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2018 Service Academy Gender Relations Survey

Statistical Methodology Report

DATA DRIVEN SOLUTIONS FOR DECISION MAKERS

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The Office of People Analytics (OPA) is indebted to numerous people for their assistance with the 2018 Service Academy Gender Relations Survey (SAGR) which was conducted on behalf of the Office of the Under Secretary of Defense for Personnel and Readiness (OUSD[P&R]). The survey program is conducted under the leadership of Dr. Ashlea Klahr, Director of OPA's Health and Resilience (H&R) Division. The H&R Division is conducted under the oversight of Ms. Lisa Davis, Deputy Director. The project managers for this effort were Ms. Natalie Namrow, Fors Marsh Group, LLC (FMG) and Ms. Kimberly Hylton, FMG.

The lead survey design analysts were Ms. Kimberly Hylton and Ms. Natalie Namrow. Ms. Margaret Coffey, Team Lead of Survey Operations, is responsible for the creation of survey database and archiving standards. The lead operations analyst on this survey was Mr. W. Xav Klauberg, FMG.

OPA's Statistical Team, under the guidance of Mr. David McGrath, Senior Statistician, is responsible for all statistical aspects of this survey, including, sampling, weighting, nonresponse bias analysis, imputation, and the implementation of statistical hypothesis testing used in the survey program. Mr. Eric Falk, Team Lead of the Statistical Methods Branch, was responsible for coordinating the sampling and weighting processes, and provided consultations and overall process control. Mr. Eric Falk, mathematical statistician within the Statistical Methods Branch, developed the statistical weights based on the respondents for this survey. Eric Falk and John Chantis conducted the nonresponse bias analysis. John Chantis, Eric Falk, and David McGrath wrote this methodology report.

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2018 SERVICE ACADEMY GENDER RELATIONS SURVEY: 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. The Health and Resilience (H&R) Division, within OPA, conducts in-depth studies of topics which impact the health and well-being of military populations.

The *2018 Service Academy Gender Relations Survey* (*2018 SAGR*) is designed to track unwanted sexual contact and sexual harassment issues at the Service Academies. The U.S. Code, Title 10, Armed Forces, as amended by Section 532 of the John Warner National Defense Authorization Act (NDAA) for Fiscal Year 2007, codified an assessment cycle at the Academies that consists of alternating surveys and focus groups. This requirement applies to the DoD Academies (U.S. Military Academy [USMA], U.S. Naval Academy [USNA], and U.S. Air Force Academy [USAFA]). The first assessment in this series was conducted in 2004 by the DoD Inspector General (IG). Responsibility for subsequent assessments was transferred in 2005 to the H&R Division within OPA.

Although not covered by the requirement of U.S. Code 10, U.S. Coast Guard Academy (USCGA) leadership requested they be included, beginning in 2008, in order to evaluate and improve their programs addressing sexual assault and sexual harassment. The USCGA is surveyed under authority of U.S. Code 14, Section 1. The United States Merchant Marine Academy (USMMA), within the Department of Transportation (DOT), is not required to participate in the assessments codified by U.S. Code 10. The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 required the Secretary of Transportation and USMMA to address sexual assault and harassment at the Academy, including assessment. USMMA officials requested they be included in the SAGR, beginning in 2012, in order to evaluate and improve their programs addressing sexual assault and sexual harassment.[1]

This report describes the sampling and weighting methodologies for the *2018 SAGR*, which fielded in March and April 2018. The first section of this report describes the design and selection of the sample. The second section describes weighting and adjustments for multiple comparisons. The third section describes the calculation of response rates, contact rates, and cooperation rates for the full sample and for population subgroups. The final section presents the nonresponse bias analysis. Information about administration of the survey is found in the *2018 Service Academy Gender Relations Survey: Overview Report* (OPA, 2018).

[1] Results for USMMA are analyzed and weighted separate from the DoD MSA's and the USCGA.

Sample Design and Selection

Target Population

The *2018 SAGR* was designed to represent all students at the following Service Academies:

- U.S. Military Academy (USMA)
- U.S. Naval Academy (USNA)
- U.S. Air Force Academy (USAFA)
- U.S. Coast Guard Academy (USCGA)

Sampling Frame

The sampling frame consisted of 13,918 students on rosters provided to OPA by each Academy for class years 2018, 2019, 2020, and 2021. Students were scheduled by each Academy to attend one of the briefing sessions. They were expected to check-in for their session and receive a mandatory briefing about the survey, but participation in taking the survey was voluntary. OPA observed that the checked in percentages varied by academy. For example, the percentage of students that checked in at the Naval Academy was 99 percent. However, the checked in percentages for Army, Air Force, and Coast Guard, were 94, 95, and 94, respectively. In addition, not all academies provided OPA with details about students that were unaccounted for or excused from the survey. In order to keep population and estimation procedures consistent across the four academies, OPA did not exclude any students from the projections, which is different from the previous administration. The impact of this change is negligible because the percentage of the students at the Naval, Air Force, and Coast Guard academies that were excused, based on information provided from those academies, was 1.2% (118/9,620) and only a portion of these (separated/out processing, on exchange, etc.) would be considered out of scope.

