Younger, Unmarried, Childless, and Less Happy Americans Use the Internet the Most*

An Analysis of the 2016 US General Social Survey

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Abstract

In this study, we investigated the 2016 United States General Social Survey to gain an understanding of the characteristics of the people that use the Internet the most, such as age, marital status, number of children, and level of happiness. We did this by comparing the average number of weekly Internet use across population groups. We found that young adults that have never been married or have children and who are not satisfied with their general happiness are those that use the Internet the most. In an era in which the Internet is becoming more and more used in the US, it is important to understand which population group uses the Internet the most in order to inform public policies surrounding Internet addiction and mental health.

1 Introduction

The Internet has become a widely used computer network that allows for connection, communication, and access to information. By the mid 1990s, the Internet began reaching millions of users from around the world, where using a web of information, known as the World Wide Web, was a popular way of browsing information and facilitating communication online ("A Short History of the Internet" 2020). Throughout the years, the different ways in which the Internet is used have expanded, and now users can also make purchases through electronic commerce platforms and share different forms of media on social media platforms.

This report aims to investigate the characteristics of American adults that use the Internet the most in comparison to those that use it the least. We aim to understand the reasons why these factors are correlated with a higher Internet use pattern and a lower Internet use pattern. Our estimand is the mean number of weekly hours of Internet usage of American adults. Using the survey data from the United States General Social Survey (GSS) recorded in 2016, we constructed different models on 6 factors and their relationship with total weekly hours of Internet use: age, race, sex, marital status, number of children, and happiness.

Through examining the relationships between the variables and the weekly number of hours of Internet use, we found that young adults tend to use the Internet more than older adults. This may be due to physical, psychological, and social barriers when using the Internet. We also found that those who have never been married use the Internet more than others with different marital statuses. This could be related to age and the difference in reasons for using the Internet. Additionally, as social media is a large part of Internet usage, we found that the using these platforms have a negative impact on emotional health, demonstrating a possible correlation between high Internet usage and a low level of happiness. These findings are important because using the Internet more regularly can improve the lives of individuals for its convenience and its accessibility. It is beneficial because it allows for easier and instantaneous communication, for learning, for increasing access to services, for encouraging connections and decreasing isolation, and for gathering information (Lane 2022). However, the consequences of increased Internet usage, such as Internet addiction and mental health issues, should also be kept in mind. Our research on which population groups use the Internet the most in

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*Code and data are available at: https://github.com/AnnieYan0807/GSS-data-analysis.git.

the US can lay the foundation for subsequent research investigating the pros and cons of Internet use on different population groups, and the ways in which the pros and cons affect those who use the Internet more.

The remainder of this report is structured as follows: Section 2 discusses the dataset of interest, including the methodology of the survey and its strengths and weaknesses, Section 3 presents the results through data visualizations, Section 4 discusses our findings, its weaknesses, and next steps, and Section 5 consists of the supplementary survey as an extension of the survey data to improve and enhance the study.

2 Data

2.1 Survey

2.1.1 Key Features

The General Social Survey (GSS) is a national survey conducted in the United States of America that aims to better understand trends in the American adult population's social characteristics and attitudes to better inform research and public policy ("About the GSS," n.d.). Beginning in 1972, this interview-based survey is conducted biennially on five key themes: gender and marriage, current affairs, civil liberties, politics, and religion and spirituality ("Key Trends," n.d.). The 2016 GSS is unique in that it also includes questions about Internet-usage behaviours, which is why our analysis focuses on the GSS of this year. In 2016, there is data for 2,867 respondents for 961 variables.

2.1.2 Methodology

The GSS' target population is adults aged 18 years and older living in the United States. The sampling frame for the 2016 GSS is people living in the US aged 18+ who can speak English or Spanish and live in households ("Frequently Asked Questions," n.d.). Thus, those living outside households (e.g. in university dorms, nursing homes, institutions, military quarters) are not included in the GSS ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.). The frame was created using the NORC National Sampling Frame, which first uses US Census data to stratify US geographic regions by size and then chooses metropolitan areas and non-metropolitan counties within these regions, as the first stage of selection ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.). In the second stage of selection, these metropolitan areas and non-metropolitan counties were stratified by race and income and further divided into blocks ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.). Then, the sample is gathered by interviewers beginning from the northwest corner of a given block and moving from household to household until the equal-sex quota has been filled ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.).

Thus, the sample for the 2016 GSS was an area-probability sample gathered by the clustered sampling approach, as households are selected and then one random member from the household is selected to be included in the survey ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.). A key tradeoff of this approach is that, while this method is much easier than solely random sampling, it can lead to bias in that there is more bias if the clusters are similar to each other.

Non-response is handled by inputting it in the GSS dataset as one of the following options depending on the method of non-response: "NA", "no answer", "do not know", or "skipped".

2.1.3 Strengths & Weaknesses

A strength of this 2016 GSS survey was that it was delivered both in English and in Spanish, allowing for a greater reach than had the survey just been conducted in English, like in the years previous to 2006 ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.). Of the people who had been excluded from this survey due to the English-only delivery, Spanish-speakers made up the majority, so this dual language delivery addressed this key exclusion ("GSS 1972-2018 Cross-Section Codebook: Appendix a - Sampling Design and Weighting," n.d.).

A weakness of this sample is the lack of a gender variable, as the sample only provides a variable on sex. A gender variable would be more useful for data analysis, as it better reflects the respondent's lived experience. The lack of a gender variable that better accommodates for people's lived experience might lead to those who feel uncomfortable with the binary categories of sex to refrain from participating in the survey, leading to selection bias.

