

**The tweet smell of celebrity success:
Explaining variation in Twitter adoption among a diverse group of young adults***

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Abstract

What motivates young adults to start using the popular microblogging site Twitter? Can we identify any systematic patterns of adoption or is use of the service randomly distributed among Internet users of this demographic? Drawing on unique longitudinal data surveying 505 diverse young American adults about their Internet uses at two points in time (2009, 2010), this paper looks at what explains the uptake of Twitter during the year when the site saw considerable increase in use. We find that African Americans are more likely to use the service, as are those with higher Internet skills. Results also suggest that interest in celebrity and entertainment news is a significant predictor of Twitter use mediating the effect of race. In contrast, interest in local and national news, international news, and politics shows no relationship to Twitter adoption in this population segment.

Keywords: Twitter, celebrities, adoption, diffusion, race, African Americans, interests, longitudinal, social media, young adults

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Introduction

By the end of 2010, Twitter claimed a user base of more than 175 million (Twitter Inc., 2010c). Despite much enthusiasm about the quick spread of social media, little scholarly investigation has considered who is more or less likely to adopt such services. While the site had grown at an extraordinary rate — Nielsen Online found a year-over-year growth rate of 1,382 percent in unique visitors in February 2009 (McGiboney, 2009) — a report in 2010 from the Edison Research/Arbitron Internet and Multimedia Series indicated that even though 87 percent of Americans ages twelve and older knew about the service, only seven percent actively used it (Webster, 2010). Similar to these findings, a survey by the Pew Internet & American Life Project found that six percent of the adult population had adopted the service by 2010 (Smith and Rainie, 2010). Who are these adopters? Is use of the service randomly distributed or can we identify systematic predictors of site adoption?

With its quick rise in popularity, it is not surprising that Twitter has piqued the interest of the popular media (e.g., Grammaticas, 2010; Miller, 2009) and scholars alike (e.g., Acquisti and Gross, 2006; Kwak et al., 2010). Academic studies conducted on the service describe the topics covered on the site, its uses in various settings, and the network structures, behaviors, and beliefs among its users (e.g., boyd et al., 2010; Golder and Yardi, 2010; Java et al., 2007; Marwick and boyd, 2010; Zhao and Rosson, 2009). However, to date, little research has explored in detail the background characteristics of those who use Twitter as compared to those who do not offering possible explanations for what drives adoption. The goal of this paper is to fill this gap in the literature.

We begin with an overview of Twitter and why it is of interest to scholarly investigation beyond specifics of the site. We briefly review previous literature that analyzes variation in social network site adoption by user background as well as work relevant to Twitter users and content prominent on the service. Next, we describe our unique longitudinal survey data set collected from 505 diverse young adults, all of whom have some college experience, during the year in which the service went mainstream spreading to more than 105 million users by the spring of 2010 (Bosker, 2010), the time of our second wave of data collection. Then, we present basic statistics about the site's popularity among a group of young adults followed by an examination of how users' demographic and socioeconomic background, their technology experiences, and their interest in various topics relate to site adoption. Our findings suggest that factors such as race and ethnicity, Web-use skill, and personal interests are important predictors of Twitter adoption.

What is Twitter and Why Study It?

Twitter is a microblogging platform that allows people to share posts 140 characters in length (Sagolla, 2009). The service invites Internet users to create a username and brief online profile (with room for a name, photograph, location information, a short note, and Web address). The profile displays a user's posts – or 'tweets' – in chronological order with the latest additions appearing at the top of the profile. Users can follow one another's content without reciprocal obligation. The default setting is to make one's content public, however, users have the option of making their profiles private. While the writing above the update box asks, 'What's happening?', users can post content about anything within the site's 140-character limit per post. Programmers and companies unaffiliated with the site have built software to interact with the site's functionality to provide additional features for users including the ability to store and link to photos (e.g., Twitpic) and the capability to receive alerts when certain keywords are used in tweets (e.g., TweetBeep). Those using the service can access its content directly on the Web site (twitter.com) or through third-party applications (e.g., TweetDeck).

