

# Explaining differences in access to home computers and the Internet: A comparison of Latino groups to other ethnic and racial groups

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Published online: 24 October 2007  
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**Abstract** A report by the U.S. Department of Commerce notes that Internet use among African-Americans and Latinos is growing at a substantially faster rate than Internet use among whites or Asians suggesting that the so-called “Digital Divide” may be disappearing. Using data from the Computer and Internet Use Supplement to the October 2003 Current Population Survey (CPS), I explore this hypothesis. I find large disparities in home computer and Internet access across major racial and detailed Latino groups that do not appear as though they will disappear soon. I also find that ethnic and racial disparities in home computer and Internet access rates are larger for children than for adults. The results are mixed for other measurable dimensions of the digital divide. Using regression models and special decomposition techniques, I find that differences in income and education explain part, but not all, of the ethnic and racial disparities in home computer and Internet access. Language is also found to be an important determinant of home computer and Internet access even after controlling for education, family income and immigrant status. Spanish-speaking Latinos have strikingly low rates of computer ownership and home Internet access. In contrast, concerns over privacy on the Internet do not appear to contribute substantially to racial disparities in home Internet access.

**Keywords** Latino · Internet · Computers · Digital divide

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This research was funded by the UC Latino Policy Institute, the William T. Grant Foundation and the Community Technology Foundation of California. The views expressed here are those of the author and not necessarily those of the UC Latino Policy Institute, Community Technology Foundation of California or William T. Grant Foundation.

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## 1 Introduction

A report entitled, “A Nation Online: How Americans Are Expanding Their Use of the Internet” by the U.S. Department of Commerce [49] documents the rapid growth in the use of the Internet in the past few years. The report also notes that Internet use among African-Americans and Latinos grew at a substantially faster rate from August 2000 to September 2001 than Internet use among whites or Asians. The differential trends in Internet use across ethnic and racial groups suggest that the so-called “Digital Divide” may be disappearing. In fact, the latest report by the U.S. Department of Commerce [50] entitled, “A Nation Online: Entering the Broadband Age”, does not even discuss racial differences in access to technology.<sup>1</sup> A closer look at the data, however, reveals that we have a long way to go. For example, nearly two thirds of all white, non-Latinos have access to the Internet at home. In contrast, only about 40 percent of African-Americans, Latinos and Native Americans have access to the Internet at home.

The focus on disparities in access to computers and the Internet as the measure of the digital divide has also been criticized lately. Other aspects of the digital divide such as training and content have been identified as emerging concerns (see [38] for example). Inequality in access to technology, however, is an important metric for the digital divide and, as documented below, remains at alarming levels. Although part of the discussion has moved from access to ability, perhaps this shift is premature for some subgroups of the population. The evidence presented below indicates extremely low rates of access to home technology for Latinos, African-Americans and Native Americans. Clearly, disparities in technology skills are important [7, 24, 55, 56], but access, especially at home, remains a major challenge for these groups. Disparities in access to computers and the Internet at home are important because home access most likely represents the highest quality access in terms of availability and autonomy, which may provide the most benefits to the user [7]. Home use also represents by far the most common location of use [49].

This “Digital Divide” may have serious economic consequences for disadvantaged minority groups as information technology skills become increasingly important in the labor market. Another concern is that the Internet is “expected to become a primary medium for communications, commerce, education, and entertainment in the 21st century” [53].<sup>2</sup> Future economic, education and political advancement for these groups may depend on access to computers, the Internet and broadband technology.<sup>3</sup>

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<sup>1</sup>To be sure, estimates of Internet use and broadband access at home by race and Hispanic origin are reported in an appendix table along with other demographic characteristics, but these estimates are not discussed in the text.

<sup>2</sup>The share of employment in information technology industries and occupations and the share of employees using computers and the Internet at work have risen dramatically over the past decade [15]. Technology-related jobs are also expected to continue to grow rapidly over the next decade [52] and online-job search is becoming increasingly popular [50]. Finally, home computers may improve educational outcomes [1, 3, 12, 37] and political engagement [26].

<sup>3</sup>In addition to being important for communications and media [35], access to the Internet may also be increasingly important for consumers as it has lowered the price of many goods and services, has provided extensive information on many products, and has made shopping more convenient (see [2, 4, 23, 34]).

Based on these concerns, a plethora of public and private programs in the United States have been created to close the digital divide. For example, in the federal government alone, the Department of Agriculture, Commerce, Education, Health and Human Services, Housing and Urban Development, Justice and Labor, each have programs addressing the digital inclusion of various groups. One of the largest programs, known as the E-rate program, provides discounts to schools and libraries for the costs of telecommunications services and equipment with the level of discount depending on economic need and rural location (see [16, 32] for more details). Spending on the E-rate program totaled \$12.9 billion from 1998 to 2003 [54].

Using data from the Computer and Internet Use Supplement to the October 2003 Current Population Survey (CPS), I document and explore the underlying causes of ethnic and racial differences in home computer and Internet access. Estimates are provided for all major racial groups and detailed Latino groups identified in the CPS for both adults and children. I also examine disparities in other measurable dimensions of the digital divide, such as alternative locations of Internet use, computer and Internet activities, the number of household computers, the age of computers, and access to high-speed connections at home (e.g. DSL and cable modems). After documenting home access patterns, explanations for differences in access to technology are explored. In particular, I examine whether ethnic and racial differences in family income, education, occupation, and family structure have independent effects on disparities in home computer and Internet access using logit regressions and a decomposition analysis.<sup>4</sup> I also analyze whether low rates of technology access at home among Latino groups are due to language barriers and whether disparities in access to technology are related to ethnic and racial differences in concerns over privacy on the Internet. To date, we know very little about the importance of these potential causes.

