Technology in Society 60 (2020) 101213

Contents lists available at ScienceDirect

Technology in Society

journal homepage: http://www.elsevier.com/locate/techsoc

A comparison of a public and private university of the effects of low-cost streaming services and income on movie piracy

Johnny Nhan [a,*], Kendra Bowen [a], Aaron Bartula [b]

[a] Texas Christian University, USA
[b] University of North Texas at Dallas, USA

ARTICLE INFO

Keywords:
Movie piracy
Netflix
Income
Piracy

ABSTRACT

This paper examines factors that affect online movie piracy activity. Specifically, the authors examine the impact of inexpensive legal streaming services, such as Netflix, and household family income as well as gender. A sample of college students at a private university, representing a more affluent population, are compared with students from a public institution. Initial findings indicate differences between the two samples. Lastly, although digital piracy is reduced among the samples, it does still exist suggesting a much more complex issue than previously thought.

1. Introduction

2016 was a banner year for Hollywood as box office sales reached a record $11.37 billion, up from the previous $11.14 billion record set in 2015 [1]. Despite its success, the movie industry was waging an invisible war against what it considered an existential threat: online piracy. One study estimates that if piracy were eliminated during theatrical runs of movies, industry revenues would see a 15% increase, equating to over $1 billion in additional revenue [2]. Another study conducted by Herz and Kiljański [3] sampled over 28,000 residents from six counties in Europe and found that unpaid movie viewings diminished movie sales at this time by 4.4%, and that most of the lost sales were due to a relatively small group of consumers.

The industry appears to be losing the fight with record demand for content coupled with increasingly sophisticated software across a multitude of devices. For instance, in 2017, a season finale of the HBO series Game of Thrones drew a record 16.1 million legal viewers. However, that number paled in comparison to the over 143 million illegal downloads or streams, resulting in the series pirated over a *billion* times [4]. Moreover, digital piracy has evolved from file downloads to a very lucrative video streaming business, where unauthorized sites that host and stream pirated movies make hundreds of millions in ad revenue [5].

The growth of digital piracy in the past decade can be considered a continuum of software and digital music piracy coupled with changes in consumer consumption. Prior to the proliferation of movie piracy, music studios fought for its survival as consumers shifted from optical media towards digital distribution. Without a legal digital distribution business model and service, music consumers flocked to peer-to-peer (P2P) services in the late 1990s, prompting music labels, specifically its trade group, the Recording Industry Association of America (RIAA), to pursue controversial aggressive legal action against services, such as Napster, as well as litigation against thousands of individual users, particularly college students (See Ref. [6]).

Paralleling music piracy, movie piracy may be attributed to the delay by Hollywood to adapt to shifts in consumer consumption from physical to digital media coupled with the availability of unauthorized P2P sources. Netflix, for example, which began as a DVD mail distribution service, did not have its subscription digital streaming service until 2007. Today, Netflix and other legal streaming services have established a clear business model and technological infrastructure that caters perfectly to socially connected Millennials, whose binge-watching habits have been labeled "The Netflix effect" [7]. For example, as of March 2018, Netflix now has 117 million members [8]. More importantly, these subscriptions to these authorized streaming services are of high-quality, reliable, and relatively inexpensive. As more people "cut the cord" of traditional cable television and transition to digital streaming as the primary source of media consumption, several questions emerge: How does the existence of relatively low-cost legal streaming services, such as Netflix, Amazon Prime Video, and Hulu, impact unauthorized streaming services?

This study examines the current attitudes and activities of illegal

* Corresponding author. Department of Criminal Justice, Texas Christian University, 2855 Main Dr., Fort Worth, TX 76129, USA.
E-mail address: j.nhan@tcu.edu (J. Nhan).

https://doi.org/10.1016/j.techsoc.2019.101213
Received 20 December 2018; Received in revised form 10 September 2019; Accepted 15 November 2019
Available online 20 November 2019
0160-791X/

sources of movies in a time when relatively inexpensive options are widely available. Furthermore, we consider family wealth and student income by comparing samples of private university students with public university students. The impact of these subscription services is examined to determine the level of and attitudes towards movie piracy using a survey sample of students from a North Texas public university and a private university. Also, this study contextualizes the purchase of legitimate digital streaming subscriptions and movie piracy activity with family income and other variables. As noted above, the financial loss attributed to digital movie piracy is significant and is growing. Thus, comparing relatively high-tuition private college students with those of more affordable public schools may reveal any general socioeconomic factors at play.

2. Review of the literature

2.1. Students and motivations for piracy

Piracy research has primarily focused on college students and computer software. Studies show that college students engage in high levels of computer software piracy. College students are often characterized as having savvy technical skills coupled with a high demand for software but lack the financial means to obtain them legally. Factors that determine whether consumers purchase or pirate software, include price perceptions, product desire, product availability, and perceived risks [9]. Moreover, piracy activity among college students has been attributed to apathetic attitudes towards piracy despite acknowledgement that it is a crime [10–12].

A review of 30 years of literature by Liang and Yan [13] found the "typical" college student who engages in software piracy are males, who were more enthusiastic and less ethically sensitive. However, family income, major of study, and computer experience were shown to be inconclusive. They also found college students typically have high levels of tolerance for software piracy and viewed such activities as being socially and ethically acceptable.

A variety of studies have looked directly at motivations for piracy. Wagner and Sanders [14] discussed the decision-making process that considered ethical factors with awareness, cognition, evaluation, decision, and action. Limayem, Khalifa, and Chin [15] assert that pirating habits and availability dictate software piracy activity (See Ref. [13]). Gunter, Higgins, and Gealt [16] examined 8th and 11th grade students applying Gottfredson and Hirschi's [17] self-control theory with music piracy. They found two factors that attributed to a lifetime of music piracy (being Asian and planning on attending college), with three that reduced the likelihood of piracy activity (being female, living in poverty, and higher levels of self-control). Similarly, Malin and Fowers [18] found self-control to be the strongest predictor of music and movie piracy compared to other statistically significant factors that included association with deviant peers and being male among adolescents.

