Table 3 below). OPA identified 999 (0.1%) additional members as ineligible through either the survey instrument or member contact (SAMP_DC=2 or 3 in Table 3).

Sample Design

The sample for the 2018 *WGRA* survey used a single-stage stratified design. Design parameters from the DoD Sexual Assault and Prevention Office (SAPRO) specified an agreed upon 23 installations that OPA would consider when designing the sample to ensure that there were a sufficient number of respondents to make accurate estimates by base and gender.

OPA implemented the stratification in two steps. First, the selected installations were considered based on their size and expected number of respondents, and OPA determined that placing women from these 23 bases into a single stratum was the most effective method to meet the estimation goals. Next, OPA stratified the remaining members into 85 strata that were initially determined by a full cross-classification of the four stratification variables (see Table 1 below). When initial strata contained fewer than 200 members in the stratum, OPA collapsed variables together in reverse order as shown in Table 1 (e.g., first collapse Race by combining minority with non-minority, so a stratum may look like Coast Guard/Female/O4-O6).

Table 1 shows these four variables and associated variable levels.

Table 1.
Variables for Stratification and Key Reporting Domains

Stratification Variable	Variable Name	Categories
Service	CSERVICE	1. Army
		2. Navy
		3. Marine Corps
		4. Air Force
		5. Coast Guard
Gender	CSEX	1. Male, Unknown
		2. Female
Paygrade Group	CPAYGRP9	1. E1–E4
		2. E5–E9
		3. W1–W5
		4. O1–O3
		5. O4–O6
Race	CRACECAT	1. Non-Minority
		2. Minority

OPA selected individuals with equal probability and without replacement within each stratum. However, because allocation was not proportional to the size of the strata, selection probabilities varied among strata, and individuals were not selected with equal probability overall. To achieve adequate sample sizes for all domains (reporting categories), OPA used a nonproportional allocation.

Sample Allocation

OPA allocated the sample to achieve the goal of reliable precision on estimates for outcomes associated with reporting a sexual assault (e.g., retaliation) and other measures that were only asked of a very small subset of members, especially for males. Given estimated variable survey costs and anticipated eligibility and response rates, OPA used an optimization algorithm to determine the minimum-cost allocation that simultaneously satisfied the domain precision requirements. Response rates from previous surveys were used to estimate eligibility and response rates for all strata. The *2016 Status of Forces Survey of Active Duty Members (SOFS-A)*, the *2017 SOFS-A*, and the *2016 WGRA* were used to estimate these rates.

OPA determined the sample allocation by means of the OPA Sample Planning Tool (SPT), Version 2.1 (Dever & Mason, 2003). This application is based on the method originally developed by J. R. Chromy (1987) and described in Mason, Wheelless, George, Dever, Riemer, and Elig (1995). The SPT defines domain variance equations in terms of unknown stratum sample sizes and user-specified precision constraints. A cost function is defined in terms of the unknown stratum sample sizes and the per-unit cost of data collection, editing, and processing. The variance equations are solved simultaneously, subject to the constraints imposed, for the sample size that minimizes the cost function. Estimated eligibility and response rates affect the allocation by inflating the final sample size to compensate for projected survey nonresponse.

Prevalence rates (e.g., sexual harassment rate) refer to a percentage that is used in determining the estimated variance used for the calculation of the sample size. OPA always uses a projected prevalence of 50 percent since it is the most conservative and yields the largest estimated sample size.

There were 122 reporting domains defined for the 2018 WGRA and the initial goal was to achieve below 5 percent precision on estimates. The survey design cannot control for 16 of the domains because the domains are conditional upon survey responses. The precision requirement for each domain is typically based on an estimated prevalence rate of 50 percent with a 95 percent confidence interval half-width no greater than ± 5 percent. However, given the rarity of events covered by many of the 2018 WGRA questions, OPA ensured that a much tighter precision would be met for questions seen by all respondents, while making it likely that confidence interval half-widths of ± 5 could be met for questions that are relevant to only a small portion of respondents. Therefore, OPA tightened the precision constraints accordingly. The overall sample for DoD was approximately 75 percent of all women and 50 percent of all men. All Coast Guard members were selected for the survey.

The 2018 WGRA total sample size was 735,645 (694,441 DoD and 41,204 Coast Guard); Table 2 provides the sample sizes by stratification variables.

Table 2.
Sample Size by Stratification Variables

Stratification Variable	Total	Army	Navy	USMC	Air Force	Coast Guard
Sample	735,645	240,814	188,210	97,076	168,341	41,204
Gender						
Male, Unknown	569,823	184,308	136,594	83,873	129,795	35,253
Female	165,822	56,506	51,616	13,203	38,546	5,951
Paygrade Grouping						
E1–E4	397,301	138,332	95,313	73,650	75,835	14,171
E5–E9	249,754	74,277	71,852	18,498	66,269	18,858
W1–W5	7,255	4,240	839	522	0	1,654
O1–O3	53,754	17,304	14,069	3,101	15,478	3,802
O4–O6	27,581	6,661	6,137	1,305	10,759	2,719
Race						
Non-Minority	435,168	131,530	106,488	61,759	105,206	30,185
Minority	300,477	109,284	81,722	35,317	63,135	11,019

Weighting

Using methods similar to the 2016 WGRA, OPA created analytical weights for the 2018 WGRA to account for unequal probabilities of selection and varying response rates among

population subgroups. Sampling weights were computed as the inverse of the selection probabilities. The sampling weights were then adjusted for nonresponse using models that considered over 50 possible correlates of nonresponse. The adjusted weights were raked to match population totals and to reduce bias unaccounted for by the previous weighting steps. More details about the weighting process can be found later in this document.

