

Xboxes and Ex-workers? Gaming and Labor Supply of Young Adults in the U.S.*

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Abstract

One popular hypothesis holds that advances in video game technology over the last decade have led young adult men to reduce their working hours. I examine American Time Use Survey data in detail, documenting the extent of the increase in gaming. I note that increasing gaming time is offset by decreasing time spent watching television, movies, and streaming video. I find that the Aguiar et al. model and empirical strategy predict increases in labor supply due to negative technology shocks in television and streaming video, which are both implausible given the rise of streaming technology over this period and greater in magnitude than the predicted reductions associated with gaming. Moreover, I find that the observed trend is consistent with an alternative explanation that a shift in social norms rendered playing video games more acceptable at later ages, particularly for non-employed men. The increase in gaming is concentrated among men living with parents, and is not uniform for all ages of young adults. The data further suggest that men exiting the work force do not exhibit significant preferences for gaming leisure. Overall, the evidence suggests that while young men have dramatically increased the amount of time they spend gaming over the past decade and a half, their decreasing levels of employment and labor force participation are more likely to result from changes in labor demand.

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1 Introduction

Video game technology has improved dramatically since the first successful mass-market video game consoles were released in the United States about four decades ago. In particular, massively multiplayer online games have increased in both technological sophistication and popularity since the early 2000s. Young men have devoted increasing amounts of time to gaming since this time, stoking long-standing fears of the negative consequences of the leisure choices of the young. These fears extend a long thread of American society going back at least as far as the worries of [Comstock \(1883\)](#) about “half-dime novels and story papers” as “traps for the young.’ Researchers have often focused on examining negative impacts of video games, though these concerns have generally not been supported by evidence. For example, many concerned parties have feared that video games could increase violence among young men. [Cunningham et al. \(2016\)](#) explore this hypothesis and find no evidence of this effect.¹

The popular press has devoted significant attention to the hypothesis of [Aguiar et al. \(2018\)](#) that over approximately the last decade, the increasing appeal of video games as a “leisure luxury” has led men in their twenties to reduce their working hours. Researchers have also cited this work extensively, frequently concerned with its implications for related examinations of adult male labor supply.² [Abraham and Kearney \(2018\)](#) place the *Aguiar et al.* analysis in the context of overall declining trends in the proportion of the population working from 1999 to 2016, and note that its conclusions depend critically on key structural assumptions of the proposed model. Moreover, [Abraham and Kearney](#) question whether the observed behavior might be consistent with other hypotheses, such as changing norms among young adult men.

Taking these analyses as a starting point, I examine the changing lives of 21 to 30 year olds over the past decade and a half. Current Population Survey (CPS) data show that the Great Recession hit the employment of young adult men—especially less-educated young adult men—particularly hard.

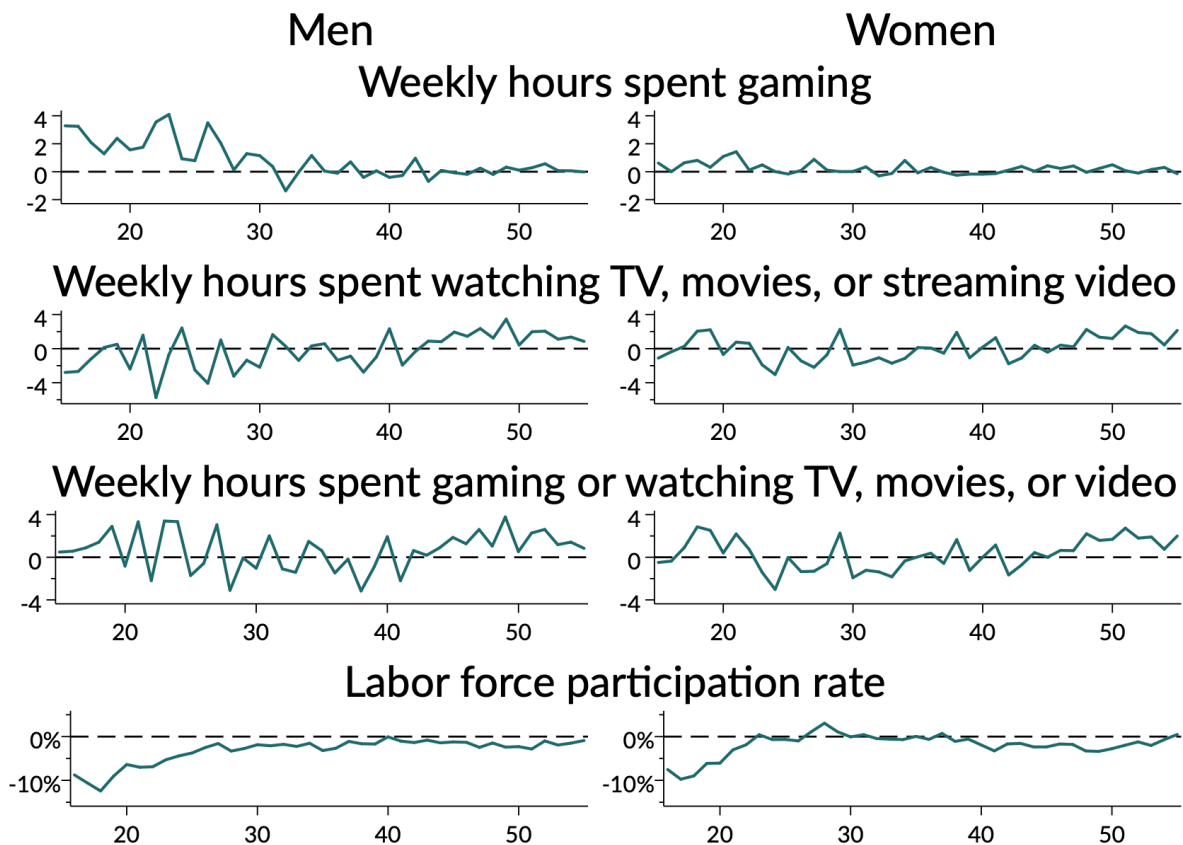
¹[Granic et al. \(2014\)](#) note that video games could have wide-ranging positive impacts, surveying the more limited research of such benefits.