Sample Design

The *2018 SAGR* was a census of men and women on rosters provided by the four academies. This sample design is consistent with the design in 2014 and 2016 but differs from prior-to-2014 administrations of the SAGR surveys where OPA selected a census of all women but sampled the men. For the *2018 SAGR*, the final sample (population) of 13,918 consisted of 10,316 Academy men and 3,602 women. Table 1 shows the distribution of students by Service Academy, gender, and class year.

Table 1.
Sample (Population Roster Size) by Service Academy, Gender, and Class Year

Gender/Class Year	Total	USMA	USNA	USAFA	USCGA
Total	13,918	4,298	4,440	4,156	1,024
Gender					
Men	10,316	3,326	3,255	3,069	666
Women	3,602	972	1,185	1,087	358
Class Year					
Class of 2018	3,259	986	1,065	992	216
Class of 2019	3,325	998	1,074	1,004	249
Class of 2020	3,557	1,152	1,103	1,027	275
Class of 2021	3,777	1,162	1,198	1,133	284

Data were collected in March and April 2018. A trained research team from OPA administered the anonymous paper-and-pen survey in group sessions. Separate sessions were held for female and male students at each Academy. After checking in, each student was handed a survey, an envelope, a pen, and an Academy-specific information sheet. The information sheet included details on where students could obtain help if they became upset or distressed while taking the survey or afterwards. Students were briefed on the purpose and details of the survey and the importance of participation. Completion of the survey was voluntary. If students did not wish to take the survey, they could leave the session at the completion of the mandatory briefing. Students returned completed or blank surveys (depending on whether they chose to participate) in sealed envelopes into a bin as they exited the session; this process was monitored by the survey proctors as an added measure for protecting students' anonymity.

OPA received roster counts from each of the Academies that contained the gender and class year. OPA maintained a list of Academy students and indicated when the student arrived for survey administration. For example, USMA contained 3,326 men (see Table 1). OPA collected 13,741 questionnaires during the SAGR survey administration. The information from these surveys was entered into a database and this electronic database is referred to as the "immediate returns."

Weighting

OPA created analytical weights for the *2018 SAGR* to account for varying response rates among population subgroups (Service Academy, gender, and class year). Sampling weights defined as the inverse of the selection probabilities took the value of one (1) for all members because the survey was a census. The sampling weight was then adjusted for nonresponse. The first step of the weighting process was to determine case dispositions for all sampled members.

Case Dispositions

OPA assigned final disposition codes for weighting based on eligibility and completion of the survey. Unlike most OPA surveys, we considered all Academy students as eligible for the

2018 SAGR because the Academies were unable to provide consistent information on student eligibility as mentioned in the sampling frame section above. Execution of the weighting process and computation of response rates both depend on this classification.

OPA determined final disposition codes and calculated weights for the number of complete and eligible respondents. Complete returns have responses on 50% of survey questions asked of everyone and endorsement of the two types of critical questions determined for this survey. Critical question requirements include endorsement of 1) any item in the gender related experiences section (questions 4 through 39) and 2) the question on experiences of unwanted sexual contact (USC) (question 48). There were 9,647 complete eligible returns (ELIGFLGW=1). There were 2,996 questionnaires that were handed in completely blank (FLAGFIN=17 or QCOMPN=0). There were 1,098 students that answered at least one survey question, but not enough to be considered complete eligible. The remaining 177 students either never showed up to the briefing or did not return a survey. Final disposition codes for the *2018 SAGR* are shown in Table 2.

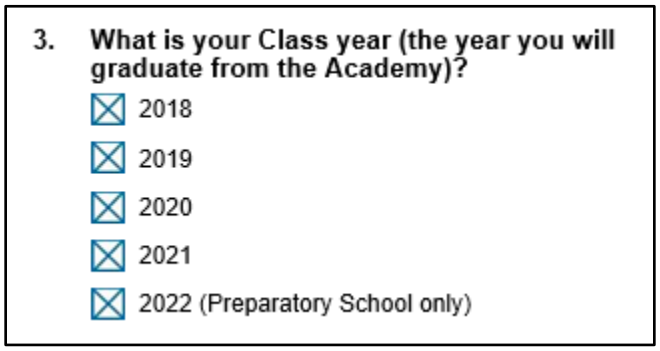
Table 2.
Case Dispositions for Weighting

Case Disposition	Information Source	Conditions	Sample Size
Eligible, complete response	Survey Return	Survey returned with critical items completed and at least 50% of items completed	9,647
Eligible, incomplete response	Survey Return	Survey returned with critical items not completed or at least 50% of items not completed	1,098
Survey returned blank	Survey returned blank	Survey returned blank	2,996
Survey not returned	No Survey Return	Student did not check in or survey was not returned	177
		Total	**13,918**

Treatment of Missing Data

OPA formed 32 nonresponse adjustment cells using the cross classification of Service Academy (4), gender (2), and class year (4). Weights were computed within these categories. Service and gender are captured during survey administration, while class year is captured only by reporting on the survey (see question 3 in Figure 1 below). Some survey respondents left class year missing, and therefore, OPA imputed class year for students in order to assign respondents to one of the 32 weighting cells.

