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2014-03-17

Manpower System Analysis Thesis Day Brief v.3 / Class of March 2014

Monterey, California, Naval Postgraduate School

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Welcome Naval Postgraduate School Thesis Day





Maximizing Female Retention in the Navy

**LT Clinton Ceralde and
Capt Christopher Czepiel**

**Advisors: Dr. Dina Shatnawi
Dr. Marco DiRenzo**

Sponsor: OPNAV 134W



- N134W: “It is understood that a minority group is more likely to retain if the minority group is better represented in the organization. However, it is not clear whether there is a minimum percentage within the organization that positively impacts minority retention, known as a critical mass.” June 1, 2013



Research Questions

- **Primary:**
 - Does the relative proportion of females in a given occupation affect long term retention of female officers in the Navy?
- **Secondary:**
 - Is there a staffing level at which point a “critical mass” is achieved that positively impacts female retention?
(Regression Analysis)
 - Does the proportion of women in a given occupation have an effect on their perception of the Navy.
(Survey Analysis)

Logit Methodology

- Logistic Regression Analysis to determine the existence of critical mass, and to estimate the critical mass necessary to increase the probability of a female choosing retention for a given occupational field
 - *Data from DMDC* from 10/1/2002 through 9/30/2012
 - *Retention: >5 ½ years*
 - *Variable of Interest:* The coefficient on proportion female after controlling for factors that affect retention



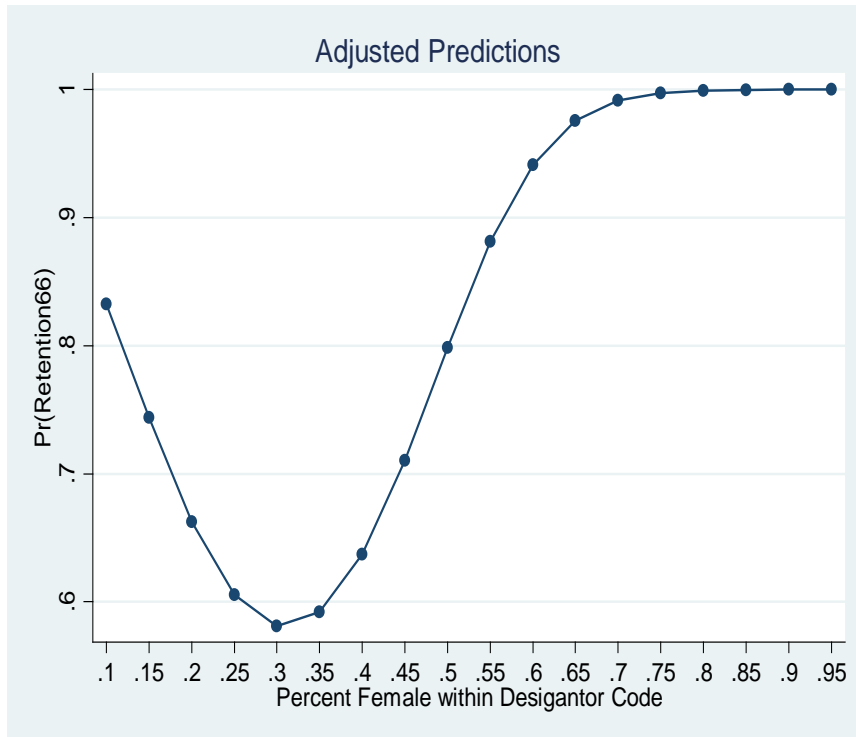
- Multivariate Logistic Regression Analysis (Logit)
- Regressions are performed separately for the designator categories of SWO and Other, Staff Corps (Medical), all Designators Combined.
- Retention probabilities are evaluated for the average female navy officer, at the mean value for independent variables in the model.
- We vary the percentage of females in each of these regressions from 10 percent to 95 percent to calculate the different probabilities of retention.



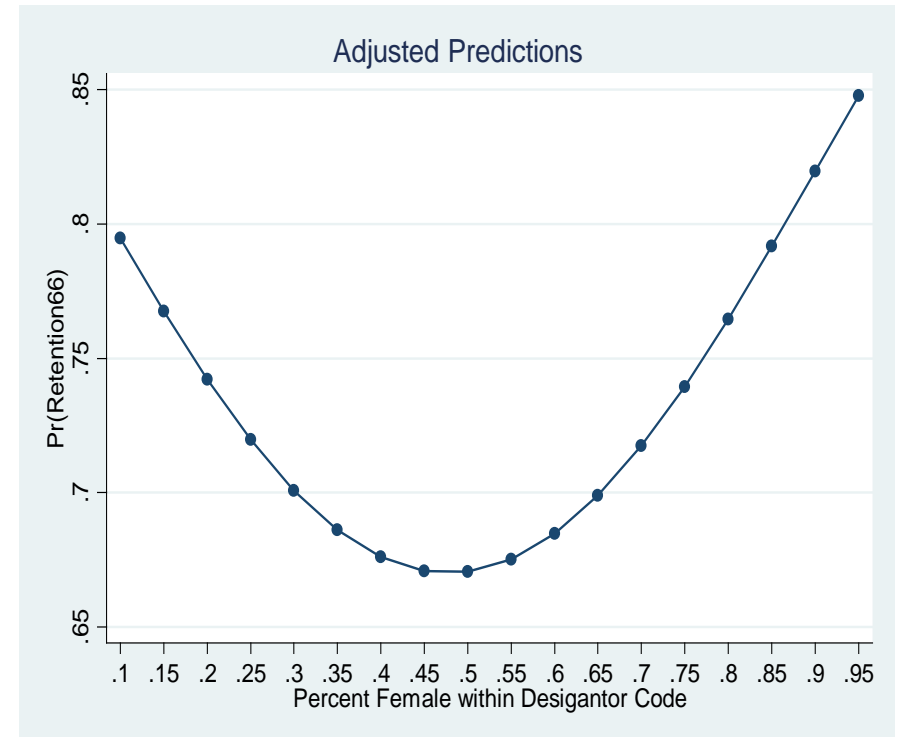
Results of Regression Analysis

- The results indicate that as the proportion of females increase within these designator categories, the probability of choosing to remain in the Navy at five years and six months decreases until it reaches a threshold point or critical mass.
- Once critical mass is obtained, the probability that a Navy female officer will remain on active duty service begins to increase.