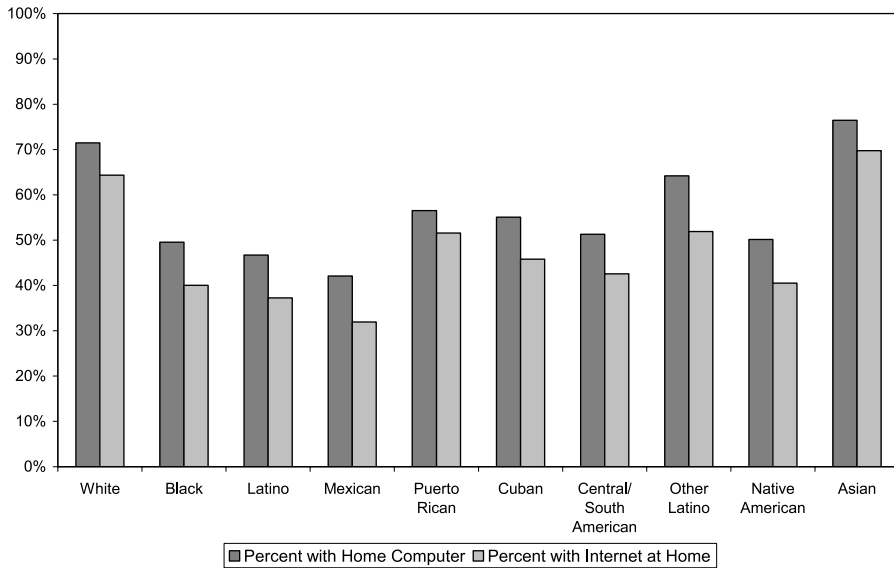
## 2 Ethnic and racial differences in access to home computers and the Internet

Patterns of access to technology at home are estimated using microdata from the Computer and Internet Usage Supplement to the October 2003 Current Population Survey (CPS).<sup>5</sup> The survey, conducted by the U.S. Census Bureau and the Bureau of Labor Statistics, is representative of the entire U.S. population and interviews approximately 50,000 households and 130,000 individuals. It contains a wealth of information on computer and Internet access and use by individuals not found in other government data sources. All of the estimates reported below are at the individual level. Information is gathered for all members of the household from interviewing

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<sup>4</sup>See [11] for an analysis of the causes of low rates of technology use among African-American and Mexican-American working-age adults using earlier data from the 2000 CPS.

<sup>5</sup>The next Computer and Internet Supplement to the CPS is scheduled for fall 2007. Estimates reported below, however, indicate that overall trends in computer ownership and Internet use appear to be flattening out, and estimates from the Pew Internet & American Life Project [31] indicate relatively constant trends in rates of technology use from fall 2003 to spring 2005. For example, 72 percent of adults reported using a computer in Nov. 2003 and 72 percent in Spring 2005. The percent of adults going online increased slightly from 64 percent in Nov. 2003 to 68 percent in Spring 2005.



**Fig. 1** Home computer and Internet access by race/ethnicity among adults (ages 18+), United States current population survey, October 2003

the survey respondent who is chosen to be the most knowledgeable person in the household.<sup>6</sup>

The focus here is on access to technology at home instead of home use or outside the home use. Although home use rates are important, improving access appears to be the most critical aspect of the digital divide. Intra-family differences in preferences for use of home computers and the Internet are interesting, but of less concern when thinking about policy implications. Information on location of use is also available in the CPS, but rates of use outside the home are substantially lower than inside the home as discussed below. Internet access at home is also of more interest because racial disparities in public access to the Internet outside of the workplace, at least among urban residents, should be negligible because most Americans have access to the Internet at a public library [53]. Finally, home access most likely provides more frequent and longer access than other locations, and can be considered the first metric for measuring the digital divide [48]. The increased availability and autonomy of use of the Internet at home is likely to be more beneficial to the user than work, library or community technology use [7].

Estimates from the October 2003 CPS indicate that blacks and Latinos are substantially less likely to have access to a computer at home than are white, non-Latinos.<sup>7</sup> Figure 1 and Table 1 report the fraction of all adults (ages 18 and over) who have access to a computer at home. The reported estimates indicate that 71.5 percent of

<sup>6</sup>CPS survey takers are instructed to select a new household member if the initially chosen respondent does not appear knowledgeable enough of other household members during the interview.

<sup>7</sup>Individuals of black, Asian, or Native American race can be of any Hispanicity. The Latino group only includes individuals reporting white or other race.

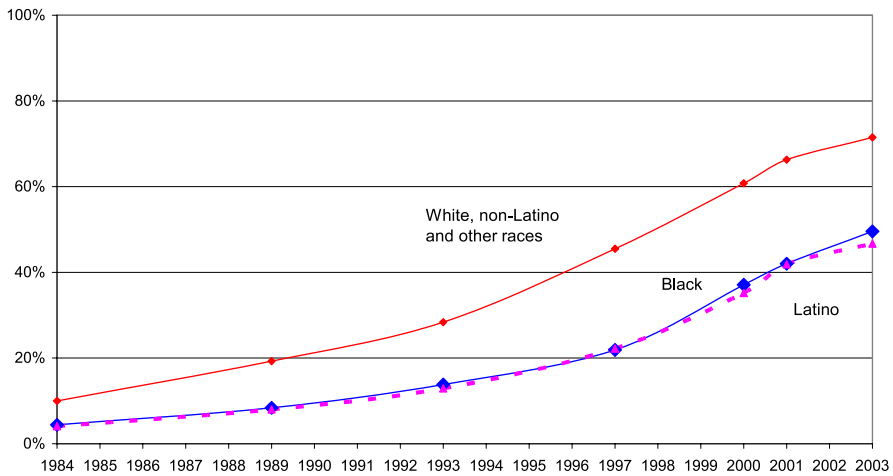
**Table 1** Home computer and Internet access rates by race/ethnicity, United States current population survey, October 2003

	Percent with home computer	Standard error	Percent with Internet at home	Standard error	Population size (000s)	Sample size
<b>Adults (ages 18+)</b>						
White	71.5%	0.161%	64.3%	0.2%	150,465	78,397
Black	49.6%	0.507%	40.0%	0.5%	24,466	9,743
Latino	46.7%	0.514%	37.3%	0.5%	24,697	9,413
Mexican	42.1%	0.655%	31.9%	0.6%	15,591	5,689
Puerto Rican	56.5%	1.580%	51.5%	1.6%	2,328	986
Cuban	55.1%	2.496%	45.8%	2.5%	1,143	398
Central/South American	51.3%	1.197%	42.5%	1.2%	4,553	1,745
Other Latino	64.2%	1.967%	51.9%	2.1%	1,083	595
Native American	50.1%	1.653%	40.5%	1.6%	1,421	916
Asian	76.5%	0.682%	69.7%	0.7%	9,464	3,875
<b>Children (ages 5–17)</b>						
White	87.0%	0.253%	79.1%	0.3%	32,278	17,638
Black	55.1%	0.863%	42.3%	0.9%	8,413	3,325
Latino	56.3%	0.815%	42.5%	0.8%	8,710	3,703
Mexican	51.0%	1.012%	36.8%	1.0%	6,018	2,439
Puerto Rican	65.9%	2.362%	55.2%	2.5%	829	404
Cuban	73.2%	4.325%	62.6%	4.7%	264	106
Central/South American	64.6%	2.056%	51.0%	2.1%	1,233	542
Other Latino	80.3%	2.736%	64.7%	3.3%	366	212
Native American	58.7%	2.598%	43.1%	2.6%	465	360
Asian	84.6%	1.164%	73.3%	1.4%	2,170	965

Note: All estimates are calculated using sample weights provided by the CPS

whites have access to a home computer. In contrast, only 49.6 percent of blacks and 46.7 percent of Latinos have access to a home computer. Asians have the highest rate of home computer access at 76.5 percent, and Native Americans have a relatively low rate of home computer access at 50.1 percent. The home computer rates for all of these groups are statistically different from white, non-Latino rates with  $p$ -values less than 0.001. In fact, all pair-wise comparisons of the rates for major ethnic and racial groups are statistically significant, with the exception of Latinos and Native Americans. These two groups have very similar home computer rates.