A study of digital music piracy identified income factors on piracy activity. Bhattacharjee, Gobal, and Sanders [19] found many lower-income individuals tend to pirate music to sample "unknown" songs by artists rather than purchase the entire album. However, the researchers did not find disposable income as a significant factor for with willingness to pay for known songs, citing the high value attributed to these songs and relatively lower cost of music compared to software.

Hinduja [20] examined the impact of high-speed Internet on software piracy. His study of over 400 college students found a significant impact of higher Internet speeds on the frequency of pirating software and possessing more pirated material. Furthermore, the study suggested the only limitation of piracy activity among college students was technology, as piracy activity increased evolutionarily from copying optical disks to broadband Internet. Moreover, Cheng, Sims, and Teegan [21] found business students' high levels of software piracy activities were explained by perceptions that the software was too expensive to afford, coupled with the ease of copying and little chance of getting caught. In comparison, music piracy can be considered the ideal form of piracy with its smaller file sizes and no need for updates for the content creator compared to software [22].

Several economic studies examined larger socioeconomic factors that influence media piracy. Banerjee, Khalid, and Sturm [23] measured a sample of 53 countries found that countries with institutional factors, such as weak regulatory and enforcement structures, had higher rates of software piracy. They cite, for instance, the widespread availability of "compilation CDs" with $10,000 worth of software openly sold for $5 in Hong Kong. Similarly, Karraganis [24] examined media piracy in emerging economies, such as in India, Russia, and South American countries that focuses on developing new cultural and business paradigms for distribution and sales in these markets rather than ineffective strong enforcement in the existing system.

2.2. Legal content distribution networks and piracy

Researchers have found evidence to suggest a direct relationship between the availability of legal digital content distribution networks (CDNs) with unauthorized downloading. Danaher, Dhanasobhon, Smith, and Telang [25] compared illegal downloads before and after the removal of legitimate distributed digital content by NBC via iTunes and Amazon and found an immediate 11.4% increase in the pirated version of that video content, representing a spike of approximately 48,000 daily downloads. This spike represents a utilitarian choice for downloading that is often concentrated among younger downloaders. In a similar study, Danaher, Hersh, Smith, and Teland [26] examined the affects of piracy website blocking in the United Kingdom. They found that the more piracy sites blocked decreased overall piracy and increased usage of legal subscriptions.

Sinclair and Green [27] created a typology of music downloaders found that younger consumers are more likely to pirate but can be distinguished between utilitarian types and high-volume persistent downloaders. They assert that "steadfast pirates" with high levels of piracy activity were found to have high technical skills with low levels of guilt but consumed very little legal digital music. In contrast, they found "ex-downloaders" who curtailed most if not all illegal downloading activities, while sharing low levels of guilt and high technical skills, consumed high levels of legal digital music. They explain the low cost of services, such as Spotify, have hit a utilitarian sweet spot in terms of convenience, price, and quality that warrants migration to legal CDNs.

The overall effects of available legal distribution on piracy activity remain unclear. Welter's [28] limited thesis study tracked the availability of legal content distribution via Netflix with peer-to-peer (p2p) piracy sites *thePirateBay.org* and *Demonoid.me* and found a break in illegal downloads during the Netflix release, but resumed shortly afterwards. Illegal piracy activities for some movies decreased significant after this legal alternative but others remained constant with only a slight discernible downward effect, leading him to question whether piracy activities were based on convenience or impatience [28]. College students and youth are becoming more tech savvy and have demonstrated continued interest in digital piracy.

3. Methods of inquiry

3.1. Participants

This study employs a survey-based research design intended to compare the sentiments of two student populations that represents lower socio-economic status (SES) with higher SES. These universities were chosen to compare the impact of family income and other socio-demographics associated with a public versus private institution that may impact movie piracy activity.

The lower SES sample was drawn from a small public university with approximately 3,000 undergraduates with an in-state tuition of approximately $260 per credit hour, or less than $9,500 annual tuition

in the 2018-19 academic year. Approximately 99% of students enrolled in 2018 resided in the state. According to the university's 2018 fact sheet, student body is comprised of mostly females (roughly 70%) and is a racial minority majority with nearly 80% of the student body identifying as African-American or Hispanic.

In comparison, the private university's 2018–19 undergraduate student population was approximately 9,000 with a tuition was approximately $1,600 per credit hour with an annual full-time tuition of almost $47,000. This does not include room and board fees for freshmen and sophomores who are required to live on campus, which is an additional $12,000, bringing the total cost to nearly $60,000 per academic year. The high cost of attending the private university is generally a barrier for lower income individuals. According to the university's published data, there is a Caucasian student body of nearly 70%, with nearly 60% of the student body being female.

Income for the sample collected reinforces the notion of socioeconomic disparities amongst public and private institutions. The private school had a relatively high family income (ordinal median = $100,000–149,000), which was expected given the costs associated with a private university. Of the group, 62.6% reported an annual household income over $100,000 per year, with 28.8% (N = 47) making over $250,000 annually representing approximately the top 5% income earners in the country. The public group was more in line with the average American family.

Unfortunately, due to the racial demographic make-up of each institution, this study is unable to parse out any potential racial effects between private and public student bodies. Family and personal income questions were inquired to gauge disposable income and the subjects' willingness to download or stream movies from free unauthorized sources.

A total of 395 students were contacted to participate in this study. Of those, 309 volunteered, 169 from the private institution and 140 from the public. This resulted in a response rate of 78.23%. Subjects were selected using a convenience sample of students from several upper level undergraduate criminal justice courses at both universities. 15 Junior/Senior level criminal justice courses were chosen with the assumption that the respondents would have a greater understanding of the degree of criminality of piracy. Subjects ranged in age from 18 to 55 plus years, with the vast majority of students aged 18 to 34 (83.8%). Note that a direct age comparison of the two institutions highlights another significant disparity in student body make-up. The private institution carries a median student range of 18–24 with 83.4% of respondents falling into that category, whereas the public institution has a higher median age range of 25–34 with respondents more equally distributed across age categories (see Table 2).