As the most popular microblogging platform currently available,¹ many businesses, government agencies, news media outlets, popular public figures, and others have joined the Twitter network. The tool has been used to raise money for charities, propose to significant others, shed light on political issues taking place around the world, break news, share the latest celebrity gossip, declare what people are eating for lunch, complain about companies and products, and rehabilitate business reputations (Miller, 2009; Sagolla, 2009). Educators have begun implementing Twitter in their classrooms (e.g., Faculty Focus, 2010). Government agencies are disseminating important information using the service, such as alerts about food recalls, natural disaster warnings, weather watches, and safety tips (Howard, 2010; Shute, 2009). Businesses have begun providing discounts and contests for their Twitter followers (Dunn, 2010; Israel, 2009). The above are just a few examples of the many ways in which various entities are utilizing Twitter in an attempt to benefit their constituents, fans, and followers. While content analysis (Arceneaux and Schmitz Weiss, 2010) of press coverage about the site from 2006 through 2009 in traditional newspaper clippings, magazine articles and blog posts revealed some tone of skepticism about the service, overwhelmingly most of the media contributions have covered Twitter with a positive emphasis possibly encouraging its continued diffusion and adoption.

Despite all of the above-mentioned enthusiasm and the platform's significant gain in use over a short period of time, there is no evidence to suggest that its use is anywhere near universal. Assuming that everybody uses the system can lead to problematic situations if government agencies, public officials, businesses, celebrities, teachers, and others rely too heavily on this particular method of information dissemination. That is, if popular prominent actors privilege this service over other forms of communication when trying to reach a wide variety of constituents then they may be leaving those behind who are not on the site. If non-users are systematically different from adopters then the bias occurs against certain population groups more than others. For example, in December 2010, the mayor of Newark, New Jersey used Twitter to solicit feedback about where in the city snow was the heaviest and which areas needed plowing (Gregory, 2010). While an innovative use of social media, given the relatively low diffusion of the service to the general population, his messages would have only reached a certain segment of his constituents.

Furthermore, as Twitter is a site filled with vast amounts of information, researchers have begun to use material posted on the service by users to research public opinion (e.g., Bollen, Mao and Zeng, 2011). However, findings from such investigations are not necessarily generalizable beyond Twitter. What biases may be inherent in the samples collected through the site? Whose voices may be systematically excluded from such studies and who may be missing out on the information, assistance, and opportunities provided through this tool by agencies, businesses, politicians, health officials, and others? What factors may explain why an Internet user has or has not adopted Twitter? The focus of this paper is to answer the aforementioned questions to determine if there are any categorical differences between users and non-users of this service among a group of young adults.

User Attributes and Social Network Site Uses

Facebook, MySpace and User Background

Past research has demonstrated that social network site usage is not randomly distributed among Internet users, and that one's demographic background and socioeconomic status can play a role in specific social network site (SNS) adoption. For example, Hargittai's (2007) research on a group similar to the one studied here found that White and Asian American students were more likely to use Facebook in comparison to Hispanic students who reported less use of Facebook and more use of MySpace. Overall, women were more likely to use MySpace, however, there was little gender difference in the use of Facebook, Xanga, and Friendster. Based on a survey exploring the

online activities of teens and young adults, Watkins (2009) also found that more Whites than Latinos reported Facebook as their most frequented SNS; the latter group was more likely to use MySpace most often. Qualitative research findings by boyd (in press) on teenagers during 2004-2009 echo a similar racial/ethnic as well as socioeconomic differentiation between MySpace and Facebook adoption. Since user background has been shown to play an important role in who adopts SNSs, and Twitter is considered a type of such site, it is worth considering whether such factors also influence its adoption.

Twitter and User Background

There have been several descriptive studies that explore Twitter and its relation to user characteristics. Based on a nationally representative telephone survey, Webster (2010) identified a strong increase in Twitter awareness among Americans age 12 and older rising from five percent in 2008 to 87 percent by 2010. While the survey shows awareness and usage on the rise, only seven percent of the population reported using the service with just a third of that group, or 2.3 percent of the population, using it at least once a day. Among those using Twitter at least once a month, African Americans were overrepresented as compared to their percentage of the general population. In comparison to the population as a whole, the average monthly Twitter user spent more time on the Internet, was more educated, and was more likely to own handheld devices. Smith and Rainie's (2010) report on Twitter use found that women and young adults were more likely to use the service than men and older adults (Smith and Rainie, 2010). With regard to race and ethnicity, 13 percent of African Americans and 18 percent of Hispanic Americans reported use of the service in comparison to White, non-Hispanic Americans at five percent.

While the reports by Webster (2010) and Smith and Rainie (2010) provide informative descriptions about Twitter users, research has not yet considered the implications of one's background for Twitter adoption in light of other factors beyond one's demographic and socioeconomic status. Our study simultaneously considers how these background variables as well as Internet experiences and topical interests explain people's adoption of the service. We explain the reason for the inclusion of the latter factor in the next section.