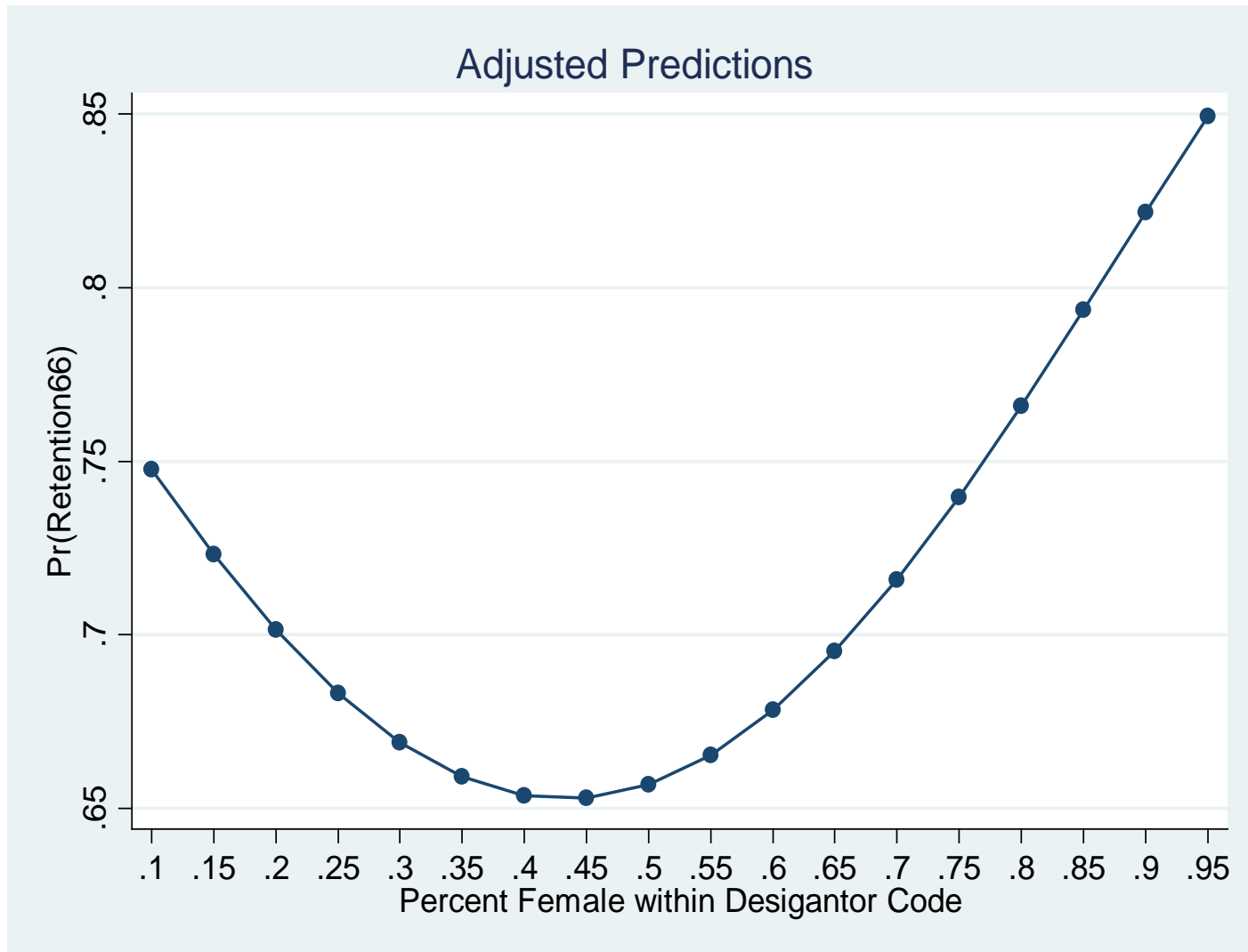
SWO & Other URL



Staff Corps (Medical)



All Designators Combined





Survey Methodology

- Survey to identify individual-level attitudes and perceptions that affect retention decisions
 - 15-20 minute survey (144 questions)
 - 877 respondents
 - Some things to capture: Structural Plateau, Turnover Intention, Relational Demography
 - For each of these categories, several similarly worded statements were presented to our respondents to test for response validity and consistency.



Survey Respondents

The top 5 occupational designator groupings that received the greatest number of female representation from the respondents.

877 Respondents: 53% Male, 41% Female, 6% Undisclosed

Designator Categories	Information Dominance (RL)	SWO (URL)	Aviation (URL)	Medical (Staff Corps)	JAG, CEC, Supply, Chaplain (Staff Corps)
Number of Respondents	22	53	68	156	42
Approximate Percentages of Respondents	6%	15%	19%	43%	12%

Turnover Intention
Statement: "I will leave this military as soon as I can."

Designator Categories	Information Dominance (RL)	SWO (URL)	Aviation (URL)	Medical (Staff Corps)	JAG, CEC, Supply, Chaplain (Staff Corps)
Agree or Strongly Agree	18.2%	30.2%	30.9%	30.8%	14.3%

Structural Plateau: Little chance of vertical movement in the organization
Statement: "I'm unlikely to receive further promotions in my organization."

Designator Categories	Information Dominance (RL)	SWO (URL)	Aviation (URL)	Medical (Staff Corps)	JAG, CEC, Supply, Chaplain (Staff Corps)
Agree or Strongly Agree	22.7%	20.8%	19.1%	15.4%	7.1%

Relational Demography: Similarity between the individual and the demographics characteristics of employees within the organization
Statement: “I would like to see more female superiors in my occupational field.”

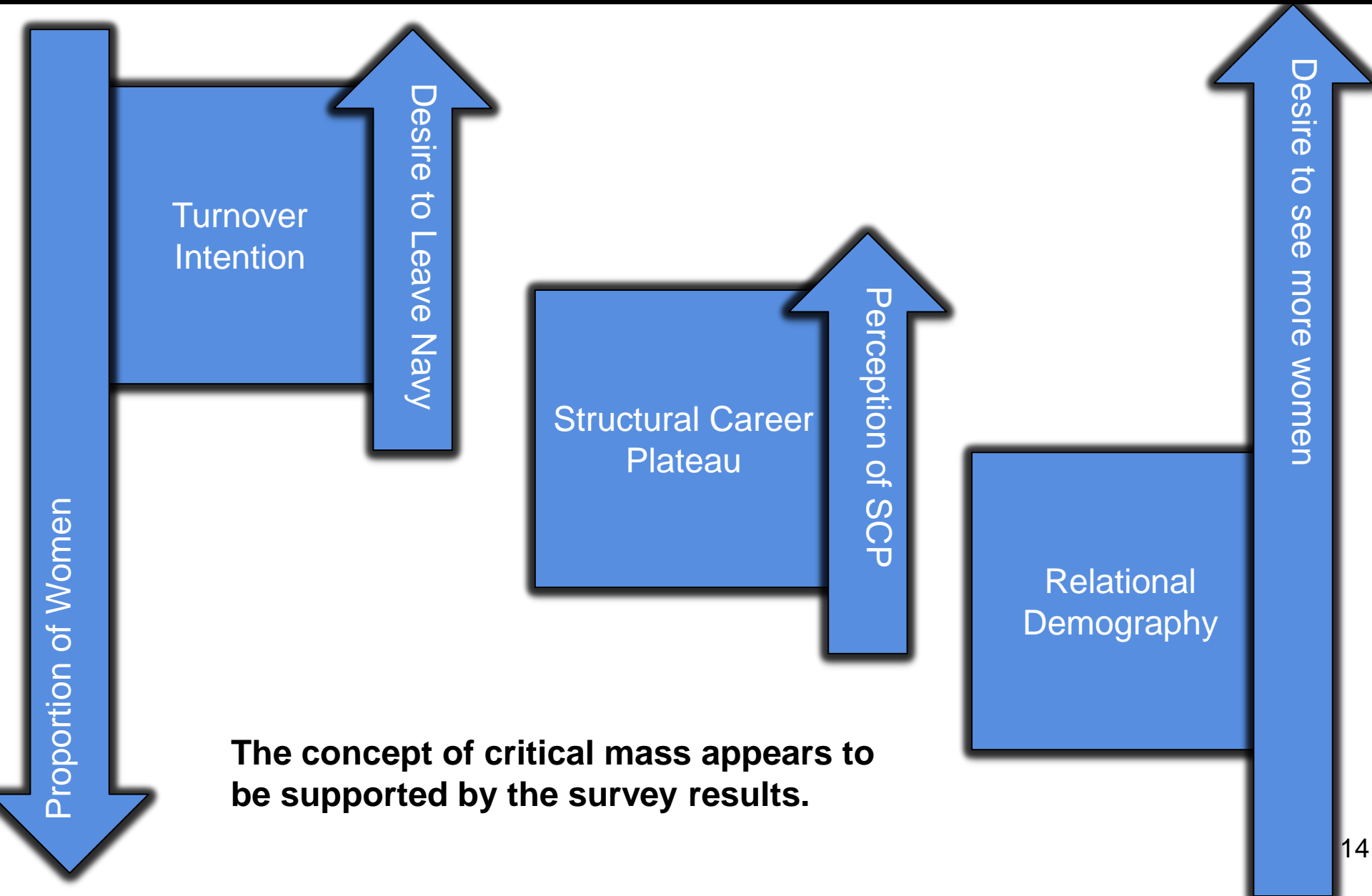
Designator Categories	Information Dominance (RL)	SWO (URL)	Aviation (URL)	Medical (Staff Corps)	JAG, CEC, Supply, Chaplain (Staff Corps)
Agree or Strongly Agree	68.2%	62.3%	64.2%	27.3%	57.1%

Statement: “If there were a greater proportion of female officers in my field, I would be more likely to stay in the Navy.”

Designator Categories	Information Dominance (RL)	SWO (URL)	Aviation (URL)	Medical (Staff Corps)	JAG, CEC, Supply, Chaplain (Staff Corps)
Agree or Strongly Agree	13.6%	15.4%	23.9%	8.5%	4.8%



Results of Survey Analysis



The concept of critical mass appears to be supported by the survey results.



Recommendations

- Collect more variables that may impact retention and may differ by gender, such as number of deployments, duty station, etc.
- Observe a longer time horizon to obtain more observations for each designator category.

Questions?