While the respondents typically majored in criminal justice, some majored in other areas of social science (Sociology, Psychology, Political Science, Economics and Other Social Science) with a dual major or minor in criminal justice. This sample represents the limited scope of the study for convenience of access to criminal justice students. As such, the subjects may not represent the sentiments of the entire student body and comparisons between social science majors and more technical, computer-oriented majors could not be made.

3.2. Procedures and design

Surveys were distributed by the researchers in an email to several criminal justice courses at both universities over the research period. Specifically, subjects were sent an email with a link to the survey that was anonymously administered via *Qualtrics* survey software and

Table 2
Participant Characteristics.

Variable	Private		Public	
	f	%	*f*	%
Age				
<18	2	1.2	1	0.7
18–24	141	83.4	58	41.4
25–34	18	10.7	39	27.9
35–44	7	4.1	20	14.3
45–54	1	0.6	17	12.1
55 and Over	0	0.0	5	3.6
Race				
White	126	74.6	33	23.6
Black/African American	15	8.9	47	33.6
Asian	8	4.7	2	1.4
American Indian or Alaska Native	2	1.2	3	2.1
Other	18	10.1	55	39.3
Gender				
Male	79	46.7	27	19.3
Female	90	53.3	113	80.7
Class				
Freshman	9	5.3	4	2.9
Sophomore	28	16.6	8	5.7
Junior	49	29.0	62	44.3
Senior	82	48.5	66	47.1
Major				
Criminal Justice	61	30.8	91	52.9
Sociology	9	4.5	38	22.1
Psychology	25	12.6	22	12.8
Political Science	21	10.6	2	1.2
Economics	11	5.6	0	0.0
Science/Engineer	15	7.6	0	0.0
Other Social Science	3	1.5	7	4.1
Other	53	26.8	12	7.0

Table 1
Income Related to Piracy.

Variable	Private						Public					
	Download		P2P		Streaming		Download		P2P		Streaming	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Household Income												
Less than $50,000	14	58.3	4	16.7	12	52.2	7	11.5	7	11.5	14	22.6
$50,000–99,999	15	40.5	9	25.0	23	60.5	18	26.9	11	19.3	22	32.8
$100,000–149,999	9	34.6	3	11.5	12	46.2	0	0	0	0	2	11.8
$150,000–249,999	11	37.9	3	10.3	11	37.9	0	0	0	0	0	0
$250,000–499,000	8	40.0	6	30.0	10	50.0	0	0	0	0	0	0
$500,000–999,999	6	31.6	3	15.8	10	52.6	0	0	0	0	0	0
$1,000,000 Plus	4	50.0	2	62.5	2	25.0	0	0	0	0	0	0
Employment												
Employed	16	40.0	6	17.6	20	50.0	21	20.0	15	16.7	29	27.4
Un- employed	53	41.1	24	23.1	61	47.7	6	17.6	4	13.3	10	29.4
Parental Help												
None/little	26	37.2	14	24.6	28	50.0	22	20.4	15	14.0	28	25.9
Moderate	14	42.4	4	2.1	16	48.5	3	16.7	3	15.8	7	36.8
A lot	29	37.2	12	15.6	37	47.4	2	15.4	1	7.7	4	30.8

distributed between July 2016 and January 2018. The two-year time span was chosen to provide more accurate comparisons across student bodies. Additionally, the extended period proved to be prudent as, discussed above, the increase in popularity of streaming services as well as the number of service providers continues to sharply rise. Prior to the distribution of the survey, in-class explanations of the study and statement of voluntary participation were given. The subjects were told that no incentives would be given to participate in the study.

While there are a range of legal websites that movies are downloaded to a computer or computing device for later consumption, there are a fast-growing number of illicit sites. P2P torrent trackers, such as the infamous The Pirate Bay, are popular sources for indexing new and unreleased movies. Finally, unauthorized streaming websites have become a very popular source for current and unreleased movies. These countless sites emerge and are frequently shut down but are relatively easily found by using a simple search engine query, such as Google. Thus, the dependent variables for this study are from questions that focus on unauthorized sources and peer-to-peer and bit torrent sites usage. Subjects were asked the following Likert scale questions: (1) how often do you download movies from unauthorized sources?; (2) how often do you use peer-to-peer sources?; and (3) how often do you stream new movies from unauthorized websites? It should be noted that question three focused just on movies that were currently not released for purchase (i.e., not on purchasable digital download/Blu-Ray/DVD). The five-point response options are Always, Most of the Time, About Half the Time, Sometimes, and Never. As constructed, the questions are determining the amount of illegal activity (i.e., negative behavior), therefore the responses that are reverse coded were an extreme negative response of "Always" = 1 and "Never" = 5. Simply, the lower the score the more negative the behaviors (note these are treated as continuous in some of the modeling).

A combination of variables related to demographics, legal and illegal streaming activities serve as the independent variables for this paper. Respondents were asked basic demographic questions about their gender, class level (Senior, Junior, Sophomore, Freshman), housing status (e.g., campus dorm, off campus apartment), ethnicity and age. It was paramount for this study to discern financial security as a predictive measure of movie piracy. Thus, students were asked questions concerning income and whether students received financial support from parents. The survey asked for the respondent's approximate household income range. To avoid the assumption that using a high family income equated to large amounts of individual disposable income, an additional series of questions considered are individual income, employment status and the degree of financial assistance provided by their parents based on a five-point Likert scale ranging from "None at all" to "A great deal."