Personal Interests and Twitter Topics

While no study to date has looked at the role that a user's self-proclaimed topical interests play in predicting Twitter use, past research demonstrates that certain themes are more common than others on Twitter. In order to identify the most popular subjects discussed among users, Cheong (2009) analyzed Twitter's publically available list of 'trending topics' (i.e., the topics receiving an upsurge of tweets) (Twitter Inc., 2010a) for November 2009. While it is unknown how representative these data are of all trending topics, the results for this time period indicate that the majority of themes were associated with entertainment (27 percent), sports (20 percent), Internet memes (12 percent) (i.e., a cultural concept spread virally via the Internet (Shifman and Thelwall, 2009), and technology news (12 percent). In another study, Kim and colleagues (2010) analyzed the themes of more than nine hundred thousand Twitter lists, a feature that allows users to categorize other users and their tweets into groups (Twitter Inc., 2010b). They found that the top 20 list titles included the following: 'news', 'music', 'celeb', 'sports', 'celebrities', 'tech', 'media', 'entertainment', and 'politics' (in that order of popularity).

While the above inventory suggests popular topical interests on Twitter, some topics that may be of interest to many users could have been excluded from the study given that not all lists are publically available for data capture and only some users compile lists. Additionally, it may be that more active Twitter users are more likely to compile lists and thus the topics represented on them may reflect the interests of only the most engaged users rather than the Twitter user population as a whole. Further, because the project is by definition only looking at the interest of Twitter users through their actions on the service, it is impossible to know how the interests of Internet users in general compare to those of Twitter users in particular. Nonetheless, such studies do offer some helpful information on what topics are prominent at least with some users of the service.

Research related to popular Twitter users has also illustrated that some of the most followed accounts on the site include people and organizations related to some of the aforementioned themes of entertainment, sports, politics, and media. A look at the most popular Twitter accounts for 2009 (Marwick, 2010) revealed that the top 20 most followed users included famous actors like Ashton Kutcher, TV hosts such as Oprah Winfrey, politicians like Al Gore, athletes including Shaquille O'Neal, musicians like Britney Spears, and news organizations such as CNN. In another study, Kwak and colleagues (2010) crawled more than 40 million user profiles in 2009 identifying only 40 accounts that had more than a million followers, all of which were either celebrities or media outlets.

While research on users and their chosen tweet topics demonstrates common themes, no study has looked at how interest in these topics may influence adoption of the service in the first place. This type of information may provide insight into why people join the service. For example, if someone is broadly interested in celebrity news and there is a substantial number of users connected to the entertainment industry and chatter on Twitter about entertainment-related topics is prevalent, such a person may be more likely to adopt the service. In the following section we introduce the longitudinal data set we use to analyze how people's topical interests along with their demographic and socioeconomic background as well as Internet experiences relate to Twitter adoption.

Data and Methods

We draw on unique longitudinal survey data about a diverse group of young adults' Internet uses to answer the above questions. This demographic has the highest rates of digital media use and, in particular, of social network sites (Lenhart et al., 2010: 17) constituting a helpful population when it comes to exploring the nuances of differentiated user practices. We collected representative data about the first-year cohort at the University of Illinois, Chicago (UIC) in Spring 2009 and then followed up with the same respondents a year later in Spring 2010. (The authors of this piece have never been affiliated with this school beyond the scope of this study. This campus was chosen due to the diverse composition of its student body.) The first-wave of data collection occurred in collaboration with the First-Year Writing Program, which oversees the instruction of a required course at the university. Working with this program was advantageous to the project, because it prevented biasing against students who may be less likely to take a particular course.

In 2009, students took a paper-pencil survey in class with detailed questions about their Internet uses including their familiarity and experiences with Twitter. Administering the survey on paper rather than online is important for a study whose central focus is differentiated Internet uses, because relying on online responses would bias the sample toward people who are more likely to spend time on the Web, have more private access to the Internet, and who feel more comfortable filling out online forms. For similar reasons, we avoided online surveying in 2010 as well. Our second set of data was collected through follow-up surveys in postal mail to all respondents who had consented to being contacted again the previous year (the majority had done so at over 98 percent).

Our initial data set in 2009 included the responses of 1115 first-year students.² Of the 92 course sections in the Writing Program, 86 participated in the study for a 93.5 percent participation

rate on the part of sections. Of all the students enrolled in the class, 80.5 percent filled out the questionnaire. For 2010, we have responses from 505 of the initial participants for a 45.3 percent response rate. By 2010, ten percent of the initial sample was no longer enrolled at UIC, rather they had transferred to other schools with a few having left college altogether.³

In the first wave of the study, respondents did not receive any incentives. In the second wave, they were offered a \$20 gift certificate and were entered into a drawing for one of five iPods.⁴ The data set we draw on here includes information on the 505 young adults for whom we have data for both years.