An Analysis of the Role of Service-Specific Factors in Active Duty Navy Suicides

LT James Golliday

**Advisors: Dr. Yu-Chu Shen
Dr. Jesse Cunha**

- In 2010, suicide became the second greatest cause of active duty military deaths (combat is first)
- From 2010-2012, active duty Navy suicides increased from 40 to 61
- Suicide degrades force readiness and resiliency
- Suicide = high visibility
 - Congress (FY09 National Defense Authorization Act)
 - SECDEF (DoD TF for Suicide Prevention)
 - CNP (Force Readiness, Force Resiliency)



Research Question

What service-specific factors are associated with the occurrence of active duty suicides in the U.S. Navy?



Data and Sample

- Conducted quantitative analysis of suicide susceptibility among service-specific characteristics and demographics for CY2002-CY2012
- Utilized pre-collected records
 - Defense Manpower Data Center: demographics, career information
 - Armed Forces Medical Examiner System: month and year of death with a binary indicator of suicide outcome
- 703,230 enlisted
- 98,594 officers

- Performed logistic regression analysis
 - Measured odds ratio of suicide given service-specific characteristics and demographics
 - Analyzed enlisted personnel separately from officers due to significant differences between the two groups
 - Demographic factors: age, race/ethnicity, gender, marital status, children
 - Service-specific factors: rank, rating, designator, AFQT score, combat zone deployments, accession waivers
 - Warfare platform



General Suicide Statistics

CY2002-CY2012 (n=449)

	Number of Suicides	Percentage of Total Suicides	Sample Size*	Crude Suicide Rate (per 100,000 persons)**
CY2002	38	8%	411,127	9.2
CY2003	42	9%	411,595	10.2
CY2004	37	8%	406,355	9.1
CY2005	37	8%	392,380	9.4
CY2006	33	7%	381,183	8.7
CY2007	39	9%	366,548	10.6
CY2008	36	8%	359,438	10.0
CY2009	44	10%	356,280	12.3
CY2010	33	7%	350,559	9.4
CY2011	50	11%	349,819	14.3
CY2012	60	13%	347,546	17.3
Total	449	~100%	791,021***	56.8

*Includes all active duty personnel in the sample (active component and reservists on active duty)

**Computed based on total personnel in the sample for applicable year

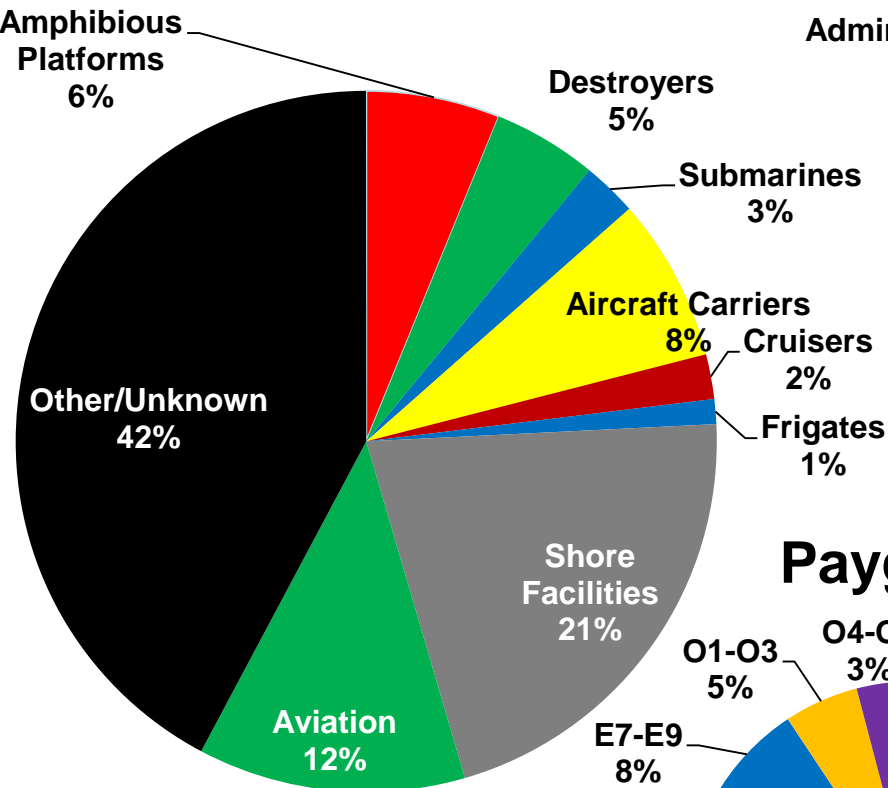
*** Number of unique Sailors in the entire sample (individual records)



General Suicide Statistics

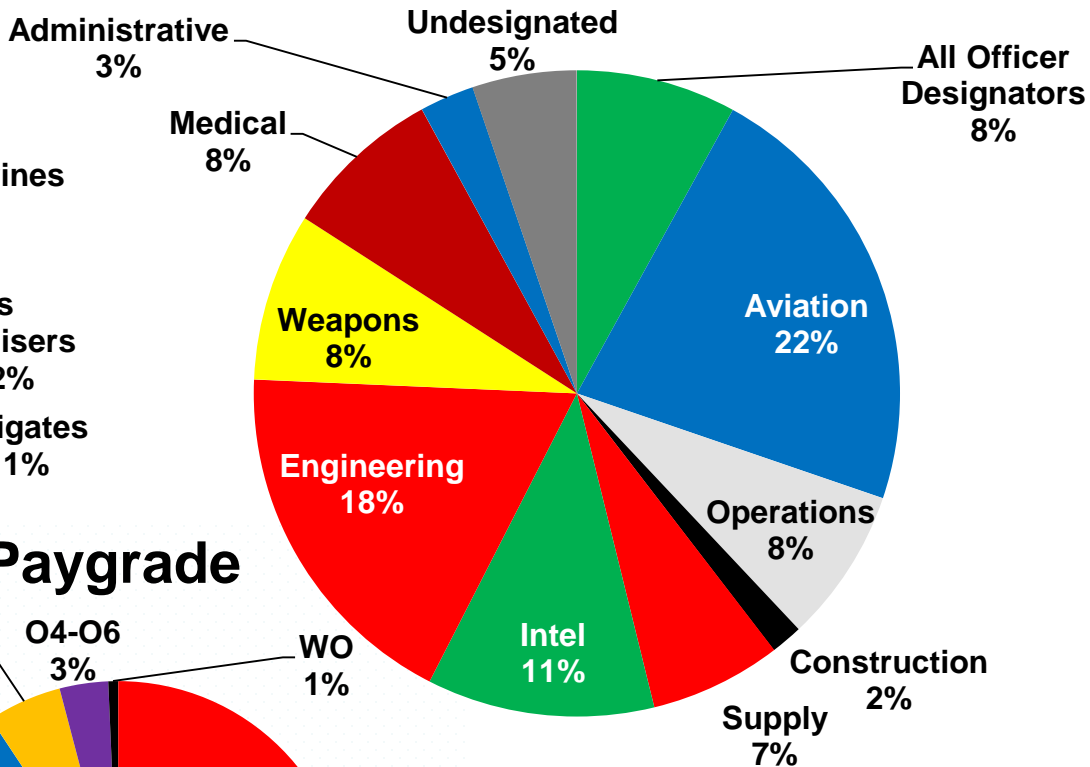
CY2002-CY2012 (n=440)

Warfare Platform

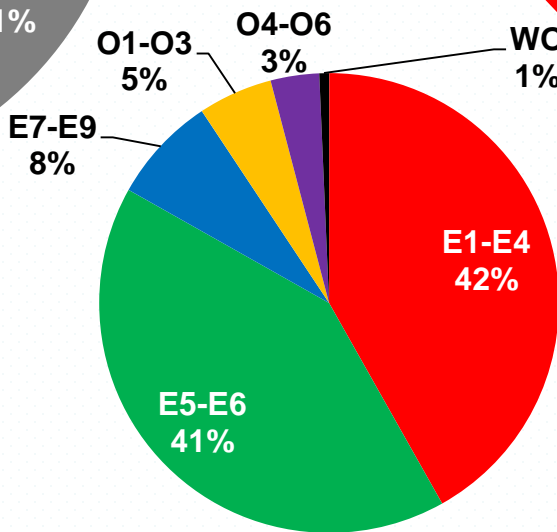


Combat Zone: 13%

Designators and Ratings



Paygrade



Males: 96%
Caucasians: 73%
African-Americans: 13%
Married: 48%
Never Married: 47%
Divorced/Widowed/Separated: 5%