The final group of variables used in the predictive modeling assessed which legal sources students use to stream movies. Respondents were asked if they use the following subscription-based movie service providers: Netflix, Amazon Prime, HBO Go/Now, Hulu, on demand Cable/Satellite, YouTube, or Other. Similarly, to avoid the assumption that subjects paid for legal subscription services, subjects were asked if their account(s) were shared or paid for by someone else.

An anonymous quantitative survey was chosen based on its ability to create more objective and reliable findings on a topic that can be considered sensitive in nature. The assumption was made by the researchers that subjects discussing illegal activities without anonymity may produce inaccurate results and possible bias. Subjects drawn represent a good cross section of criminal justice courses and majors as well as non-majors taking those courses. Other studies have employed similar samples. For instance, Jambon and Smetana [10] conducted a survey using a stratified sample of ethnically diverse college students at a private university (N = 188) to measure attitudes towards the morality of illegal music downloads. In concurrence with their study, frequency rates were analyzed. However, this study chose to run Ordinal Logistic Regression rather than ANOVA. This decision was twofold: first the dependent variables of interest are measured on a 5-point Likert scale; secondly, as discussed below most respondents do not illegally download/pirate content which resulted in violations of homogeneity of variance.

4. Results and discussion

Frequency distributions show several trends among college students. As expected, the world's top streaming service with over 130 million subscribers in 2018, Netflix, was the preferred legal streaming platform among both schools. Survey data shows 94% of the private school sample and 85% of the public university sample use Netflix. HBO Go/Now has the largest discrepancy between the universities, with 32% of the private school sample utilizing it compared to just 9% of the public university participants. Other than Netflix and HBO Go/Now, the streaming service usage differs slightly between the schools (See Table 3). The public university participants preferred YouTube (54.3%) as a second choice, followed by on-demand cable (35.7%), and Amazon Prime (26.4%). The private university participants used Amazon Prime (35.5%) as a second choice, followed by YouTube (34.9%) and Hulu (32.5%).

One central question of this study is whether the widespread use of legal streaming services coupled with the low subscription cost affects piracy activity. The first expectation is that a higher income population as indicated in a private university should have lower levels of piracy activity compared with a lower income population because they have more disposable income and can afford the low monthly cost. The second expectation is that having a subscription to one or more legal streaming services eliminates the need for illegal sources. Both these postulates are not as simple and direct as they would seem.

First, usage of legal streaming services does not necessarily mean that users pay for such services. Netflix and other legal streaming services allow account sharing, where one paid account can have multiple simultaneous users. It is often not uncommon for college students to share accounts with friends or use their parents' account. This study found that while approximately 90% of the private university sample use Netflix, only 69.8% personally pay for a subscription. Interestingly, there is a larger ratio of use to pay for the private school group. This is likely because students with greater household incomes have a higher-level of reliance on parental licenses compared to the public university sample who is often in charge of the day-to-day expenditures. Additionally, higher income households may have existing subscriptions to legal streaming services (See Table 1).

Second, legal streaming services and pirating is not mutually exclusive. In other words, students sampled often supplemented legal services with a variety of illegal sources. This is not surprising given that legal streaming services are incomplete, with different services offering different content, requiring users to have multiple subscriptions for a more complete library. Moreover, there is a demand for current films during theatrical runs. Consequently, a good percentage of users from both universities still pirate content.

The most popular form of piracy among students sampled was streaming movies from unauthorized sources (see Table 4). Approximately 48% of the private university and 28% of the public university

Table 3
Streaming Service Usage.

Usage	Private		Public	
	f	%	*f*	%
Netflix	159	94.1	119	85.0
HBO Go/Now	54	32.0	13	9.3
On-demand cable	48	28.4	50	35.7
Amazon Prime	60	35.5	37	26.4
YouTube	59	34.9	76	54.3
Hulu	55	32.5	35	25.0
Other	23	13.6	28	20.0

subjects responded that they have streamed movies from illicit sites. To those who engage in illegal streaming, this is no surprise. Streaming sites are popular, easy to find, and easy to use. For example, sites like PutLocker allow visitors to stream thousands of movies and television shows for free with a user-friendly Netflix-like interface. They do this by using a technical loophole to avoid legal trouble by acting as a search engine that embeds the video from a secondary website without hosting any content on their own servers. These sites generate revenue form ads on their site and stream in the film.

Fewer respondents reported downloading movies from unauthorized sources. Approximately 40% of private university and 25% of public university respondents indicated that they download movies from illegal sources. The lower number is not surprising, given that there is a fundamental difference between streaming a movie in a browser and downloading a movie that is stored on the local computer. Downloading a movie locally can be more legally risky than streaming. For example, in 2014, a United Kingdom court ruled that watching copyrighted content online is not considered infringement since the content is only stored locally temporarily (See NLA vs. Meltwater, [29]).

The smallest group of individuals sampled downloaded from peer-to-peer (P2P) sources. 17% of the private university respondents and 13% of public university respondents reported using P2P. P2P sources are among the most popular and perhaps infamous sources of piracy. In the early 2000s, BitTorrent index The Pirate Bay drew the attention of the Motion Picture Association of American (MPAA), who made multiple attempts to shut down the site, including raiding and seizing servers in Stockholm, only to have it re-emerge on another host. In 2008, that legal battle entered the world of education when the Higher Education Opportunity Act required campuses to inform students of the illegality of P2P file sharing and that they can be subject to criminal and civil penalties [30]. Consequently, many colleges have either blocked or highly monitor P2P traffic as a matter of policy. While the universities sampled in this study do not block all P2P traffic, both universities publish strict policies with potential disciplinary action and warns of copyright law which may deter P2P activity.

Overall, most respondents indicated that legal streaming services had a strong impact on piracy activity. Over half of the respondents from universities indicated they had stopped piracy activity due to legal streaming services. Approximately 35% of private school respondents indicated they *agreed* or *strongly agreed* when ask if they stopped due to the presence of legal streaming services. In total, over 54% of private school respondents indicated piracy activity was affected by legal streaming services. Similarly, over 38% of public-school respondents *agreed* or *strongly agreed* that they had stopped piracy activity due to legal streaming services. In total, approximately 47% of public-school respondents indicated legal streaming services affected their piracy activity to some degree (See Table 5).

