Lab 2 Report: TV watch time across generations

Godsee Joy, Karanveer Lamba, Deric Liang

2024-04-10

Introduction

With new technologies rapidly emerging, there is reason to believe that generational differences exist in the use of technology, specifically in time spent watching TV. A study in China explored the relationship between age group and TV viewing and found that the youngest groups see a drop in TV viewing frequency.[1] Another study in the U.S. found that adults over 65 spent threefold more waking time watching TV than young adults, elevating concern about negative health consequences.[2] This motivates our research to evaluate these findings using additional data sources for U.S. respondents. Therefore, our research question is: Does a person's generation relate to the number of hours spent watching TV daily?

Data and Operationalization

We use 2018 observational data from the General Social Survey (GSS) to explore the relationship between age (X concept) and hours a day watching TV (Y concept). The GSS is a reputable, nationally representative multi-stage area probability sample conducted via in-person interviews, such that each unit of observation is an American adult from different households. It collects information on each respondent's demographics, lifestyle, and opinions on a variety of topics.[3]

The 2018 GSS cross-sectional data contains responses from 2,348 individuals and includes variables for our main X concept (*age*, metric) and Y concept (*tvhours*, metric), as well as other covariates such as marital status (*marital*, nominal), workforce status (*wrkstat*, nominal), highest education level (*degree*, ordinal), and respondent family income (*coninc*, metric). Survey documentation is unclear about whether TV hours includes using streaming services, cable, or alternatives, so there is likely some measurement error in how respondents interpreted this question. However, we use this as our main outcome variable due to a lack of more precise questions in GSS, and care more about the sedentary behavior involved with watching TV. We hypothesize that commitments from marriage or employment would place constraints on a respondent's time to watch TV. Literature supports inclusion of education and income. After confirming distributional similarity between respondents with missing values and those without, we removed subjects who did not provide responses for any of these variables, leaving us with 1,421 observations.

The values for age responses vary from 18 to 89+ years, which we categorize into the variable *age_cat* with the following generations as per our research question: Silent Generation (73 or older), Baby Boomers (54-72), Gen X (38-53), and Gen Z/Millennials (18-37). The values for hours a day watching TV range from 0 to 24 hours. We consolidate marital status of married into "married" and all other responses (divorced, never, separated, widowed) into "not married" as well as working status of part-time or full-time into "working" and "not working" capturing remaining options (unemployed, laid off, keeping house, etc.) to minimize the categories needed to meet our goal of measuring TV watchtime constraints.

[1] Liu, X. (2023). Household income, education level, and television-viewing frequency—a quantitative economic analysis. Academic Journal of Business & Management, 5(17). https://doi.org/10.25236/ajbm.2023.051702.

[2] Depp, C. A., Schkade, D. A., Thompson, W. K., & Jeste, D. V. (2010). Age, affective experience, and television use. American journal of preventive medicine, 39(2), 173–178. https://doi.org/10.1016/j.amepre.2010.03.020.

[3] NORC at the University of Chicago (2021). About The GSS. https://gss.norc.org/About-The-GSS.

Assumptions and Model Specifications

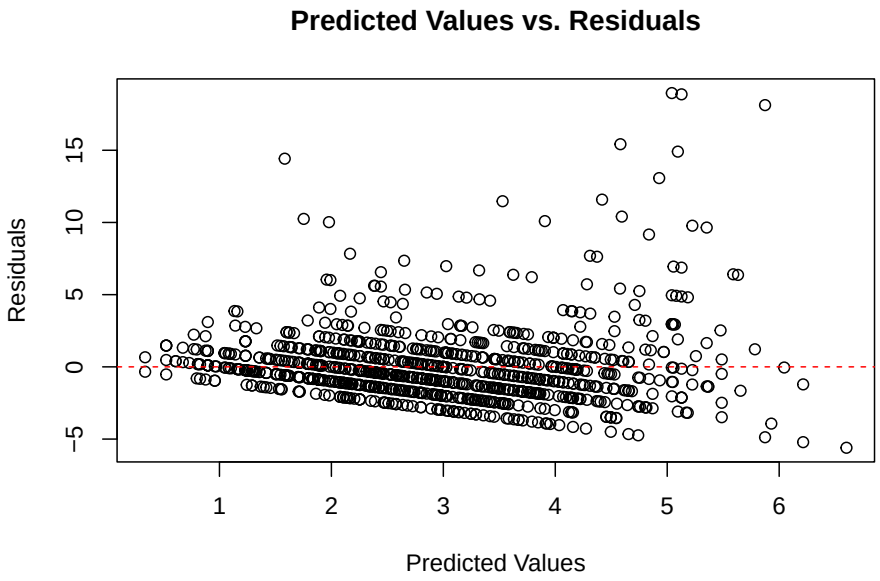
We use the large-sample OLS regression methodology to fit multiple models for determining the relationship between age and TV hours. The assumptions for this methodology require the data to be independent and identically distributed (IID) and that a unique best linear predictor (BLP) exists. The GSS uses representative individual sampling such that we do not have concerns about IID violations. Additionally, we apply a logarithmic (ln) transformation to the income variable to adjust for its heavy right-skew and stabilize the variance and covariance measures. A unique BLP likely exists, as none of the covariates are perfectly collinear.