Case Dispositions

As the first step in the weighting process, case dispositions were assigned based on eligibility for the survey and on completion of the questionnaire. Execution of the weighting process and computation of response rates both depended on this classification.

Final case dispositions for weighting were determined using information from personnel records, field operations (as recorded in the Survey Control System [SCS]), and returned questionnaires. No single source of information is entirely complete and correct for determining the case disposition; inconsistencies among sources were resolved according to the order of precedence shown in Table 3. This order of execution is critical to resolving case dispositions. For example, suppose an individual in the sample refused the survey with the reason that it was too long. In the absence of any other information, the disposition would be “Active refusal,” a type of eligible nonrespondent. However, if OPA received a phone call that this same member had left the military; the final disposition would be “Ineligible by self- or proxy-report.”

Case disposition counts for the *2018 WGRA* are shown in Table 3. Table 4 presents the number of complete eligible respondents (SAMP_DC=4) by stratification variables: Service, gender, paygrade grouping, and race.

Table 3.
Case Dispositions for Weighting

Case Disposition (SAMP_DC)	Information Source	Conditions	Sample Size
1. Record ineligible	Personnel record	OPA determined whether sampled members had a record in the <i>DEERS PITE</i> prior to fielding the survey. No record in DEERS indicated the member either separated from the military, passed away, etc.	9,800 (1.3%)
2. Ineligible by self- or proxy-report	Survey Control System (SCS)	The sampled member or a proxy reported that member was ineligible due to such reasons as "Retired," "Ill," "Incarcerated," "No longer employed by DoD," or "Deceased."	211 (0.03%)
3. Ineligible by survey self-report	Survey eligibility questions	The sampled member was determined to be ineligible based on their response to Q1 of the survey questionnaire "Were you on active duty on [OPEN DATE]?"	788 (0.1%)
4. Eligible, complete response	Item response rate	Respondents needed to answer at least three of the six critical questions related to sexual assault.	115,884 (15.8%)
5. Eligible, incomplete response	Item response rate	Survey is not blank but none of the critical sexual assault questions were answered.	5,735 (0.8%)
8. Active refusal	SCS	Survey is returned blank due to such reasons as "Refused-too long," "Refused-inappropriate/intrusive," "Refused-other," "Unreachable at this address," "Refused by current resident," "Refused additional e-mails," or "Concerned about security/confidentiality."	560 (0.1%)
9. Blank return	SCS	Blank questionnaire returned with no reason given.	962 (0.1%)
10. PND	SCS	Postal non-deliverable or original address is non-locatable.	169,487 (23.0%)
11. Nonrespondent	Remainder	Remaining sampled members that did not respond to survey.	432,218 (58.8%)
Total			735,645

Table 4.
Complete Eligible Respondents by Stratification Variables

Stratification Variable	Total	Army	Navy	USMC	Air Force	Coast Guard
Sample	115,884	28,387	22,563	8,270	42,889	13,775
Gender						
Male	84,453	19,739	15,687	6,315	31,561	11,151
Female	31,431	8,648	6,876	1,955	11,328	2,624
Paygrade Grouping						
E1–E4	33,842	8,639	4,575	3,783	13,803	3,042
E5–E9	53,523	12,330	11,399	3,090	19,629	7,075
W1–W5	2,400	1,021	297	191	0	891
O1–O3	14,585	3,861	3,519	733	5,025	1,447
O4–O6	11,534	2,536	2,773	473	4,432	1,320
Race						
Non-Minority	73,395	16,215	13,350	5,152	28,198	10,480
Minority	42,489	12,172	9,213	3,118	14,691	3,295

Nonresponse Adjustments and Final Weights

After case dispositions were resolved, the sampling weights were adjusted for nonresponse. First, the sampling weights for cases of known eligibility (SAMP_DC=2, 3, 4, or 5) were adjusted to account for cases of unknown eligibility (SAMP_DC=8, 9, 10, or 11). Next, the eligibility-adjusted weights for eligible respondents with completed questionnaires (SAMP_DC=4) were adjusted to account for eligible sample members who returned an incomplete questionnaire (SAMP_DC=5). All weights for the record ineligible (SAMP_DC=1) were set to 0 and this weight was transferred to the other cases during raking.

The weighting adjustment factors for eligibility and completion were computed as the inverse of model-predicted probabilities. OPA used extreme gradient boosted (XGBoost) decision trees to model the six outcomes in Table 5, separately for females and males.