While approximately half of respondents from both universities indicated they had curtailed piracy activity due to legal streaming services, the findings of those who disagreed or strongly disagreed that they had stopped piracy due to these legal services may tell a more interesting story. Only approximately 17% of private school students and less than 10% of public university respondents indicated that they disagreed to some degree that legal streaming services impacted their piracy activity. This shows that only a relatively small percentage of students who pirate movies are committed to piracy activity. Further exploration of these students would be warranted. However, these findings are not shocking, since many prefer illicit sources, which have more content. For instance, a 2017 experimental study that gave participants free legal streaming services that included Netflix, and movies on demand, showed that study participants did not stop using BitTorrent to pirate movies and TV shows due to the demand for movies that are not licensed in those services, such as movies that are still in theatrical release [31]. The study concludes that "pirates are cheapskates," since they were only willing to spend approximately $3.25 per month rather than pay for Netflix [32].

Table 4
Cross tabulation of illicit usage.

Variables	Private		Public	
	f	%	*f*	%
Streaming				
Yes	81	48.2	39	27.9
No	87	51.8	101	72.1
Downloading				
Yes	69	40.8	27	19.4
No	100	59.2	112	80.6
P2P				
Yes	30	17.9	19	13.7
No	138	82.1	120	86.3

Table 5
Impact of Legal Streaming Services.

Stopped due to Streaming	Private		Public	
	f	%	*f*	%
Strongly agree	22	13.0	33	23.6
Agree	38	22.5	21	15.0
Somewhat agree	32	18.9	12	8.6
Neutral	45	26.6	51	36.4
Somewhat disagree	13	7.7	4	2.9
Disagree	10	5.9	4	2.9
Strongly Disagree	7	4.1	5	3.6
Missing	2	1.2	10	7.1

4.1. Gender and piracy

Even when gender is considered, private university students pirated more movies. Our sample found that 52.6% men and 44.4% women of private university students pirated movies (via streaming) compared to the public institution student body of 40.7% men and 24.8% women (see Table 6). While the overall usage of Bit Torrent/P2P is low amongst the sample and the least popular means of piracy, significant gender differences were found for both the public and private institutions which was heavily skewed towards men. 17.9% more male students than female at the private institution and 10.6% more at the public school noted using P2P sources for digital movie piracy.

There are statistically significant gender differences with piracy activity in our sample, with men engaging in piracy activity much more than women. An ordinal logistic regression found significant differences in the levels of piracy, particularly for unauthorized downloading of movies from unauthorized sources and the use of peer-to-peer sources (see Table 7). Results indicate that there are significant differences between males and females when downloading movies from unauthorized sources ($p < .01$), the use of peer-to-peer sources ($p < .01$), and streaming movies from unauthorized sources ($p < .05$). While this gender difference exists, research suggests that it is not conclusive that gender alone is enough to directly determine levels of piracy. Morris, Johnson, and Higgins' [33] study of college students that examined gender and the predictability of willingness to engage in digital piracy found when controlling for other factors, such as association with pirating peers, gender was not significant. To this, we consider the impact of institution type (public and private university) with gender.

4.2. Public vs. private university

Though piracy is limited amongst the sample, we do find significant differences between the public and private university. The results confirm the hypothesis that institution type matters in digital movie piracy. Findings indicate that downloading movies from unauthorized sources and streaming new movies from unauthorized websites are both strongly significant. Specifically, our model suggests the private university students were significantly more likely to pirate movies compared with their public university counterparts (See Table 7).

Table 6
Male versus Female Piracy Activity.

Variable	Private						Public					
	Download		P2P		Streaming		Download		P2P		Streaming	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Gender												
Men	35	44.3	22	27.8	41	52.6	27	100.0	6	22.2	11	40.7
Female	34	37.8	8	9.0	40	44.4	21	18.8	13	11.6	28	24.8

Table 7
Ordinal Regression Model.

Variables	Downloading		P2P		Streaming	
	b	SE	*b*	SE	*b*	SE
Private	−1.960**	.406	−.767	.480	−1.183**	.375
Male	−.182**	.274	−1.013**	.343	−.535*	.252
Freshman	.055	.625	.323	.831	−.566	.543
Sophomore	.113	.410	1.309	.779	.392	.389
Junior	.109	.287	.193	.354	.269	.264
Non-White	−1.200**	.359	−.737	.439	−.449	.341
Age	−.041	.093	−.126	.109	.013	.084

* Significance at $p < .05$, **Significance at $p < .01$.

While seemingly counterintuitive, higher personal and family income is not positively correlated with lower piracy levels. Furthermore, the sample shows that private university students paid for and had access to more legal streaming services and pirated movies significantly more than students at the public school (See Tables 3 and 8). This finding contradicts the expectation that higher income populations have more disposable income to pay for legal services and therefore, would pirate movies less often. This opposite directional effect has been found in previous studies. For instance, Gunter [34] found that individuals who made more money separate from their parents were more likely to pirate software or movies. This counterintuitive measure may suggest other demographic and motivational factors at play for digital piracy, such as gender, race, and grades [16], association with peers [35], and the effects of self-control and rationality on value in decision-making [36].

5. Conclusions

The proliferation of inexpensive legal digital streaming services in the past decade has transformed the landscape of media consumption, especially among Millennials (See Ref. [7]). Most survey respondents indicated that paid streaming services were their primary means of digital media consumption. Based on this study's findings, it is understandable that Netflix has been credited for ushering in the transition from optical media to digital streaming and blamed for bankrupting and destroying once video rental giant, Blockbuster [37].