Sample descriptives

Table 1 presents descriptive statistics about demographics for the 2010 sample. More women (64.2 percent) participated in the study than men. The majority (99.6 percent) of respondents were 19-20 during the second wave of data collection. Given the lack of variation on this measure, we exclude it from the analyses. There is considerable racial and ethnic diversity in the sample. Following U.S. Census conventions (U.S. Census Bureau, 2000), we first asked respondents to indicate if they were of Hispanic or Latino origin and 22 percent indicated being so. Next, we asked students to indicate their race based on the following categories: (a) White/Anglo/Caucasian/Middle Eastern; (b) Black/African American; (c) Asian; (d) American Indian or Alaskan Native; (e) Other. Most responses in the 'Other' category indicated Hispanic origin and were coded accordingly. Close to a quarter (24.6 percent) of respondents are Asian/Asian American, 8.5 percent are African American and 42.8 percent are White. Due to the small number of Native Americans in the sample (1.2 percent), these students were excluded from the analyses looking at race and ethnicity.

We used parental education as a proxy for socioeconomic status. In the 2009 survey, respondents were asked to report the education level of both their mother and their father from the following categories: (a) less than high school degree; (b) high school degree; (c) some college; (d) college degree (for example: B.A., B.S., B.S.E); (e) advanced graduate (for example: master's, professional, Ph.D., M.D., Ed.D.). We aggregated this information by considering the highest level of education that either parent of a student has. That is, if a student has a father with a high school education and a mother with a college degree then we recoded the parental education variable for this respondent as 'college degree'. Table 1 shows that there is considerable diversity regarding parental educational background. Close to a quarter (24.1 percent) of students come from families in

which neither parent has more than a high school degree, a similar proportion (24.7 percent) have parents with no more than some college experience, about a third (32.2 percent) have at least one parent with a college degree and just below a fifth (18.3 percent) have a parent with a graduate degree.

Digital media experiences

The amount of Internet experience a user has may contribute to adoption of services so we include information about several such measures in our analyses. We have data on veteran status, autonomy of use, frequency of Web use, and Web-use skill. We also include data on use of one's mobile device for text-messaging and accessing the Web (two cell phone functions related to Twitter use). Table 2 reports the means and standard deviations for these measures for both 2009 and 2010. At the time of the first wave of data collection, students had been online close to six years (5.7) on average. The mean number of locations at which students could access the Internet (from among 10 listed on the survey) was 6.4 in 2009 and slightly higher at 6.7 in 2010. We calculated frequency of use by asking respondents how much time they spend on the Web (excluding time spent on email, chat and voice services) on an average weekday and an average Saturday or Sunday. We then calculated a weekly Web-use figure from these measures. In 2009, the average number of hours spent online weekly was 17.4 increasing to 19.7 by 2010.

In addition to experiences with the Internet, we also have measures of Web-use skill. Using an established instrument (Correa, 2010; Hargittai, 2005; Hargittai and Hsieh, in press), we asked respondents to rate their level of understanding of 27 Internet-related terms on a five-point scale. We average the responses to these items to obtain the skill index variable (Cronbach's $\alpha=0.94$ in 2009, $\alpha=0.93$ in 2010). The average skill of respondents is 3.2 in both years having increased only at the hundredth decimal-point level between the two years (a change from 3.18 to 3.23).

Finally, to measure use of a mobile device for texting or accessing the Web, we draw on a survey question that inquired about the frequency with which respondents use various functionalities of their cell phones. We created a dummy variable for those participants who reported using their cell phone daily for text messaging, which close to 85 percent of the sample reported in 2009 and 90.5 percent in 2010. Accessing the Web on one's mobile device is considerably less common among participants, therefore this dummy variable stands for using one's cell phone to go online with any amount of frequency (never versus ever). In 2009, 33.9 percent did so, by 2010, this figure increased to 48.9 percent.

While everybody in the sample is an Internet user and most own a cell phone that they use daily, at a more nuanced level, respondents' digital media experiences vary considerably (note the standard deviation figures in Table 2). With respect to core technology experiences, we can call this the 'Net Generation' (Tapscott, 1998), but when it comes to details of their experiences with digital technologies, they vary quite a bit.

Topical interests

The survey included the following question – not in close proximity of the question inquiring about Twitter use – to measure respondents' interests in various content matters: 'We would like to find out how interested you are in the following topics. This question is not restricted to your Internet uses. Generally speaking, are you very interested, fairly interested, not very interested or not at all interested in the following?' (underlining in the original). Themes included 'local/national news', 'international news', 'politics', 'entertainment, celebrity news', 'sports', 'technology, latest gadgets', 'making arts and crafts', 'career advice, job search' and various other topics. We consider how interest in topics identified by the literature as prominent on the site relates to Twitter adoption. Each variable is a continuous measure with values ranging from 1-4.