Demographic

Gender

- Enlisted males 4.7 times more likely than enlisted females
- Male officers 3 times more likely than female officers

Age

Enlisted 30-34 years of age
1.7 times more likely
than enlisted 17-19 years of age

Race

Enlisted African-Americans
31% less likely
than enlisted Caucasians

Children/Dependents

- Enlisted with 3 dependents 39% less likely than enlisted with no dependents
- Officers with 2 dependents
2.7 times more likely
than officers with no dependents

Odds Ratio of Committing Suicide

Service-Specific

Enlisted Rating

- Supply ratings 1.5 times more likely than administrative ratings
- Undesignated ratings 41% less likely than administrative ratings

Officer Designator

Surface Warfare Officers (SWOs)
73% less likely
than administrative designators

Warfare Platform

- Enlistees on submarines
44% less likely than enlistees assigned to shore facilities
- Enlistees on aircraft carriers
34% less likely than enlistees assigned to shore facilities

Accession Waiver

- Enlistees with non-moral accession waivers 1.4 times more likely than enlistees with no accession waivers

*On average. Statistically significant results only

Conclusions

- Overall demographic results reflect trends
 - Male is more likely to commit suicide
 - Sailors in age group 30-34 have the highest odds
- Enlisted supply ratings appear to be more likely to commit suicide
- SWOs appear to be less likely to commit suicide
- Sailors assigned to submarines and aircraft carriers appear to be less likely to commit suicide



Recommendations

- Incorporate collective suicide risk factor research findings into Suicide Awareness General Military Training (NETC) and Suicide Prevention Coordinator training (OPNAV N135)
- Conduct new research on service-specific suicide risk factors every 2-3 years
- Conduct additional research for supply ratings to determine specific risk factors within the ratings
- Conduct additional research for warfare platforms to determine specific factors that make aircraft carriers and submarines less susceptible to suicide

Questions?





Quantitative and Qualitative Examination of Hiring Freeze Outcomes at DoD organizations: analysis of an Army command

LT Jacqueline Evans
LT Ezra Hatch

Advisors: Dr. Dina Shatnawi
Dr. Marco DiRenzo

Sponsor:
U.S. Army Mission and Installation Contracting Command

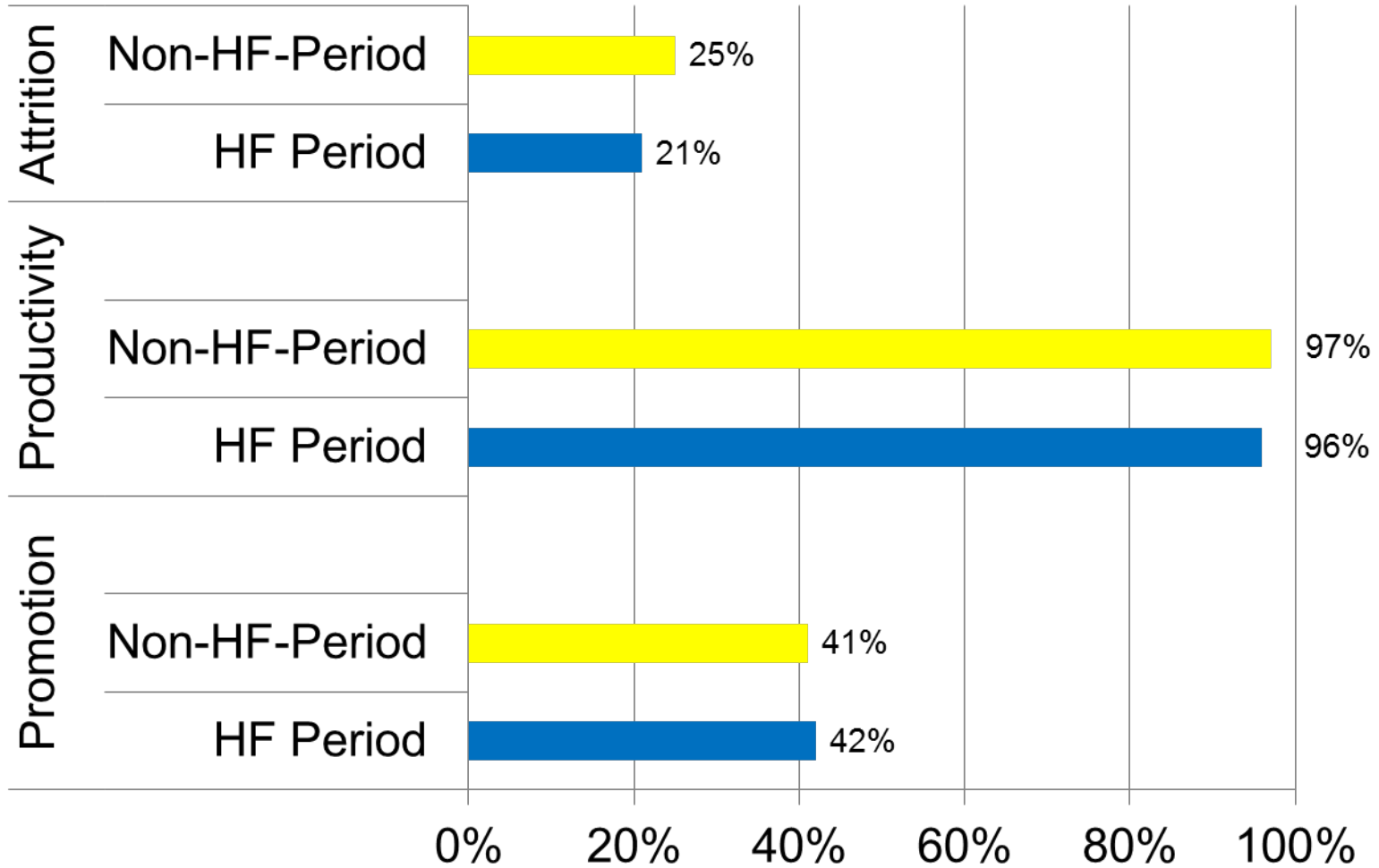


- Background
 - Assessing the Army Mission and Installation Contracting Command (MICC) during periods of a hiring freeze and non-hiring freeze.
 - COS is concerned about the health and well-being of the employees and organizations outcomes.
 - Hiring freeze impacts all DoD organizations

- Primary Questions:
 - How does a hiring freeze affect the productivity of the command?
 - How are the health and well-being of the employees affected?

- Type of Methods
 - Quantitative
 - Probit analysis based on binary outcomes of DMDC data
 - Used Marginal effects to calculate variable magnitude
 - Dependent variables of Attrition, Productivity, and Promotion.
 - 160,000 observations of bi-monthly panel data
 - 1,400+ civilian employees over a five year period (FY09-FY13).

- Type of Methods (cont.)
 - Qualitative
 - Survey assessing voluntary turnover, organizational climate, job burnout & job satisfaction.
 - Survey was sent out to 1,640 employees and we received 350 responses, making up 22% of the MICC employee population. (military & civilian)
 - Created charts displaying percentages of factors listed above.