Digital streaming service usage is not mutually exclusive. Many respondents used a combination of legal streaming services. Netflix was the platform of choice by both institutions, followed by YouTube (44.6%) for the public university respondents and Amazon Prime for the private university students (35.5%). This difference may be the only evidence of the impact income has on the groups, as Amazon Prime requires an annual paid subscription to access content while most YouTube content is free to users.

Table 8
Ordinal regression models: Financial variables.

Variables	Downloading		P2P		Streaming	
	b	SE	*b*	SE	*b*	SE
Household Income	−.019	.036	−.033	.046	−.034	.034
Student Income	.151*	.070	.187*	.091	.208**	.069
PA Great Deal	−.014	.410	.845	.525	−.059	.388
PA Lot	.613	.569	1.080	.736	.144	.500
PA Moderate	.165	.413	.971	.547	−.088	.380
PA Little	−.080	.397	.354	.484	−.405	.372

*PA stands for Parental Assistance; "None at all" is the reference category for Parental Assistance.
* Significance at $p < .05$, **Significance at $p < .01$.

The most surprising finding runs counter to the easy assumption often made of the inverse relationship between income and illicit movie piracy: The need to pirate movies decreases with higher levels of income. The logic is that students who have more disposable income who come from a more affluent family and can attend an expensive private university should easily be able to legally stream or buy movies. Conversely, students who come from a lower SES background would be assumed to have less disposable income and therefore piracy would be a good "free" alternative. However, this study finds that students sampled from the expensive private university pirated significantly more than from the public university, even when considering different factors.

This study examined the impact of income using several different variables: (1) Family income, (2) employment status of the student, and (3) income from parents, all of which were not significant. These variables were considered to differentiate between individual and family income, which may in some cases, be mutually exclusive. For instance, a student from a high-income family who receives little support in the form of disposable income is not affected by family wealth.

It is notable that the vast majority of respondents indicated that they currently "never" download movies from unauthorized websites (59% private, 80% public), obtain movies via P2P sources (82% private, 86% public), or stream movies from unauthorized sources (51% private, 72% public). Many open-ended questions were given to respondents to list their top three reasons why they engaged in movie piracy. Unsurprisingly, the top reason given was cost, with several respondents stating, "It's free." A similar number of respondents cited piracy activity was necessary to supplement content that was unavailable on legal streaming services, such as ones that were not found on the Netflix catalog and movies that were still playing in theaters. A typical response was, "Not released to view elsewhere." Finally, some respondents cited the ease and convenience of piracy. A small number of respondents gave answers that were more principled in nature, with one simply stating, "Because I can," and another stating, "I don't want to support a certain cause involved."

The smaller number of individuals who did not engage in piracy activity cited a combination of practical and principled reasons. The top reasons given were because the activity was considered illegal, followed by several who feared a virus infection proliferated by many of these elicit sites. A small number of individuals cited the fear of or have had some experience in getting caught. When comparing the universities findings: potentially this speaks more to the degree of college readiness as oppose to demographics. In general, the private students come from primary schools that rate and perform high academically. Further, they represent a more traditional student body with few first-generation college students. Taken in combination, it is hypothesized that those students are groomed more towards college and its rigorous expectations; conversely the public institution students have a steeper learning curve once their tenure begins.

The study showed notable gender differences in piracy activity in

both public and private institutions (See Table 7). For instance, the public university sample showed male respondents (22.2%) engaged in far more P2P activities than female respondents (11.6%). Similarly, the private university respondents showed differences with 27.8% of males using P2P sources with only 9% females. This gender gap is consistent with the existing research. Hinduja [38]; among other criminologists, have documented a significant gender gap with software piracy. His study of college undergraduates found significant differences in the frequency and intensity of piracy activity. Higgins [39] explained the gender gap difference using self-control and social learning theories among college students, finding both theories to be statistically significant factors. While this study finds significance for gender, results were not significant for all forms of movie piracy.

Lastly, the data shows that the high usage of legal streaming services as whole has greatly reduced movie piracy. Nearly half of respondents indicated they have to some degree stopped pirating movies due to the availability of inexpensive streaming services compared to only approximately 17% who was relatively not affected. These findings are consistent with Welter's [28] analysis of BitTorrent traffic comparing pre and post Netflix movie availability. He found a drop in the piracy rate for several movies, suggesting piracy may be a "matter of convenience for those who are time-rich but cash-poor" ([28]; p. 24).

6. Limitations and future inquiry

Conducting a survey-based research design resulted in some limitations. Quantitative studies often lack the depth of qualitative inquiry with stronger validity. Survey instruments, while strong on reliability, often lack the depth and breadth of a grounded-theory approach and other forms of qualitative inquiry, which can produce unforeseen variables and context to the issue (See Ref. [40]). Future research considerations may ideally include a mixed methodology approach that encompasses more attitudes towards piracy and integrating criminological theories. Yu [12]; for example, supplemented survey data on attitudes towards piracy by college students with interviews to find mostly positive attitudes towards piracy. This mixed approach may yield more variables on why class and family income do not factor more into the low levels of movie piracy as well as explaining the ubiquity of Netflix as the preferred legal streaming service. Such inquiries may reveal a large sea change in media consumption that is consistent with Millennials' digital lifestyles. Moreover, a longitudinal study may show age and income effects on piracy activity. Additionally, our sample drawn from two schools may not represent the larger population of public and private schools. Lastly, the sample was drawn out of convenience, and did not include many tech-savvy computer science and engineering majors which may not accurately reflect more sophisticated piracy activity. Expanding the sample size significantly with multiple campuses would yield more definitive and generalizable findings. Nevertheless, despite this study was very limited in scope and exploratory in nature, it shows that there is a notable impact of relatively inexpensive legal streaming services on movie piracy.