Measuring Twitter use

On both surveys, respondents were asked to indicate whether they had ever heard of Twitter followed by a question about whether they use it. The answer options for the latter were: (a) 'no, have never used it'; (b) 'tried it once, but have not used it since'; (c) 'yes, have used it in the past, but do not use it nowadays'; (d) 'yes, currently use it sometimes'; (e) 'yes, currently use it often'. From these responses, we created a binary variable for 'Twitter user' that has a value of 1 if the person reported currently using the service either sometimes or often and has a value of zero otherwise.

Analyses

We present bivariate statistics to highlight the relationship of user attributes with use of the service. Then, we turn to the results of logistic regression analyses to identify the relative effect of user background, prior Internet experiences and prior topical interests on use of Twitter. While cross-sectional data would not allow us to comment on whether a factor influences Twitter adoption, longitudinal data allow us to make such claims. Since Twitter use itself may result in more time spent online or text messaging, it would be problematic to use concurrent measures of these factors as predictors of Twitter use. For example, if we were to find that a certain type of topical

interest in 2010 is related to Twitter use in that same year, the explanation may be that using Twitter increased a person's level of interest in a certain topic. However, by relying on data from a prior period, we can identify causal relationships. Accordingly, we rely on data from 2009 for the independent variables to predict Twitter use in 2010.

Results

Prevalence of Twitter Use

Table 3 presents the detailed breakdown of responses to the question about Twitter awareness and use for both years identifying some changes from 2009 to 2010. Whereas in 2009, over a third (37.6 percent) of respondents had never heard of the site, by 2010 this figure had dropped to just 2.2 percent. This rise in awareness was coupled with an increase in use from a mere 3.6 percent in 2009 to 17.8 percent by 2010. While this increase is considerable, it is important to note that it is still only a minority of the sample that reports using Twitter. Even among a group of wired young adults, less than a fifth are users of the service despite much popular hype. The fact that this figure is higher than usage figures reported for nationally-representative samples (Smith and Rainie, 2010; Webster, 2010) is not surprising since our respondents represent younger users who are more likely to adopt such sites (Smith and Rainie report 14 percent for those ages 18-29, [2010: 3]).

The Relationship of Twitter Use and User Attributes

Before turning to the results of the regression analyses, we look at bivariate statistics regarding the relationship of Twitter use with students' demographic and socioeconomic background, their digital media experiences, and their topical interests.

User background. Table 4 presents the proportion of Twitter users by gender, race and ethnicity, and parental education. There is some gender difference with 13.8 percent of men reporting use of the service sometimes or often compared to a fifth (20.1 percent) of women. We find considerable differences among members of various racial and ethnic groups. African Americans are much more likely than others to report Twitter use with over a third of them (37.2 percent) claiming to do so compared to just over a fifth of Whites (20.8 percent), 13.7 percent of Asians/Asian Americans and just a tenth (10.1 percent) of Hispanics. Some variation also exists based on parental education, our proxy for socioeconomic status. Students whose parents do not

have a high school degree are considerably less likely to use Twitter at five percent than those from more educated parental backgrounds.

Digital media experiences. Table 5 compares the digital media experiences of Twitter users and non-users. Although the value is higher for all measures among Twitter users, most of the differences are relatively small. For example, while the average non-user had been online for 5.7 years by 2009, the average Twitter user had 5.8 years of experience using the Internet by then. The variation is a bit larger for autonomy of use (6.3 average access locations as compared to 6.9) and Twitter users report higher-level skills with an average score of 3.4 in contrast to 3.1 for non-users.

Topical interests. The first two columns in Table 6 describe the mean and standard deviation of topical interests in 2009 (irrespective of Twitter use) among respondents in order of overall interest level while the latter two columns show the interest level by Twitter user status in 2010. Figures show that for some topics, there is a statistically significant difference between users and non-users, namely, entertainment and celebrity news, career advice and job search, sports as well as making arts and crafts seem to garner higher interest levels among Twitter users. Because the interest data are from a year prior to our measure of Twitter use, exposure to related content through Twitter cannot explain these relationships.