Another weakness of the 2016 GSS survey is that the interviewer physically fills out the responses for the respondent. This can potentially lead to measurement error. When the interviewer fills out the survey on behalf of the respondent, there may be a difference in the observed responses of the interviewer and the actual responses of the interviewee. This creates difficulty in verifying responses ("For Survey Participants," n.d.).

A third weakness of the survey is the role of selection bias that exists due to the inability to reach the entire population. The survey may also be susceptible to volunteering bias because the data is reliant on participants willingly providing their answers, which could lead to biased results.

2.2 Questionnaire

A strength of the questionnaire was the clear wording of the question regarding Internet usage per week in hours. The survey question was formatted as follows: "Not counting e-mail, about how many minutes or hours per week do you use the Web? (Include time you spend visiting regular web sites and time spent using interactive Internet services like chat rooms, Usenet groups, discussion forums, bulletin boards, and the like.)" ("GSS Data Explorer: NORC at the University of Chicago" (n.d.)). The providing of examples was likely helpful in stimulating the respondents' memory of what exactly Internet usage can look like, as if one is flat out asked whether they use the Internet, it can be hard to conceptualize what that looks like.

A key weakness of this questionnaire is the race variable, as it only allows for three options: "Black", "White", or "Other", which does not take into account the largest ethnic minority group, Hispanics and Latino Americans, as well as other ethnic groups, such as Asians and Indigenous Americans in the United States. In comparison, while not without fault itself, the US Census identifies 5 minimum categories of race (White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander) and also allows for the reporting of more than one race (Bureau 2022). The questionnaire should at least have followed these US Census minimum race categories.

Another weakness of this questionnaire is that questions are allowed non-responses. This results in truncated data, in which the dataset has been incompletely collected. Having no response for a question can only be observed as null, despite there being a possible actual value (Alexander 2023). There are a variety of reasons as to why a respondent may not want to answer a question, but can only be observed as a non-response by researchers to avoid biased assumptions and inaccurate results.

2.3 Overview of Data

2.3.1 Data Source

In this report, the 2867 observations from the 2016 United States General Social Survey are used. The survey data was obtained from the University of Chicago National Opinion Research Centre (NORC) ("GSS Data Explorer: NORC at the University of Chicago," n.d.).

This report was created using the R statistical programming language (R Core Team 2020). The here package was utilized to retrieve files from another folder within the same R project (Müller 2020). For the results and analysis of this report, all figures were created using the tidyverse package (Wickham et al. 2019). Additionally, the tables were created using the packages knitr (Xie 2023) and kableExtra (Zhu 2021), and the graphs were created using the packages lessR (Gerbing 2021), tidyr (Wickham, Vaughan, and Girlich 2023), and ggplot2 (Wickham 2016).

2.3.2 Variables of Interest

Our report selects 7 variables for analysis. We focus on 6 particular factors that we predicted affects the amount of Internet use: age, sex, race, number of children, marital status, and happiness. In this paper, we investigate the influence of these various factors on the total number of hours of weekly Internet usage. The packages tidyverse (Wickham et al. 2019), haven (Wickham, Miller, and Smith 2022), and reshape2 (Wickham 2007) were used to clean the dataset by grouping or converting the questionnaire responses into categorical or textual answers.

The variables, Number of Children and Weekly Internet Hours, are recorded as a numerical value. Weekly Internet Hours has a maximum value of 168, as there are only 168 hours in a week. Age is also recorded as a numerical value, but is cleaned to represent ages in groups of ten years. The other variables, Sex, Race, Marital Status, and Happiness Level, are all recorded as a textual option for respondents to choose from.

(a) Relationship between Age and Sex
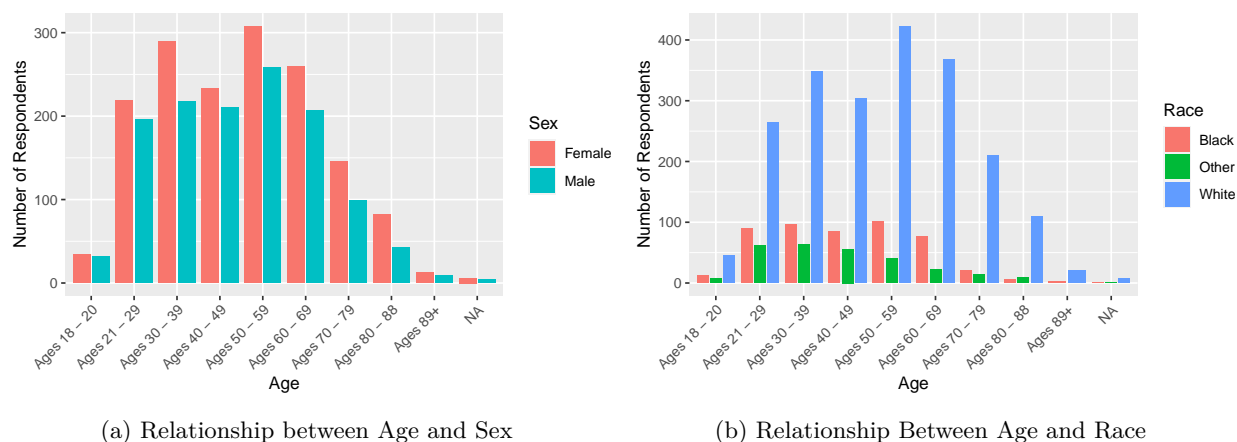
(b) Relationship Between Age and Race