Table 5.
Key Outcome Variables

Variable	Variable Name	Question Type
Hostile Work Environment	HWE	Military Equal Opportunity
Gender Discrimination	SDISC	Military Equal Opportunity
Sexual Quid Pro Quo	QPQ	Military Equal Opportunity
Attempted Sexual Assault	SA_ATT	Sexual Assault
Non-Penetrative Sexual Assault	SA_TOUCH	Sexual Assault
Penetrative Sexual Assault	SA_PEN	Sexual Assault

The 2018 *WGRA* nonresponse adjustment involved two steps, each of which produced a set of models. The first step used data from the eligible, complete respondents to develop stage one models for the key outcome variables. Predicted values of the six outcomes from Table 5 were computed for both respondents and nonrespondents. Two second stage models (eligibility and completion) were fit separately by gender to predict the probability of response, using the results from the stage one models along with a limited number of other predictors: Service, paygrade, race. In addition survey form type (paper vs. web) was used for the second stage completion model. The reciprocals of the predicted values from the second model were used as nonresponse adjustments and applied to the respondents. The XGBoost models were weighted; first by the sampling weight, and second by the eligibility-adjusted weight resulting from multiplying the sampling weight by the eligibility status adjustment. Then, the models were adjusted by multiplying the eligibility status weight by the completion status adjustment. Table 6 provides a list of the auxiliary variables included in the first-stage XGBoost models. A subset of these variables is used in the second stage for modeling the response and completion variables.

Table 6.
Variables Used to Model Key Outcome Variables

Variable	Variable Name	Categories
Military Accession Program	ACC_SRC_CD2	ACC_SRC_CD was recoded. Any accession code that had less than 50 respondents were put into the category '0'
Mailing Address Match Flag	ADDMATCH	0=Address is different; 1=Address is the same
Armed Forces Qualification Test score	AFQT_CAT_CD2	AFQT_CAT_CD was recoded; Groups with less than 100 respondents were combined into '4Z';
Member Age	AGE	17-76
Basic Allowance for Housing Indicator	BAHREC	N=Not receiving BAH, Y=receiving BAH, Z=Unknown, .=Missing
Number of People that are Female/Male at Base	BASEMALE_PCT	BASEMALE and BASESIZE were used to create percentage that were male
Base name of Member	BASENAME_CD	BASENAME was recoded; Any base with less than 50 complete eligible responses were combined into an "**** All Small Bases' group
Number of People at Base	BASESIZE_CD	BASESIZE was recoded into subgroups
Email address purchase flag	BUYEMAIL	0=Do not buy email address, 1=Buy email address
Total Number of Children	CHILDCNT	0-13
Duty Location in the World Regions	CREGION1	1='US & US territories, Other, Unknown', 2='Europe', 3='Asia & Pacific Islands'
Service of Member	CSERVICE	1=Army, 2= Navy, 3= Marine Corps, 4= Air Force, 5= Coast Guard
Gender of Member	CSEX	1=Male, 2= Female
Current deployment status	CUR_DEPLOY	1=Yes; 0=No
Number of Deployments	DCOUNT	0-33
Deployment flag in the last 12 months	DEPLOY12	1=Yes; 0= No
Deployment flag in the last 24 months	DEPLOY24	1=Yes; 0= No
Dual Spouse Flag	DUAL_FLAG	Dual="Dual Spouse"; OTHR="Not a dual spouse'
Duty UIC Match Flag; Address is the Same	DUICMATCH	0=Duty UIC is different; 1=Duty UIC is the same
Education level	EDUC_CD	EDUC was recoded; Less than 100 respondents were put into similar education levels
E-mail at Time of Sampling	EMAIL	1=Have an e-mail ; 0= no email
Email address flag	EMAILSTAT_CD	EMAILSTAT was recoded: '1=No email or all attempted email addresses invalid, 2=At least one attempted email address not invalid
Ethnic affinity code	ETH_CD	ETH was recoded; Less than 100 respondents were put into other ethnicity group (OTH)

Table 6. (continued)

Variable	Variable Name	Categories
Family Status	FAMSTAT	0= Unknown marital status and/or child status, 1= Single with child(ren), 2= Single without child(ren), 3= Married with child(ren), 4=Married without child(ren)
Home Address Flag	FLG_H	N=No home address; Y=Home address
Retired or Separated from Service Flag	LEFTSERV	0=No; 1=Yes
Marital Status Code	MRTL_STA_CD	MRTL_STA was recoded; Less than 100 respondents were put into 'O'
Number of members in member's duty UIC	N_DUIC	1-6,560
Number of males in member's duty UIC	N_DUICMALE	0-5,215
Number of people within members' specific occupation code	N_OCC	4-80,284
Number of males in member's primary occupation	N_OCCMALE	0-80,096
On or Off Base Status	OFFBASE	0=Unknown, 1=On Base (No BAH), 2=Off Base (receiving BAH)
Percent of males in member's duty UIC	P_DUICMALE	0-100%
Percent male within members' specific occupation	P_OCCMALE	0-100%
Paygrade of Member (20 level)	PAYGRADE	E1-E9, W1-W5, O1-O6
Occupation Grouping	PDODOCC_CD	PDODOCC was recoded; There were 298 levels and this was formed by taking the first 2 characters
Race/Ethnic Category	RACE_ETH	A=AIAN, B=Asian, C=Black, D=White, E=Hispanic, F=NHPI, M=Multi Race, Z=Unknown
Strength Accounting Codes	STR_ACCT_CD2	STR_ACCT_CD was recoded; the A20's were put with the A24
Active Federal Military Service Base Calendar Date	TAFMS_DT2	TAFMS_DT2 was recoded: Took the year and month
Years of service	TAFMS_YR_QY	0-49; 99's were coded to missing
US Citizen Citizenship Origin Code	US_CITZ_ORIG_CD	A='Born within the US, GU, PR or VI', B='US citizen, parent became a citizen by naturalization', C='Born outside US,GU,PR or VI to at least one citizen parent', D='US citizen by naturalization', Y='Not a US citizen', Z='Origin not determined'
US Citizenship Status Code	US_CITZ_STAT_CD	A=US national, C=US citizen, N=Non US citizen or national, Z=Unknown

To further explain the *2018 WGRA* nonresponse adjustments, recall from Table 3 that SAMP_DC (case disposition) 2, 3, 4, and 5 denote cases with known eligibility, whereas SAMP_DC 8, 9, 10, and 11 correspond to cases for which eligibility is unknown. The eligibility adjustment increased the weights of case dispositions 2, 3, 4, and 5 to represent dispositions 8, 9, 10, and 11. The second adjustment increased the weights of complete eligible cases (SAMP_DC=4) to compensate for incomplete eligible cases (SAMP_DC=5).