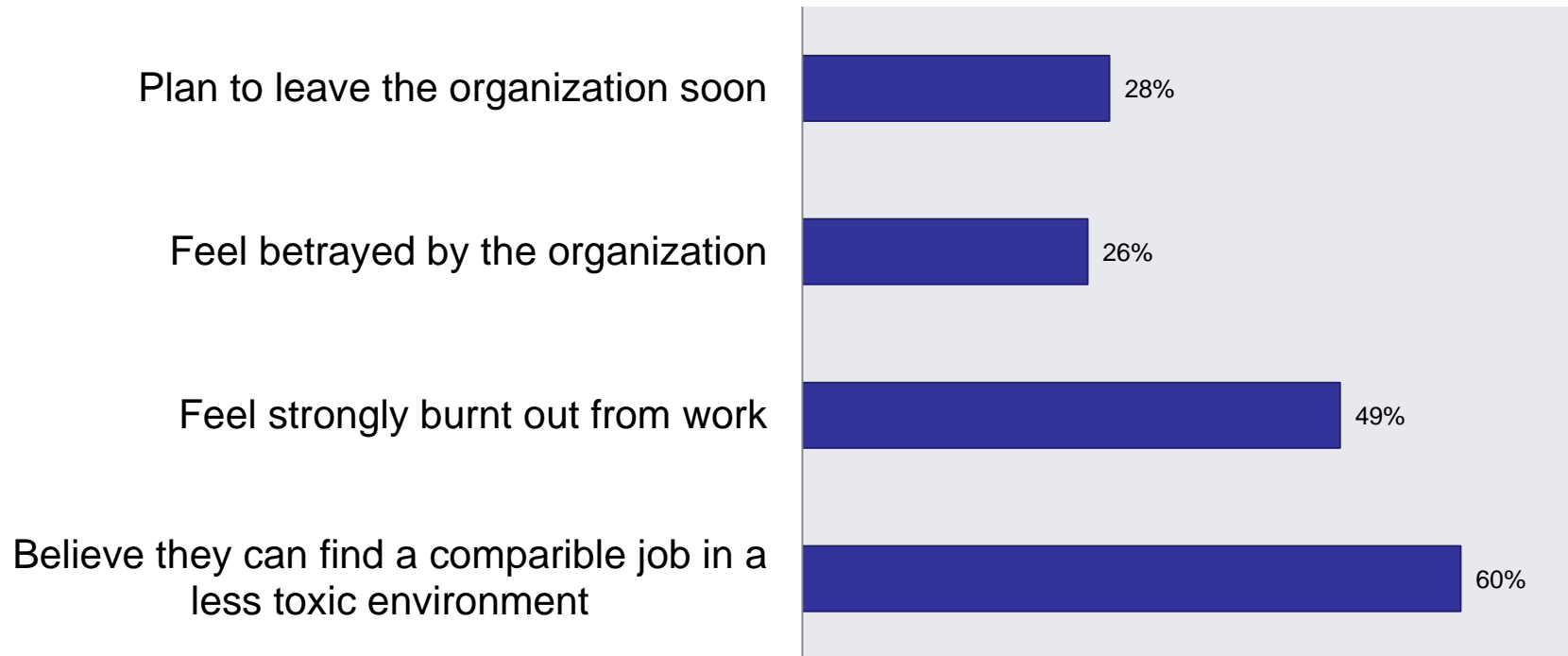


* All values significant at the 5% level

– **Figure 1**



Impacts Associated With Hiring Freeze



- DMDC data
 - Employee's at the MICC are less likely to attrite, less likely to get an award and more likely to be promoted during a hiring freeze period.
- Survey data
 - Results indicate that 28% of employees plan to leave the organization soon due to poor organizational climate, job burnout, and low job satisfaction.
- MICC data
 - Discovered that the MICC is spending approx. \$17M in overtime and were able to hire few employees during the hiring freeze periods.



Recommendations

- Compare hiring freeze affects to other military service commands
- Conduct further research using more years of data covering hiring freeze periods.
- Compare DMDC data with the state of the economy for the respective years during the hiring freeze.
- Do a cost-benefit analysis on overtime payout vs. hiring full time employees.
- Identify critical billets and implement policy that allows those billets to qualify for hiring freeze waiver.

Questions?

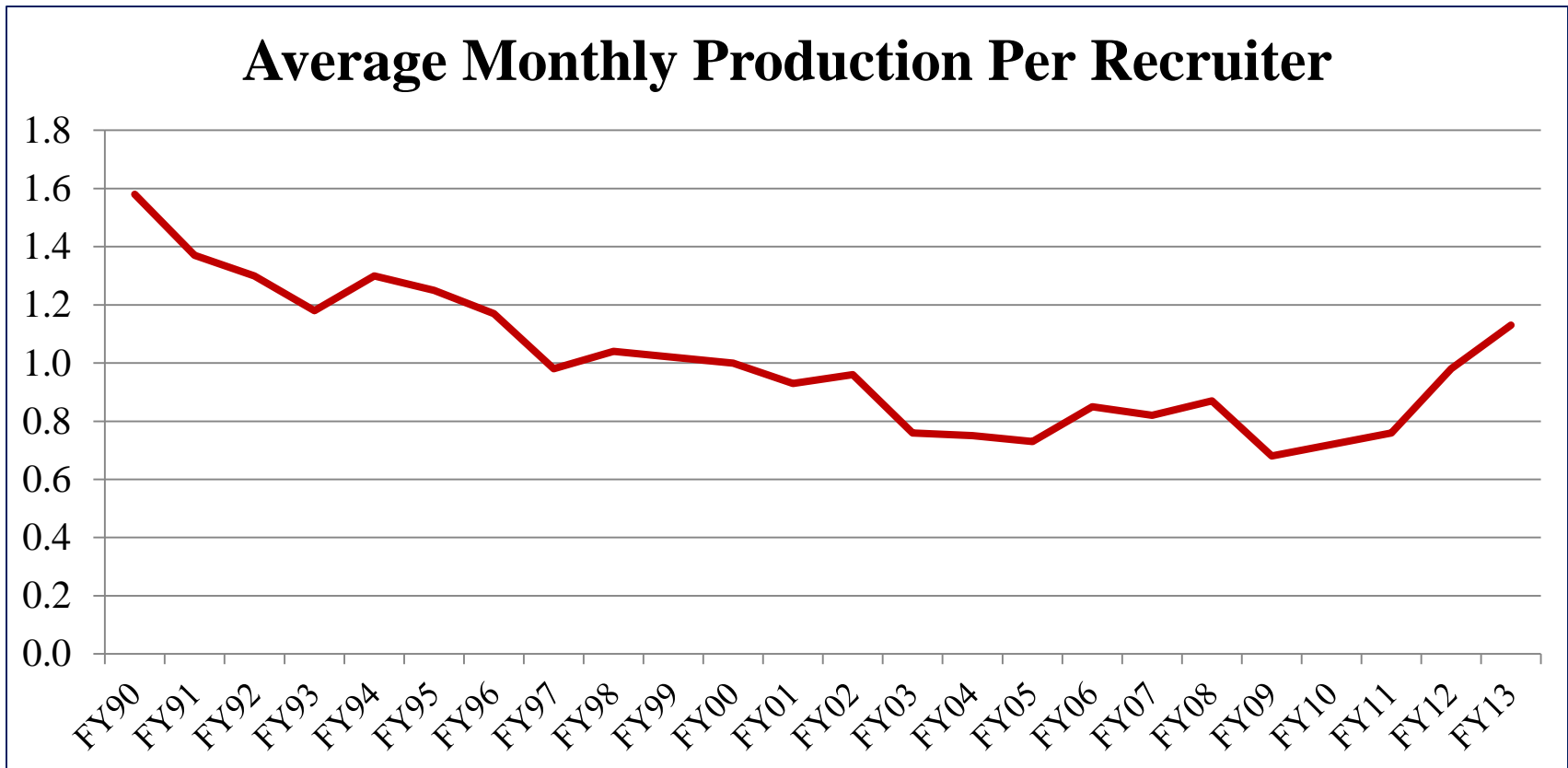




The Effects of Incentives on Recruiter Productivity

LT Luis Ortiz IV

Advisors: **Dr. Jeremy Arkes**
 Dr. Jesse Cunha



- Steady decrease in recruiter productivity
- Incentives may not motivate recruiter productivity