Figure 1.
Question 3: Class Year



OPA imputed the missing class years for complete eligible returns proportionately based on the class year size for each Service Academy. The proportion of students in each class year was calculated for each Service Academy and multiplied by the number of missing complete eligible records for that Service Academy. For example, if 12 students were missing their class year (SRCLASS) from one Service Academy, and the proportion of each class year was 25%, then OPA imputed 3 of the missing records to each of the class years (2018, 2019, 2020 and 2021). OPA imputed class year by attaching a random number to each of the missing complete eligible respondents and then sorting the complete eligibles with missing class year by gender, Academy, and the random number. This put the data into a random order. OPA then assigned a class year to each of the complete eligible respondents with missing class years. OPA imputed class year for 273 complete eligible members, or 2.83% of all students who checked in.

Complete Eligible Cases for Weighting

After imputation of class year, the complete eligible cases for weighting were calculated by adding the number of complete eligible cases with known class year with the number of complete eligible cases with imputed class year. Table 3 shows the total number of eligible cases for weighting by Service Academy, gender, and class year.

Table 3.
Complete Eligible Cases for Weighting by Service Academy, Gender, and Class Year

Gender/Class Year	Total	USMA	USNA	USAFA	USCGA
Total	9,647	3,193	2,946	2,715	793
Men	6,724	2,296	2,071	1,876	481
Class of 2018	1,630	579	517	434	100
Class of 2019	1,477	497	427	426	127
Class of 2020	1,751	616	548	475	112
Class of 2021	1,866	604	579	541	142
Women	2,923	897	875	839	312
Class of 2018	619	190	194	165	70
Class of 2019	645	203	196	182	64
Class of 2020	793	241	219	236	97
Class of 2021	866	263	266	256	81

Nonresponse Adjustments and Final Weights

All sampling weights for the *2018 SAGR* took the value of one (1) because the survey was conducted as a census. The sample weights were adjusted for nonresponse in two steps within 32 cells formed by the cross classification of Service Academy (4), gender (2), and class year (4) shown in Table 4:

- Step 1: Adjust weights for nonresponse based on survey returns as follows:
  - Transfer the weight of the 4,271 survey nonrespondents (row 2 through 5 from Table 2) to the 9,647 survey respondents. To create this adjustment factor, OPA formed a ratio of the roster size divided by the survey respondents (completes only) within each of the 32 cells.
- Step 2: Adjust weights for the non-complete returns:
  - OPA set the final weights for the incomplete and blank surveys to zero.

The final weight for eligible respondents indicates the number of students that a complete respondent represents at the Service Academy within the same gender and class year. For example, a USMA male respondent graduating in 2018 represents 1.351 men in the 2018 USMA class year. The final weights by Service Academy, gender, and class year are shown in Table 4. Final weights ranged from 1.041 (women, USMA, 2020) to 1.827 (male, USNA, 2019).

Table 4.
Final Weights by Service Academy, Gender, and Class Year

Gender / Class Year	USMA	USNA	USAFA	USCGA
Men				
Class of 2018	1.351	1.547	1.795	1.330
Class of 2019	1.543	1.827	1.742	1.315
Class of 2020	1.463	1.464	1.533	1.536
Class of 2021	1.450	1.508	1.516	1.366
Women				
Class of 2018	1.074	1.366	1.291	1.186
Class of 2019	1.138	1.500	1.440	1.281
Class of 2020	1.041	1.374	1.267	1.062
Class of 2021	1.087	1.222	1.223	1.111

Multiple Comparison Section

To support the SAGR reports and briefings, OPA conducts a large number of statistical tests to identify significant differences across demographic groups (e.g., Academy) or compared with prior years. To protect against erroneous statistically significant results due to large numbers of statistical tests, OPA used a p-value of 0.01 for its statistical tests in the *2018 SAGR*. OPA chose this cut-off after empirically testing a statistical method called False Discovery Rate correction (FDR) developed by Benjamini and Hochberg (1995). FDR was 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 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 (e.g., USMA vs. USNA estimates of the effectiveness of the sexual assault training), 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 was true.

Contact, Cooperation, and Response Rates

Contact, cooperation, and response rates were calculated in accordance with the response rate formula (RR6)[2] of the American Association for Public Opinion Research (AAPOR, 2016) standard definitions.

Contact, cooperation, and response rates were computed for the *2018 SAGR* as follows:

The contact rate (CON) is defined as

$$CON3 = \frac{\text{contacted sample}}{\text{eligible sample}}$$ [3]

The cooperation rate (COOP) is defined as

$$COOP4 = \frac{\text{complete eligible responses}}{\text{contacted sample}}$$

The response rate (RR) is defined as

$$RR = \frac{\text{complete eligible responses}}{\text{eligible sample}}$$

Table 5 shows the calculation of the three rates. The final response rate is the product of the contact rate and the cooperation rate. The counts include the 273 complete eligible cases with unknown class year. Table 6 shows response rates by Service Academy, gender, and class year. Note that because the sample design was a census, all students have a sampling weight of 1 and therefore unweighted and weighted response rates are the same.