Figure 1: Relationship between Age and Sex and Age and Race

Most of the respondents of the 2016 GSS are adults ranging from ages 21 to 69 years old. The size of each age group between that range oscillates within the right skewed distribution. The largest age group respondent size is 50 to 59 years old. By graphing the variables, age and sex in Figure 1, we observe that there are more female adults in each age group participating in this survey than there are male adults. The overall distribution is skewed to the right. The visualization of age and race in Figure 1 demonstrates that the respondents that identify with the White racial group comprises most of the respondent sample. This racial group is also shown to have a near-symmetrical distribution. Conversely, the other racial groups in this survey, Black and Other, are significantly the minority of the survey sample. The Black and Other racial groups are skewed to the right, illustrating that there are less individuals that identify with these racial groups in the older age groups. According to the 2020 US Census surveys, the most common racial group in America is White or Caucasian, which means that the 2016 GSS data on this group provides a relatively accurate representation of American society (Jensen 2022).

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$x
[1] "Number of Children"

$y
[1] "Number of Respondents"

$fill
[1] "Marital Status"

attr(,"class")
[1] "labels"
```
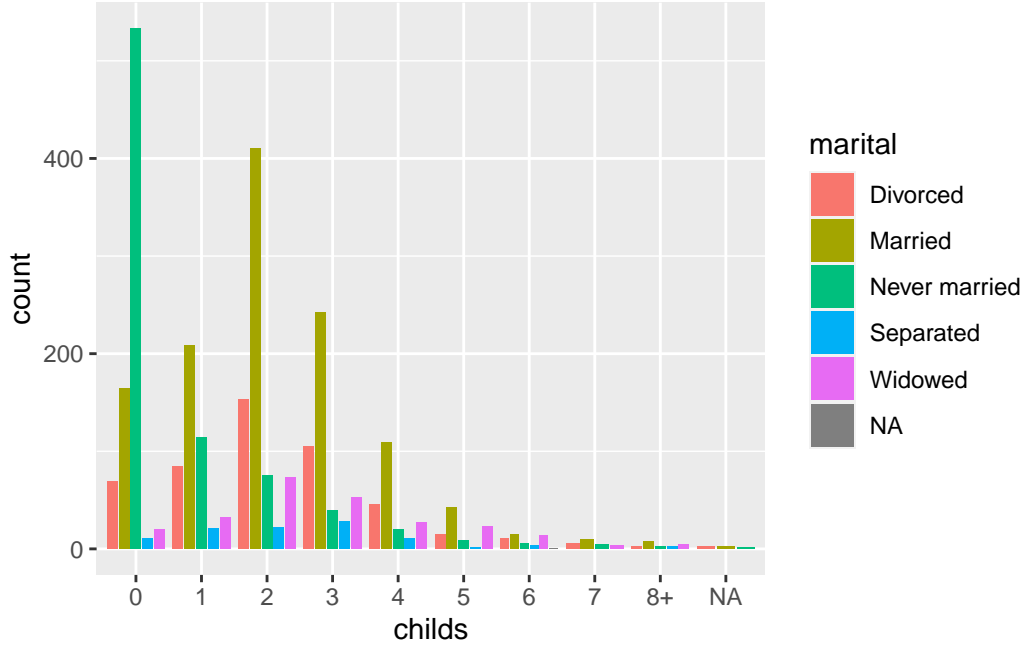
Figure 2: Relationship between Marital Status and Number of Children

According to Figure 2, respondents who are married have a right skew distribution of the number of children they have, where the mode of the data is having two children. As for individuals that responded as never having been married, the distribution was exponential, in which the mode of this distribution is having zero children. As the number of children increases, the number of individuals who have never been married decreases. The distribution of the other minority marital groups are skewed to the right. Overall, most survey respondents have zero children.

Figure 3 demonstrates general happiness trends and exhibits a left skew distribution. This illustrates that a significant proportion of the respondents indicate that they are fairly happy and an adequate proportion indicate that they are very happy. With a limited number of options to measure happiness quantitatively, it is difficult to discern a distribution on varying levels of happiness.

3 Results

Figure 4 depicts the relationship between age and average weekly Internet usage. The data on Internet usage hours for various age groups are averaged to reduce any bias due to selectively chosen survey responses. The curve on the graph is skewed to the right, with its peak occurring in the 21 to 29 age group, which has the highest Internet usage of approximately 18 hours per week. Subsequently, Internet usage gradually declines with age, with the lowest usage recorded in the 89+ age group at an average of 2 hours per week. This graph indicates that young adults, particularly those aged 21 to 29, spend more time on the Internet. As people age, their Internet usage tends to decline gradually. The graph suggests a statistically significant correlation between age and Internet usage, and the trend is relatively clear.