²For example, [Coglianese \(2018\)](#) and [Krueger \(2017\)](#) work to address the implications of the *Aguiar et al.* hypothesis in their analyses.

The cyclical downturn occurred in the context of long-term shifts in rates of marriage and living with parents for young adults.

As shown in Figure 1, increased gaming over the past decade and a half has been concentrated among men under 30, and has been offset by corresponding decreases in time spent watching television, movies, and streaming video. The increases in gaming time for men under 30 dwarf those of women and older men. However, the change in labor force participation has shown a similar age pattern for men and women.

Figure 1: Change in time use and labor force participation by age and gender, 2003-2007 to 2013-2017



Source: 2003-2017 ATUS and CPS ASEC samples from IPUMS. LFPR not shown for 15 year olds.

Over the entire period since 2003 covered by the American Time Use Survey (ATUS), non-working young adult men have spent more time gaming and using electronics than their working counterparts. Total electronics leisure time was nearly constant across this period for men of a given

employment status; increasing gaming time is generally offset by decreases in time spent watching television and movies. The percentage of electronics leisure time spent gaming has not increased uniformly for young adult men: full-time students and non-employed men markedly increased this percentage over this period, while employed men saw only modest increases. Additionally, the increase in the amount of time spent gaming is concentrated among young adult men living with parents.

I examine whether changing social norms could explain the underlying data. Evidence from the ATUS is consistent with the implications of a shift in social acceptability of greater gaming for young adult men, particularly non-employed men and those in their early 20s. Moreover, an examination of men who recently left employment suggests that they do not prefer to spend significantly more time gaming than currently employed men, contrary to the hypothesis that preferences for gaming could be enticing men to leave the labor force.

2 Data

This analysis uses hierarchical ATUS data extracts from IPUMS Time Use covering all currently available years, 2003-2017 (Hofferth et al., 2018).³ Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) samples are drawn from IPUMS-CPS (Flood et al., 2018).

The ATUS is a national time use survey administered by the Bureau of Labor Statistics (BLS) which collects extensive information on how Americans spend their time, as well as a range of household and worker characteristics. One respondent (age 15 or older) per household is chosen from a subset of households which have recently completed the CPS. Begun in 2003, data are now available for years 2003 through 2017, with about 14,000 respondents per year. Response rates vary from 46.8% in 2017 to 57.8% in 2003. Respondent probability weights are used to account for nonresponse and oversampling of some groups, producing nationally representative estimates.

An ATUS respondent provides information to an interviewer on how she spent her day; activities are then coded using a hierarchical coding scheme. If a respondent reports two or more activities

³Aguiar *et al.* exclude 2003 data since significant changes were made to some coding guidance between the 2003 and 2004 waves of the survey. I do not find evidence of significant differences in the measurement of electronics leisure between 2003 and later years, and include 2003 data in this analysis.

at the same time, she is prompted to designate one as the primary activity, and her time is coded using the primary activity (Shelley, 2005).

The CPS ASEC, typically fielded in March of each year, collects a range of economic and demographic data. Unlike other CPS samples, the ASEC sample includes active-duty military members of some households, which I exclude. As with the ATUS, respondent probability weights are used throughout to generate nationally representative estimates.