Table 5.
Contact, Cooperation, and Response Rates

Type of Rate	Computation	Calculation	Weighted Response Rate
Contact	Contacted sample/Eligible sample	13,741/13,918	98.7%
Cooperation	Complete eligible responses/Contacted sample	9,647/13,741	70.2%
Response	Complete eligible responses/Eligible sample	9,647/13,918	69.3%

[2] OPA defines partial respondents as members that complete more than 50% of base survey items and any critical questions (if the survey contains them). Therefore, OPA includes partial interviews in the numerator of cooperation and response rate computations.

[3] For SAGR surveys, OPA defines "Contacted" as those students who received a questionnaire (for reasons explained in the report OPA considered all members eligible for 2018 SAGR).

Table 6.
Weighted Response Rates by Service Academy, Gender and Class Year

Gender/Class Year	Total	USMA	USNA	USAFA	USCGA
Total	69.3	74.3	66.4	65.3	77.4
Men	65.2	69.0	63.6	61.1	72.2
Class of 2018	65.4	74.0	64.6	55.7	75.2
Class of 2019	60.1	64.8	54.7	57.4	76.0
Class of 2020	67.3	68.4	68.3	65.2	65.1
Class of 2021	67.5	68.9	66.3	66.0	73.2
Women	81.1	92.3	73.8	77.2	87.2
Class of 2018	80.9	93.1	73.2	77.5	84.3
Class of 2019	74.2	87.9	66.7	69.5	78.0
Class of 2020	83.1	96.0	72.8	78.9	94.2
Class of 2021	85.4	92.0	81.8	81.8	90.0

Nonresponse Bias Analysis

Survey nonresponse has the potential to introduce error into the estimates, and this source of error is called nonresponse bias (NRB). OPA uses weights to adjust the sample so the weighted respondents match the full population on observable characteristics (e.g., gender or class year). This eliminates the source of NRB related to the observed variables. When all NRB can be eliminated in this manner, the missingness is called *ignorable* or *missing at random* (Little & Rubin, 2002). Including more observable demographic variables into the weights reduces the likelihood of NRB. However, only three observable variables exist for this study due to the anonymous method of data collection.

The level of NRB varies for every question on the survey, but the objective of this research was to assess the extent of NRB for the estimated rate of Unwanted Sexual Contact (USC) that occurs at U.S. Service Academies. The Service Academies in the study are: USMA, USNA, USAFA, and USCGA. The USC rate provides policy offices and the Academies an estimate of the number of students who experienced this behavior.

Nonresponse bias occurs when survey respondents are systematically different from nonrespondents, and these effects are not removed during survey weighting. Statistically, the bias in a respondent mean, $\bar{y}_r$ below, (e.g., USC rate) is a function of the response rate and the relationship (covariance) between response propensities (p) and the estimated statistic y (i.e., USC rate), and takes the following form:

$Bias\ (\bar{y}_r) = \frac{\sigma_{yp}}{\bar{p}} = \left(\frac{\rho_{yp}}{\bar{p}}\right)\sigma_y\sigma_p$, where:

σ_{yp} = covariance between *y* and response propensity,

$\bar{p}$ = mean propensity over the sample,

ρ_{yp} = correlation between y and p,

σ_y = standard deviation of y,

σ_p = standard deviation of p

NRB can occur with high or low survey response rates, but declining response rates for DoD surveys increases the risk of NRB, and has therefore increased the focus on assessing NRB.

It is important to consider three additional factors regarding the *2018 SAGR* NRB:

1. The *SAGR* survey has significantly higher response rates than most military surveys due to the in-person mode of data collection. Weighted response rates in Military surveys conducted in 2018 typically ranged between 18-22% while the *2018 SAGR* response rate was 69%. Although NRB can occur with any level of response rates, the high response rate reduces the likelihood of large NRB in *2018 SAGR* estimates.

2. The *2018 SAGR* was a completely anonymous survey and OPA had only three available administrative variables: Academy, class year, and gender. Examining the relationship between these variables and survey response shows that these variables are less predictive of survey response than variables used in typical OPA surveys (e.g. paygrade). Therefore, this NRB analyses is limited relative to typical OPA NRB studies such as the *2016 Workplace and Gender Relations Survey of Active Duty Members: Nonresponse Bias Analysis Report* (DMDC, 2017-019). However, it is important to note that the Service Academy population is more homogeneous than typical military populations that OPA surveys. The members of the Service Academies are similar in age (18-24 years old), have similar living conditions (on campus; they do not PCS or deploy), and have very high academic aptitude.

3. The *2018 SAGR* survey is administered in large lecture halls where large groups of students complete paper surveys in a common setting. The impact of this method of data collection on both nonresponse and measurement error is unknown, and is an area of interest for future research.