The relatively low rates of access to home computers among blacks and Latinos have also existed for at least as long as the government began collecting data on computer use. Figure 2 displays the percent of adults (18 and over) who have access to a home computer by race for selected years from 1984 to 2003. These estimates are from the computer use supplements to the CPS and are reported in [42–46]. I re-

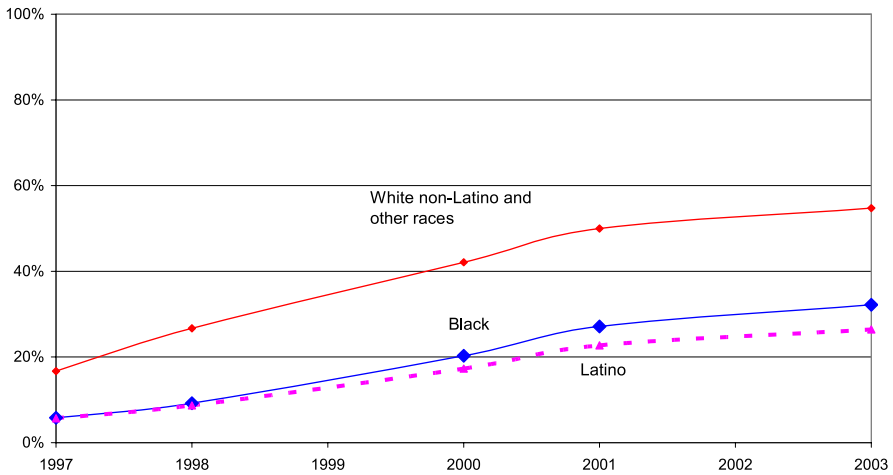


**Fig. 2** Percent of U.S. population (ages 18+) with access to a home computer by race/ethnicity, current population survey, 1984–2003

port estimates from the 2000, 2001 and 2003 microdata using similar sample criteria and racial group definitions. In 1984, only 4.4 percent of blacks and 4.1 percent of Latinos had home computers, whereas 10.0 percent of whites and those of other race had access to home computers. The white, non-Latino category in the Census reports includes all other races, which includes Asians and Native Americans. Over the past two decades, the racial gaps have declined when measured as a ratio, but not in percentage point terms. In either case, the estimates clearly indicate that blacks and Latinos have been and continue to be much less likely to have access to a home computer than whites. These patterns also generally follow historical disparities in other technologies such as telephones [36].

Racial differences in home Internet access are also a cause of concern among policymakers. For example, the U.S. Department of Commerce [48] has argued that economic advancement, educational advancement, and community participation are increasingly dependent on access to the Internet. Similarly, U.S. Department of Commerce [49] notes that access to the Internet is important because of the growth in commercial activity, government services, and health and educational materials online. Figure 1 and Table 1 report the fraction of adults who have Internet access at home. Nearly 65 percent of all white, non-Latinos have home Internet access. In contrast, only 40.0 percent of blacks and 37.3 percent of Latinos have Internet access at home. Asians have the highest rate of home Internet access and Native Americans have low rates. All of these groups have statistically different levels with extremely low  $p$ -values (e.g. less than 0.001).

Racial disparities in home Internet use have existed for several years (estimates are displayed in Fig. 3). Previous Census Bureau reports display estimates of Internet use instead of Internet access because of the lack of information available on Internet access in earlier CPS surveys. In 1997, the fraction of blacks and Latinos ages 18 and over that used the Internet at home was roughly 35 percent of the white rate [46]. Although Internet use has increased dramatically since 1997, racial disparities have



**Fig. 3** Percent of U.S. population (ages 18+) who use the Internet at home by race/ethnicity, current population survey, 1997–2003

changed only slightly. Using the same age group (ages 18 and over) in 2003, I find that the black/white ratio in home Internet use is 0.588 and the Latino/white ratio is 0.483. As a percentage of the white rate, minorities have made some gains, however, it is difficult to compare rates when they are changing rapidly over time. Furthermore, in percentage points the gaps increased from slightly more than 10 percentage points for both groups in 1997 to more than 20 percentage points for blacks and nearly 30 percentage points for Latinos in 2003.

Estimates from March–May 2002 surveys by the Pew Internet & American Life Project indicate similar relative patterns of Internet use by race [21]. Sixty percent of whites use the Internet compared to 45 percent of blacks. These estimated rates of Internet use may be higher than those reported above partly because they measure overall Internet use, not just at home. Estimates reported below from the 2003 CPS indicate that 65.5 percent of whites and 45.3 percent of blacks use the Internet anywhere, which are roughly comparable.

Returning to the issue of home Internet use versus access, I estimate both home computer and Internet use rates and make comparisons to the access rates presented above. Both blacks and Latinos are less likely to use computers and the Internet than whites even conditioning on having home access. Although not reported in the tables, I find that roughly 70 percent of black adults who have access to a home computer make use of that computer and 80 percent of black adults who have access to the Internet at home make use of the Internet at home. Approximately, 60 and 70 percent of Latinos use home computers and the Internet conditional on access, respectively. The hypothesis that these rates of use conditional on access are similar to those for whites is rejected. Eighty percent of whites who have access to a home computer use it and 85 percent with home Internet access use it. Ethnic and racial differences in use conditional on home access may be due to differences in intra-family preferences for technology use, content, demographics (e.g. presence of elderly family members

and size of families), quality of available technology, variation in skills, measurement error and other differences.<sup>8</sup>

## 2.1 Latinos

Latinos are a heterogeneous group. For example, economic and educational outcomes differ greatly across Latino groups [45]. Figure 1 and Table 1 report home computer and Internet access rates for several Latino groups. As expected, home computer and Internet access rates also differ across Latino groups. Mexican-Americans have the lowest rates among all reported Latino groups. Latinos from Central and South America, Puerto Ricans, Cubans and Other Latinos have statistically higher rates than Mexican-Americans. All Latino groups, however, are substantially less likely to have access to home computers or the Internet than are white, non-Latinos. These differences in rates from the white, non-Latinos are all statistically significant with  $p$ -values less than 0.001.