2.1 Measuring gaming and electronics use in the ATUS

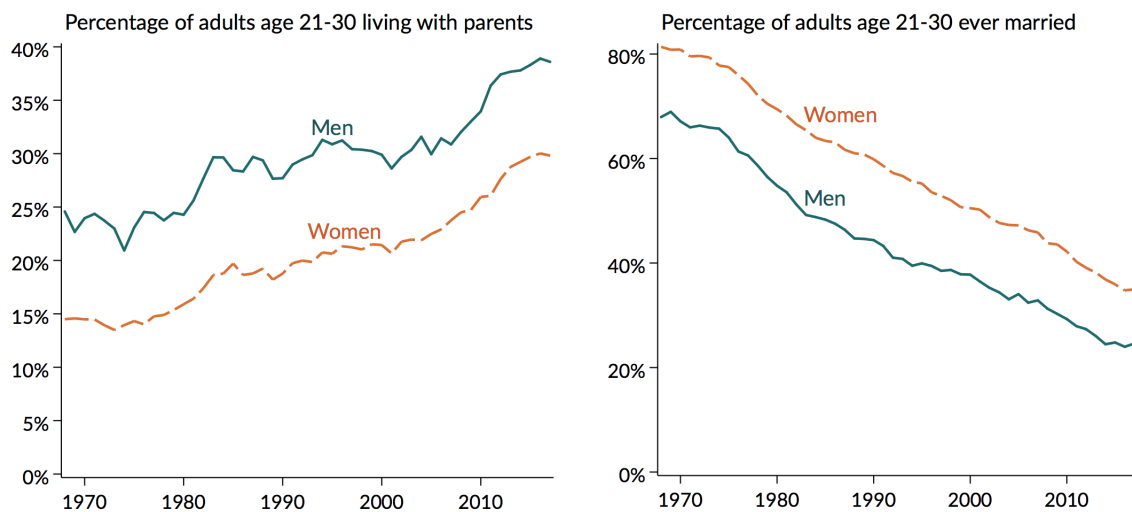
The ATUS does not have a code exclusively used for time spent playing video games, but activity code 120307 corresponds to "playing games." In practice, the vast majority of time assigned to this activity for young adults appears to be spent playing video games. MacDonald (2016) suggests that this may include significant amounts of time spent playing other games, and prefers to focus on a measure of activity code 120307 *only when reporting being alone*. However, as MacDonald (2016) notes, this measure excludes video games played with others. Limited survey evidence from the video game industry suggests that gamers are increasingly playing video games with friends and family. I therefore use the broader measure of all gaming time, consistent with the common practice in the literature including the analyses of Aguiar et al. (2018) and Ward (2018).

Additional electronics time is measured using activity codes 120303 and 120304 (television and movie watching, including streaming video) as well as 120308 (non-gaming computer use for leisure). Notably, Aguiar *et al.* add time spent in activity 120308 to time spent gaming to calculate a measure of computer use that serves as the primary measure in much of their analysis. However, this category includes a wide range of activities such as computer programming for personal use or computer use that is not specified as clearly belonging in another category. Given the difficulty of classifying many of these activities as clearly leisure, I exclude this category from this analysis.

3 Recent changes in the lives of young adults

Young adults' lives have changed in a variety of significant ways since 2000. The percentage of 21 to 30 year olds living with parents increased dramatically after 2000, after slowly rising through much of the 1980s and 1990s. By 2016, young adult men were nearly 10% more likely to live with parents than in 2001, and this rate increased nearly as much for women. As shown in Figure 2, both women and men were more than 15% more likely to live with parents in 2016 as they were in parts of the 1970s.

Figure 2: Two significant changes in the lives of young adults



Source: 1968-2017 CPS ASEC samples from IPUMS-CPS. Excludes armed forces.

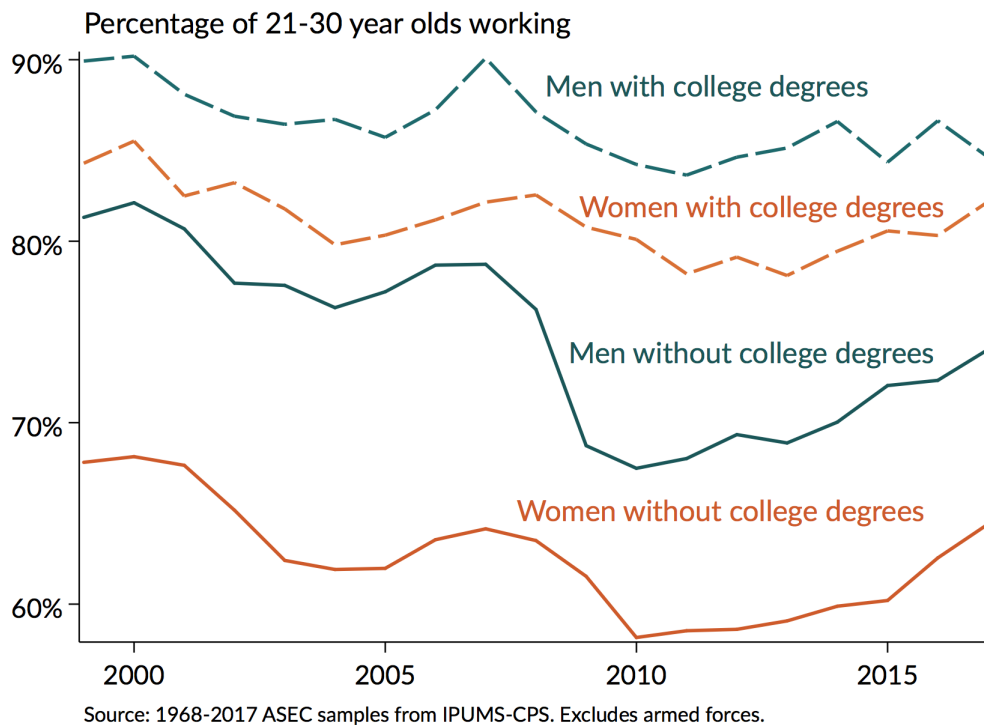
Previous researchers have addressed portions of this increase. For example, [Ruggles \(2007\)](#) examined the reverse relationship—parents living with their children—and found this arrangement increasingly common through 2000. [Matsudaira \(2016\)](#) notes that young adults increasingly lived with parents through 2011, estimating that much of this increase is explained by changing economic conditions. Crucially, this trend continued after 2011, even as economic conditions improved.