To increase response to the *2018 WGRA*, nonrespondents to the web version of the survey were sent a paper form of the questionnaire. The paper version included the key survey items, but it omitted many secondary items on the web questionnaire, presenting the recipient with approximately 70 questions instead of the approximately 216 on the web version. The primary set of weights was based on responses from the full data set including both the web and paper versions. To support analysis of items only on the web version, a second set of weights was produced, following the same steps as the full data set excluding the paper questionnaire. For this weighting, all paper questionnaire respondents were treated as nonrespondents, including in the fitting of the XGBoost models. This second set of weights is intended solely for analysis of web-only items. The primary set of weights provides the basis for estimating the key outcomes from the survey items collected on both the web and paper versions of the questionnaire.

Finally, the nonresponse-adjusted weights were modified through a process called raking. The purpose of raking is to use known information about the survey population to increase the precision of survey estimates. This information consists of totals for different levels of variables (such as demographic characteristics). For example, the variable CSEX has two levels: male and female. During the raking process, sampled individuals are first categorized into the cells of a table defined by two or more variables—called raking dimensions. The goal of raking is to adjust the weights so that they add up to the known totals—called control totals—for the different levels within each raking dimension. Preceding one dimension at a time, raking computes a proportional adjustment to the weights associated with each level of the raking dimension. After all dimensions are adjusted, the process is repeated until the totals for all levels of the raking dimensions are equal to the corresponding control totals (at least within a specified tolerance).

Control totals were computed from information from the sampling frame. There were four raking dimensions, defined in Table 7:

Table 7.
Variables Used for Raking

Variable	Variable Name	Categories	
DoD x paygroup (CDOD x CPAYGRP7)	DODPAY7	1. DoD*E1-E3	8. CG*E1-E3
		2. DoD*E4	9. CG*E4
		3. DoD*E5-E6	10. CG*E5-E6
		4. DoD*E7-E9	11. CG*E7-E9
		5. DoD*W1-W5	12. CG*W1-W5
		6. DoD*O1-O3	13. CG*O1-O3
		7. DoD*O4-O6	14. CG*O4-O6
DoD x race (CDOD x CRACECAT)	DODRACE	1. DoD*Non-minority	3. CG*Non-minority
		2. DoD*Minority	4. CG*Minority
DoD x Gender x Pay (CDOD x GENDER x CPAYGRP5)	DODGENPAY	1. DOD*Male*E1-E4	11. CG*Male*E1-E4
		2. DOD*Male*E5-E9	12. CG*Male*E5-E9
		3. DOD*Male*W1-W5	13. CG*Male*W1-W5
		4. DOD*Male*O1-O3	14. CG*Male*O1-O3
		5. DOD*Male*O4-O6	15. CG*Male*O4-O6
		6. DOD*Female*E1-E4	16. CG*Female*E1-E4
		7. DOD*Female*E5-E9	17. CG*Female*E5-E9
		8. DOD*Female*W1-W5	18. CG*Female*W1-W5
		9. DOD*Female*O1-O3	19. CG*Female*O1-O3
		10. DOD*Female*O4-O6	20. CG*Female*O4-O6
DoD x Gender x Service x Officer (CDOD x CSEX x CSERVICE X CPAYGRP6)	DODGENSVCOFF	1. DOD*Army*Male*Enlisted	11. DOD*Navy*Female*Enlisted
		2. DOD*Army*Male*Officer	12. DOD*Navy*Female*Officer
		3. DOD*Navy*Male*Enlisted	13. DOD*USMC*Female*Enlisted
		4. DOD*Navy*Male*Officer	14. DOD*USMC*Female*Officer
		5. DOD*USMC*Male*Enlisted	15. DOD*AF*Female*Enlisted
		6. DOD*USMC*Male*Officer	16. DOD*AF*Female*Officer
		7. DOD*AF*Male*Enlisted	17. CG*Male*Enlisted
		8. DOD*AF*Male*Officer	18. CG*Male*Officer
		9. DOD*Army*Female*Enlisted	19. CG*Female*Enlisted
		10. DOD*Army*Female*Officer	20. CG*Female*Officer

Table 8 summarizes the distributions of the sampling weights, intermediate weights, final weights, and corresponding adjustment factors by eligibility status for the primary weights. As described earlier in the report, eligible respondents are those individuals who were not only eligible to participate in the survey but also completed at least three of the critical sexual assault

questions. Record ineligible individuals are those who were not eligible to participate in the survey according to administrative records; no weights were computed for these cases.