The difference between Mexican-Americans and whites is striking and statistically significant. Only slightly more than 40 percent of Mexican-Americans have access to a home computer, and less than one third has Internet access at home. Clearly, the digital divide is a reality for Mexican-Americans. Their low rates of use are somewhat hidden in the U.S. Department of Commerce reports because only estimates for Latinos as a group are reported. Cubans also have low rates of computer and Internet access at home, which is somewhat surprising as Cubans have high income levels compared to other Latino groups [45].

## 2.2 Children

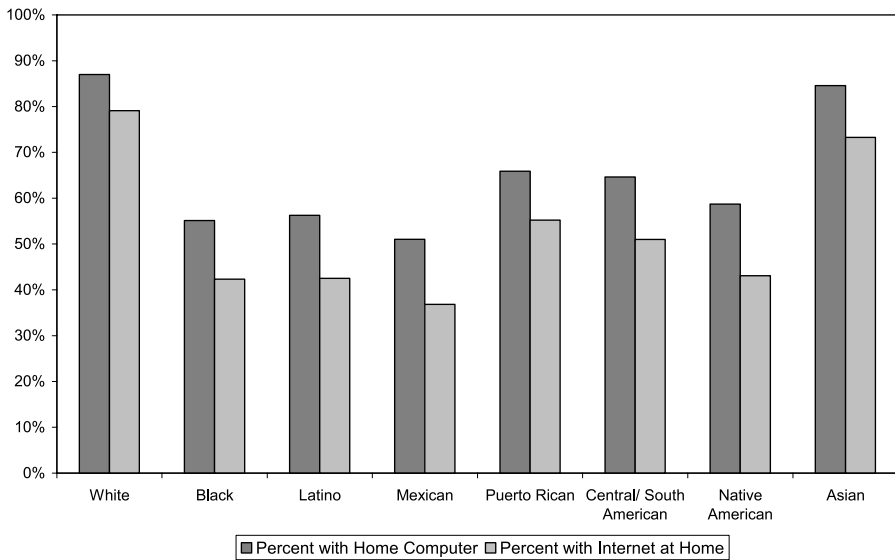
Children are more likely to have access to a home computer than are adults. Table 1 and Fig. 4 report home computer rates by race/ethnicity for children ages 5 to 17.<sup>9</sup> Among white, non-Latino school-age children, 87.0 percent have access to a home computer. In contrast, only 55.1 percent of black children and 56.3 percent of Latino children have access to a computer at home. Among Mexican-American children, roughly 1 out of 2 children have access to a home computer. These ethnic and racial disparities in access among children are extremely large and are statistically significant with most  $p$ -values less than 0.001. In fact, they are larger for children than for adults, which is especially troubling given the potential importance of access to technology on educational and future labor market outcomes.

Children also have a higher likelihood of having Internet access at home than do adults for all reported groups. Nearly 80 percent of white children have Internet access at home, compared to 42.3 and 42.5 percent of black and Latino children, respectively. These racial gaps in Internet use are much larger than those for adults.

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<sup>8</sup>Another concern is that the survey respondent for the household may not have complete information regarding use among other household members potentially leading to measurement problems. The household survey respondent, however, should have accurate knowledge about the presence of a computer and the Internet in the home.

<sup>9</sup>See U.S. Department of Education [51] for estimates of computer use for white, black and Latino children ages 3–24, which also show large racial disparities.



**Fig. 4** Home computer and Internet access by race/ethnicity among children (ages 5–17), United States current population survey, October 2003

Asian children have a high rate of home Internet access, which is not much lower than the white rate. Interestingly, however, Asian adults have higher rates of home technology access than whites. Both of these differences, although relatively small, are statistically significant.

### 2.3 Additional dimensions of the digital divide

Although access to home computers and the Internet represent the first and primary measure of inequality in technology, it may be useful to examine ethnic and racial patterns in other measures of technology access and use. I investigate several of these measures. Some of these measures are included in the Internet Connectedness Index created by Jung, Qui and Kim [18].<sup>10</sup> First, I explore whether ethnic and racial disparities exist in Internet use at other locations. Patterns of technology use across locations may be useful for thinking about policies to address the digital divide, such as free or subsidized home Internet service or expanding community technology centers (see [20] for example). Estimates of home, work and library Internet use are reported in Table 2.<sup>11</sup> Ethnic and racial disparities are large in work Internet use, but are much smaller in library use. In fact, a higher percent of blacks than whites report

<sup>10</sup>The index is created from information on number of years owned a computer, the number of tasks and activities used with the Internet, number of locations of Internet use, self-reported goals of using technology, amount of time using the Internet, self-reported positive and negative benefits of the Internet, and dependency on computers and the Internet from a survey of Los Angeles residents.

<sup>11</sup>The CPS also includes information on Internet use in Internet cafes and coffee shops, but this location represents only slightly more than 1 percent. Community center use was not asked in 2003. In 2001, however, less than 1 percent of adults reported using it there. Although community technology centers are

**Table 2** Locations of Internet use by race/ethnicity, current population survey, October 2003

	Percent using Internet at home	Percent using Internet at work	Percent using Internet at library	Percent using Internet anywhere	Sample size
White	54.7%	30.4%	5.9%	65.5%	78,397
Black	32.2%	18.5%	7.6%	45.3%	9,743
Latino	26.4%	13.8%	4.9%	35.5%	9,413
Mexican	21.8%	11.9%	4.4%	30.8%	5,689
Puerto Rican	40.3%	16.2%	6.4%	49.4%	986
Cuban	35.6%	20.6%	2.0%	42.9%	398
Central/South American	29.3%	14.4%	6.0%	38.1%	1,745
Other Latino	40.7%	25.5%	6.7%	53.8%	595
Native American	30.6%	18.6%	6.2%	46.2%	916
Asian	54.2%	31.8%	8.0%	65.4%	3,875

Notes: (1) The sample consists of adults (ages 18+). (2) All estimates are calculated using sample weights provided by the CPS

using the Internet at a library and the difference is statistically significant with a  $p$ -value much less than 0.001. Latinos overall have a lower rate of library use ( $p$ -value less than 0.001), but there is no statistically significant difference between whites and some Latino groups in library use.