Greater rates of living with parents would be expected if fewer adults were marrying at this age. Indeed, over this time period young adult marriage rates continued their steady decline. Among 21 to 30 year olds, both men and women were more than 40% less likely to have ever married in 2016

than in 1970. However, contrasting with the propensity to live with parents, young adult marital rates have dropped almost completely consistently over the past five decades.

As [Matsudaira \(2016\)](#) suggests, changing economic conditions may explain the accelerating increase in young adults living with parents as their marital rates continue a steady decline. As shown in [Figure 3](#), the percentage of young adult men without college degrees who were employed fell more than eight percentage points from the peak in 2008 to its lowest point in 2010. Unlike women, these men remained significantly below pre-Great Recession employment levels in 2017.

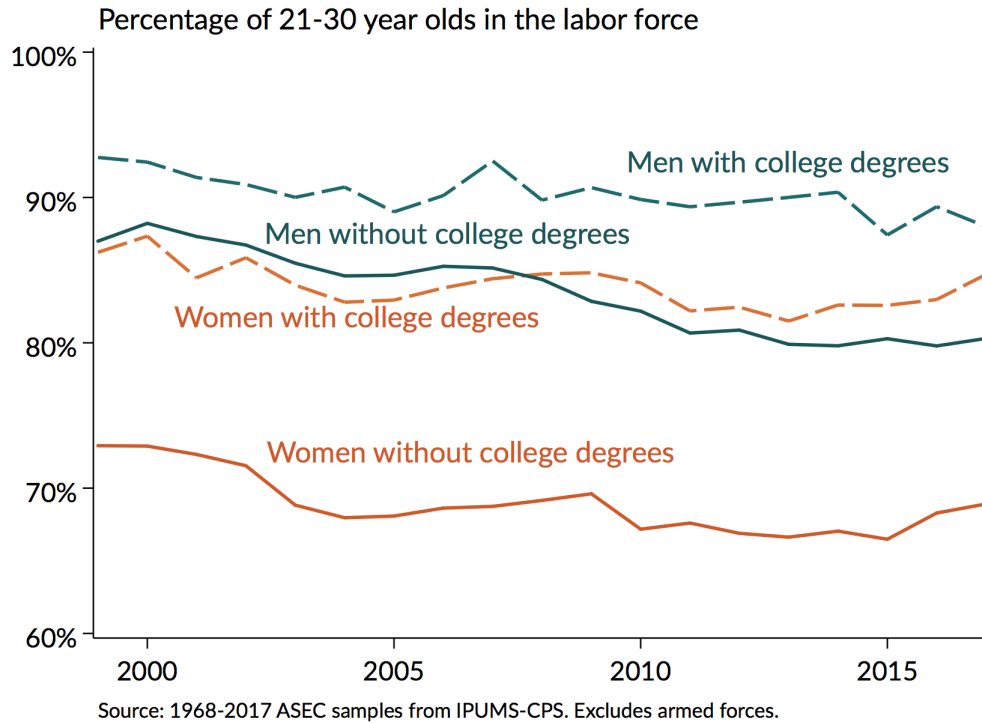
Figure 3: Young adult employment as a percentage of the population



By contrast, rates of labor force participation for young adults do not demonstrate strong cyclical patterns since the late 1990s. Labor force participation rates decreased slightly over this period for young adult men and women, but the most dramatic reduction was seen among men without college degrees. These shifts are illustrated in [Figure 4](#). Unlike the dramatic cyclical changes in the percentage of young adults (especially those without college degrees), the decreases in labor force participation do not appear to be strongly related to the health of the economy. Particularly for less-

educated young adult men, the trend of decreasing participation appears to have persisted across the business cycle.

Figure 4: Labor force participation of young adults



The significant drop in the young adult male employment-to-population ratio, particularly among less-educated men, has motivated researchers to seek out explanations for the observed shifts. I turn in the next section to a detailed examination of the ATUS data on young adults' use of electronics.

4 Overview of young adult electronics time use

Young adult men spent increasing amounts of time gaming over this period, consistent with the increases noted by [Aguiar et al. \(2018\)](#). Table 1 illustrates this, with data pooled over three-year periods to address the relatively small sample sizes when examining 21-30 year olds in the ATUS. The percentage of men or women reporting playing games or watching TV, movies, or streaming video decreased slightly over this period. The percentage reporting gaming on a given day increased. Both

women and men increased their average time spent gaming over this period, though the increases were larger for men. The average amount of time spent gaming in a week for men increased from 2.3 hours in 2003-2005 to 4.0 hours in 2015-2017. However, the stylized fact of increasing young adult male gaming comes with several important caveats.