Figure 5 illustrates the average weekly Internet usage of two sexes. Similar to the age and Internet usage graph, the data on Internet usage hours for different genders are averaged to minimize any volunteering bias. The data shows that there is no substantial difference between male and female Internet usage. Female participants have an average of 12.9 hours per week spent on the Internet, while male participants have a slightly higher average of 13.3 hours per week spent on the Internet. However, the gender selection in this survey is limited, and further discussion regarding this limitation can be found in the ethics and bias section Section 4.5.
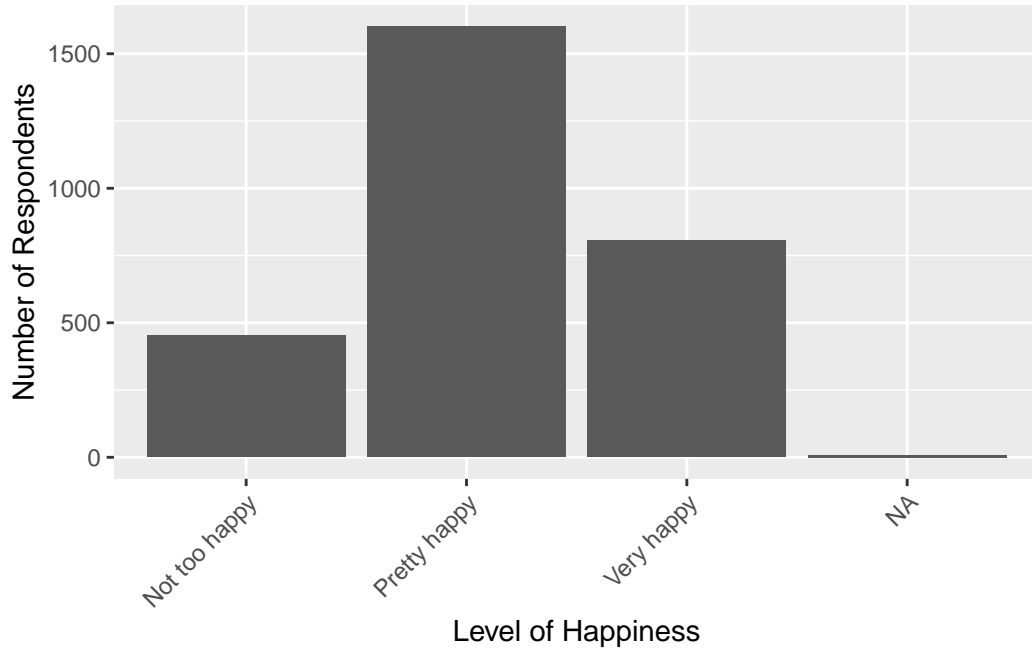
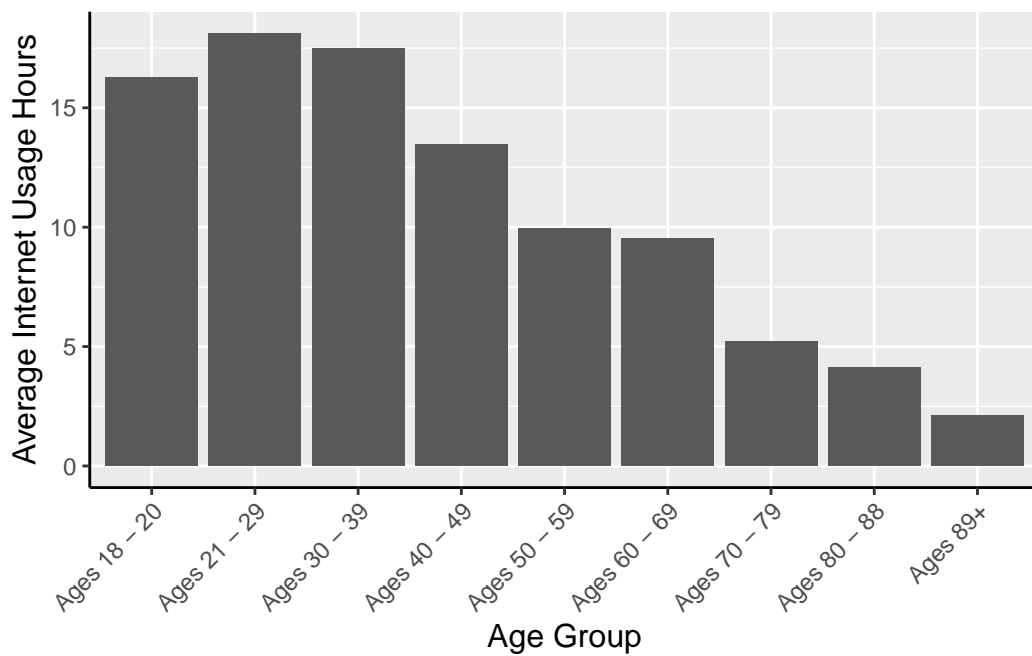Figure 3: Happiness Level Responses from Survey Respondents

Figure 4: Average Weekly Total of Internet Use by Age Group
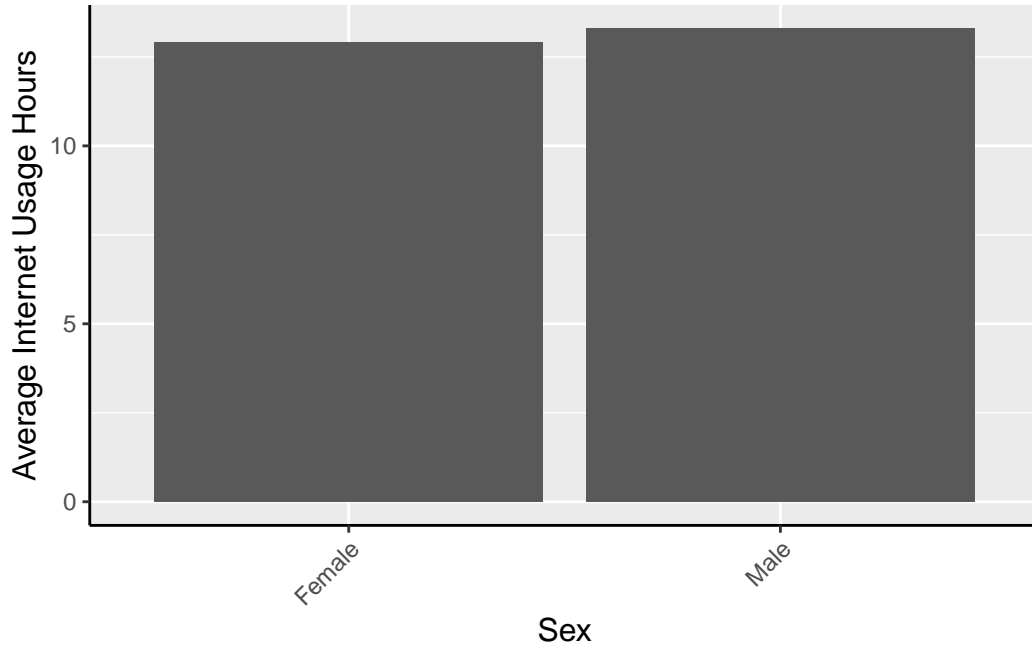
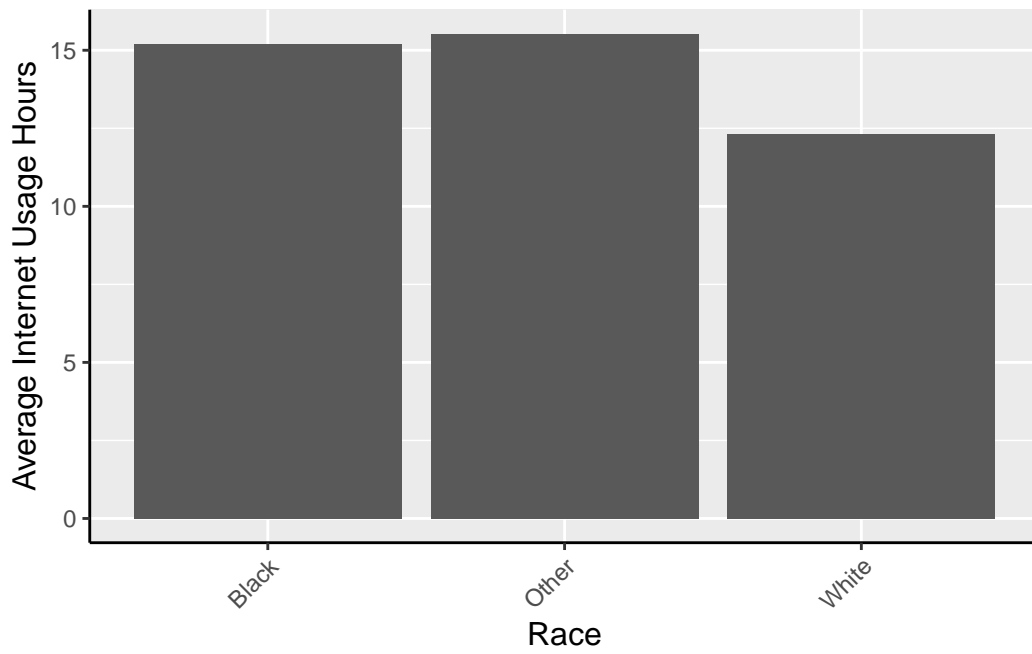Figure 5: Average Weekly Total of Internet Use by Gender

Figure 6: Average Weekly Total of Internet Use by Race

Figure 6 displays the average weekly Internet usage of individuals belonging to different races. Based on the data, we can observe that individuals who do not identify as either Black or White have the highest Internet usage, with an average of 15.5 hours per week. Black individuals have a similar level of Internet usage, also averaging 15.2 hours per week. In contrast, White individuals tend to have the lowest Internet usage, with an average of 12.3 hours per week.
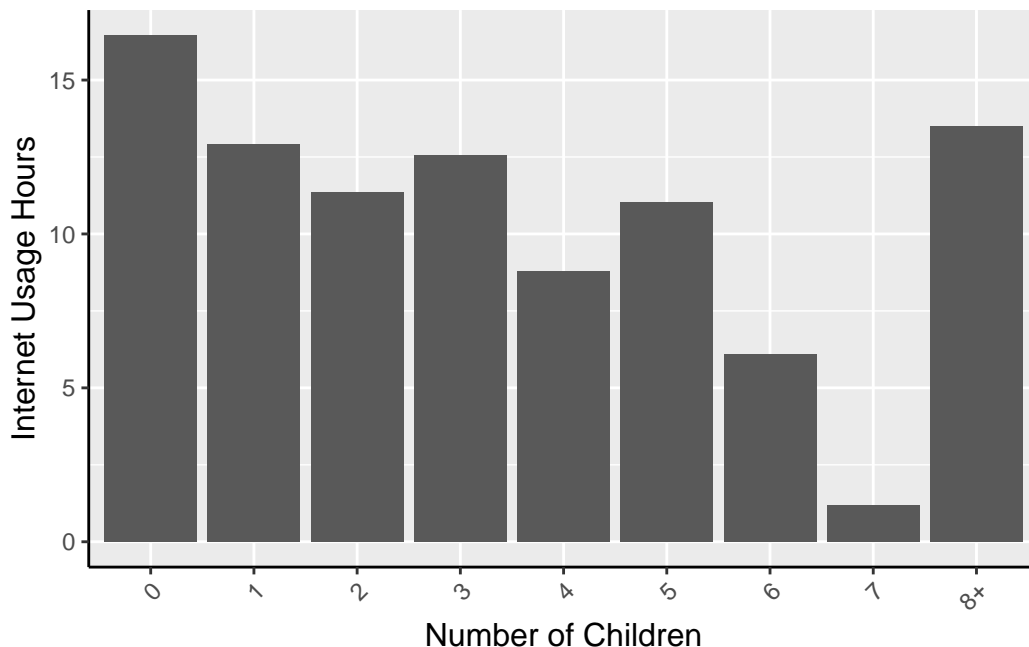

Figure 7: Average Weekly Total of Internet Use by Children

Figure 7 shows the relationship between respondents with a specific number of children and their weekly total hours of Internet use. Respondents that do not have any children are the group that uses the Internet the most during the week. Their average amount of hours of weekly Internet use is approximately 16.5 hours. The data demonstrates that there is an inverse relationship between the two variables. This means that there is a gradual decrease of Internet use hours as the number of children increases. The group that uses the least amount of hours, with an average of approximately 1.5 hours of Internet use weekly, are those with 7 children. However, the second largest group that uses the Internet are those that reported having 8 children or more, making this group an outlier.

Figure 8 displays the relationship between marital status and Internet usage in 2016. In accordance with popular opinion, people who have never been married use the Internet the most, with an average of around 17.5 hours per week. Most notably, people who are widowed use the Internet the least, with an average of around 9.5 hours per week, perhaps due to the correlation between age and widowhood. The graph suggests a significant difference in the Internet use between these two population groups, with a difference of 8 hours between the two.

Figure 9 displays the relationship between perceived level of happiness and Internet usage in 2016. People who reported the lowest level of happiness had the highest Internet usage, with an average of around 14 hours per week. People who reported the highest level of happiness had the lowest Internet usage, with an average of around 12 hours per week. There seems to be a direct decrease in Internet usage the more happy the respondent measures themselves to be, with a difference of 2 hours between the happiest respondents and least happy respondents.