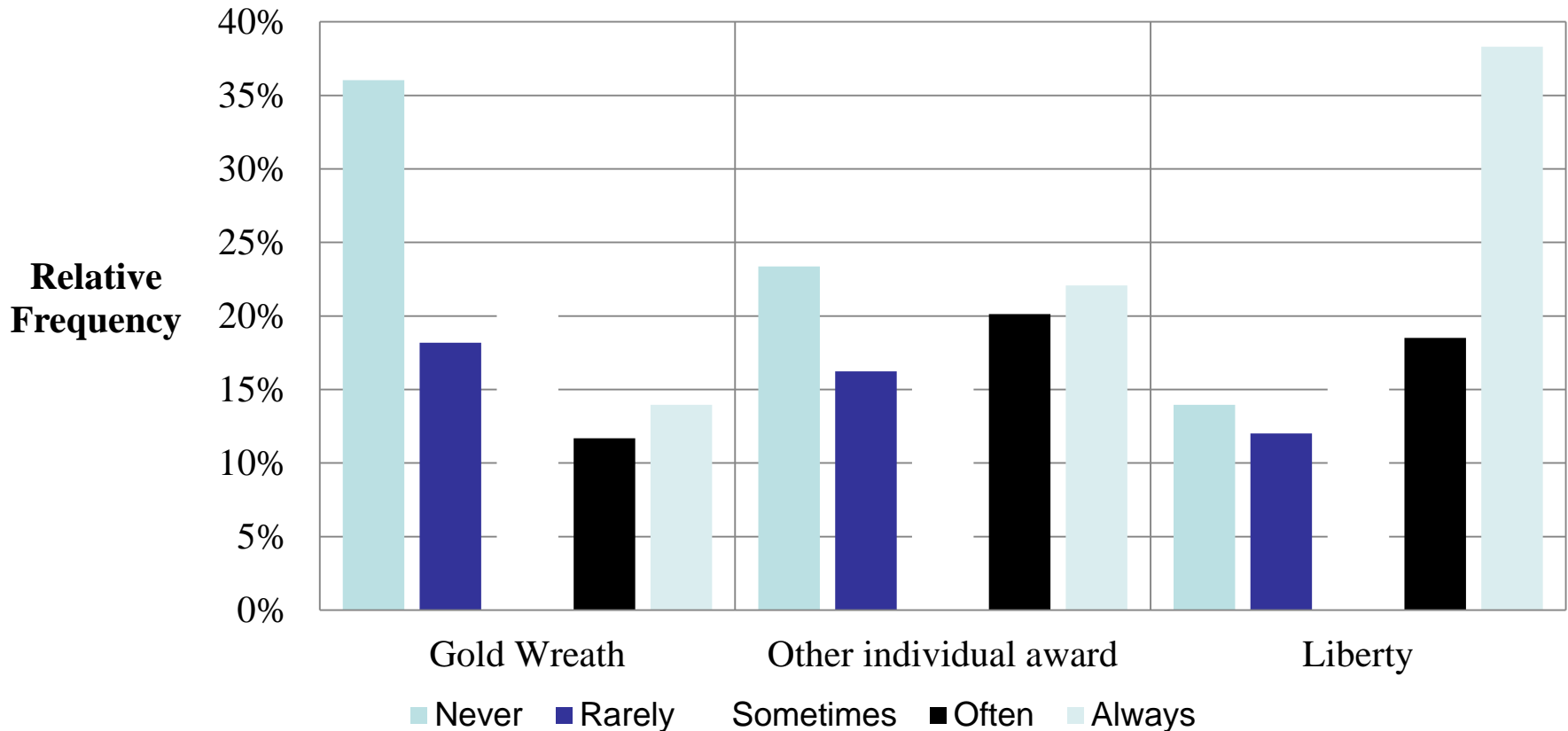
- What motivates recruiters to be more productive?
- What effects do non-monetary and monetary incentives have on recruiter productivity?
- Would a bonus-per-contract increase productivity enough to pay for itself (by reducing # recruiters needed)?

- Designed survey to elicit preferences for various monetary and non-monetary incentive schemes.
- Administered survey to 20 of 26 NRDs
- 306 enlisted recruiters completed survey
 - (response rate: 15% for enlisted production recruiters)

- Primary information we wanted:
 1. How effective are non-monetary incentives
 2. How productive would recruiters be with certain incentives such as:
 - Bonus per net HQ contract
 - Time-off per net HQ contract

Effect of non-monetary incentives

- Survey question:
 - How often do the following awards motivate you to attain one more net high quality contract?



Estimating Bonus Productivity

- Scenario 1
 - Recruiters asked which plan they prefer:
 - Plan A: Receive current SDAP of \$450 per month; or
 - Plan B: Receive a \$250 SDAP plus a \$50 bonus per net high-quality contract
 - Choosing Plan B → they expect 4+ HQ contracts/month
- Scenario 2 (if Plan A above, then ...)
 - Recruiters asked which plan they prefer:
 - Plan A: Receive current SDAP of \$450 per month; or
 - Plan B: Receive a \$250 SDAP plus a \$100 bonus per net high-quality contract
 - Choosing B → they expect 2+ HQ contracts/month



Preferred bonus amount

Bonus	Bonus Acceptance	Cumulative Acceptance (n=306)	Cumulative Percent	Implied Monthly HQ PPR
\$50	44	44	14%	4.00+
\$100	95	139	45%	2.00+
\$150	20	159	52%	1.33+
\$200	39	198	65%	1.00+
\$250	12	210	69%	0.80+
\$300	34	244	80%	0.67+

Assumptions:

- 33,480 annual HQ requirement; 3250 recruiters required
- Recruiter can attain their estimates
- Recruiters are not demand-constrained
- No geographical constraint by reducing force

Bonus	Required recruiter force	Force reduction	Benefits (\$ millions)	Cost (\$ millions)	Benefit/Cost Ratio
\$50	2546	704	\$54.7	\$1.7	32:1
\$100	2723	527	\$41.0	\$3.3	12:1

Cost = Bonus x Annual HQ requirements (33,480)

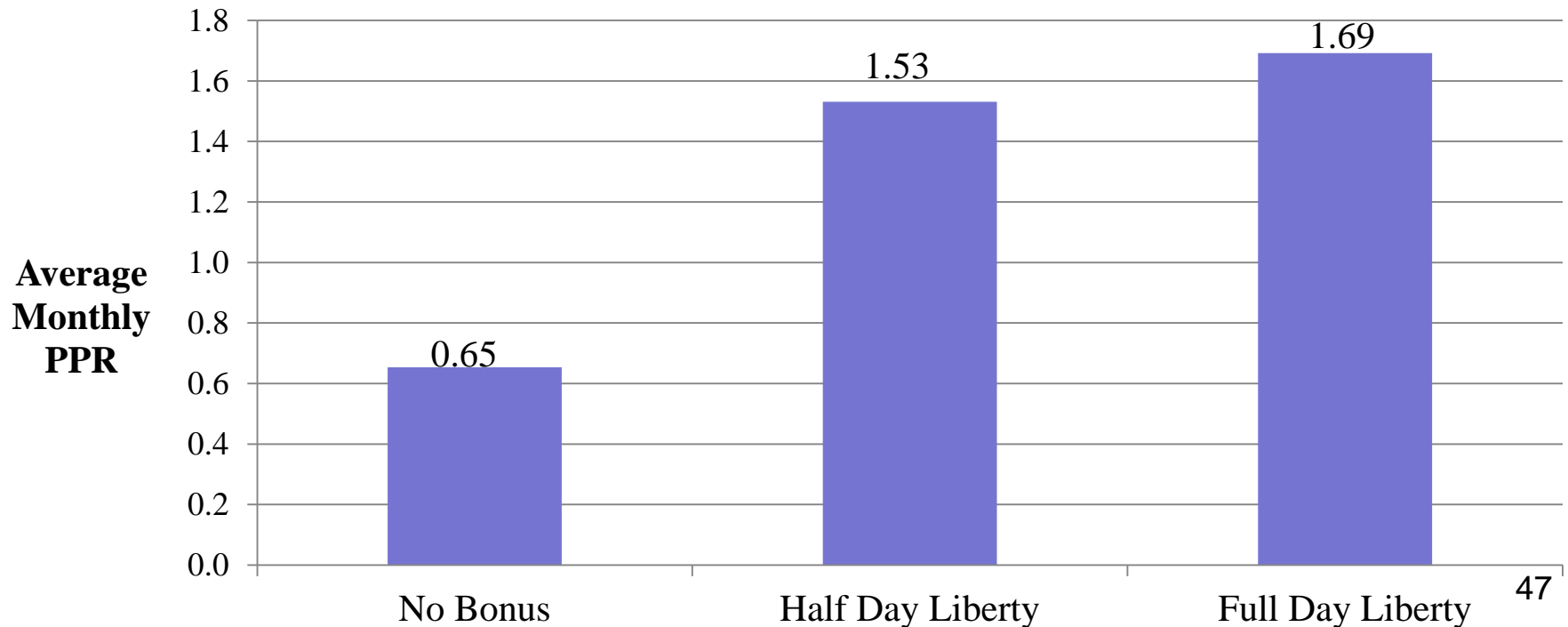
Benefit = Cost of recruiter* x Force reduction

* Cost of recruiter equals \$72,771 (average annual salary, to include benefits) plus \$4950 (33 months of SDAP)



- Increased potential for fraud
- Degradation of unit cohesion
- Determining when/how to pay recruiters
- Bonus may reinforce “used car salesman” stigma

