

Psychometric and Sampling Support for Navy Personnel Surveys

The U.S. Navy faces a number of challenges related to managing the needs of its officers and enlisted personnel in an era characterized by changing work demands, unpredictable missions, and possible reductions in total end-strength. To better address these challenges, Navy leaders need accurate metrics for Sailors' perceptions of the quality of Navy work life and how it affects them, their families, and the Navy as a whole.

As the Navy's manpower and personnel research laboratory, Navy Personnel Research, Studies, and Technology (NPRST) conducts large-scale surveys to assess the work environment and quality of life among the Navy's almost 500,000 active-duty and reserve personnel. RTI International has provided NPRST with a psychometric evaluation of the Navy-Wide Personnel Survey and assisted with sampling for several surveys of Navy personnel, including the Navy QOL Survey, Navy Quick Polls, and the Sexual Assault Victim Intervention (SAVI) program evaluation followup survey.

Psychometric Evaluation of the Navy-Wide Personnel Survey

The Navy-Wide Personnel Survey (NPS), conducted by NPRST, is one of the most comprehensive sources of data concerning Navy Sailors' perceptions of the quality of their work life. However, the items and scales on the NPS have not been psychometrically evaluated previously. To address this need, RTI conducted a comprehensive psychometric evaluation of the items and scales on the 2005 NPS using advanced



psychometric techniques such as item response theory and confirmatory factor analyses.

Based on these analyses, RTI recommended revisions to the items and developed scales with good psychometric properties. In addition, we developed a brief index for predicting retention intentions and a Navy Climate Index for measuring overall perceptions of the Navy experience. Scores on the Navy Climate Index were strongly related to Sailors' ratings of Navy tone, their current command's tone, and overall satisfaction with Navy life.

As a second part of the project, RTI explored potential short forms for the NPS scales and the Navy Climate Index. We successfully developed a 13-item Navy Climate Index-Short Form (NCI-SF) that reduced the number of items by 73% and correlated highly with the long form ($r=0.97$). The NCI-SF may be administered when Navy leaders need rapid feedback on the current Navy climate.

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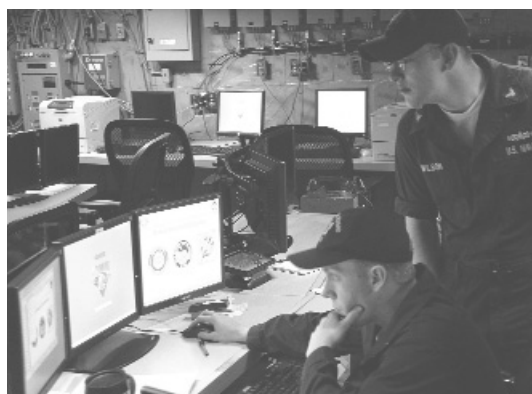
Psychometric and Sampling Support for Navy Personnel Surveys *(continued)*

Navy Cluster Sampling

Through the Navy Cluster Sampling project, RTI provided statistical support to NPRST in the form of consultation, technical support, and training on several aspects of sampling for NPS and other surveys. For example, RTI has worked on the following aspects of survey design:

- Frame development—the construction of a complete and accurate list of the population elements
- Use of optimal designs ranging from simple random sampling to more complex designs involving stratification and clustering
- Definition and use of efficient strata
- Sample allocation to strata—equal, proportional, combination of the two, and the pros and cons of each
- Calculation of the design weight—the inverse of the probability of selection
- Development of differential nonresponse weighting adjustment (e.g., weighting class adjustment and poststratification, especially by rank, race, and gender)
- Use of RTI's SUDAAN® software for variance estimation and analysis to correctly incorporate the design complexity
- Calculation and interpretation of the design effect and its role in understanding the quality of the sample data
- Calculation of sampling error and its application to hypothesis testing.

The goal of these collaborative efforts was to provide a consistent and statistically sound approach to the survey process—from design to final data analysis. This work continues to allow NPRST to use the most efficient sampling design to collect data representing the Navy as a whole and to provide reliable data for manpower and personnel decision support, while sampling as few Sailors as possible.



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