These findings beg the question of whether home use and outside the home use are complements or substitutes. For the entire adult population, estimates from the CPS indicate that Internet use at work and libraries is higher among those who use the Internet at home than those who do not. But, these locations of use are not perfect complements as 12.6 percent of non-home Internet users use the Internet at work and 3.3 use the Internet at the library.<sup>12</sup> These general results hold by race. The main finding from examining patterns of Internet use by location, however, is that large and statistically significant ethnic and racial differences exist in Internet use overall. These patterns follow the patterns displayed above for home computer and Internet access. Blacks, Latinos and Native Americans have lower rates of Internet use anywhere than do whites and Asians. These differences are statistically significant with  $p$ -values lower than 0.001.

A related question is whether there exist large ethnic and racial differences in how individuals use computers and the Internet. Differential use of technology may represent disparities in skills, which is another dimension of the digital divide. Table 3

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not currently providing services to a large percent of the population this may be more due to limited supply than demand [20]. Furthermore, community technology centers provide additional services potentially making them an attractive alternative to lack of or limited home access [19, 22].

<sup>12</sup>These estimates are not reported in the tables and do not control for differences in other characteristics such as education and income. A thorough investigation of whether home use and outside the home use are complements or substitutes is beyond the scope of the study.

**Table 3** Types of use among home computer users by race/ethnicity, current population survey, October 2003

	Types of computer use at home						Sample size
	Word processing	Non-Internet games	Graphics, photographs and videos	Spreadsheets or databases	Manage household records	Work at home	
White	56.1%	49.8%	38.0%	33.3%	33.8%	30.3%	47,020
Black	54.4%	56.5%	32.5%	27.9%	29.0%	21.6%	3,712
Latino	50.0%	48.1%	31.8%	28.9%	27.8%	23.0%	3,019
Mexican	49.8%	51.0%	32.4%	29.7%	27.9%	22.8%	1,562
Puerto Rican	47.4%	50.1%	30.8%	28.0%	26.5%	24.2%	421
Cuban	52.0%	42.2%	30.1%	30.0%	31.0%	28.7%	159
Central/South American	50.4%	41.7%	30.6%	27.0%	25.7%	21.2%	599
Other Latino	54.0%	45.9%	33.8%	28.5%	32.9%	22.3%	278
Native American	55.4%	64.3%	35.2%	25.1%	25.1%	17.7%	321
Asian	61.3%	40.8%	38.5%	40.1%	36.0%	30.9%	2,202

Notes: (1) The sample consists of adults (ages 18+) who use a home computer. (2) All estimates are calculated using sample weights provided by the CPS

reports estimates of several types of computer use at home. The most common use of home computers among home computer users is for word processing. Roughly half of computers users use their computer for word processing. Ethnic and racial disparities in word processing use conditional on using the home computer are not large. These differences are much smaller than the access rate differences reported above. Games represent another popular use of computers with roughly one half of users reporting this type of use. Again, ethnic and racial differences are not large. Other types of use, such as graphics, spreadsheets or household record management are less common and also do not have large differences across groups. For these measures, many of the differences between groups are not statistically significant contrasting with the differences for home computer access rates.

Finally, the main difference in computer use across groups is for working at home. Thirty percent of whites use a computer at home for work compared to 21.6 percent of blacks and 23.0 percent of Latinos. These differences are likely to capture more general differences in occupations, unemployment and telecommuting patterns. These patterns are statistically different.

The 2003 CPS also includes information on how people use the Internet. Table 4 reports estimates for the most common types of Internet use [50]. The most common type of Internet use at home is for email followed by searching for product and service information. Overall, estimates of home Internet use do not reveal glaring disparities in types of Internet use at home. The largest differences are in the percent of individuals using the Internet to purchase products and services. White Internet users are much more likely than black or Latino Internet users to shop online, with the differences being statistically significant ( $p$ -values less than 0.001). These differences

**Table 4** Types of use among home Internet users by race/ethnicity, current population survey, October 2003

	Types of Internet use at home							Sample size
	E-mail	Playing games	Purchase products or services	Health information	Search for product or service information	News, weather or sports information		
White	89.7%	35.5%	57.3%	45.4%	80.4%	69.0%	50,927	
Black	80.1%	44.3%	37.0%	38.6%	68.1%	58.3%	4,316	
Latino	80.5%	37.1%	42.3%	36.2%	67.2%	60.5%	3,366	
Mexican	76.8%	35.9%	40.4%	34.9%	66.6%	58.2%	1,780	
Puerto Rican	85.2%	47.1%	47.1%	37.9%	69.1%	63.1%	464	
Cuban	89.0%	38.4%	44.6%	40.9%	65.1%	58.9%	173	
Central/South American	84.2%	34.5%	43.1%	34.2%	66.9%	63.8%	652	
Other Latino	83.2%	33.6%	45.0%	44.9%	70.6%	65.4%	297	
Native American	81.1%	41.4%	40.0%	34.1%	70.5%	60.9%	393	
Asian	91.7%	29.6%	54.4%	42.9%	75.2%	69.5%	2,407	

Notes: (1) The sample consists of adults (ages 18+) who use the Internet at home. (2) All estimates are calculated using sample weights provided by the CPS

are likely to partly reflect income differences. Related to online shopping, disparities in searching for product and service information are also large.

The main finding from the estimates reported in Tables 3 and 4 are that ethnic and racial differences in types of use are much smaller than disparities in access. Conditional on using computers and the Internet at home, ethnic and racial groups tend to use these technologies for roughly the same purposes. The main exceptions appear to be work and shopping uses which are likely to capture differences in other characteristics, such as occupations and income.

Another difficult-to-measure dimension of the digital divide is the quality of home computers and Internet connections. This is important because examining rates of access to home computers may be misleading if the quality of these computers differs substantially across groups. The CPS includes information on the year the newest computer was purchased and the number of computers in the household (up to 3). Interestingly, white, black and Latino computer owners do not differ substantially by when they purchased their newest computer. In fact, Latinos are slightly more likely than are whites to own computers that were purchased from 2001 to 2003. The percent of white, black and Latino computer owners with computers purchased in the past three years are 61.3, 60.6 and 66.8 percent, respectively.

