

## 2018 Service Academy Gender Relations Survey: Multiple Correspondence Analysis

### Method Summary

Variables from the *2018 Service Academy Gender Relations (2018 SAGR)* survey were selected for further analysis based on results of a multiple correspondence analysis (MCA). This document describes the approach employed in the MCA. Results from a two-dimensional solution showed that variables related to alcohol (i.e., SAUSEALC, SABUYALC, ANYALCDRG, USEALC, and OFFALC) defined one key dimension that emerged in the MCA<sup>1</sup>. Accordingly, alcohol involvement in unwanted sexual contact (USC) incidents was chosen for further exploration.

### Data Processing

The analysis began by filtering out all respondents who did not experience USC, as the focus of the analysis was to characterize different kinds of USC at the service academies. The filtering factor in this study was USCCOMBO; all “-98” responses were removed, as they corresponded with respondents who reported not experiencing USC. At this step, “564” eligible respondents remained and were included in the next step of the analysis.

Second, conceptually related and usually infrequently endorsed questions on the *2018 SAGR* that were related to the identity of the offender(s), the location of the incident, and the time of the incident were combined. The analysis team identified 14 variables that could be reduced to a set of five. The variables that were combined and the name and label of the variables that were created are listed in Table 1.

In the case of creating the five new combined variables, respondents who endorsed (i.e., responded “yes”) at least one of the constituent variables were recorded as having endorsed the combined variable. Only valid non-endorsements (i.e., responded “no”) for all of the constituent variables were assigned a non-endorsement response. All other combinations of non-endorsement and refusal or “don’t know” responses were recorded as refused.

Finally, all refused, “don’t know,” and valid skip responses for all analysis variables were recorded as system missing. The analysis variables in the *2018 SAGR* data, including created variables, are listed in Table 1.

Table 1.

Variable	Label	Combined Variables
USCCOMBO	Most serious unwanted sexual contact behaviors experienced in the one situation	
SA1NUMOFF	How many people did this to you?	

<sup>1</sup> Other variables that defined this dimension included USCOCCUROFFACC, USCOCCURA, USCWHENA, SASTEPINB, and USCCOMBO. Variables that defined the second dimension included OFFALC, USEALC, SAGRPGEN, USCOFFNDOTHERACAD, HZBLUSC1SIT, SA1NUMOFF, USCOFFNDB, SADRUGED, ANYALCDRG, and SAUSEALC.

SAGRPGEN	Gender(s) of offender(s)	
USCOFFNDA	Offender: Academy student who was in a higher class year	
USCOFFNDB	Offender: Academy student who was in the same class year	
USCOFFNDC	Offender: Academy student who was in a lower class year	
USCOFFNDOOTHERACAD	Offender: Other Academy	USCOFFNDD USCOFFNDE USCOFFNDF
USCOFFNDFACSTAFF	Offender: Academy staff	USCOFFNDG USCOFFNDH
USCOFFNDNONACC	Offender: Non-academy	USCOFFNDI USCOFFNDJ
USCOFFNDK	Offender: Unknown person	
OFFRELA	Relation: Someone you were currently dating	
USCOCCURA	Location: Academy grounds in a dormitory/living area	
USCOCCURB	Location: Academy grounds not in a dormitory/living area	
USCOCCUROFFACC	Location: Off-academy	USCOCCURC USCOCCURD USCOCCURE USCOCCURF USCOCCURG
USCWHENA	Timing: During normal duty hours	
USCWHENAFTERHRS	Timing: After hours	USCWHENB USCWHENC
USCWHEND	Timing: On leave	
USCWHENE	Timing: During summer experience/training/sea duty	
HZBLUSC1SIT	Experienced hazing and/or bullying	
STALKSHR	Offender(s) sexually harass, stalk, or sexually assault you BEFORE the assault	
STALKSHR2	Offender(s) sexually harass, stalk, or sexually assault you AFTER the assault	
SAUSEALC	At the time of this unwanted situation had you been drinking alcohol?	
SABUYALC	Did the person(s) who did this to you buy or give you alcohol to drink?	
SADRUGED	Do you think that you might have been given a drug without your knowledge or consent?	
OFFALC	Had the person(s) who did it been drinking alcohol?	
USEALC	Either survivor or offender was drinking prior to USC?	
ANYALCDRG	Use of any alcohol and/or drugs in this situation?	

SASTEPINA	Was there anyone else present who stepped in to help you?
SASTEPINB	Was there someone else present who could have stepped in to help you, but did not?
XSEX	DoD-only gender
XCLASS	Class year for DoD Academies
XACAD	DoD-only Academies

## Data Analysis

The 2018 SAGR data outlined in Table 1 were analyzed using an MCA to uncover underlying dimensions in the data. The MCA is a categorical data, or cross-tabulation-based, generalization of the more commonly known principal components analysis (PCA). Both MCA and PCA are analyses that are based on eigenvalue decomposition of question response matrices. The PCA is a decomposition based on the Pearson product-moment correlation matrix of the questions in the analysis. The MCA differs from the PCA, as it does not require an ordered structure to the question responses on each survey item. As opposed to the Pearson product-moment correlation matrix, the MCA uses Burt tables, which are built from question-response option frequencies for each possible cross-tabulation of the input questions that are structured like a covariance matrix. An MCA-based approach was advantageous for this study, as it can examine variables category by category. As such, it is better able to accommodate the many unordered categorical variables that are present in the 2018 SAGR and does not force a rigid linear relationship on each set of responses.

For the current analysis, system missing responses were permitted to enter into the analysis as separate categories distinct from valid responses so that cases that were missing data would not be eliminated from the analysis.

In total, the MCA extracted 15 dimensions from the data and had a total of .46 for its model inertia. Model inertia is the multivariate Chi-square value divided by the sample size. It acts as a generalized variance much like eigenvalues derived from a PCA.

The first dimension extracted by the MCA was associated with .42, or 90%, of the inertia. Unfortunately, this dimension mainly separated missing from non-missing responses on the set of questions in the analysis. That is, respondents who scored high on the dimension tended to have valid responses of any kind and also tended to be female, in less senior classes, and from the United States Military Academy (USMA), whereas respondents who scored lower on the dimension were more often missing responses, men, in more senior classes, and from the United States Air Force Academy (USAFA). Although this missing versus not missing trend was strong in the data, it was not of substantive interest and was not incorporated into the clustering results.

The second (.02 or 5% of inertia) and third dimensions (<.01 or ~1% of inertia) were associated with substantive responses and meaningfully separated the USC situations. These two dimensions were retained for the clustering.

To generate clusters, both dimensions were first split at their median score. Second, both median split dimensions were aggregated to produce all combinations of median split dimensions as clusters of the USC situations.

It is important to note that not accommodating the first dimension in the median split clustering did not affect the results, as all of the dimensions obtained by the MCA were statistically independent. Thus, high or low scores on the “missingness” dimension had no relation to obtaining high or low scores on the second or third dimensions that were used. Thus, the first dimension could be effectively ignored and considered a “statistical control” for missingness in the data.

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