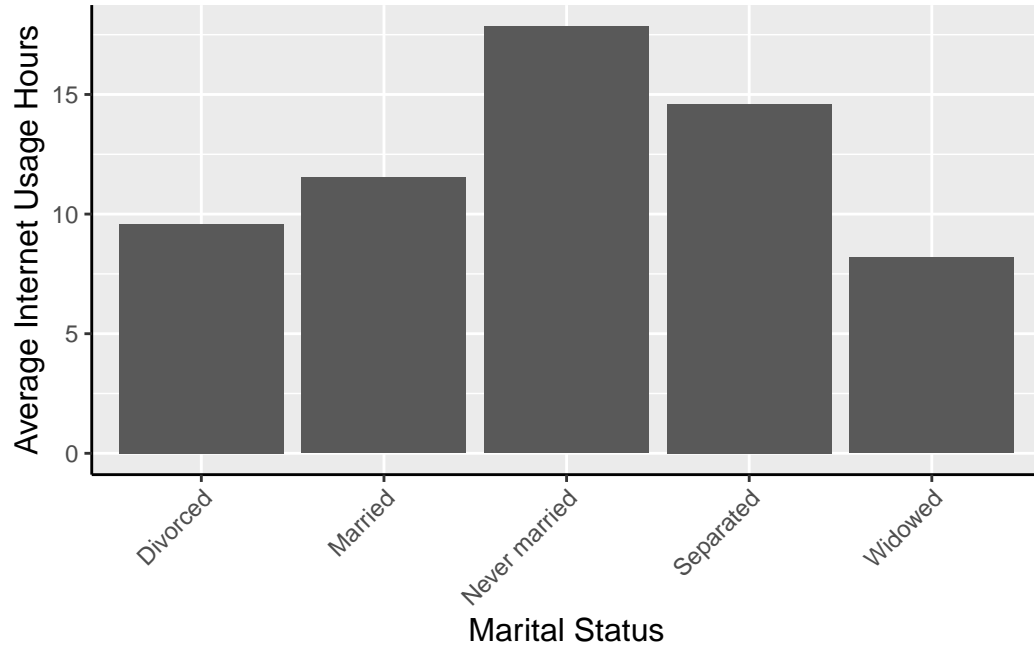
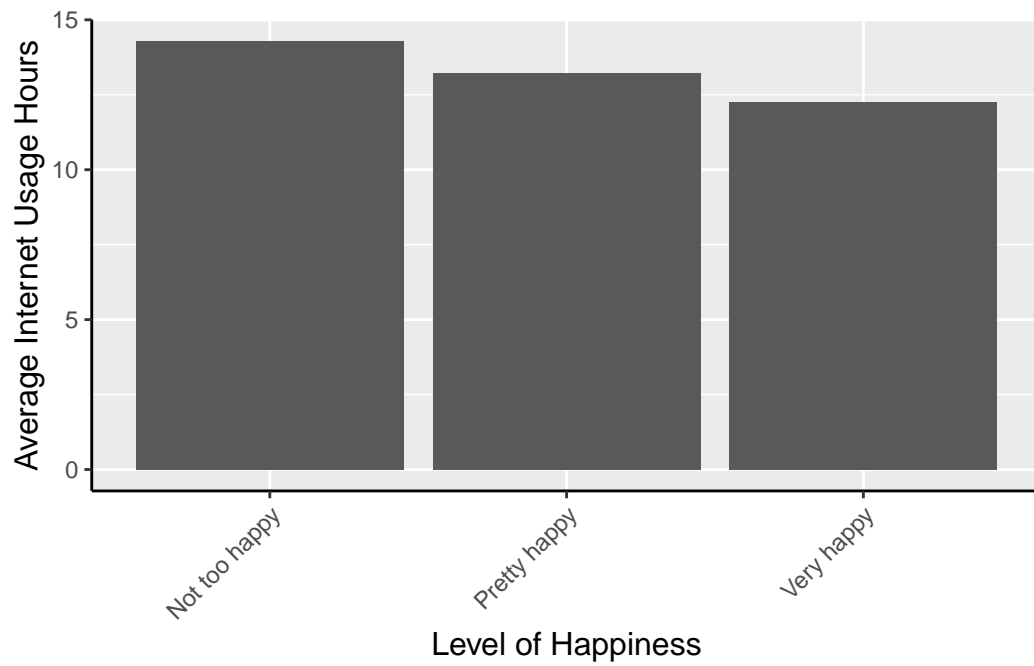Figure 8: Average Weekly Total of Internet Use by Marital Status

Figure 9: Average Weekly Total of Internet Use by Level of Happiness

4 Discussion

4.1 Aging Reduces the Amount of Hours Spent Using the Internet

Based on the results, we find that as aging increases, the amount of weekly total hour Internet use decreases. As shown in Figure 4, the majority of respondents that have the highest number of weekly hours of Internet use are those between the ages of 18 and 39 years old. The three age groups within this range have the three largest Internet usages. By observing the tail of the right-skewed distribution in Figure 4, the graph illustrates that as the age of respondents increases beginning from the age range of 20-29 years old, the use of the Internet reduces. In this era of developing technology and digital services, the Internet has become a widely used source for information, commerce, communication, and entertainment. According to our results, many young adults are commonly online. This may be because they have the functional capabilities of learning how to use the Internet and actually using the Internet. Its ease and convenience allows users to have access to instant information and communication, popularly used by young adults. In comparison, those of older age tend to use the Internet less. The reason for this may be because, as individuals age, they experience declining changes in their physical, mental, and social abilities, affecting their functional capacities. Research has shown that 23% of older adults indicate that having a physical or health condition makes reading difficult or challenging (Smith 2019). This shows that those in older age groups have barriers when it comes to using the Internet. Although using the Internet is valuable to those of older age, as it helps them connect with family members remotely and experience socialization, the factors that make using the Internet challenging keeps them from increasing their weekly use. Many older adults have expressed that, when using technology and digital services, they would need assistance (Smith 2019). Despite seniors being less likely than the rest of the population to go online, once they understand how to use it, it becomes a part of their everyday lives. Research has shown that 71% of seniors go online almost everyday and 11% go online three to five times weekly (Smith 2019). While many older adults understand the beneficial aspect of the Internet, there still remains many non-users of the Internet due to disabilities that come with aging (Smith 2019).

4.2 Marriage and Number of Children Reduces the Amount of Hours Spent Using the Internet

4.2.1 Marital Status