We fit six models: a basic model with metric age only, a model with generations only, several models introducing one covariate at a time, and finally a full model with generations and all the covariates, using robust standard errors. ANOVA F-tests with $\alpha = 0.01$ confirm that each model improves on the previous specification. We performed EDA on a random 30% sample (n = 426) of the 2018 GSS data for model specification, and verified the results with a confirmation sample of the remaining 70% (n = 995) of the observations, as shown below. We also considered models with household size (*hompop*, metric) and sex (*sex*, nominal), but decided against including them due to statistically insignificant improvements to the model based on ANOVA F-tests.

Table 1: Regression models for age on TV hours per day

	Dependent variable:					
	TV hours					
	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.034***					
	(0.005)					
Generation-Gen X		0.242	0.251	0.362	0.448*	0.560**
		(0.193)	(0.190)	(0.194)	(0.197)	(0.196)
Generation-Baby Boomer		1.387***	1.071***	1.155***	1.244***	1.378***
		(0.247)	(0.234)	(0.238)	(0.237)	(0.242)
Generation-Silent		1.676***	0.911**	0.929**	0.963**	0.991**
		(0.310)	(0.333)	(0.331)	(0.327)	(0.327)
Not working			1.318***	1.292***	1.136***	0.898***
			(0.207)	(0.203)	(0.199)	(0.179)
Not married				0.661***	0.562***	0.284
				(0.165)	(0.161)	(0.160)
Education-Bachelor					0.250	0.188
					(0.202)	(0.204)
Education-Associate					1.155**	0.895*
					(0.366)	(0.379)
Education-High School					1.254***	0.936***
					(0.204)	(0.209)
Education-Less than High School					1.611***	1.065**
					(0.331)	(0.369)
ln(Income)						−0.432***
						(0.122)
Constant	1.251***	2.272***	1.927***	1.501***	0.599*	5.507***
	(0.254)	(0.142)	(0.143)	(0.186)	(0.238)	(1.364)
Observations	995	995	995	995	995	995
R^2	0.044	0.056	0.099	0.112	0.145	0.166
Adjusted R^2	0.043	0.053	0.095	0.107	0.138	0.157
Note:						*p<0.05; **p<0.01; ***p<0.001

Directionally, the negative relationship of TV hours with income and education aligns with previous literature. We also find that marriage and employment decrease TV hours per our hypotheses, though marital status is not statistically significant. Finally, examining the relationship with generations with Gen Z/Millennials as a baseline, we find that Gen X, Baby Boomer, and Silent Generation respondents watch an average of 0.560, 1.378, and 0.991 more hours of TV a day (all else equal), significant at an $\alpha = 0.01$ level. We find these increases to be practically significant as well - assuming 8 leisure hours in a day, these represent a 7%, 17%, and 12% increase in TV hours across the respective generations (all else equal). To further assess the quality of our regression model we prepared the following diagnostic plot of predicted values against the residuals, and see evidence of potential heteroskedasticity, but our use of a large sample and robust standard errors helps mitigate this.



Conclusion

We note several limitations to our findings. First, due to missing data in 2022, we used older data from 2018. Given the significant effects of COVID-19 across work and leisure activity, repeating this analysis with more recent data may yield different results. Additionally, we observed several potential outliers for TV hours (> 15 hours), but examining these observations did not lead to clarity on whether these were errors, thus we conservatively kept them given the robust sample collection methodology used by the GSS. Next, we combined Gen Z and Millennials due to small sample size, leading to a potential dilution in measuring differences between them. Finally, future research could also explore other variables that may have important relationships to TV hours, such as seasonality, time spent on other leisure activities, and internet usage. In conclusion, our model yielded statistically and practically significant results. Older generations show significantly higher TV watch time, with notable robustness as covariates are added to the model.