Table 1: Electronics time use of young adults in the ATUS

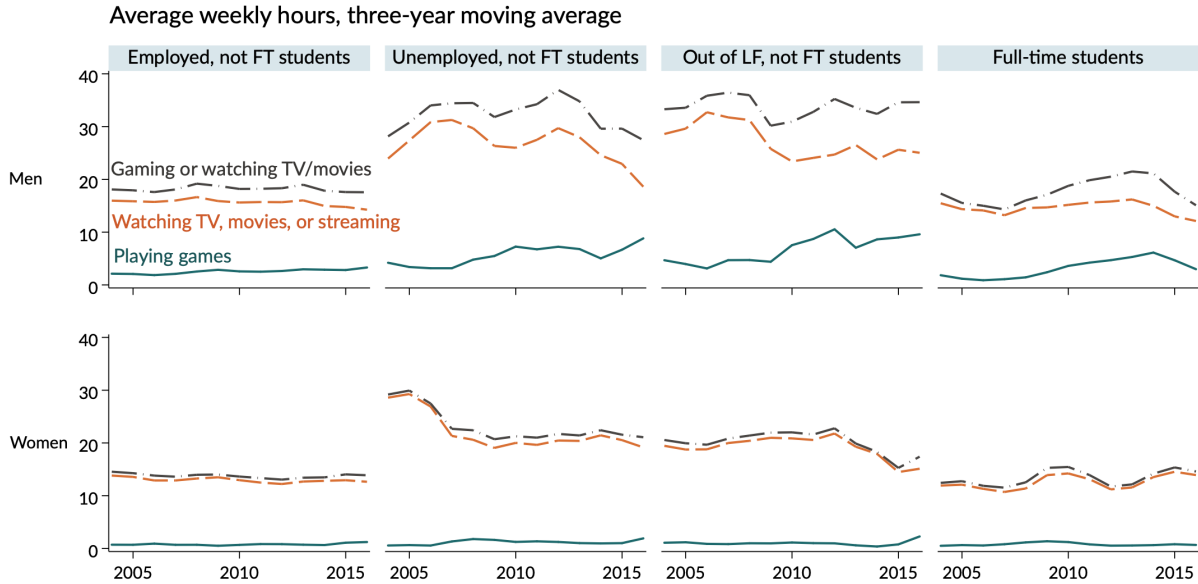
	Men 21-30			Women 21-30		
	2003-2005	2015-2017	Change	2003-2005	2015-2017	Change
Percent on diary day:						
Gaming	12.0%	18.4%	6.4%	5.8%	8.8%	3.0%
Watching TV, movies, or streaming	77.5%	73.0%	-4.5%	77.3%	73.2%	-4.1%
Gaming, TV, movies, or streaming	80.6%	78.2%	-2.4%	78.2%	75.4%	-2.8%
Weekly hours spent:						
Gaming	2.3	4.0	1.7	0.8	1.4	0.6
Watching TV, movies, or streaming	16.9	14.9	-2.0	15.3	13.6	-1.7
Gaming, TV, movies, or streaming	19.3	18.8	-0.4	16.1	15.0	-1.1

First, gaming remains a relatively infrequent activity, as shown in Table 1. The ATUS only collects a time diary for a single day per respondent, so it is generally not possible to distinguish per-person and population-wide frequency. For example, the 12% figure in 2003-2005 might be due to 84% of young adult men gaming one day per week, or 12% of men gaming every day.⁴ However, it is clear that on a given day, the majority of young adults—regardless of gender—do not report playing video games. While gaming remained a relatively rare activity in 2015-2017, the percentage of both men and women gaming on a given day had increased since the beginning of this period. Gaming incidence increased to about 1.5 times its starting rate over this period for men and women; 18.4% of young adult men report gaming on a diary day in 2015-2017 relative to 12.0% in 2003-2005, and for women this rate increased from 5.8% to 8.8%.

Second, young adult men increased their gaming more than women, but both groups more than counteracted increasing gaming time with aggregate reductions in time spent watching TV, movies, and streaming video. For both men and women, average time spent gaming or watching TV, movies and streaming decreased over this period. Gaming as a proportion of the time young adult men spend on such electronics leisure increased over this period, but gaming still represents less than one fourth of this leisure time.

⁴This limitation is discussed in further detail by [Frazis and Stewart \(2012\)](#).

Figure 5: Time spent playing games and watching TV, movies, or streaming, ages 21-30