- In response to potential issues, we also asked about liberty as an incentive to increase productivity.
- Questions:
 - Under a \$250 SDAP, how many net HQ contracts would you expect to write given:



Summary of key results

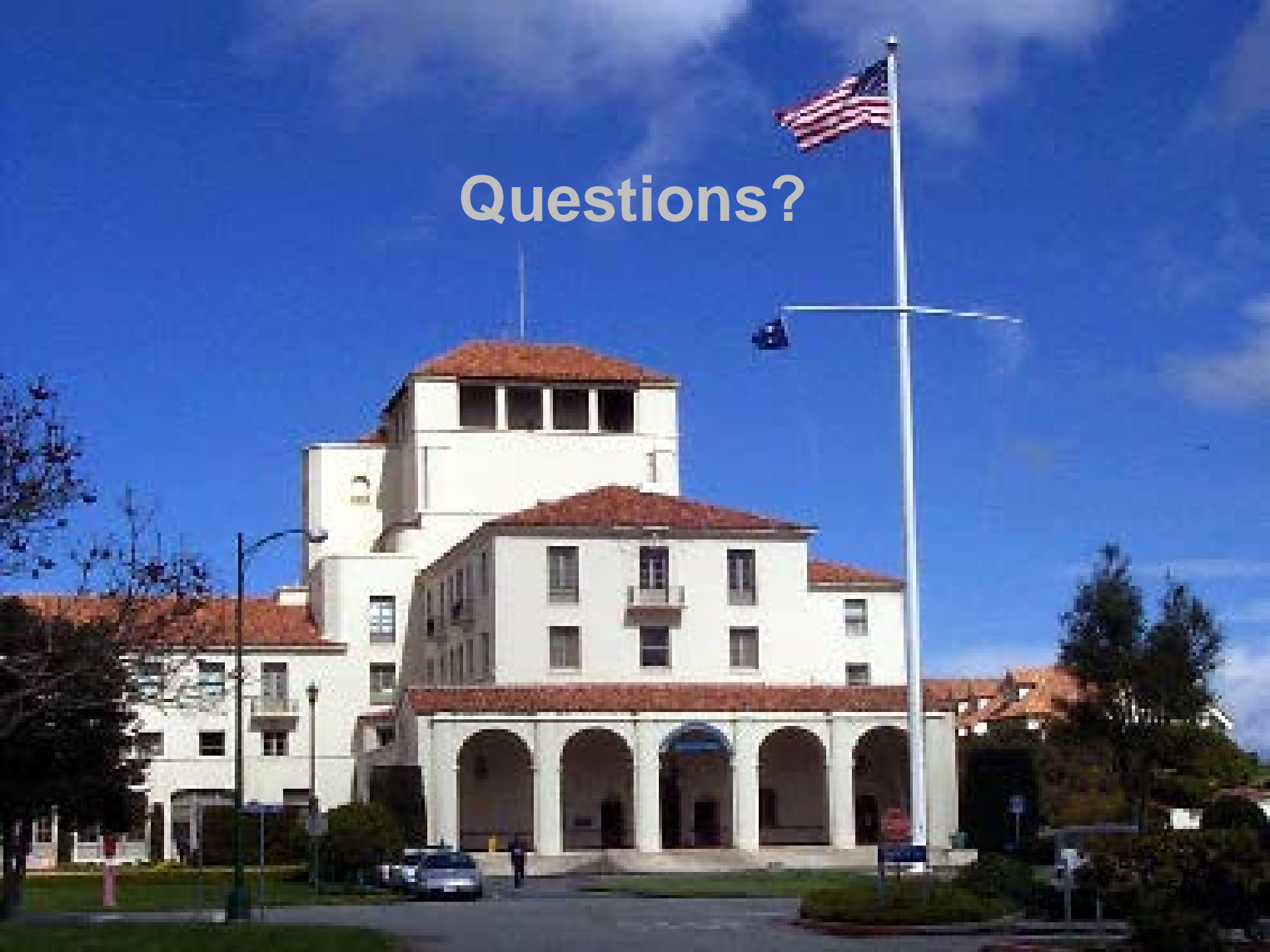
- Bonus should easily pay for itself
 - High benefit-cost ratio
- Significant potential to increase productivity utilizing Liberty as an incentive
 - **Awarding liberty for net high-quality contracts is likely to improve PPR at no monetary cost!**



Recommendations

- Further investigate bonus effects
 - Can fraud be mitigated?
- Field “Liberty” experiment among NRDs to further study its effect on recruiter productivity

Questions?





Evaluating the Tailored Adaptive Personality Assessment System on Delayed Entry Program Attrition

LT Adam R. Turpin

**Advisors: Dr. Elda Pema
Dr. Simona Tick**



- DEP attrition not extensively researched
- Cognitive factors alone do not explain recruit behavior.
- Army uses TAPAS to assess the “whole-person”
- TAPAS may help Navy to better understand DEP attrition behavior.

TAPAS Explained

- Computer adaptive test
- 15 personality facets
 - Versions 7 & 8 add five unique facets
- 2 composite scores
 - “Will-Do” – predicts attrition & commitment
 - “Can-Do” – predicts training graduation & job knowledge



Research Question

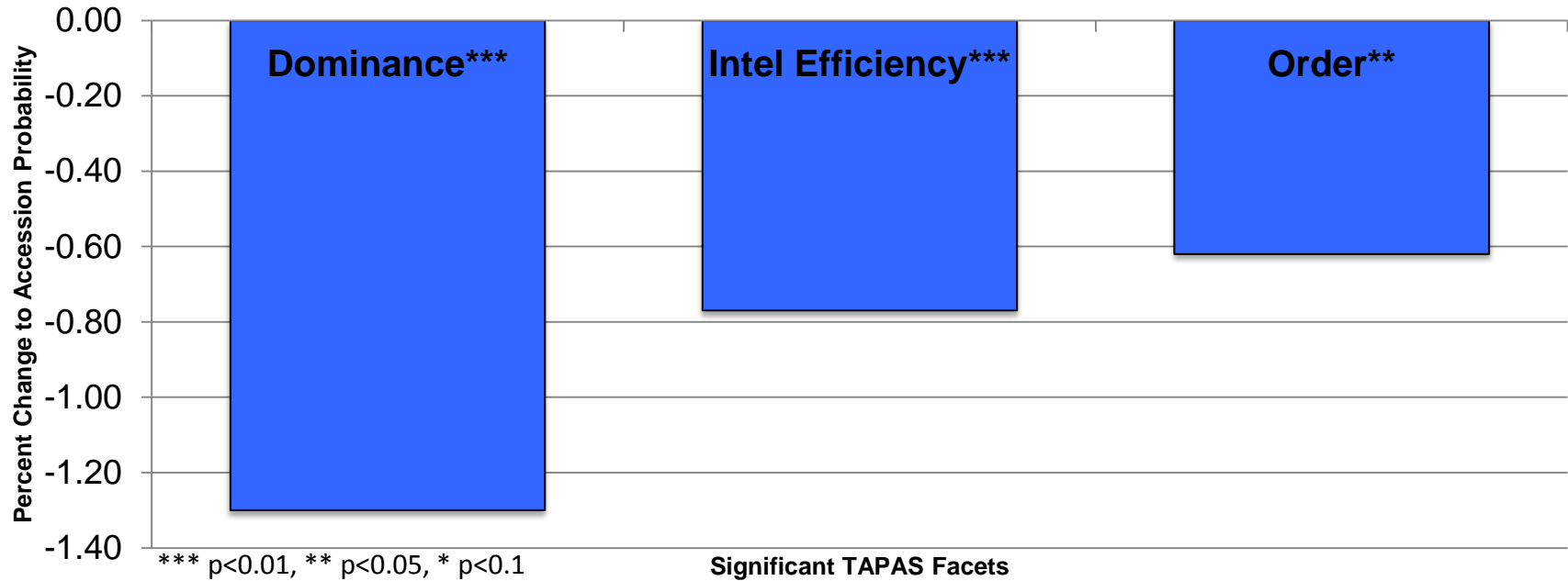
- Do TAPAS test scores predict whether or not a recruit will attrite from the Delayed Entry Program?