As seen in Figure 8, people who have never married use the Internet significantly more than those who are married or who are widowed. This trend could partially be explained by the correlation between age and being married, as those who have never been married are more likely to be younger. In the United States in 2016, at the time this survey data was collected, the median age of marriage was 28 years old for women and 30 years old for men ("Median Age at First Marriage (Women)," n.d.). This statistic is consistent with the findings of Figure 4, which shows that Internet usage is highest for people aged 21 to 29, people who are just prior to the median age of marriage. This explanation is supported by the finding that widowed people use the Internet the least, out of all of the marital categories. Because widowhood is more likely in people who are older, the correlation between age and Internet use is further reflected here (Isherwood, King, and Luszcz 2017). Thus, the relationship between marriage versus non-marriage and Internet use, in which those who have never been married use the Internet more than those who are married, is related to the inverse relationship between age and amount of average Internet use stated in Section 4.1 above.

This trend of younger and non-married people using the Internet more than older, married people could be further explained by the use of online and digital dating apps by younger, non-married people as ways to connect with people romantically. The United States is one of the countries that uses online dating sites and apps the most, suggesting that online dating is normalized in American culture and partially explaining why younger, non-married people use the Internet much more than their older, married counterparts (Buchholz 2023). The widespread usage of handheld mobile devices that has become the norm for all age groups, but especially younger people who are more likely to use social media and online dating apps, furthers this.

A third contributing factor to this trend could be that non-married individuals feel more isolated due to not meeting societal norms of marriage and turn to the Internet to seek connections and community. People who

live in societies in which marriage is socially expected, such as the United States, can feel isolated, for which using the Internet can help them feel a sense of belonging that they find missing in their lives (Himawan et al. 2021).

4.2.2 Number of Children

Figure 7 demonstrates the relationship between number of children of respondents and average weekly Internet use. This graph shows that people with no children use the Internet more than people who have children. Like Section 4.2.1 above, this could be due to the correlation between age and having children: those who are older are more likely to have children than those who are younger. The median age at which women have children is 30 years of age, which is consistent with the findings of Figure 4, which states that people in their 20s use the Internet the most (Morse 2022). This general inverse relationship between number of children and Internet use, is related to the inverse relationship between age and amount of average Internet use stated in Section 4.1 above. The outlier of the "8+" children category has a high Internet usage because there were only 6 people who responded about their Internet usage in that category (compared to the approximately 500 people who responded about their Internet usage in the "0" children category), such that the result was skewed by one participant who reported 60 hours of Internet use.