Explaining Differentiated Twitter Adoption

Table 7 presents the results of the logistic regression models that examine how demographic characteristics, digital media experiences from a year earlier and prior topical interests predict Twitter use in 2010. In Model 1, we only include information about people's gender, race and ethnicity as well as parental education (the omitted categories are male, White and graduate degree for parental education). The only statistically significant relationship is between being African American and using Twitter. Members of that group are significantly more likely to use Twitter than Whites. Next, we include variables about digital media uses from the prior year. From the resulting Model 2, we continue to see higher likelihood of Twitter use among African Americans. Additionally, gender is now also significant suggesting that the digital media use variables were suppressing that effect. That is, when we compare males and females with similar Internet and cell phone experiences then women are more likely to be Twitter users. Results also suggest that prior Internet skill influences Twitter adoption whereby those with higher skills are more likely to use the service.

The final model, Model 3, includes all of the aforementioned variables with the addition of topical interests. We find that certain topical interests from 2009 seem to be driving use of Twitter in 2010. In particular, those interested in entertainment and celebrity news are much more likely to be users of the site as are those interested in making arts and crafts. Those interested in science are less likely to be users of Twitter. Worth highlighting is that an interest in politics, local/national news, international news or technology shows no relationship with Twitter use among this group of young adults.

Notable is that in Model 3, African Americans no longer exhibit a higher likelihood of using Twitter than Whites. That is, if we compare an African American respondent with a White respondent both of whom exhibit the same level of interest in entertainment and celebrity news while holding other factors in the model constant then there will be no statistically significant difference in their likelihood of adopting Twitter. The relationship of site adoption with being African American seems to be due to the fact that members of this group are more likely to be interested in entertainment and celebrity news than Whites. Asian Americans, on the other hand, now show a lower likelihood of using the service. Additionally, those with parents who do not have a high school degree are considerably less likely to use Twitter than those who have at least one parent with a graduate degree. Regarding the relationship of skill to site adoption, Internet know-how continues to be statistically significant whereby those more savvy about the Web in 2009 are more likely to use Twitter by 2010 even when controlling for several other factors.

Directions for Future Research

Although our data have allowed for the analysis of differences between users and non-users of Twitter addressing questions that previous literature has overlooked, future scholarship can contribute additional insights by exploring related areas that our data are unable to address. While we were able to offer several explanatory factors for Twitter adoption, other characteristics beyond one's background, Web-use skill, and topical interests may also play a role in the process such as one's perception of the site. Furthermore, it may be especially revealing to gather information about the Twitter experiences of people in one's social network (i.e., friends, family, and professional contacts) as these may also influence site adoption.

While our work showcases that people with certain interests are more likely to use Twitter, our data do not provide insight on whether these users are utilizing Twitter to gain information on related topics. Subsequent work can build off of these results by investigating how one's interests

impact actual use of the service. Moreover, while we have some basic measures of Twitter use, future work should collect more nuanced information about how people use the service (e.g., frequency of postings, types of updates, types of accounts people tend to follow, ratio of followers and those followed).

While our study sheds light on the practices of a diverse young adult population sharing some college experiences, it is important for future work to investigate service adoption on a more nationally-representative sample and especially one with data on people from different age segments given that topical interests may vary by life stage. Unfortunately, we know of no existing longitudinal data on a national sample (based in the US or any other country) with enough detail about people's Internet skills and topical interests (factors that we identified as important predictors of adoption) coupled with their Twitter experiences to make this possible and thus such efforts would require new data collection.

Discussion and Conclusion

While much press coverage has focused on the recently-popularized site Twitter (Arceneaux and Schmitz Weiss, 2010) and scholarly studies have addressed a variety of areas related to the site's users and their networks and behaviors (e.g., Marwick and boyd, 2010; Wohn and Na, 2011), little research has looked at who is adopting Twitter in the first place and why. If certain population segments are systematically underrepresented on the site then the information distributed on the service is biasing against such people more than others. Given that the service is gaining increasing popularity with government agencies, public officials, businesses, and educators to disseminate information, it is crucial to understand who may or may not be receiving the information presented through this tool.

Using unique longitudinal data, the goal of this paper has been to examine what factors contribute to Twitter adoption. Similar to past studies on sites like Facebook and MySpace (boyd, in press; Hargittai, 2007; Hargittai, in press; Watkins, 2009), our results suggest that race and ethnicity contribute to service adoption. African American students in the sample were much more likely than any other group to use the service. Unlike other work, however, we are able to provide an explanation for what may be driving this variation. Once we take into consideration respondents' interests in various topics, the association with race goes away suggesting that racial and ethnic differences in topical interests are one significant source driving the differential rates of Twitter adoption.

In particular, interest in entertainment and celebrity news is an especially strong predictor of site adoption among this particular group of young adults even when controlling for user background characteristics and digital media experiences. This interest aligns well with topics that research has identified as popular themes on Twitter (e.g., Cheong, 2009; Kwak et al., 2010). Given the pervasiveness of celebrities on the site, as Marwick and boyd (in press) note, people with related interests may be especially likely to start using the service due to the ‘perception of direct access to a famous person’ (Marwick and boyd, in press: 6).