For this NRB study, OPA conducted two studies: 1) evaluated the composition of the survey respondents relative to the sample and population and 2) assessed missing data by analyzing both the survey drop-offs and item-missing data. While the level of NRB and its impact on the quality of survey estimates remains partially unknown, as long as the essential survey conditions (e.g., mode of survey contact, data collection, sampling and weighting) remain the same, the level and direction of NRB likely stays consistent across iterations of a survey. Therefore, comparing the estimates from a current survey to the prior iteration likely provides very useful data even if non-trivial NRB exists.

Study 1: Evaluate the Composition of the Survey Respondents Relative to the Sample and Population

OPA considered whether, and how, survey nonresponse (unit nonresponse) affects NRB for this survey. In this section OPA evaluated the composition of the respondents and nonrespondents based on a set of subgroups. Because the *2018 SAGR* was a census, the population and the sample were the same. Differences between the composition of survey respondents compared with the sample on observable characteristics (e.g., gender or Academy) may provide evidence that there are also differences on unobservable characteristics. OPA accounts for differences on observable characteristics during *SAGR* weighting, but can only account for unobservable characteristics (e.g., a USC experience) to the extent they are correlated with observable characteristics.

Table 7 shows the composition of Academy, class year, and gender by population, respondents, nonrespondents, and weighted estimates. Note that men represent 74% of the population, 70% of the respondents, but represent 84% of the nonrespondents (compare male percent in columns b, d, and f). If this discrepancy was not accounted for during weighting, male respondents would be under-represented in the survey estimates. However, the weighted estimates column (column h) shows that the weights adjust male respondents to exactly match their 74% representation in the population. Overall, the *2018 SAGR* respondents and nonrespondents look more similar on the three available demographics than in typical OPA surveys. SAGR respondents tend to be more women (largest difference), freshmen, and attend the USMA and USCGA Academies. Column h shows that survey weighting effectively accounts for these observable characteristics. Survey weighting also reduces any biases in unobservable characteristics (e.g., USC) that are correlated with these three characteristics. Similar to 2016, the assessment of the composition of respondents relative to the sample provides some NRB concern in *2018 SAGR* estimates. However, we emphasize that the Service Academy population is much more homogeneous than typical military populations, and this could be an argument that there is lower NRB risk.

Three chi-square tests of independence were performed to examine the relationship between survey response and the three observable characteristics (i.e., gender, Academy, and class year) respectively. Survey response was statistically correlated with all three observable characteristics (gender: χ^2 (df=1, n= 10,621) = 52.1[4], p < 0.01: Academy: χ^2 (df=3, n= 10,621) = 100.7, p < 0.01: class year χ^2 (df=3, n= 10,621) = 16.2, p < 0.01). Class year frequency is only known in aggregate. Survey respondents who did not complete the class year question (n=273) were not included in the analysis because individual class year is unknown. Therefore, the chi-square test for class year examines the relationship between survey completion (i.e., contrasting complete eligible respondents with those that at minimum answered the 'class year' question) and class year. The distribution of survey respondents is significantly different from the population for all three observable characteristics. Therefore, OPA posits it more likely that survey respondents would also be different from the population on unobservable characteristics (e.g., race, risky behavior, etc.).

[4] Rao-Scott corrections to chi-squared tests (PROC SURVEYFREQ with CHISQ option) for contingency tables were used and are appropriate when the estimated cell proportions are derived from survey data (Rao & Scott, 1981,1984)

Table 7.
2018 SAGR Overall Population and Respondent Composition

Demographic	Population/Sample		Respondents		Nonrespondents		Weighted Estimates	
	Frequency (a)	Percent (b)	Frequency (c)	Percent (d)	Frequency (e)	Percent (f)	Frequency (g)	Percent (h)
Academy								
USMA	4,298	31	3,193	33	1,105	26	4,298	31
USNA	4,440	32	2,946	31	1,494	35	4,440	32
USAFA	4,156	30	2,715	28	1,441	34	4,156	30
USCGA	1,024	7	793	8	231	5	1,024	7
Class Year								
2018	3,259	23	2,249	23	1,010	24	3,259	23
2019	3,325	24	2,122	22	1,203	28	3,325	24
2020	3,557	26	2,544	26	1,013	24	3,557	26
2021	3,777	27	2,732	28	1,045[a]	24	3,777	27
Gender								
Male	10,316	74	6,724	70	3,592	84	10,316	74
Women	3,602	26	2,923	30	679	16	3,602	26
Total	**13,918**	**100**	**9,647**	**100**	**4,271[b]**	**100**	**13,918**	**100**

[a]OPA imputed class year for the 273 complete eligible respondents that did not self-report a class year.
[b]The number of nonrespondents was determined by the difference in the roster size and the number of complete eligible respondents.

Summary of Study 1

The *2018 SAGR* was a census, where all eligible men and women were selected with certainty. This analysis assesses whether survey respondents possess similar observable characteristics (e.g., gender) to survey non-respondents. OPA found that the distribution of survey respondents was statistically significantly different from survey nonrespondents for the three observable characteristics: Academy, gender, and class year. Although statistical significance was observed for the three variables, response rates varied less for these statistics than statistics assessed during OPA's typical web surveys. For example, response rates for senior officers can be 60 percent compared with a junior enlisted rate of less than five percent in a typical OPA survey.