The mean sampling weight is 2.0 for the complete eligibles. The nonresponse adjustment for eligibility status that follows next makes the biggest single adjustment to the weights, in terms of increasing both the mean and the coefficient of variation (C.V.) of the weights. The two remaining adjustments for nonresponse among the eligible population and the final raking have a modest effect on increasing the mean weight. The corresponding factors shown in the last two columns of Table 8 have small C.V.'s; in other words, the factors in each column differ from each other by relatively small amounts.

Table 8.
Distribution of Weights and Adjustment Factors for Complete Eligibles

Statistic	Sampling Weight	Eligibility Status Adjusted Weight	Complete Eligible Response Adjusted Weight	Final Weight	Eligibility Status Factor	Complete Eligible Response Factor	Raking Factor
N	115,884	115,884	115,884	115,884	115,884	115,884	115,884
MIN	1.0	1.3	1.3	1.2	1.2	1.0	0.9
MAX	6.2	249.5	262.9	275.9	43.8	1.2	1.5
MEAN	2.0	9.9	10.5	11.1	5.4	1.1	1.0
STD	0.9	10.2	10.9	12.5	6.0	0.02	0.09
C.V.	0.46	1.03	1.04	1.12	1.12	0.02	0.09

Under simplifying assumptions, Kish (Kish, 1965) approximates the relative increase in variance due to weight variation as 1 plus the C.V. squared ($1+(C.V.)^2$). Because the C.V. of the weights is 1.12, the increase in variance due to weighting is 2.27. Given the task of the weighting adjustments is to compensate for differential nonresponse and its possible impact on the bias of key outcome variables, the increase in variance due to weighting appears reasonable.

Table 9 shows the sum of the weights at different stages of weighting. The weights adjusted for known eligibility status distribute the sampling weights for nonrespondents with unknown eligibility status among the remaining dispositions. The eligible response adjusted weights then compensate for eligible respondents providing incomplete surveys. By design, the final raking adjustments redistribute record ineligible and other dispositions excluded from the final weights to match the total number in the original frame.

Table 9.
Sum of Weights by Eligibility Status

Eligibility Category	Sum of Sampling Weights	Sum of Eligibility Status Adjusted Weights	Sum of Complete Eligible Response Adjusted Weights	Sum of Final Weights
1. Eligible weighted	228,711	1,142,342	1,212,408	1,283,244
2. Ineligible weighted	2,078	41,093	41,093	43,950
3. Non-response unweighted	1,079,581	66,842	0	0
4. Record ineligible unweighted	16,824	16,824	16,824	0
Total	1,327,194	1,267,101	1,270,325	1,327,194

Variance Estimation

Sampling error is the uncertainty associated with an estimate that is based on data gathered from a sample of the population rather than the full population. Note that sample-based estimates will vary depending on the particular sample selected from the population. Measures of the magnitude of sampling error, such as the variance and the standard error (the square root of the variance), reflect the variation in the estimates over all possible samples that could have been selected from the population using the same sampling methodology. Analysis of the 2018 WGRA data required a variance estimation procedure that accounted for the weighting procedures. The final step of the weighting process was to define strata for variance estimation by Taylor series linearization. For each strata/variance strata, OPA ensured that there were at least 25 complete eligible responses with non-zero final weights. The variance strata closely mirrored the original strata and collapsing only occurred in four strata.

Multiple Comparisons

To support the WGRA reports and briefings, OPA conducts a large number of statistical tests to identify significant differences across demographic groups or compare estimates with prior years. This is known in statistical hypothesis testing as the multiple comparisons problem. Numerous techniques have been developed to reduce the false positives associated with conducting multiple statistical tests. It should be noted that there is no universally accepted approach for dealing with the problem of multiple comparisons. To protect against erroneous statistically significant results during the 2018 WGRA, OPA used a p-value of 0.01 for its statistical tests. OPA chose this cut-off after empirically testing a statistical method called False Discovery Rate correction (FDR) developed by Benjamini and Hochberg (1995). FDR is defined as the expected percentage of erroneous rejections among all rejections. The idea is to control the false discovery rate which is the proportion of "discoveries" (significant results) that are actually false positives. Based on the FDR thresholds from several prior gender relations surveys, OPA determined that a p-value of 0.01 was a reasonable threshold. More details on performing multiple statistical tests follows.

When statistically comparing groups, a statistical hypothesis whether there are no differences (null hypothesis) versus there are differences (alternative hypothesis) is tested. OPA

mainly uses independent two sample t-tests and the conclusions are usually based on the p-value associated with the test-statistic. If the p-value is less than the critical value then the null hypothesis is rejected. Any time a null hypothesis is rejected (a conclusion that estimates are significantly different), it is possible this conclusion is incorrect. In reality, the null hypothesis may have been true, and the significant result may have been due to chance. A p-value of 0.01 means there is a one percent chance of finding a difference as large as the observed result if the null hypothesis were true.

Contact, Cooperation, and Response Rates

Contact, cooperation, and response rates were calculated in accordance with the recommendations of the American Association for Public Opinion Research (AAPOR, 2016 Standard Definitions), which estimates the proportion of eligible respondents among cases of unknown eligibility (SAMP_DC=10 and 11).