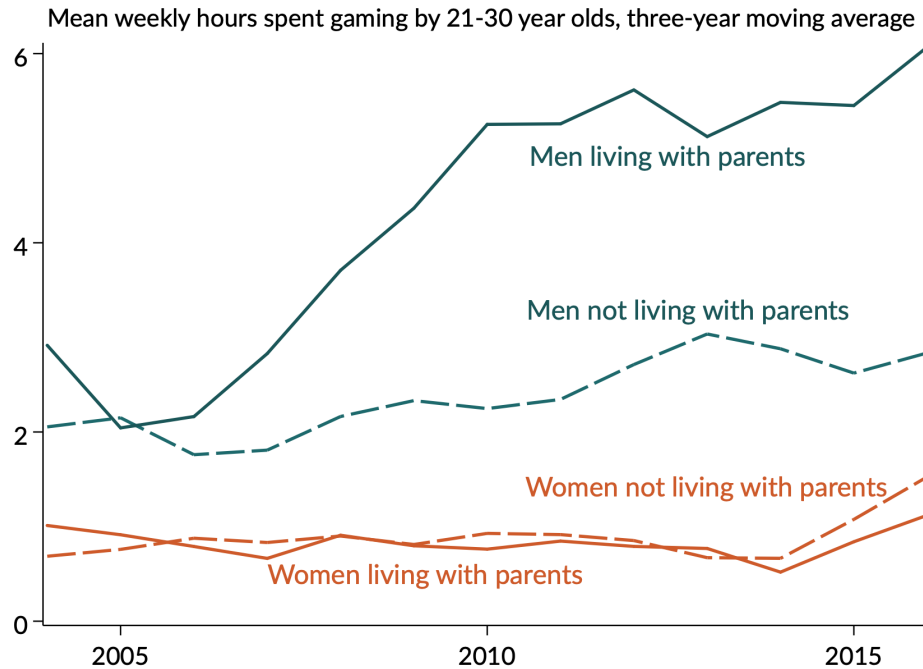


Disaggregating by employment and student status increases noise in the estimated means, but does not reject this basic story. In Figure 5, I present the average weekly hours spent on the different types of electronics leisure, separated by employment and student status. I use a three-year moving average to smooth some of the variation in the series. The amount of time spent on gaming and watching television by employed men and women (excluding students) remained consistent across this time period. Television time was down slightly over this time period for both men and women in this category. Average gaming time for student and non-employed men increased after the Great Recession, reaching a new plateau for each of these categories around 2010.

Finally, increasing gaming time is concentrated among young adult men living with their parents, as shown in Figure 6. Both groups averaged about two hours of gaming per week in 2004-2006, but in 2015-2017 men living with their parents averaged over six hours per week, while men not living with their parents averaged under three hours of gaming per week. This stark difference is not evident among young adult women.

Young adults increasingly lived with parents over this period, but it is unclear what role this played in increasing gaming. Living with parents could simply provide the resources to enable young

Figure 6: Increased gaming is concentrated among men living with their parents



adult men to spend more time gaming than they otherwise would. Alternatively, changing social norms may have reduced the stigma of both living with parents and spending more time gaming.

5 Possible explanations for increased gaming

5.1 Improving video game technology

[Aguiar et al. \(2018\)](#) hypothesize that improvements in video game technology since the mid-2000s might explain increases in time spent playing video games. Fundamentally, a change in technology is difficult to distinguish from a change in tastes or social norms by examining shifts from spending time with other electronics to video games. However, I posit that improving technology or a general shift in tastes would affect all young adult men, leading to similar shifts from other electronics to gaming for men of different ages as well as those who are employed, non-employed, and full-time students.

Aguiar *et al.* hypothesize that gaming is a leisure luxury, so that an individual facing a given percentage increase in leisure time will increase gaming time by a significantly greater percentage. Observationally, this is broadly consistent with men shifting other electronics leisure to gaming. However, gaming as a leisure luxury yields the additional implication that the underlying improvements in video game technology are driving increases in demand for leisure, and therefore reductions in the labor supply of young adult men. If this mechanism holds, men who exit employment might be expected to have a higher propensity to play video games than their employed counterparts.

5.2 Shifting social norms

An alternate hypothesis is that increasing gaming among young adult men is a result not of improved technology as Aguiar *et al.* suggest, but of changing social norms among these men. I adopt a variation of this: that it is increasingly socially acceptable for non-employed men to spend time gaming somewhat further into their 20s. This hypothesis yields two testable predictions. First, later cohorts would be expected to spend more time gaming at later ages than previous cohorts. Second, gaming would increase for full-time students in parallel with unemployed men and those who have exited the labor force—but crucially this would not hold for employed men. I test both of these predictions.

6 Testing predictions

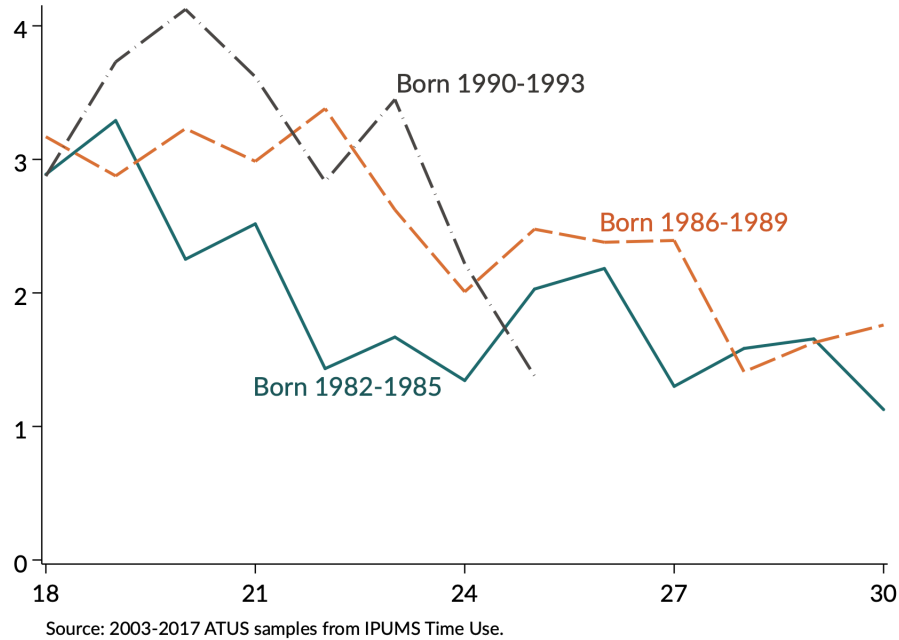
The hypothesis of increasing social acceptability for certain young adult men to play video games yields a set of predictions which I test using ATUS data.