This research shows that the proliferation of relatively inexpensive streaming services, such as Netflix, as expected, has reduced the overall use of movie piracy among the college students surveyed. However, these services have not eliminated the use of unauthorized sources. Interestingly, we found that at an individual level, factors that were expected to produce differences, such as family income and parental financial support, did not yield statistically significant results. These mixed results show that motivations for piracy is not purely price sensitive and rational. For example, in 2007, British band Radiohead offered their album, "In Rainbows" for free to download on their website. Despite this offer, the album was downloaded over half a million times more on BitTorrent, leading some to argue that "even free hasn't been enough of a draw" [41]. Similarly, an experimental study by De Matos and Smith [42] found that despite giving households a package of streaming video-on-demand services for free, the subjects did not reduce the likelihood of using BitTorrent. Further inquiries into motivations of piracy is warranted. Some studies on digital piracy, focusing on software and music piracy have applied Sykes and Matza's [43] neutralization theory to understand such drives, which may be applied to movie piracy (See Refs. [44–46]). Additionally, the illicit market might be more content driven as legal streaming outlets are still limited in content. Other factors, such as deterrent effects and even the lure and excitement of piracy (See Ref. [47]), should also be considered for future research.

One significant factor that warrants further inquiry is the impact of campus culture on piracy. Understanding the differences in motivations, perhaps by qualitative inquiry, may yield interesting results. It may be the case that students from more affluent families tend to feel more entitled and apply *neutralization techniques* to not perceive themselves as engaging in any harmful criminal activity, identify themselves as a criminal, or conceive any real form of punishment as a deterrent, and therefore commit more piracy (See Ref. [43]). In-depth ethnographic research may be necessary to analyze this subculture.

Ultimately, this writing serves as a limited basis for further research that may develop understandings of piracy that can potentially produce effective regulatory policies. Current policies, ranging from punitive criminal action to litigation, may not deter digital piracy. Interestingly, even rational economics may be insufficient in understanding piracy, as shown by our comparison of income and other factors between universities. Moreover, incentives such as low cost and even free legal streaming services has failed to eliminate piracy, which points to digital piracy being a much more complex issue than previously thought.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.techsoc.2019.101213.

References

[1] B. Alexander, Box Office Hit a Record $11.37B in 2016, Beating 2015's Massive Haul, USA Today, 2017, January 2. Retrieved from, http://www.usatoday.com/story/life/movies/2017/01/02/2016-record-box-office-year-finding-dory-rogue-one/95879192/.
[2] L. Ma, Al.L. Montgomery, M.D. Smith, The Dual Impact of Movie Piracy on Box-Office Revenue: Cannibalization and Promotion, Social Science Research Network, 2016. Retrieved from, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2736946.
[3] B. Herz, K. Kiljański, Movie piracy and displaced sales in Europe: evidence from six countries, Inf. Econ. Policy 43 (2018) 12–22, https://doi.org/10.1016/j.infoecopol.2018.02.001.
[4] T.M. Andrews, 'Game of Thrones' Was Pirated More than a Billion Times – Far More than it Was Watched Legally, 2017, September 8. The Washington Post. Retrieved from, https://www.washingtonpost.com/news/morning-mix/wp/2017/09/08/game-of-thrones-was-pirated-more-than-a-billion-times-far-more-than-it-was-watched-legally/?utm_term=.5e86dd21ad5e.
[5] T. Johnson, Study: Piracy Shifts Away from Downloading to Video Streaming, 2015, February 10. Variety. Retrieved from http://variety.com/2015/biz/news/report-piracy-shifts-away-from-downloading-to-video-streaming-1201430189/.
[6] G. Zilkha, The RIAA's troubling solution to file-sharing, Fordham Intellect. Prop. Media Entertain. Law J. 20 (2) (2009) 667–713.
[7] S. Matrix, The Netflix effect: teens, binge watching, and on-demand digital media trends, Jeun. Young People, Texts, Cult. 6 (1) (2014) 119–138, https://doi.org/10.1353/jeu.2014.0002.
[8] n. a., About Netflix, 2018. Retrieved from, https://media.netflix.com/en/about-netflix.
[9] R.W.D. Veitch, I. Constantiou, To pirate or purchase? A model of individual decisions for digital product acquisition. *Association for Information Systems*, in: Proceedings from the Mediterranean Conference on Information Systems, vol. 54, 2011.
[10] M.M. Jambon, J.G. Smetana, J. Appl. Dev. Psychol. 33 (1) (2012) 31–39.
[11] N.I. Konstantakis, G.E. Palaigeorgiou, P.D. Siozos, I.A. Tsoukalas, What do computer science students think about software piracy? Behav. Inf. Technol. 29 (3) (2010) 277–285.
[12] S. Yu, College students' justification for digital piracy, J. Mix. Methods Res. 6 (4) (2012) 364–378.
[13] Z. Liang, Z. Yan, Software piracy among college students: a comprehensive review of contributing factors, underlying processes, and tackling strategies, J. Educ. Comput. Res. 33 (2) (2005) 115–140.
[14] S.C. Wagner, G.L. Sanders, Considerations in ethical decision-making and software piracy, J. Bus. Ethics 29 (1/2) (2001) 161–167.

