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DSC 680 Project 1

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Understanding the Drivers of Employee Engagement and Intent to Leave

Business Problem

Employee engagement is widely recognized as a key indicator of retention, performance, and overall workplace health. Despite the availability of large-scale employee survey data, organizations often struggle to determine which factors have the strongest relationship with engagement and employees' intent to leave. This project uses the 2024 Federal Employee Viewpoint Survey (FEVS) to explore how engagement, workload perceptions, and selected demographic characteristics relate to intent to leave within the federal workforce.

Background

The Federal Employee Viewpoint Survey is administered annually across U.S. federal agencies to capture employee perceptions related to leadership, work experience, and organizational climate. The 2024 Public Use Data File includes responses from hundreds of thousands of federal employees, offering a comprehensive view of engagement and retention-related sentiment. Because the survey reflects employee perceptions rather than objective measures, the analysis focuses on identifying patterns and associations rather than causal effects.

Data Explanation and Preparation

The analysis uses the 2024 FEVS Public Use Respondent Data File and the corresponding FEVS codebook published by the U.S. Office of Personnel Management. The

respondent file contains 674,207 observations and 96 variables, including survey questions and demographic indicators. A metadata-level join was performed by matching survey variable names to their descriptions in the codebook, successfully labeling approximately 97.9% of variables. Unmatched fields consisted primarily of technical identifiers and weighting variables.

Initial data review showed that most survey items had high response rates. Missing values were more common in demographic variables such as sex (21.9%), race (20.8%), age group (12.0%), tenure (6.8%), supervisory status (6.8%), and intent to leave (6.2%), which is consistent with optional disclosure patterns in survey data.

Methods

EDA was conducted to understand response distributions, examine engagement patterns across demographic groups, and assess relationships between engagement, workload, and intent to leave. Engagement was operationalized using a composite score created by averaging four Likert-scale items: personal accomplishment (Q3), use of talents (Q6), alignment with agency goals (Q7), and access to information (Q9). Workload perceptions were examined using the item "My workload is reasonable" (Q5).

Intent to leave (DLEAVING) was analyzed as an ordinal variable and recoded numerically to preserve response ordering for correlation analysis. Descriptive statistics, visualizations, and correlation matrices were used to summarize key relationships.

Analysis and Findings

Overall engagement-related items were skewed toward positive responses, with most employees selecting values of 4 or 5 on the five-point scale, while still showing meaningful variation.

The intent-to-leave item showed substantial dispersion across response categories. Of the respondents with valid responses, 418,426 selected category A (lowest intent to leave), 75,213 selected B, 114,655 selected C, and 24,004 selected D (highest intent to leave). While most employees reported low intent to leave, a sizable minority expressed moderate to high likelihood of leaving.

The composite engagement score had a mean of 3.92, a standard deviation of 0.84, and a median of 4.0, indicating generally high engagement with notable variability across respondents. Engagement levels varied by federal tenure and supervisory status, suggesting differences in employee experience by role and career stage.

Correlation analysis revealed a moderate negative association between engagement and intent to leave ($r = -0.36$), indicating that higher engagement scores are associated with lower intent to leave. Perceived workload reasonableness (Q5) was also negatively associated with intent to leave ($r = -0.25$), though the relationship was weaker than that observed for engagement. Engagement and workload perceptions were positively correlated with one another ($r = 0.51$), suggesting that employees who feel engaged are also more likely to view their workload as reasonable.

Conclusion

The findings indicate that employee engagement is meaningfully related to intent to leave in the federal workforce. Higher engagement particularly related to accomplishment, alignment, and access to information is associated with lower likelihood of leaving. While workload perceptions alone are not the strongest driver, they remain an important supporting factor when considered alongside engagement.

Assumptions

This analysis assumes that Likert-scale survey items can be treated as approximately continuous for descriptive and correlational analysis. It also assumes that recoding ordinal intent-to-leave responses preserves their ordered meaning.

Limitations

The analysis is based on self-reported perceptions, which may be influenced by individual circumstances or recent events. Public-use demographic categories are broad, limiting subgroup-level insights. Additionally, correlations reflect association rather than causation and should not be interpreted as direct causal effects.

Challenges

Key challenges included managing a large number of survey variables, addressing missing demographic data, and translating technical outputs into clear workforce insights. Care was required to handle ordinal and categorical variables appropriately.

Future Uses and Additional Applications

Future work could extend this analysis by developing predictive models of intent to leave, exploring interaction effects (e.g., engagement by tenure), or examining agency-level patterns where privacy constraints allow. Clustering methods could also be used to identify distinct engagement profiles.

Recommendations

Organizations should prioritize engagement drivers related to role clarity, meaningful work, and alignment with organizational goals, as these factors show the strongest relationships with intent to leave. Monitoring engagement scores alongside workload perceptions may help identify early retention risk signals.

Implementation Plan

1. Finalize engagement and workload metrics for ongoing monitoring.
2. Develop baseline predictive models using engagement and demographic variables.
3. Translate findings into dashboards and summaries for leadership review.
4. Use insights to inform engagement initiatives and workload management strategies.

Ethical Assessment

Although FEVS data is publicly available, ethical considerations remain critical. All findings are reported at an aggregate level to protect respondent anonymity. Results are framed as perception-based associations rather than objective truths, and limitations are clearly acknowledged to avoid misuse.

References

U.S. Office of Personnel Management. (2024). Federal Employee Viewpoint Survey (FEVS)

Public Use Data File.

U.S. Office of Personnel Management. (2024). Federal Employee Viewpoint Survey

Technical Documentation.

Appendix

Research Questions and Findings

1. Which leadership behaviors are most strongly connected to higher engagement?

- The engagement composite included items related to organizational alignment (Q7) and information access (Q9), suggesting that leadership behaviors providing clear communication and connection to organizational mission are associated with higher engagement. A more targeted analysis of supervisor-specific survey items would be needed to comprehensively identify which leadership behaviors matter most.

2. How do workload and burnout influence an employee's desire to leave?

- Workload perceptions showed a moderate negative correlation with intent to leave ($r = -0.25$). However, this relationship was weaker than engagement ($r = -0.36$). Additionally, workload and engagement were positively correlated ($r = 0.51$), suggesting that engaged employees view their workload more favorably. While

reasonable workload matters for retention, it is not the strongest predictor and may

be influenced by broader engagement factors.

3. Do engagement levels differ based on tenure, supervisory status, or pay category?

Yes, Boxplot analysis revealed that engagement levels varied across both federal

tenure and supervisory status, indicating that career stage and role type influence

employee experience. Pay category was not examined in the current analysis as it is not

available in the public-use FEVS dataset.

4. Which survey items, when combined, best predict intent to stay or leave?

The engagement composite score (Q3: personal accomplishment, Q6: talent use, Q7: goal

alignment, Q9: information access) demonstrated the strongest relationship with intent to

leave (r = -0.36). These items together capture meaningful work, skill utilization,

organizational connection, and role clarity. Workload reasonableness (Q5) served as a

secondary predictor (r = -0.25). Future predictive modeling could identify optimal

combinations using machine learning approaches.