Differences between respondents and nonrespondents suggest NRB presence. However, survey weighting effectively adjusts for these observable characteristics. Survey weighting also reduces any biases associated with unobservable characteristics (e.g., experienced sexual harassment) that are correlated with the observable characteristics. Therefore, weighting adjustments on observable characteristics can reduce the bias associated with failing to account for unobservable characteristics, even if there are differences on the unobservable characteristics between survey respondents and nonrespondents.

The relationship between observable and unobservable characteristics is unknown, and therefore the most desirable outcome for this study would be where respondents and nonrespondents match on observable characteristics, something OPA does not find here. While OPA interprets this study as presenting concerns that NRB may be present in *2018 SAGR* estimates, OPA has observed this effect in all OPA surveys, including prior administrations of SAGR.

Study 2: Assessment of Missing Data (Survey Drop-Offs and Item-Missing Data Rates)

OPA analyzed item missing data and survey drop-offs for all *2018 SAGR* questions, but specifically the USC question (Q48) to investigate whether some respondents refuse to answer questions or quit the survey (i.e., drop-off) because of the sensitivity of the questions. If the decision to refuse to answer the question is not random (i.e., those who avoid the USC question have different USC rates than complete respondents), then a source of NRB exists. OPA cannot directly test this possibility because the USC rate for respondents that skip the question or quit the survey is unknown. However, OPA draws limited conclusions about NRB by assessing respondent behavior near the USC question.

The drop-off analysis shows the last question that a survey respondent answered on the survey. For example, if a respondent answered Q1 to Q10 and quit, the drop-off analysis would place the respondent in the frequency count at Q10. Drop-off analysis does not count for standard item missing data (e.g., a respondent skips one question (accidentally or on purpose) but returns to answer further questions). If a student answered Q1 to Q10, skipped to Q12 and answered questions 12 to 20, and then answered no further questions, the drop-off analysis would include the student in the frequency count for Q20.

It is important to caveat this analysis because the *2018 SAGR* was administered on paper, and respondents had the opportunity to flip through the survey if they wished; this could lead to atypical drop-offs or patterns that are hard to interpret. For instance, someone concerned about answering the USC question could drop-off at Q5 after flipping through the survey and seeing where the survey was headed. This may make the assessment of survey drop-offs difficult to interpret relative to typical OPA surveys that use web administration and can confirm which question respondents are viewing when they quit the survey. Although SAGR was administered via paper, the drop-off analysis assumes the majority of respondents followed the skip pattern of the survey and proceeded in a linear order completing questions asked on the survey.

This analysis examines the partial respondents and the complete respondents to understand the cause of survey drop-offs. For *2018 SAGR*, Table 8 shows a key finding that 91% of women (n=2,842 out of 3,134) who started the survey completed the last question, in comparison to 85% of men (n=6,452 out of 7.611). This compares closely with 2016 where 92% of women and 86% of men finished the survey; therefore, most students that start the *SAGR* survey complete it. The percentages in both Table 8 and Figure 2 account for the changing denominators due to skip patterns causing a different numbers of survey respondents to see each question (i.e., percentage of drop-offs is the frequency of respondents who exited the survey divided by the number of respondents eligible to see a specific question).

The *2018 SAGR* survey asked students questions about nine content areas, including whether they had experienced a variety of unwanted verbal and/or physical behaviors. Table 8 shows the percent of SAGR respondents that dropped off the survey (i.e., quit prior to finishing) during each content area. Men drop off the *SAGR* at higher rates than women throughout the survey, but especially early in the survey (Q1-Q41) where the questions are less sensitive. OPA's interpretation of these drop-offs is that men are less interested in this survey because they have lower sexual harassment and USC risk.

Table 8.
2018 SAGR Drop-off by Topic Areas

Topic Area	Question Numbers	Drop-off (Women)	Drop-off (Men)
Background Information	Q1–Q3	1.5%	3.2%
Gender-Related Experiences	Q4–Q41	2.8%	5.0%
Gender-Related Situation With the Greatest Effect	Q42–Q47	0.6%	0.3%
Unwanted Sexual Behaviors	Q48–Q52	0.6%	0.9%
Unwanted Sexual Contact Situation With the Greatest Effect	Q53–Q72	0.2%	0.0%
Outcomes Associated With Experiencing Sexual Assault	Q73–Q84	0.1%	0.0%
Bystander Intervention	Q85–Q87	0.9%	1.4%
Academy Education and Culture	Q88-Q93	2.4%	3.8%
Prior Experiences	Q94-Q95	91.0%	85.2%

For women, drop-off by topic area ranges from 0.1% to 2.8% (0% to 4.3% in 2016), excluding Q95 because it is the final question on the survey. For men, drop-offs by topic area range from 0.03% to 5.0% in 2018 (excluding Q95) compared with 0.0% to 14.9% in 2016. The 'Gender-Related Experiences' topic area has the highest percentage of drop-offs for both men and women; however, this is expected because this section contains the most questions.