Interestingly, other topics and types of users that scholars have pointed out as prevalent on the site do not show an association with the adoption of Twitter among this group of young adults. For example, given the popularity of news outlets on the service, it is notable that an interest in politics, local/national news, and international news exhibits no relationship with Twitter use for this population segment. Our lack of finding in this regard could be explained by the absence of age variation among study participants. It is possible that among older cohorts such interests are more likely to drive adoption.

Similar to recent descriptive studies of the site (Smith and Rainie, 2010; Webster, 2010), our study finds that while awareness and use of Twitter has risen considerably, even in 2010 less than a fifth of a group of young adults is using it. Even among such a highly-wired group, we still find considerable variation in experiences with digital media in general and Twitter use in particular. Not only has just a small proportion of respondents adopted the service, but a significant predictor of use is online skill. Despite the fact that assumptions of youth digital savvy dominate popular rhetoric (e.g., Henley, 2010; Richtel, 2010), our data along with other recent empirical investigations (Correa, 2010) do not support the presumptions inherent in a whole generation being labeled with terms like ‘digital natives’ (Prensky, 2001) that incorrectly assume universal know-how, comfort with, and usage of all facets of digital media.

Our study is unique in that we were able to compare both the users and non-users of Twitter in order to determine if there are any systematic predictors of Twitter adoption. Our findings do indeed suggest that the service is not universal nor is it randomly distributed among a diverse group of young adults. Certain population segments based on factors related to race and ethnicity, Web-use skill, and topical interests seem to adopt Twitter more than others. These findings indicate that scholarship solely focused on Twitter users needs to be conscious of the systematic ways in which it excludes certain population segments from study. More generally, users of Twitter such as

government agencies, public officials, businesses, and educators should be cautious about relying on this service too heavily to avoid unintentionally excluding from important information a large group of non-users who represent certain population segments more than others.

Applied more broadly, this study echoes lessons learned from previous studies about other SNSs like Facebook and MySpace that found demographic variation in users and non-users and also demonstrated that users tend to differ systematically between sites (Hargittai, 2007, Hargittai, in press, boyd, in press). Unlike prior work, our longitudinal study design and wider range of variables than has been previously available has allowed for an investigation of what may be driving differential adoption by user background. This highlights the importance of gathering more nuanced data about users over time in studies of digital media practices regardless of the specific service under investigation.

Our results underscore the importance of recognizing that popular hype does not equal universal adoption by all user populations. Researchers must stay conscious of who may be excluded from their studies, when focusing solely on users of certain services, as the result of their study's research design (e.g., sampling on users of a service while excluding non-users altogether) may be biasing against certain types of people systematically. As an increasing body of literature is showing, adoption of a site is not a random event and thus conversations and considerations restricted to existing users of certain sites end up ignoring the experiences of non-users altogether whether intentionally or not.

Notes

¹ The Web site Compete.com allows users to compare the popularity of different sites. When inputting various microblogging sites such as Twitter, Tumblr, Identi.ca and Plurk, Twitter comes out far ahead of all of them.

² The questionnaire included an item to verify students' attentiveness to the survey. A small portion of students, 4.5 percent, responded incorrectly to this verification question, suggesting that they were checking off responses randomly instead of replying to the substance of the questions. These students have been excluded from the data and analyses presented here so as to minimize error introduced through such respondents. The 1115 students represent those who answered this verification question correctly.

³ It is due to this aspect of the data that we do not refer to the study sample as college students given that some were no longer enrolled as such in the second wave of data collection.

⁴ The 2010 questionnaire also included an item to verify students' attentiveness to question wording (see note 3 above). We received 15 surveys – or less than three percent of respondents – that had this question marked incorrectly and were thus excluded from the analyses. The 505 surveys represent those who answered the verification question correctly.

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Table 1. Background of study participants in 2009

	Percent	N
Women	64.2	505
Men	35.8	505
Age		
18	65.7	505
19	33.9	505
20-24	0.4	505
Race and Ethnicity		
African American, non-Hispanic	8.5	505
Asian American, non-Hispanic	24.6	505
Hispanic	22.0	501
Native American, non-Hispanic	1.2	505
White, non-Hispanic	42.8	505
Parents' Highest Level of Education		
Less than high school	8.4	503
High school	15.7	503
Some college	24.7	503
College	32.2	503
Graduate degree	18.3	503