This trend could also be explained by the amount of personal time that people have for themselves. Personal use is one of the main activities of Internet use (including instant messaging and social media), and people with children are less likely to have time for themselves as they spend time caring for their children (Petrosyan 2023). This likely increases with more children. Thus, the relatively inverted relationship between number of children and Internet use could be partially explained by the inverted relationship between number of children and personal time.

However, the Internet has increasingly come to be a key resource for parenting, both for getting information and for receiving support (Duggan et al. 2015). This explains why average Internet use is relatively similar across people with 1 child to 5 children.

4.3 Happiness Reduces the Amount of Hours Spent Using the Internet

In a previous study, we found a potential correlation between happiness and Internet usage. Specifically, individuals who reported lower Internet usage tended to have higher levels of happiness. There are a few reasons that may contribute to this finding.

We suspect this finding may be attributed to various factors related to social media usage, given that people spend an average of 2 hours and 31 minutes daily on social media (Georgiev 2023). Our secondary research indicates that certain aspects of the Internet, such as social media, can negatively impact psychological health. Excessive use of social media can result in addiction, anxiety, depression, or isolation. Furthermore, social media can become a substitute for real-life social interaction, causing individuals to feel lonely and disconnected. Comparing oneself unfavourably with Internet social figures can also lead to low self-esteem and negative body image, while cyberbullying can have potential mental health implications for individuals who spend long hours on the Internet. A study by the University of Pennsylvania in 2018 found that reducing social media use to 30 minutes a day resulted in a significant reduction in anxiety, depression, loneliness, and sleep problems (Robinson and Smith 2023).

Additionally, research suggests that spending more time online can make children less happy with their lives. For instance, a study by the University of Sheffield concluded that spending an extra hour a day on social networks reduces the probability of being completely happy with life overall by approximately 14 percentage points (Sheffield 2017). Thus, we have reason to believe that Internet usage, particularly social media usage, can have a negative impact on happiness levels to some extent and affect the relationship between happiness and Internet usage.

Another factor that could contribute to the correlation between happiness and Internet usage is a fulfilling real life. Engaging in offline activities, such as spending time with loved ones, pursuing hobbies, or achieving personal goals, can be more rewarding than spending time online. This can lead individuals to prioritize fulfilling activities over aimless scrolling through the Internet and decrease their need for validation or

connection through social media and other online platforms. Thus, individuals who are fulfilled in their offline lives may have lower Internet usage hours and higher happiness levels.

4.4 Weaknesses and Next Steps

4.4.1 Weakness