White computer owners appear, however, to have access to more computers at home on average than do blacks and Latinos. Among white computer owners, 33.2 percent have access to 2 or more computers at home excluding old computers that are not used. In contrast, 22.1 and 21.3 percent of black and Latino computer owners have access to 2 or more computers at home, which are statistically significantly lower than the white rate. These patterns for computer owners combined with the lower rates of

home computer access among blacks and Latinos documented above imply that overall white, non-Latinos are likely to have access to more home computers on average than are blacks or Latinos. Furthermore, blacks live in slightly larger households and Latinos live in much larger households on average than whites suggesting that ethnic and racial disparities in “per capita” rates may be even larger [47].

The CPS also includes information on the type of Internet access. Access to high-speed connections, such as DSL and cable modems, may represent an emerging dimension of the digital divide. Estimates from the CPS, however, do not indicate that black and Latino home Internet users are substantially less likely than whites to have a high-speed connection conditional on having Internet access at home (although the differences are statistically significant). Among whites who have Internet access at home, 37.8 percent have a high-speed connection. In comparison, 34.0 percent of blacks who have home Internet access and 32.2 percent of Latinos who have home Internet access have high-speed connections. The results are generally consistent with Prieger [33] who finds little evidence of unequal availability of broadband based on black or Hispanic concentrations across geographical areas.

### 3 What are the underlying causes of the digital divide?

#### 3.1 Reported reasons for not having access to the Internet at home

Why do some ethnic and racial groups have high levels of access to home computers and the Internet and others do not? At a first pass, it may be informative to directly compare self-reported reasons for not subscribing to Internet service. In the CPS, respondents who currently do not have access to the Internet at home were asked the question, “What is the MAIN reason that you don’t have the Internet at home?” Unfortunately, the CPS does not contain a similar question on computer ownership. Table 5 reports the percent of responses to the Internet question by race/ethnicity.

As expected, cost is an important factor for disadvantaged minority groups. Roughly one third of blacks and Latinos who do not have Internet access report that cost is the main reason that they do not use the Internet at home. Among whites, a much lower and statistically significant different percentage ( $p$ -value less than 0.001) report that cost is the main reason that they do not currently have the Internet at home. Overall, these results suggest that differences in abilities to pay for Internet services may contribute to differences in Internet use across groups, but that the ability to pay is not the only factor. If differences in ability to pay were the only factor then we would expect to see very high percentages for this category. Additionally, with rapidly decreasing prices for computers and Internet service, costs are likely to become less important in explaining differential access.

The percent of individuals who report not having the Internet at home because they can use it somewhere else is very small for all groups. Relatively low levels of Internet use at home among disadvantaged minorities do not appear to be simply due to Internet availability at other locations, such as work, libraries, and community technology centers, which is consistent with the estimates presented above on locations of Internet use. The small percentages of responses also have important implications

**Table 5** Main reason for not having the Internet at home by race/ethnicity, current population survey, October 2003

	Too expensive	Lack of computer knowledge/skills	Don't want it	Can use it somewhere else	Computer not capable	Other	Sample size
White	19.2%	3.7%	44.8%	2.5%	20.9%	8.9%	27,656
Black	33.8%	4.2%	28.6%	0.8%	26.2%	6.5%	5,843
Latino	34.7%	4.6%	25.1%	1.1%	28.2%	6.3%	5,860
Mexican	33.4%	4.6%	25.2%	0.9%	30.4%	5.5%	3,831
Puerto Rican	37.4%	4.5%	26.5%	1.4%	23.5%	6.7%	484
Cuban	25.5%	7.5%	26.2%	0.0%	31.3%	9.5%	216
Central/South American	42.4%	4.8%	22.4%	1.6%	21.5%	7.3%	1,022
Other Latino	28.0%	2.1%	32.1%	4.0%	22.9%	10.9%	307
Native American	29.2%	3.1%	23.6%	0.7%	29.0%	14.3%	593
Asian	24.3%	9.9%	32.4%	2.9%	18.1%	12.4%	1,242

Notes: (1) The sample consists of adults (ages 18+) who do not have access to the Internet at home. (2) All estimates are calculated using sample weights provided by the CPS

for how we think about Internet use. Apparently, Internet use at other locations is not a perfect substitute for use at home.

For all ethnic/racial groups, a large percentage of individuals report that they do not want the Internet at home. Unfortunately, it is very difficult to interpret this finding. A response of “not wanting it” may represent a combination of specific reasons in addition to those who truly do not want the Internet even at zero cost [49]. They might have simply reported that they did not want the Internet assuming that the question implied at current prices. The distinction, however, is very important for policy because one group may be responsive to taxes, subsidies, or other price changes and the other non-responsive. Those not responsive to much lower prices may be due to concerns over access to inappropriate content, desire for a simpler non-technical lifestyle, or fear of learning a new technology as well as many other reasons.

As noted above, another aspect of the digital divide is disparities in skills. Interestingly, however, very few groups report that a lack of computer knowledge or skills is the main reason for not having the Internet at home. The low overall rates suggest that disparities in skills are not a major factor in contributing to the differences in Internet access. Unfortunately, more direct information on disparities in skills and knowledge are not available in the CPS. These may be important as previous estimates indicate that blacks and Latinos are more likely to report needing assistance with computer tasks related to technical competence and information literacy [24].

Another common response for not having Internet access at home is that the computer is not capable. Blacks and Latinos are more likely to report that their computers are not capable and the differences are statistically significant ( $p$ -values less than 0.001), but these differences are not very large. The estimates reported above on age

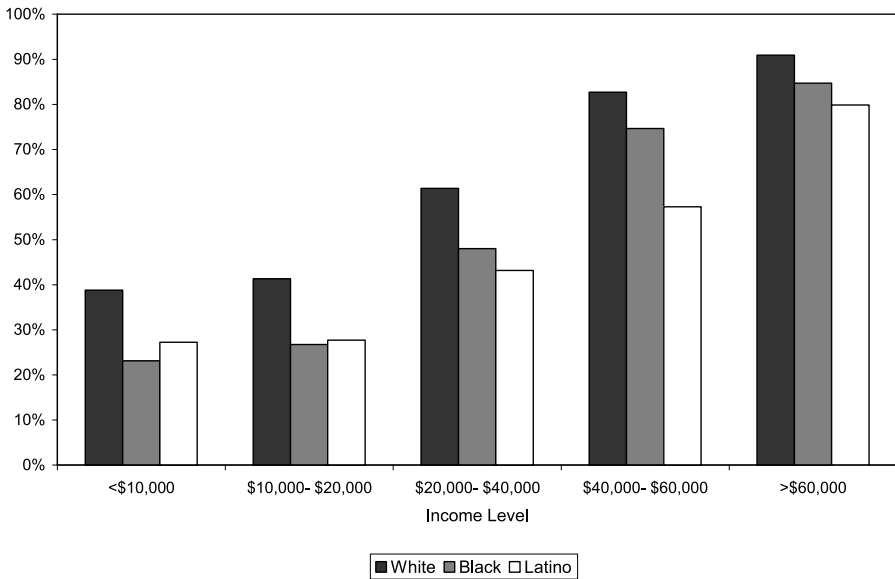
of computers also do not indicate large differences across groups, which is consistent with this finding.