The *contact rate* uses the concepts of AAPOR standard formula CON2 and is defined as

$$CON2 = \frac{(I + P) + R + O - e(O)}{(I + P) + R + O + NC - e(NC + O)} = \frac{\text{adjusted contacted sample}}{\text{adjusted eligible sample}} = \frac{N_C}{N_E}$$

The *cooperation rate* uses the concepts of AAPOR standard formula COOP2 and is defined as

$$COOP2 = \frac{(I + P)}{(I + P) + R + O - e(O)} = \frac{\text{complete eligibles}}{\text{adjusted contacted sample}} = \frac{N_R}{N_C}$$

The *response rate* uses the concepts of AAPOR standard formula RR4 and is defined as

$$RR4 = \frac{(I + P)}{(I + P) + R + O + NC - e(NC + O)} = \frac{\text{complete eligibles}}{\text{adjusted eligible sample}} = \frac{N_R}{N_E}$$

Where:

I = Fully complete responses according to RR4 are greater than 80% complete (SAMP_DC=4)

P = Partially complete responses according to RR4 are between 50–80% complete (SAMP_DC=4)

R = Refusal and break-off according to RR4 are less than < 50% complete (SAMP_DC=5, 8, and 9)¹

NC = Non-contact (SAMP_DC=10)

¹ OPA considers these all cases of known eligibility.

$O = Other (SAMP_DC=11)^2$

$e(O) = Estimated\ ineligible\ nonrespondents$

$e(NC) = Estimated\ ineligible\ PND$

$N_C = Adjusted\ contacted\ sample$

$N_E = Adjusted\ eligible\ sample$

$N_R = Complete\ eligibles^3$

Table 10 shows the corresponding sample disposition codes associated with the response categories.

Table 10.
Disposition Codes for Response Rates

Response Category	SAMP_DC Values
Eligible Sample	4, 5, 8, 9, 10, 11
Contacted Sample	4, 5, 8, 9, 11
Complete Eligibles	4
Not Returned	11
Eligibility Determined	2, 3, 4, 5, 8, 9
Self-report Ineligible	2, 3

Ineligibility Rate

The ineligibility rate (IR) is defined as the following and needs to be calculated for both weighted and unweighted to be applied to Table 10:

$$IR = \text{Self Report Ineligible} / \text{Eligibility Determined.}$$

Estimated Ineligible Postal Non-Deliverable/Not Contacted Rate

The estimated ineligible postal non-deliverable or not contacted (IPNDR) is defined as:

$$IPNDR = (\text{Eligible Sample} - \text{Contacted Sample}) * IR.$$

² These are all nonrespondents which OPA considers cases of unknown eligibility.

³ Complete eligibles is an OPA term that applies to self-administered surveys in comparison to the terms complete and partial interviews used by AAPOR.

Estimated Ineligible Nonresponse

The estimated ineligible nonresponse (EINR) is defined as:

$$\text{EINR} = (\text{Not Returned}) * \text{IR}.$$

Adjusted Contact Rate

The adjusted contact rate (ACR) is defined as:

$$\text{ACR} = (\text{Contacted Sample} - \text{EINR}) / (\text{Eligible Sample} - \text{IPNDR} - \text{EINR}).$$

Adjusted Cooperation Rate

The adjusted cooperation rate (ACR) is defined as:

$$\text{ACR} = (\text{Complete Eligible}) / (\text{Contacted Sample} - \text{EINR}).$$

Adjusted Response Rate

The adjusted response rate (ARR) is defined as:

$$\text{ARR} = (\text{Complete Eligible}) / (\text{Eligible Sample} - \text{IPNDR} - \text{EINR}).$$

The final response rate is the product of the location rate and the completion rate. Table 11 shows both weighted and unweighted location, completion, and response rates for the 2018 *WGRA*.

Finally, Table 12 shows weighted contact, completion, and response rates for the full sample by the stratification variables. The final weighted response rate for the survey was 17.6 percent.

Table 11.
Contacted, Cooperation, and Response Rates

Type of Rate	Computation	Unweighted	Weighted
Contacted	Adjusted contacted sample/Adjusted eligible sample	76.6%	79.1%
Cooperation	Usable responses/Adjusted contacted sample	21.0%	22.3%
Response	Usable responses/Adjusted eligible sample	16.1%	17.6%

Note: Weighted response rates are the official reported rates. Unweighted response rates can be influenced by the sample design.

Table 12.
Rates for Full Sample and Stratification Categories

Domain Variable	Domain	Contact Rate	Completion Rate	Response Rate
Sample	All	79%	22%	18%
Service	Army	77%	19%	14%
	Navy	76%	19%	15%
	Marine Corps	70%	16%	11%
	Air Force	87%	31%	27%
	Coast Guard	100%	34%	34%
Gender	Male	79%	21%	17%
	Female	81%	26%	21%
Paygrade	E1–E4	65%	13%	9%
	E5–E9	88%	24%	21%
	W1–W5	94%	31%	29%
	O1–O3	89%	29%	26%
	O4–O6	96%	43%	41%
Race	Non-minority	81%	24%	19%
	Minority	77%	20%	15%

Note: Reported rates are weighted. Unweighted rates can be influenced by the sample design.

Nonresponse Bias Analysis

OPA is conducting a nonresponse bias analysis (NRB) on the *2018 WGRA* and those results will be available in a separate report. OPA assessed NRB on the *2016 WGRA* and found little evidence of NRB across the three studies conducted (OPA, 2017).

