

USCG Retention Study - Department of Mathematics - Spring 2023

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BACKGROUND

The 2019 Research and Development Corporation (RAND) Retention Study found three key factors concerning retention in the Coast Guard: **work environment concerns, career concerns, and personal life concerns.** Following these results, a capstone team of CGA cadets partnered with the Women’s Leadership Institute (WLI) and the USCG Alumni Association to research further into retention, deploying surveys modeled after the RAND Study to members serving at CGA and to Coast Guard reservists in 2021 and 2022.

The third iteration of the study was initiated in 2023. For the first time, the 2023 Coast Guard Retention Team deployed the retention survey to reservists, active-duty members, and separated members. Additionally, 2023 marks the first study to implement quantitative analysis of survey data.

PROBLEM STATEMENT

The user-interactive dashboard, made with the Shiny library in RStudio is used as a tool to accomplish the following goals:

- 1) Understand which factors of those identified in the 2019 RAND Study are statistically significant
- 2) Explore inequities in retention for different subsections of demographics



DATA

A survey, containing 55 questions, modeled off the 2019 RAND Study, was deployed for one month, gathering nearly 5,000 responses.

Each survey question was asked on a 5-point Likert Scale, producing ordinal categorical data with values ranging from 0 (Have Not Experienced) to 5 (Extremely Influential).

1. Leadership:

Perception that supervisors do not care about your career or personal issues (toxic leadership)

Does Not Apply/ Did Not Experience Not Influential Somewhat Influential Influential Very Influential Extremely Influential

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In conjunction with the Department of Leadership and Management USCG Retention Study

METHODOLOGY

- Relative to an Identified Distribution (Ridit) Analysis: a non-parametric statistics test that converts ordinal categorical data into a probability, from which a Z-Score is calculated, allowing the user to compare two distributions to each other
- Likert Analysis: a parametric statistics test that produces a p-value from a two-sample t-test

These statistics tests and data visualization techniques were combined in a user-interactive dashboard, which displays statistical significance when comparing different subsections of demographics responses to any question.

Select Categories

Please select a question category and up to 4 demographics. If selecting less than 4 demographics, please leave the undesirable inputs as "None."

Choose Category
Leadership

Demographic Category 1
PayGrade

Demographic Category 2
None

Demographic Category 3
None

Demographic Category 4
None

User Selected Data Graphics and Statistics

Select Question
Leadership_ToxicLeadership

Treatment Group:
Gender: female

Control Group:
Gender: male

Demographic 1
O-1, O-2, O-3, O-4

Demographic 1
O-1, O-2, O-3, O-4

Question:
Leadership_ToxicLeadership: Perception that supervisors do not care about your career or personal issues (toxic leadership)

Treatment Responses

Control Responses

Question	Ridit Analysis Z-Score	T-Test Statistic	T-Test P-Value	Number of Treatment Responses	Number of Control Responses
Leadership_ToxicLeadership: Perception that supervisors do not care about your career or personal issues (toxic leadership)	2.231	-2.343	0.01979	114	174

INTERPRETATION OF RESULTS

Green: We are 95% confident that the treatment group (women O-1 to O-4) are more likely than the control group (men O-1 to O-4) to leave the Coast Guard due to that factor (toxic leadership).