[15] M. Limayem, M. Khalifa, W.W. Chin, Factors motivating software piracy: a longitudinal study, in: Proceedings of the 20th International Conference on Information Systems, 1999, pp. 124–131 (Charlotte, NC).
[16] W.D. Gunter, G.E. Higgins, R.E. Gealt, Pirating youth: examining the correlates of digital music piracy among adolescents, Int. J. Cyber Criminol. 4 (1) (2010) 657–671.
[17] M.R. Gottfredson, T. Hirschi, A General Theory of Crime, Stanford University Press, Palo Alto, CA, 1990.
[18] J. Malin, B.J. Fowers, Adolescent self-control and music and movie piracy, Comput. Hum. Behav. 25 (2009) 718–722.
[19] S. Bhattacharjee, R.D. Gopal, G.L. Sanders, Digital music and online sharing: software piracy 2.0? Commun. ACM 46 (7) (2003) 107–111.
[20] S. Hinduja, Correlates of Internet software piracy, J. Contemp. Crim. Justice 17 (4) (2001) 369–382.
[21] H.K. Cheng, R.R. Sims, H. Teegen, To purchase or to pirate software: an empirical study, J. Manag. Inf. Syst. 13 (4) (1997) 49–60.
[22] R.D. Gopal, G.L. Sanders, S. Bhattacharjee, M. Agrawal, S. Wagner, A behavioral model of digital music piracy, J. Organ. Comput. Electron. Commer. 14 (2) (2004) 89–105.
[23] D. Banerjee, A.M. Khalid, J. Sturm, Socio-economic development and software piracy: an empirical assessment, Appl. Econ. 37 (2005) 2091–2097.
[24] J. Karaganis, Rethinking piracy, in: J. Karaganis (Ed.), Media Piracy in Emerging Economies, Social Science Research Council, 2011, pp. 1–74.
[25] B. Danaher, S. Dhanasobhon, M.D. Smith, R. Telang, Converting pirates without cannibalizing purchasers: the impact of digital distribution on physical sales and Internet piracy, Mark. Sci. 29 (6) (2010) 1138–1151.
[26] B. Danaher, J. Hersh, M.D. Smith, R. Telang, The Effect of Piracy Website Blocking on Consumer Behavior, 2019. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2612063.
[27] G. Sinclaire, T. Green, Download or stream? Steal or buy? Developing a typology of today's music consumer, J. Consum. Behav. 15 (15) (2016) 3–14, https://doi.org/10.1002/cb.1526.
[28] B.S. Welter, The Netflix Effect: Product Availability and Piracy in the Film Industry, Unpublished master's thesis, University of Georgia, Athens, GA, 2012. Retrieved from, https://getd.libs.uga.edu/pdfs/welter_brennan_s_201212_ma.pdf.
[29] P. Sherrell, W. Smith, CJEU Decision in Metlwater – the Internet Is Saved, Browsing Does Not Require a License, 2014. Retrieved from, https://www.twobirds.com/en/news/articles/2014/global/cjeu-decision-in-meltwater-the-internet-is-saved-browsing-does-not-require-a-licence.
[30] E. Messmer, P2P Legislation Forcing University IT to Get Tough on Piracy, Network World, 2008, October 23. Retrieved from https://www.networkworld.com/article/2268624/p2p-legislation-forcing-university-it-to-get-tough-on-piracy.html.
[31] M. Godinho de Matos, P. Ferreira, M.D. Smith, The effect of subscription video-on-demand on piracy: evidence from a household-level randomized experiment, Manag. Sci. 64 (12) (2017) 5461–5959, https://doi.org/10.1287/mnsc.2017.2875.
[32] A. Rodriguez, Not Even Free TV Can Get People to Stop Pirating Movies and TV Shows, 2017, December 4. Quartz. Retrieved from, https://qz.com/1145988/study-not-even-free-tv-can-stop-people-from-pirating-movies-and-shows/.
[33] R.G. Morris, M.C. Johnson, G.E. Higgins, The role of gender in predicting the willingness to engage in digital piracy among college students, Crim. Justice Stud. 22 (4) (2009) 393–404, https://doi.org/10.1080/14786010903358117.
[34] W.D. Gunter, Internet scallywags: a comparative analysis of multiple forms and measurements of digital piracy, West. Criminol. Rev. 10 (1) (2009) 15–28.
[35] W.D. Gunter, Piracy on the high speeds: a test of social learning theory on digital piracy among college students, Int. J. Crim. Justice Sci. 3 (1) (2008) 54–68.
[36] G.E. Higgins, Digital piracy, self-control theory, and rational choice: an examination of the role of value, Int. J. Cyber Criminol. 1 (1) (2007) 33–55, https://doi.org/10.5281/zenodo.18277.
[37] M. O'Neill, How Netlfix Bankrupted and Destroyed Blockbuster, Business Insider, 2011, March 1. Retrieved from http://www.businessinsider.com/how-netflix-bankrupted-and-destroyed-blockbuster-infographic-2011-3.
[38] S. Hinduja, Trends and patterns among online software pirates, Ethics Inf. Technol. 5 (2003) 49–61.
[39] G.E. Higgins, Gender differences in software piracy: the mediating roles of self-control theory and social learning theory, J. Econ. Crime Manag. 4 (1) (2006) 1–30.
[40] J. Lofland, D. Snow, L. Anderson, L.H. Lofland, Analyzing Social Settings: A Guide to Qualitative Observation and Analysis, fourth ed., Cengage, Boston, MA, 2005.
[41] A. Greenberg, Free? Steal it Anyway, 2007, October 16. Forbes. Retrieved from, https://www.forbes.com/2007/10/16/radiohead-download-piracy-tech-internet-cx_ag_1016techradiohead.html#2f1ae0c12513.
[42] M.G. De Matos, M.D. Smith, The effect of subscription video-on-demand on piracy: evidence from a household-level randomized experiment, Manag. Sci. (2017), https://doi.org/10.1287/mnsc.2017.2875.
[43] G.M. Sykes, D. Matza, Techniques of neutralization: a theory of delinquency, Am. Sociol. Rev. 22 (6) (1957) 664–670, https://doi.org/10.2307/2089195.
[44] S. Hinduja, Neutralization theory and online software piracy: an empirical analysis, Ethics Inf. 9 (3) (2007) 187–204.
[45] G.E. Higgins, S.E. Wolfe, C.D. Marcum, Music piracy and neutralization: a preliminary trajectory analysis from short-term longitudinal data, Int. J. Cyber Criminol. 2 (2) (2008) 324–336.
[46] R. Moore, E.C. McMullan, Neutralizations and rationalizations of digital piracy: a qualitative analysis of university students, Int. J. Cyber Criminol. 3 (1) (2009) 441–451.
[47] J. Katz, Seductions of Crime, Basic Books, New York, 1988.