References

- American Association for Public Opinion Research. (2016). *Standard definitions: Final dispositions of case codes and outcome rates for surveys* (9th Ed.). AAPOR. Retrieved from http://www.aapor.org/AAPOR_Main/media/publications/Standard-Definitions20169theditionfinal.pdf
- Benjamini, Y. & Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society. Series B (Methodological)*, 57. 289–300. Retrieved from <http://www.jstor.org/stable/2346101>
- Chen, T. (2016). xgboost: Extreme Gradient Boosting (Version 0.6-4) [Computer software]. Retrieved from <http://lib.stat.cmu.edu/R/CRAN/>
- Chromy, J.R. (1987). Design optimization with multiple objectives. In *1987 proceedings of the Section on Survey Research Methods : papers presented at the Annual Meeting of the American Statistical Association, San Francisco, California, August 17–20, 1987* (pp. 194–199). Alexandria, VA: American Statistical Association. Retrieved from http://www.amstat.org/sections/srms/Proceedings/papers/1987_029.pdf
- Dever, J.A., & Mason, R.E. (2003). DMDC sample planning tool (Version 2.1) [Computer program and software]. Arlington, VA: DMDC.
- Kish, L. (1965). *Survey Sampling* (pp. 424–433). New York: John Wiley & Sons, Inc. doi:10.1002/sim.1513
- Mason, R.E., Wheelless, S.C., George, B.J., Dever, J.A., Riemer, R.A., & Elig, T.W. (1995). Sample allocation for the status of the armed forces surveys. In *Proceedings of the Section on Survey Research Methods* (Vol. II, pp. 769–774). Alexandria, VA: American Statistical Association. Retrieved from http://www.amstat.org/sections/srms/Proceedings/papers/1995_133.pdf
- Office of People Analytics (OPA). (2017). *2016 Workplace and Gender Relations Survey of Active Duty Members: Nonresponse bias analysis report*. Alexandria, VA: DMDC. Retrieved from https://www.dmdc.osd.mil/appj/dwp/dwp_surveys.jsp

Appendix A. Estimation Domains

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Estimation Domains

Domain Number	Domain Label	Population Size	Percent Sampled	Sample Size
1	Total DoD	1,285,990	54.0	694,441
2	Army	462,160	52.1	240,814
3	Navy	321,062	58.6	188,210
4	Marine Corps	184,154	52.7	97,076
5	Air Force	318,614	52.8	168,341
6	DoD*Enlisted	1,059,759	57.9	614,026
7	DoD*E1-E4	558,060	68.7	383,130
8	DoD*E1-E3	311,453	68.9	214,504
9	DoD*E4	246,607	68.4	168,626
10	DoD*E5-E9	501,699	46.0	230,896
11	DoD*Officer	226,231	35.5	80,415
12	DoD*W1-W5/O1-O3	144,682	38.4	55,553
13	DoD*O4-O6	81,549	30.5	24,862
14	DoD*Deployed Past 12 Months	203,627	51.6	105,130
15	DoD*Not Deployed Past 12 Months	1,082,363	54.4	589,311
16	DoD*Non-Hispanic White	758,911	53.4	404,965
17	DoD*Total Minority	527,079	54.9	289,476
18	DoD*Female	209,879	76.2	159,871
19	DoD*Female*Enlisted	169,835	79.5	135,062
20	DoD*Female*E1-E4	95,307	88.3	84,171
21	DoD*Female*E5-E9	74,528	68.3	50,891
22	DoD*Female*Officers	40,044	62.0	24,809
23	DoD*Female*W1-W5/O1-O3	27,294	65.0	17,730
24	DoD*Female*O4-O6	12,750	55.5	7,079
25	DoD*Female*Deployed Past 12 Months	25,880	74.7	19,320
26	DoD*Female*Not Deployed Past 12 Months	183,999	76.4	140,551
27	Female*Army	68,496	82.5	56,506
28	Female*Army*Enlisted	52,856	86.8	45,878
29	Female*Army*Officers	15,640	68.0	10,628
30	Female*Navy	62,011	83.2	51,616
31	Female*Navy*Enlisted	52,018	87.2	45,374
32	Female*Navy*Officers	9,993	62.5	6,242
33	Female*Marine Corps	15,651	84.4	13,203
34	Female*Marine Corps*Enlisted	14,043	86.6	12,159
35	Female*Marine Corps*Officers	1,608	64.9	1,044
36	Female*Air Force	63,721	60.5	38,546
37	Female*Air Force*Enlisted	50,918	62.2	31,651
38	Female*Air Force*Officers	12,803	53.9	6,895
39	DoD*Male	1,076,111	49.7	534,570
40	DoD*Male*Enlisted	889,924	53.8	478,964
41	DoD*Male*E1-E4	462,753	64.6	298,959
42	DoD*Male*E5-E9	427,171	42.1	180,005