A key weakness in our analysis was that we removed non-responses from our data, which may have made our data for Internet use not as accurate in reflecting what the actual population's Internet use looks like. A central reason as to why participant's may have chosen not to respond to the question about Internet use could be embarrassment: admitting that one spends too much time on the Internet could be embarrassing, so those who have higher Internet usage are more likely not to respond to this question. This is a very real concern as Internet addiction is emerging rapidly in our increasingly digital world, and several countries have even identified it as a public health concern (Cash et al. 2012).

Another weakness in our analysis is the self-reported nature of the results, meaning there was some bias in questions with ambiguous word choice, such as our happiness variable. The definition of the different response options to the happiness variable survey question of "not so happy", "fairly happy", and "very happy" will vary depending on the individual, as well as the day or time of day. Thus, our analysis of the relationship between happiness and Internet use may be biased.

4.4.2 Next Steps

To address our second identified weakness in Section 4.4.1 above, implementing a supplementary survey with more detailed questions, particularly about race and gender (as mentioned in Section 2.2) and more straightforward question answers (e.g. a number scale for happiness variable) would allow for more in-depth analysis.

In addition, conducting further research on the different uses of the Internet based on population groups would be a reasonable next step, now that we have determined which population groups use the Internet the most and the least.

Finally, looking at how COVID-19 impacted Internet usage would be a particularly interesting avenue of research to pursue, especially with the increase in online activities (e.g. work from home, online classes, widespread use of Zoom, etc.). It would be interesting to compare our analysis of American population groups that used the Internet the most in 2016, with 2020 (during the COVID-19 pandemic) and with 2022 (post-COVID-19 pandemic).

4.5 Ethics and Bias

Based on the data collection methodology provided by GSS, we have identified some potential biases that could arise. The survey's target population consists of adults aged 18 and above who reside in households in the United States. Since this sampling approach focuses only on a specific age group, our analysis may be biased with respect to the age factor. GSS also claimed to be strictly voluntary. While this approach supports research ethics by respecting individuals' autonomy and right to privacy, it can also result in volunteer bias. The GSS sample is from a combination of urban, suburban, and rural geographic areas, but only a few thousand respondents are interviewed in the main study. The small sample size may lead to chance findings. We also suspect potential sampling bias may affect our end results. However, with not enough information disclosed, we are unable to confirm that. The gender and race options provided by the GSS survey are limited. Participants are only given the options of selecting either "Female" or "Male" for gender, and "Black," "White," or "Other" for race. This narrow selection does not provide an adequate range of options for survey participants.

5 Appendix

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