While Table 8 shows survey drop-offs aggregated by Section, Figure 2 shows drop-offs for individual questions. Both men and women experience early drop-offs in the "Background Information" section (Q1-Q3) prior to the sensitive questions. The first question related to sexual assault or sexual harassment is Q4 ("Did someone from your Academy repeatedly tell sexual 'jokes'") had the highest drop-off. It is important to note that the sensitivity or presentation of the subsequent questions can affect drop-off; for example, drop-off from Q3 may be associated with the more sensitive nature of Q4.

OPA observed spikes in drop-offs near the beginning of the survey and at the end of the survey. The graph shows a spike in drop-offs at Q3,[5] 2.7% for men and 1.4% for women. It's possible that academy students consider self-identification of their 'class year' as sensitive, or perhaps it could simply be non-interest in the survey. The graph also shows a small spike in male drop-off at Q38 (2.0%). Members that don't experience any issues from Q4-Q41 (82% for

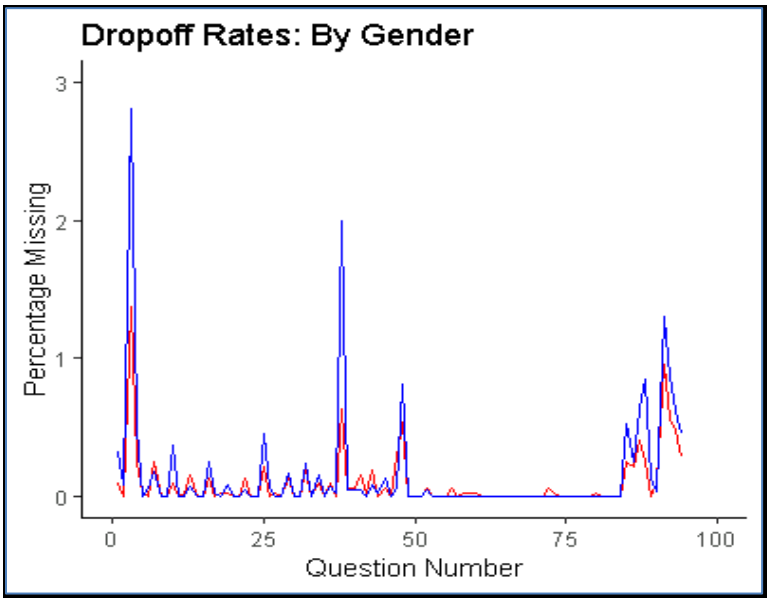
[5] Q3 asks, "What is your Class year"?

men) are next asked the USC question, so the spike at Q38 could explain hesitancy in answering the USC question, especially for men. While a possible source of NRB, the drop-offs are still a low percentage for a survey on very sensitive issues.

The remainder of this analysis examined men and women who answered the USC question and then dropped off the survey.

Figure 2 shows a spike in drop-off at Q48, which is the USC question. The male drop-off rate at this question was 0.8% (62 students) and 0.5% of women (17 students). One hypothesis is that students are traumatized answering the sensitive USC question and therefore drop-off the survey. The data do not support this hypothesis. Of the 17 women that dropped off at the USC question, 6% (n=1 of 17) indicated experiencing a USC while 2% of men (n=1 of 62) experienced a USC. These figures are both substantially lower than the overall USC rates. It is not clear why students may be dropping-off just after the USC question.

Figure 2.
2018 SAGR Male (Blue) and Female (Red) Drop-Offs



In addition to assessing survey drop-offs, OPA examined the item-missing data rates for each *SAGR* question (data not shown here). OPA compared the item missing data rates for men and women over the 297 questions[6] and found that men have higher item missing data rates for 82% of the questions (243 questions of 297). The highest item missing data rates consistently fall within skip questions, and usually contain sensitive questions. For example, of 12 female

[6] *2018 SAGR* has 95 questions; however, due to subparts of questions (e.g., Q48 a-e), there are 297 decision points that OPA refers to as questions here.

students who indicated they would get punished for not doing something sexual, 67% (8 of 12) did not answer the subsequent follow-up questions.

Summary of Study 2

OPA assessed the possible effects of NRB on the USC question through an analysis of survey drop-offs and item-missing data in the *2018 SAGR.* The level of drop-offs for the *2018 SAGR* is low, and the drop-off patterns show little evidence that respondents were offended by the sensitivity of survey questions. The analysis of item missing data and survey drop-offs provides little evidence of NRB in OPA's estimates of the USC rate.

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

DMDC. (2013d). *2012 Workplace and Gender Relations Survey of Active Duty Members: Nonresponse Bias Analysis Report.* (Report No. 2013-059). Alexandria, VA: Author.

Little, R.J. & Vartivarian, S. (2005). Does weighting for nonresponse increase the variance of survey means? Survey Methodology 31(2): 161-168.

OPA. (2016). *2016 Service Academy Gender Relations Survey: Statistical Methodology Report.* (Report No. 2016-015). Alexandria, VA: Author.

OPA (2018). *2018 Service Academy Gender Relations Survey: Overview Report.* (Report No. 2018-073). Alexandria, VA: Author.