- Estimated accession by TAPAS for DEP participants from April 2011 to March 2013.
 - Multivariate probit regression models
 - Estimated for facets and composite scores
 - Demographics held constant
 - AFQT, Education, Waivers held constant

- CNRC
 - PRIDE-MOD including TAPAS data
- DMDC
 - demographic data
- April 2011 through March 2013
- Sample size: 31,254 observations

TAPAS Results

Percentage Point Effect to DEP Accession Probability, by TAPAS Facets

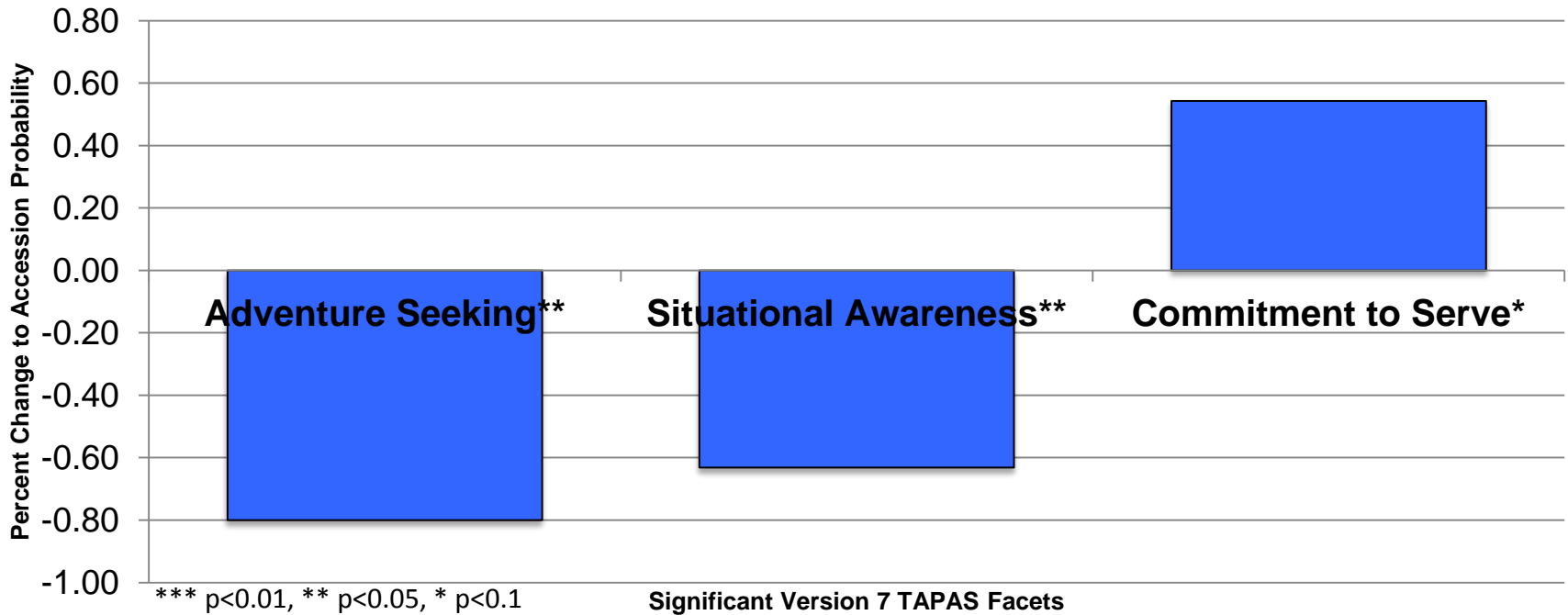


	Dominance	Intel Efficiency	Order
Std. Dev.	0.534	0.554	0.538
Min Score	-2.23	-2.13	-2.27
Max Score	1.96	2.49	1.86



TAPAS Results

**Percentage Point Effect to DEP Accession Probability, by
Version 7 TAPAS Facets**

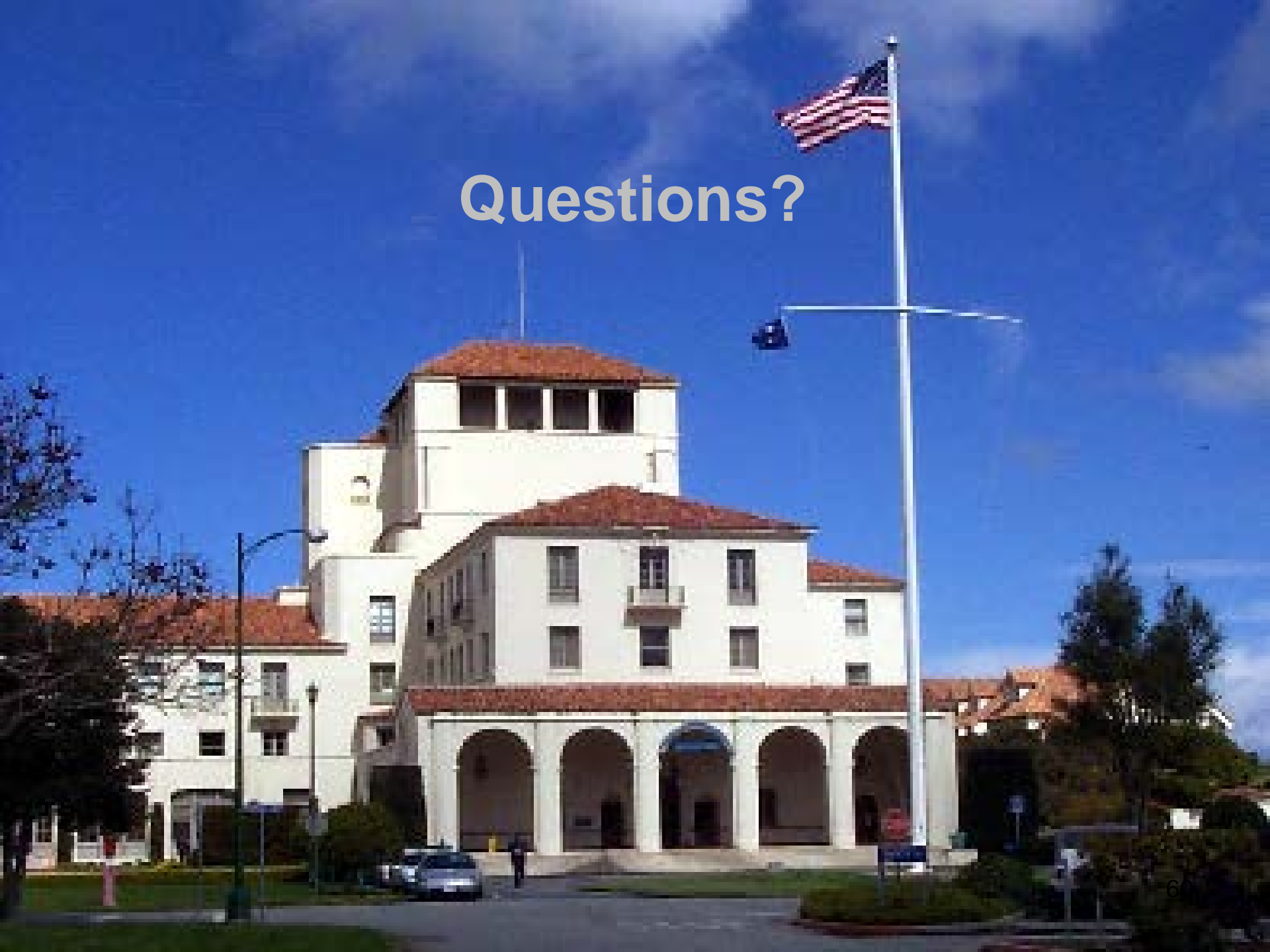


	Adventure Seeking	Situational Awareness	Commitment to Serve
Std. Dev.	0.534	0.554	0.538
Min Score	-2.23	-2.13	-2.27
Max Score	1.96	2.49	1.86

Recommendations

- Assign high Dominance recruits to positions of responsibility within the DEP pool.
- Reduce time spent in DEP for recruits with high Intellectual Efficiency and Order scores.
 - Reinforce decision to enlist
 - Provide robust DEP activity schedule
- Versions 7 & 8 facets are promising predictors.
- Continue to follow aging TAPAS cohorts.

Questions?



A photograph of the Naval Postgraduate School building, a large, multi-story, light-colored structure with a prominent central tower and a series of arches at the ground level. An American flag flies on a tall pole to the right of the building. The sky is blue with some light clouds. The text "Naval Postgraduate School" and "We thank you for your participation." is overlaid in white on the upper portion of the image.

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