### 3.2 Home computer and Internet access rates by income

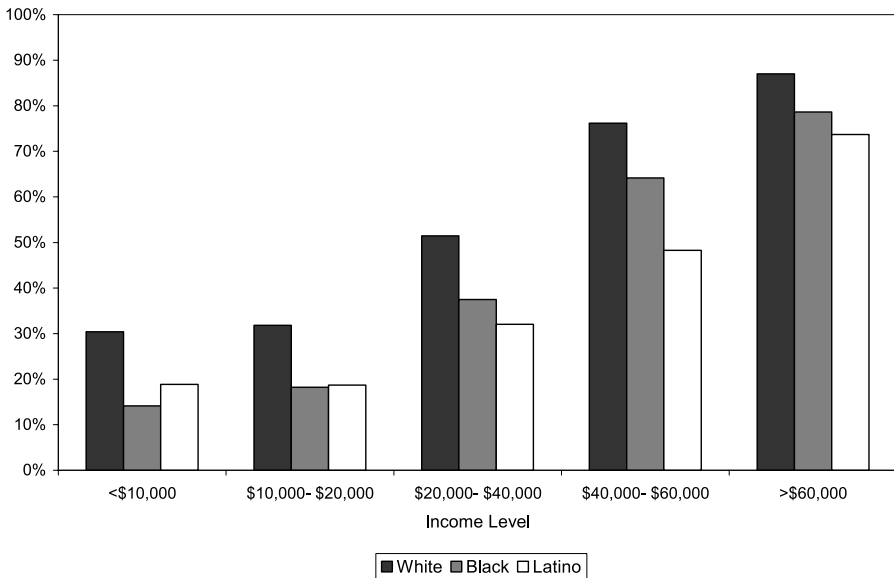
Although an examination of reported reasons for not having the Internet at home is somewhat informative, it is more useful to analyze how home computer and Internet access are related to the characteristics of individuals. In particular, do the large ethnic and racial disparities in home computer and Internet access rates exist even after controlling for income? Ethnic and racial groups differ substantially in average levels of income [44, 45] and home computer and Internet access increase with income [10]. Figures 5 and 6 display home computer and Internet access rates by income level, respectively, to address this question. For every reported income category, blacks and Latinos are substantially less likely to have a home computer and Internet access. Even among individuals with family incomes of at least \$60,000, blacks and Latinos are substantially less likely to have access to a computer or the Internet at home than are whites. Clearly, there must be additional factors at play.

### 3.3 The contributions of income and other factors to the digital divide in access to home computers?

How much of the digital divide is due to income and how much is due to other factors, such as education and family structure? Although several previous studies document large racial differences in rates of computer and Internet access, we know less



**Fig. 5** Percent of adults (ages 18+) who have a home computer by income and race/ethnicity, current population survey, October 2003



**Fig. 6** Percent of adults (ages 18+) who have Internet access at home by income and race/ethnicity, current population survey, October 2003

about the underlying causes of these differences, especially across Latino groups. The U.S. Department of Commerce [48] finds that group differences in income and education account for approximately 50 percent of the gap in Internet use between African-Americans or Latinos and the national average. However, a simple “shift-share” analysis in which the difference between the white and minority income distributions is multiplied by rates of Internet use across income levels is used to calculate this estimate. This technique does not control for other factors correlated with income and education. Additional factors that may be especially important are employment status, occupation and family structure. Exposure to computers at work or the perceived need to acquire computer skills for future employment opportunities may be the catalyst for many individuals to purchase computers and subscribe to Internet service.

Using CPS data, I explore the underlying causes of ethnic and racial differences in access to home computers and the Internet. In particular, I examine whether ethnic and racial differences in the most likely “suspects”—family income, education, occupation, and family structure—have independent effects on disparities in access to home computers and the Internet. The separate and independent effects of these variables are estimated using regression models and decomposition techniques (e.g. [5, 27]). The decomposition techniques combine regression estimates and sample means to identify how much a factor (e.g. income) contributes to the disparity between two racial or ethnic groups in a specific outcome, such as home computer or Internet access. They have been widely used to examine the causes of minority/white differences in wages (see [41] for example). The technique is described in more detail in [9, 13], but the basic idea is that contributions are estimated by multiplying the

coefficient estimates by the differences in mean values for the two groups. A simplified hypothetical example is useful to illustrate the technique. Assume that we have a majority group with an average income of \$40,000 and a minority group with an average income of \$35,000. If a \$1 increase in income increases the home computer rate by 0.00001 (which is estimated from a regression model) then group differences in income explain  $(40,000 - 35,000) \times 0.00001 = 0.05$  or 5 percentage points of the gap in home computer rates. The actual model uses coefficients from several income threshold dummies and the difference between the majority and minority income distributions to calculate the decomposition estimates.<sup>13</sup>

Table 6 reports estimates from this procedure for decomposing the gap in home computer rates between white, non-Latinos and each ethnic/racial group. The gap between whites and Asians in the home computer rate is not reported because there is essentially no difference between rates for the two groups. The individual contributions from racial differences in sex and age, marital status and children, education, income, region, central city status, and employment/occupation are reported.

I first describe the results for blacks. The white/black gap in the home computer rate gap is large (0.225 or 22.5 percentage points) and statistically significant. Racial differences in sex and age explain none of the gap and in fact widen the gap as evidenced by the negative contribution. In other words, the gap in home computer access rates would be even larger if not for the advantaged age distribution (in terms of computer ownership) of blacks versus whites. Blacks are younger on average than are whites. In contrast, marital status and children explain part of the gap (9.6 percent). This contribution is primarily due to blacks having a substantially lower probability of currently being married than whites and the positive effect of marriage on having a home computer. Using the CPS sample of adults ages 25 and over, only 43.8 percent of blacks are currently married compared to 67.8 percent of whites. Lower marriage rates among blacks may limit their opportunities to take advantage of economies of scale in the number of family members.