6.1 Delayed dropoff in gaming for later cohorts

First, I would expect that shifting norms would mean that average gaming time for men would remain somewhat high for longer into the 20s. This is in contrast to the assumption that all ages would adjust their behavior similarly. To test this, I construct synthetic cohorts by aggregating diaries of men born (1) from 1982 to 1985, (2) from 1986 to 1989, and (3) from 1990 to 1993. I then

calculate the average amount of time spent gaming (in hours per week) at each age for each synthetic cohort.

Figure 7: Average weekly hours spent playing games per week, by birth year cohort and age



The results, shown in Figure 7, demonstrate that men in post-1985 cohorts appear to be gaming more into their early 20s. For example, 23 year olds in post-1985 cohorts spend similar amounts of time gaming, on average, as 21 year olds in the 1982-1985 cohort. By the time men reach age 25, these cohort differences have shrunk. This pattern is consistent with increasing social acceptability of men in their early 20s playing video games. However, aggregating all men ages 21-30 obscures that this age-specific effect underlies observed aggregate differences in gaming.

Figure 1 shows average weekly gaming hours for those age 15-55 in the first five years of ATUS data (2003-2007) and the most recent five years of data, a decade later. Men and boys in their mid-20s and younger increased gaming time more than older men over this period. This

6.2 Uniformity of increases in gaming

Table 2 presents changes in weekly hours spent gaming, watching television and movies, and both, disaggregated by gender, employment status, and full-time student status, from the first five-

Table 2: Change in weekly hours spent by 21-30 year olds from 2003-2007 to 2013-2017

	Men			Women		
	Gaming	TV/movies	Gaming + TV/movies	Gaming	TV/movies	Gaming + TV/movies
Employed	1.2	-1.4	-0.1	0.2	-0.6	-0.4
Unemployed	4.1	-5.4	-1.2	0.4	-6.2	-5.8
Not in labor force	4.9	-6.3	-1.4	0.7	-2.5	-1.8
Full-time student	2.6	-1.3	1.3	0.2	2.0	2.2

Source: ATUS samples from IPUMS Time Use. Full-time students are classified separately regardless of employment status.

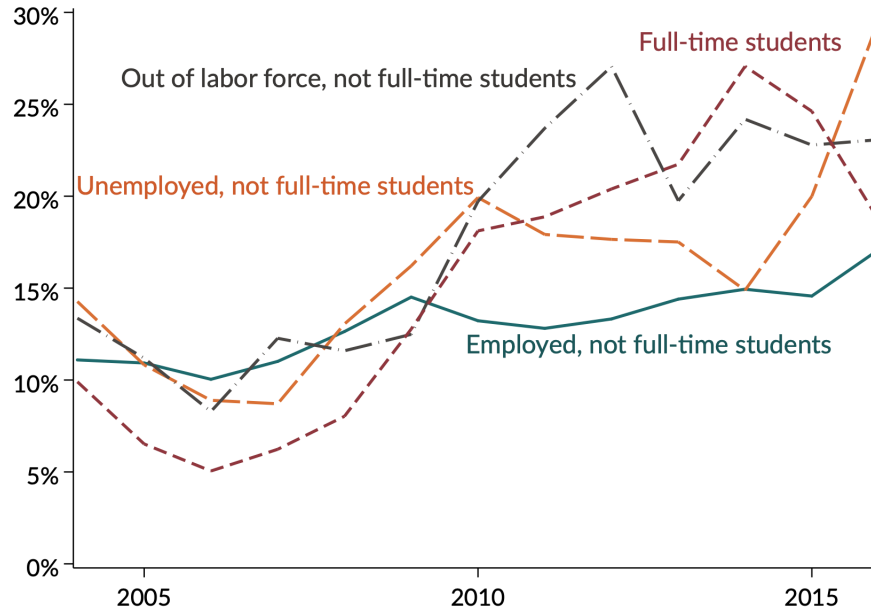
year period in ATUS data (2003-2007) to the period a decade later (2013-2017). For both men and women, non-employed 21-30 year olds who were not full-time students reduced total time spent gaming and watching television, movies, or streaming video by at least an hour per week, on average. Employed men and women decreased time spent on this electronics leisure only slightly. The only groups to see increases were full-time students. Male students spent about 1.3 hours less watching television and movies while gaming about 2.6 hours more per week. Female students spent about 2 additional hours watching television and movies while gaming only 0.2 hours more per week.

Figure 8 presents the percentage of young adult men’s electronics leisure time devoted to gaming, disaggregated by employment and student status. At the beginning of this period, each group devoted between 10 and 15% of its electronics leisure to gaming. Employed men increased this percentage steadily but only modestly across the period. By contrast, non-employed men and full-time students saw increases in the percentage of gaming time across the Great Recession, reaching new heights around 2010 and maintaining similarly higher levels at the end of this period. The patterns shown in Table 2 and Figure 8 are consistent with the prediction that changing social norms might lead to greater shifts for non-employed men than for employed men.