Appendix A.
Detailed Drop-Offs by Gender

DATA DRIVEN SOLUTIONS FOR DECISION MAKERS

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Detailed Drop-Offs by Gender

Last Question Answered	Number of Drop-Offs (Female)	Percent Drop-Off (Female)	Number of Drop-Offs (Male)	Percent Drop-Off (Male)	Comments
1	3	0.1	25	0.3	Background Information Section
2	0	0.0	7	0.1	
3	43	1.4	213	2.8	
4	8	0.3	39	0.5	Gender-Related Experiences Section
5	1	0.0	0	0.0	
6	0	0.0	5	0.1	
7	8	0.3	14	0.2	
8	0	0.0	0	0.0	
9	0	0.0	0	0.0	
10	3	0.1	29	0.4	
11	0	0.0	0	0.0	
12	1	0.0	0	0.0	
13	5	0.2	6	0.1	
14	0	0.0	0	0.0	
15	0	0.0	0	0.0	
16	4	0.1	20	0.3	
17	0	0.0	2	0.0	
18	1	0.0	0	0.0	
19	1	0.0	7	0.1	
20	0	0.0	0	0.0	
21	0	0.0	0	0.0	
22	4	0.1	4	0.1	
23	0	0.0	0	0.0	
24	0	0.0	0	0.0	
25	7	0.2	35	0.5	
26	0	0.0	5	0.1	
27	1	0.0	0	0.0	
28	0	0.0	0	0.0	
29	4	0.1	13	0.2	
30	0	0.0	0	0.0	
31	0	0.0	0	0.0	
32	6	0.2	18	0.2	
33	0	0.0	0	0.0	
34	3	0.1	12	0.2	
35	0	0.0	0	0.0	
36	3	0.1	6	0.1	
37	0	0.0	2	0.0	
38	20	0.6	152	2.0	
39	2	0.1	4	0.1	
40	2	0.1	4	0.1	
41	5	0.2	4	0.1	

Last Question Answered	Number of Drop-Offs (Female)	Percent Drop-Off (Female)	Number of Drop-Offs (Male)	Percent Drop-Off (Male)	Comments
42	1	0.0	0	0.0	Gender-Related Situation With the Greatest Effect
43	6	0.2	7	0.1	
44	0	0.0	2	0.0	
45	2	0.1	10	0.1	
46	0	0.0	0	0.0	
47	9	0.3	5	0.1	
48	17	0.5	62	0.8	USC Question and Unwanted Sexual Behaviors Section
49	0	0.0	0	0.0	
50	0	0.0	0	0.0	
51	0	0.0	1	0.0	
52	2	0.1	4	0.1	
53	0	0.0	0	0.0	Unwanted Sexual Contact Situation With the Greatest Effect
54	0	0.0	0	0.0	
55	0	0.0	0	0.0	
56	2	0.1	0	0.0	
57	0	0.0	0	0.0	
58	1	0.0	0	0.0	
59	1	0.0	0	0.0	
60	1	0.0	0	0.0	
61	0	0.0	0	0.0	
62	0	0.0	0	0.0	
63	0	0.0	0	0.0	
64	0	0.0	0	0.0	
65	0	0.0	1	0.0	
66	0	0.0	1	0.0	
67	0	0.0	0	0.0	
68	0	0.0	0	0.0	
69	0	0.0	0	0.0	
70	0	0.0	0	0.0	
71	0	0.0	0	0.0	
72	2	0.1	1	0.0	
73	1	0.0	0	0.0	Outcomes Associated With Experiencing Sexual Assault Section
74	0	0.0	0	0.0	
75	0	0.0	0	0.0	
76	0	0.0	0	0.0	
77	0	0.0	0	0.0	
78	0	0.0	0	0.0	
79	0	0.0	0	0.0	
80	1	0.0	1	0.0	
81	0	0.0	0	0.0	

Last Question Answered	Number of Drop-Offs (Female)	Percent Drop-Off (Female)	Number of Drop-Offs (Male)	Percent Drop-Off (Male)	Comments
82	0	0.0	0	0.0	
83	0	0.0	0	0.0	
84	0	0.0	1	0.0	
85	8	0.3	40	0.5	Bystander Intervention Section
86	7	0.2	20	0.3	
87	13	0.4	49	0.6	
88	8	0.3	65	0.9	Academy Education and Culture Section
89	0	0.0	11	0.1	
90	3	0.1	3	0.0	
91	30	1.0	99	1.3	
92	18	0.6	67	0.9	
93	15	0.5	48	0.6	
94	9	0.3	35	0.5	Prior USC Experiences
95	2,842	90.7	6,452	84.8	Final Question
Total	**3,134**	**100.0**	**7,611**	**100.0**	

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14. ABSTRACT
This report describes the sampling and weighting methodologies for the 2018 SAGR, which fielded in March and April 2018. The first section of this report describes the design and selection of the sample. The second section describes weighting and adjustments for multiple comparisons. The third section describes the calculation of response rates, contact rates, and cooperation rates for the full sample and for population subgroups. The final section presents the nonresponse bias analysis.

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