Domain Number	Domain Label	Population Size	Percent Sampled	Sample Size
43	DoD*Male*Officers	186,187	29.9	55,606
44	DoD*Male*W1-W5/O1-O3	117,388	32.2	37,823
45	DoD*Male*O4-O6	68,799	25.8	17,783
46	DoD*Male*Deployed Past 12 Months	177,747	48.3	85,810
47	DoD*Male*Not Deployed Past 12 Months	898,364	50.0	448,760
48	Male*Army	393,664	46.8	184,308
49	Male*Army*Enlisted	319,022	52.3	166,731
50	Male*Army*Officer	74,642	23.5	17,577
51	Male*Navy	259,051	52.7	136,594
52	Male*Navy*Enlisted	215,287	56.6	121,791
53	Male*Navy*Officer	43,764	33.8	14,803
54	Male*Marine Corps	168,503	49.8	83,873
55	Male*Marine Corps*Enlisted	148,832	53.7	79,989
56	Male*Marine Corps*Officer	19,671	19.7	3,884
57	Male*Air Force	254,893	50.9	129,795
58	Male*Air Force*Enlisted	206,783	53.4	110,453
59	Male*Air Force*Officer	48,110	40.2	19,342
60	Coast Guard	41,204	100.0	41,204
61	Coast Guard*Enlisted	33,029	100.0	33,029
62	Coast Guard*E1-E4	14,171	100.0	14,171
63	Coast Guard*E5-E9	18,858	100.0	18,858
64	Coast Guard*Officers	8,175	100.0	8,175
65	Coast Guard*W1-W5/O1-O3	5,456	100.0	5,456
66	Coast Guard*O4-O6	2,719	100.0	2,719
67	Coast Guard*Females	5,951	100.0	5,951
68	Coast Guard*Females*Enlisted	4,359	100.0	4,359
69	Coast Guard*Females*Officers	1,592	100.0	1,592
70	Coast Guard*Males	35,253	100.0	35,253
71	Coast Guard*Males*Enlisted	28,670	100.0	28,670
72	Coast Guard*Males*Officers	6,583	100.0	6,583
73	DoD*Males*Ft Hood	29,787	49.7	14,818
74	DoD*Males*Ft Bragg	39,782	46.9	18,644
75	DoD*Males*Ft Bliss	21,955	49.5	10,876
76	DoD*Males*Ft Campbell	24,455	49.5	12,101
77	DoD*Males*Ft Leonard Wood	8,315	51.6	4,292
78	DoD*Males*Naval Station Norfolk	36,412	54.0	19,677
79	DoD*Males*Naval Base San Diego	24,553	53.8	13,215
80	DoD*Males*Naval Station Great Lakes	10,657	66.0	7,033
81	DoD*Males*Naval Base Coronado	5,197	50.6	2,632
82	DoD*Males*Naval Base Kitsap	11,157	55.7	6,219
83	DoD*Males*Camp Lujune	35,107	53.4	18,755
84	DoD*Males*Camp Pendleton	36,244	52.7	19,104
85	DoD*Males*29 Palms	10,196	55.3	5,636
86	DoD*Males*Miramar	6,474	49.4	3,199

Domain Number	Domain Label	Population Size	Percent Sampled	Sample Size
87	DoD*Males*Parris Island	3,997	56.2	2,248
88	DoD*Males*Eglin AFB	7,018	48.0	3,367
89	DoD*Males*Keesler AFB	3,265	53.6	1,751
90	DoD*Males*Nellis AFB	8,027	50.3	4,036
91	DoD*Males*Kadena AB	5,418	51.8	2,809
92	DoD*Males*Hill AFB	3,314	51.5	1,706
93	DoD*Males*Joint Base San Antonio	24,577	50.7	12,455
94	DoD*Males*Joint Base Lewis-McChard	25,184	48.3	12,155
95	DoD*Males*Joint Base Pearl Harbor-Hickman	13,040	50.5	6,584
96	DoD*Males*Joint Base Langley-Eustis	9,403	49.1	4,617
97	DoD*Males*Joint Base Elmendorf-Richardson	8,307	50.9	4,228
98	DoD*Females*Ft Hood	5,997	100.0	5,997
99	DoD*Females*Ft Bragg	5,561	100.0	5,561
100	DoD*Females*Ft Bliss	3,677	100.0	3,677
101	DoD*Females*Ft Campbell	3,134	100.0	3,134
102	DoD*Females*Ft Leonard Wood	1,533	100.0	1,533
103	DoD*Females*Naval Station Norfolk	10,166	100.0	10,166
104	DoD*Females*Naval Base San Diego	6,130	100.0	6,130
105	DoD*Females*Naval Station Great Lakes	2,766	100.0	2,766
106	DoD*Females*Naval Base Coronado	657	100.0	657
107	DoD*Females*Naval Base Kitsap	1,861	100.0	1,861
108	DoD*Females*Camp Lujune	3,180	100.0	3,180
109	DoD*Females*Camp Pendleton	3,664	100.0	3,664
110	DoD*Females*29 Palms	671	100.0	671
111	DoD*Females*Miramar	993	100.0	993
112	DoD*Females*Parris Island	1,224	100.0	1,224
113	DoD*Females*Eglin AFB	1,413	100.0	1,413
114	DoD*Females*Keesler AFB	1,213	100.0	1,213
115	DoD*Females*Nellis AFB	1,930	100.0	1,930
116	DoD*Females*Kadena AB	1,088	100.0	1,088
117	DoD*Females*Hill AFB	601	100.0	601
118	DoD*Females*Joint Base San Antonio	10,116	100.0	10,116
119	DoD*Females*Joint Base Lewis-McChard	4,397	100.0	4,397
120	DoD*Females*Joint Base Pearl Harbor-Hickman	2,600	100.0	2,600
121	DoD*Females*Joint Base Langley-Eustis	2,625	100.0	2,625
122	DoD*Females*Joint Base Elmendorf-Richardson	1,539	100.0	1,539

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