6.3 Gaming behavior of those on employment margins

One way to examine whether video games serve as an enticement for men to leave employment is to compare the gaming behavior of men who recently left employment to other non-employed men. Using the ATUS, it is possible to identify a subset of men who recently exited employment by comparing employment status at the time of the ATUS interview to that recorded at the time of

Figure 8: Gaming as a percentage of total electronics leisure time, three-year moving average

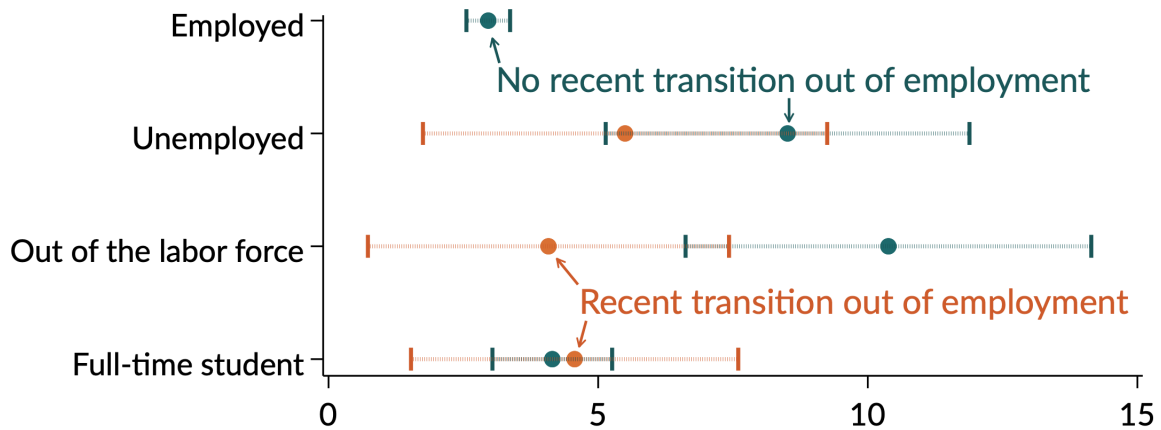


Source: 2003-2017 ATUS samples from IPUMS Time Use.

the CPS interview, two to five months earlier. Respondents who report being employed at the CPS interview but not the ATUS interview are considered to have made a recent employment transition. Figure 9 presents point estimates and confidence intervals of average weekly hours spent gaming for men by employment status and whether they recently transitioned out of employment. I pool data from 2010 to 2017 to attempt to address the issue of small sample sizes of 21-30 year old men meeting these criteria. For unemployed men, differences between those who recently transitioned out of employment and those who did not are statistically significant at the 5% significance level. Men out of the labor force who recently left employment spend, on average, 4.1 hours per week gaming, significantly less (at the 5% significance level) than the average of 10.4 hours for men out of the labor force who did not recently experience an employment transition.

The point estimates of gaming time for men who recently left employment are consistently slightly higher than those for employed men. However, these differences are neither statistically significant nor large; employed men in this sample average 3.0 hours of gaming per week, while recently employed men in the other three categories average between 4.1 and 5.5 hours of gaming per week. Non-employed men who did not report a recent transition out of employment spend, on

Figure 9: Average weekly hours spent playing video games by employment status and recent transition out of employment



Source: 2010-2017 ATUS samples from IPUMS Time Use. Vertical lines show 95% confidence intervals. Employment transitions are those occurring between CPS and ATUS interviews.

average, a significantly larger amount of time gaming than employed men. These results are consistent with the explanation that men are leaving employment for reasons other than a desire to spend more time gaming.

7 Conclusions

I find that evidence from the ATUS suggests that young adult men have significantly increased their average amount of time spent gaming over the past decade and a half. This is offset by declines in time spent watching television, movies, and streaming video. The increase in gaming is concentrated among men living with parents, and appears to be associated with later cohorts gaming more through their early 20s. Non-employed men and students appear to have shifted electronics time to gaming more dramatically than employed men. Taken together, this evidence is consistent with the explanation that norms have shifted so that it is more socially acceptable for slightly older and non-employed men to spend more of their time gaming. By contrast, this evidence does not appear to support the hypothesis of video games, as a leisure luxury, driving down the labor supply of young adult men.

Additionally, evidence from a set of young adult men who recently transitioned out of employment is inconsistent with the hypothesis that men left jobs to play significantly more video games. While non-employed men who recently left jobs play slightly more video games, on average, than employed men, they play significantly less than non-employed men who did not recently transition out of employment.

As [Abraham and Kearney \(2018\)](#) note, the connection between living with parents and shifting time use could be a crucial one. Moreover, as shown in [Figure 2](#), the increase in living with parents since 2000 is both common to men and women and marks a significant acceleration in the pre-2000 trend, reversing huge post-World War II decreases in intergenerational living that coincided with the Great Compression ([Goldin and Margo, 1992](#)). The causes and effects of such dramatic shifts in the lives of young adults warrant additional examination.

As illustrated in [Figures 3 and 4](#), men without college degrees in this age range have seen the larger reductions in employment and labor force participation than college graduate men and all women. Along these lines, [Abraham and Kearney \(2018\)](#) find the strongest evidence for explanations of falling levels of employment that are based in changes in labor demand rather than labor supply. The lack of support for the hypothesis that young adult men have reduced their labor supply due to video games bolsters the case for exploring changes in labor demand for these men in recent decades.

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