Group 14 Summary Paper

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The main goal of the investigation was to find variables of interest that would be statistically significant in predicting the total points a player achieved, assuming this would correspond to how well they did overall in the game, thus leading to a possible indication of how well they might make good decisions. Through fitting multiple linear regression models, and modeling the distributions it was found that S5 scores had little variation when comparing the difference from their initial and last score divided by the week when they had their final score. There were several schools that had effects significantly different from 0 (p values were 0.05 or less) in contributing to the prediction of total points (2570, 3561, 4829, 5340, 647, 7167, 9691). Gender, age, and mean differences in S5 scores between final and initial scores divided by time between scores were not statistically significant in predicting total points. If students choose genders similar to their own, it shows that no one gender has a better chance at getting a higher number of total points or doing better in the game than the other, and likewise with age. This could be seen as a positive aspect so that no participant when playing the game has a better or lesser. The normalized mean skill levels me, people, and priority were significant in predicting total points, thus inferring that based on how well students performed in these particular minigames, this can form a good model for predicting how well they will do overall.

There seemed to be a disconnect between the predictability of total points in the game which infers success in making good decisions, and students' S5 scores which relates to efficacy in resisting drugs. Based on this, it is possible that S5 scores may instead mostly reflect how a student thinks of themselves in these scenarios rather than what kind of decisions they will actually make, whereas in the game it is observable what kind of actions they will take. Another area of investigation was to determine if the maximum minigame level completed correlated with S5 scores. The idea behind this was that since students get to choose their minigame level and have the chance to redo it, so if they take the time to do harder levels and succeed, they have more resilience to resist drugs, thus having a lower S5 score. Through various correlation plots and attempting to fit a regression line, there was no correlation found when analyzing the shape of the data points. This was likely due to the fact that the S5 scores had little variability and were not a good representation of ability to resist drugs, but rather an indication of confidence to. When looking at the distribution of the data between all of the weeks, there appeared to be no change. When computing a t-test between the S5 values from week 0 and the last week that the S5 score was collected from each participant (since some ended on different weeks), $t(89.181) = -0.3611$, $p = 0.7189$ which shows that the means were not significantly different from each other. The 95% confidence interval shows there was no significant difference in means since it included 0:[-0.1451562, 0.1005093].

The last area of interest was regarding estimating the proportion complete to the mean skill level of each of the 5 skill levels. Through fitting models to each of the skill levels and a full model estimated by all of the skill levels. When fitting a model to the skills: me, priority, people, refusal, and know, each had a p-value < 0.05. When running an ANOVA test comparing the full model of estimating proportion complete to the simple model with only know as the predictor, the full model was statistically significant from the simple model $F(1, 164) = 772.2$, $p < 2.2e\text{-}16$.

Also, there is a very similar research done, "The Impact of a Science Education Game on Students' Learning and Perception of Inhalants as Body Pollutants" (Yvone, 2011)[1]. Which can be compared with our data. In this external research, they survey the middle schoolers' attitudes towards inhalants before and after an inhalant educational game (5-point Likert Scale), which are extremely to the given investigation in terms of age group and the type of research. In the external study, they found the deduction in attitude before and after the game to be minimum. This is similar to our analysis that the S5 score has reduced very little before and after the game. This further verifies the results of our investigation that the game only causes minimum deduction in S5 scores.

1) Klisch, Yvonne, et al. "The Impact of a Science Education Game on Students' Learning and Perception of Inhalants as Body Pollutants." *Journal of Science Education and Technology*, U.S. National Library of Medicine, 2011, https://pubmed.ncbi.nlm.nih.gov/23926416/.