Table 2. Digital media use experiences in 2009 and 2010

	In 2009		In 2010	
	Mean	St. Dev.	Mean	St. Dev.
Number of use years	5.7	(2.3)		
Number of locations accessing the Internet	6.4	(2.1)	6.7	(2.2)
Hours spent on the Web weekly	17.4	(10.0)	19.7	(10.6)
Skill index (1-5 scale)	3.2	(0.8)	3.2	(0.8)
Text-messages daily (1=yes)	0.85	(0.36)	0.90	(0.29)
Uses cell phone for Web access (1=yes)	0.34	(0.47)	0.49	(0.50)

Table 3. Use and awareness of Twitter, 2009-2010

	2009	2010
Twitter users	3.6%	17.8%
Frequent Twitter users	1.0%	9.3%
Occasional Twitter users	2.6%	8.5%
Former Twitter users	2.2%	6.0%
Had tried it once, but didn't use it after	10.7%	14.1%
Has never used it	83.5%	62.1%
Has never heard of it	37.6%	2.2%

Table 4. The relationship of user background and Twitter use

	Percent Twitter Use
Gender	
Men	13.8
Women	20.1
Race/Ethnicity	
African American, non-Hispanic	37.2***
Asian American, non-Hispanic	13.7
Hispanic	10.1*
White, non-Hispanic	20.8
Parental education	
Less than high school	4.8*
High school	19.0
Some college	12.9
College	21.0
Graduate degree	24.2

p-values for difference between category mean and mean of all other categories *p<.05, **p<.01, ***p<.001

Table 5. The relationship of technological experiences in 2009 and Twitter use in 2010

	Non-User in 2010	Twitter User in 2010
Number of use years	5.7	5.8
Number of locations accessing the Internet	6.3	6.9
Hours spent on the Web weekly	17.5	18.5
Skill index (1-5 scale)	3.1	3.4
Text-messages daily (1=yes)	0.8	0.9
Uses cell phone for Web access	0.3	0.4

Table 6. The relationship of interest in different topics in 2009 and Twitter use in 2010

	Mean	St. Dev.	Non-User	Twitter User
Local/national news	3.07	0.73	3.05	3.17
International news	2.92	0.83	2.91	2.94
Entertainment, celebrity news	2.80	0.90	2.72***	3.20***
Technology, latest gadgets	2.77	0.95	2.75	2.88
Career advice, job search	2.74	0.95	2.70*	2.94*
Science, research	2.58	0.94	2.62	2.42
Sports	2.52	1.12	2.46**	2.81**
Politics	2.49	0.96	2.46	2.41
Making arts and crafts	2.22	0.96	2.16**	2.49**

*p<.05, **p<.01, ***p<.001

Table 7. Logistic regression predicting Twitter use in 2010 (standard errors in parentheses)

2009 Data	Twitter Use in 2010					
	Model 1		Model 2		Model 3	
Female	0.442	(.27)	0.688*	(.31)	0.447	(.37)
Race and ethnicity (White omitted)						
Hispanic	-0.523	(.40)	-0.381	(.41)	-0.518	(.44)
Black, non-Hispanic	0.783*	(.37)	0.805*	(.39)	0.164	(.45)
Asian, non-Hispanic	-0.461	(.31)	-0.469	(.33)	-0.751*	(.38)
Parental education (Grad degree omitted)						
Some high school	-1.432	(.81)	-1.406	(.83)	-1.846*	(.87)
High school degree	-0.159	(.40)	0.002	(.41)	-0.183	(.45)
Some college	-0.714	(.37)	-0.619)	(.39)	-0.761	(.42)
College degree	-0.138	(.32)	(-0.36)	(.33)	-0.256	(.36)
Digital media experiences						
Years online (logged)			-0.081	(.90)	-0.513	(.96)
Number of access locations			0.937	(1.01)	0.318	(1.04)
Hours of Web/week (logged)			-0.000	(.01)	-0.00	(.01)
Internet skill			0.537**	(.19)	0.624**	(.21)
Texting daily			0.770	(.47)	0.707	(.51)
Uses of cell for Web access			0.062	(.27)	0.054	(.28)
Interests						
Local/national news					-0.121	(.27)
International news					0.128	(.22)
Entertainment, celebrity news					0.570**	(.19)
Technology, latest gadgets					0.061	(.19)
Career advice, job search					0.220	(.15)
Science, research					-0.432*	(.17)
Sports					0.264	(.14)
Politics					-0.004	(.19)
Making arts and crafts					0.360*	(.15)
Constant	-1.412***	(.31)	-6.514	(3.57)	-6.253	(3.77)
N	498		490		485	
Pseudo R ²	0.056		0.088		0.163	

* p<0.05, ** p<0.01, *** p<0.001