

## Refined Voting difficulty variable

Using the same data from our previous test, we refined and categorized the voting difficulty variable by incorporating additional variables. These variables collectively capture different dimensions of voting difficulty, allowing us to create a comprehensive composite score for analysis.

### Summary of Variables Used to Create the New Voting Difficulty Variable

The new voting difficulty variable, `difficulty_score_weighted`, was constructed using several components to capture different aspects of voting difficulty. The variables included: `regdiff_norm`, `votehard_norm`, `waittime_norm`, `triptime_norm`, `specific_difficulties_sum`, `turnout22_norm`, and `turnout22w_norm`. These components were either already on a 1-5 scale or normalized to fit this range. Additionally, binary indicators for specific difficulties were summed to create `specific_difficulties_sum`, and the `turnout22` and `turnout22w` variables were normalized to reflect higher difficulty with higher values.

### Weights Applied to Each Component

To emphasize the relative importance of different factors in the voting difficulty variable, specific weights were applied. The components were weighted as follows: `regdiff_norm` (1), `votehard_norm` (1), `waittime_norm` (0.5), `triptime_norm` (0.5), `specific_difficulties_sum` (1), `turnout22_norm` (1), and `turnout22w_norm` (0.5). These weights were used to calculate the `difficulty_score_weighted`, a composite score that integrates various dimensions of voting difficulty.

### Statistical Analysis Results

A Welch Two Sample t-test was conducted to compare the voting difficulty scores between Democrats and Republicans. The t-test results indicated no statistically significant difference between the two groups, with a t-value of 0.033525, degrees of freedom at 1365.1, and a p-value of 0.9733. The 95% confidence interval for the difference in means was [-0.2335912, 0.2417141], indicating that the true difference in means likely includes zero. The mean voting difficulty scores were 27.08815 for Democrats and 27.08409 for Republicans.

### Effect Size (Cohen's d)

The effect size, measured by Cohen's d, was calculated to be 0.001811119 with a 95% confidence interval of [-0.1042948, 0.1079170]. This negligible effect size suggests that the practical difference in voting difficulty scores between Democrats and Republicans is minimal. In practical terms, the voting difficulty experienced by members of these two groups is almost identical, indicating no meaningful difference based on the composite voting difficulty score.