Blacks have lower levels of education, on average, than whites. In the CPS sample, only 12.9 percent of blacks have a Bachelor's degree, and only 5.9 percent of blacks have a graduate-level degree. In contrast, 20.1 and 10.9 percent of whites have Bachelor's and graduate degrees, respectively. The combination of these patterns and the finding earlier that education is a major determinant of computer ownership suggests that racial differences in education account for a large part of the gap. Indeed, the decomposition estimate indicates that white/black differences in education distributions account for 10.7 percent of the home computer rate gap.

As expected, the largest factor explaining racial disparities in home computer ownership is income. Lower levels of income among blacks account for 26.8 percent of the white/black gap in the probability of having access to a home computer. As noted above, it is likely that this primarily captures racial differences in the ability to purchase computers, however, it may also partly capture racial differences in preferences for owning computers. Although income differences provide a large contribution,

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<sup>13</sup>The family income thresholds are \$10,000–14,999, \$15,000–19,999, \$20,000–24,999, \$30,000–34,999, \$35,000–39,999, \$40,000–49,999, \$50,000–59,999, \$60,000–74,999, and \$75,000 and over. The effects of increases in income in this model can differ between low and high levels of income.

**Table 6** Decomposition of racial/ethnic gaps in home computer rates, current population survey, October 2003

	Black	Latino	Mexican	Cuban	Puerto Rican	Central/ South Amer.	Native Amer.
White/minority gap in home computer rate	0.225	0.247	0.302	0.178	0.145	0.200	0.270
Contributions from racial differences in:							
Sex and age	-0.010 -4.3%	-0.026 -10.7%	-0.016 -10.4%	0.019 10.6%	-0.016 -14.5%	-0.032 -15.8%	-0.016 -6.0%
Marital status and children	0.022 9.6%	0.0040 0.2%	-0.005 -1.5%	0.009 5.0%	0.016 10.8%	0.004 2.0%	0.016 6.0%
Education	0.024 10.7%	0.039 21.6%	0.062 20.6%	0.031 18.4%	0.035 24.4%	0.050 25.1%	0.039 14.3%
Income	0.060 26.8%	0.088 23.3%	0.064 21.1%	0.043 324.1%	0.088 33.4%	0.088 28.9%	0.088 32.7%
Region	0.010 4.5%	-0.009 -3.7%	-0.011 -3.8%	0.005 2.8%	0.000 -0.1%	-0.008 -4.2%	-0.012 -4.3%
Central city status	0.002 0.9%	0.0020 0.0%	0.0020 0.0%	-0.004 -2.4%	0.0020 0.3%	0.0020 0.0%	0.007 2.5%
Employment / Occupation	0.004 1.9%	0.015 6.1%	0.019 6.4%	0.005 3.0%	0.002 1.6%	0.016 8.0%	0.008 2.9%
All included variables	0.113 50.0%	0.091 36.8%	0.08 32.5%	0.109 61.6%	0.081 55.8%	0.088 44.0%	0.130 48.2%

Notes: (1) The sample consists of adults ages 25 and over (2) Contribution estimates are mean values of the decomposition using 1000 subsamples of whites. See text for more details

they do not explain the entire gap. This finding, although more carefully estimated here, is similar to that discussed above. Thus, low levels of home computer rates among blacks are not simply due to an inability to purchase computers. In fact, 84.7 percent of blacks with family incomes of \$60,000 or more have a home computer, whereas 90.9 percent of whites with similar income levels have home computers.

The included geographical factors do not play a major role in explaining black/white differences in home computer rates. Racial differences in regional distributions explain 4.5 percent of the gap, and racial differences in central city status explain virtually none of the gap in home computer rates. Although blacks are found to be much more likely to live in the central city than are whites in the CPS sample, the contribution is essentially zero because central city status does not affect home computer ownership. Finally, racial differences in employment/occupational distributions explain only 1.9 percent of the white/black gap.

The disparity between the rates of home computer access among white, non-Latinos and Latinos is also large (0.247) and statistically significant. Table 6 also reports the decomposition results for this gap between Latinos and whites. Similar to

the results for blacks, racial differences in education, income, and occupation contribute to the gap.

Latinos have substantially lower levels of education than whites. Only 8.5 percent of Latinos have Bachelor's degrees and 3.3 percent have graduate degrees compared to 20.1 and 10.9 percent for whites, respectively. The decomposition results indicate that these lower levels of education are a major cause of why relatively few Latinos have access to home computers. Racial differences in education explain 21.6 percent of the white/Latino gap in home computer rates.

Relatively low levels of income among Latinos also contribute greatly to the gap in home computer rates. The results indicate that 23.3 percent of the gap is due to white/Latino differences in income. This contribution is comparable in magnitude to that for the white/black gap and is consistent with Latinos being less able to afford computers than whites, on average.

Similar to blacks, however, it is somewhat surprising that income does not explain more of the gap. Even at income levels of \$60,000 or more, only 79.8 percent of Latinos have a home computer compared to 90.9 percent of whites as displayed in Fig. 5. To be sure, income differences are important, but they cannot explain everything.

Occupational differences explain a smaller part of the gap in home computer access rates than income or education differences. Estimates from the CPS indicate that Latino workers are more concentrated than whites in handlers and machine occupations (low computer rate occupations) and less concentrated in professional and executive occupations (high computer rate occupations).

Disparities in home computer rates are larger for Mexicans relative to whites than for Latinos overall relative to whites. The white/Mexican gap in computer rates is 0.302. The explanations for the disparities are similar, however. Mexicans are less likely to have access to home computers than are white, non-Latinos because they have lower levels of education and income, on average. These two factors alone explain more than 40 percent of the gap in home computer rates.

The explanations differ somewhat for other Latino groups. Education explains less of the Cuban/white gap in home computer rates. The smaller contribution is due to the higher levels of education found among Cubans than Latinos overall or Mexicans. For Cubans, 17.7 percent have a Bachelor's degree and 7.6 percent have graduate degrees. In contrast, education and income explain nearly 60 percent of the gap between Puerto Ricans and white, non-Latinos. The high levels of explanatory power are due to low levels of education and income among Puerto Ricans, but they are also due to the smaller gap in home computer rates. The difference between home computer rates among Puerto Ricans and whites is 0.145.

Native Americans also have a relatively low rate of home computer access (the gap is 0.270). Low levels of income among Native Americans appear to be the most important factor explaining 33.7 percent of the gap. Low levels of education also explain a sizeable portion of the gap (14.3 percent). Another factor that explains a small part of the gap (2.5 percent) is the higher likelihood of Native Americans living in rural areas than whites.

### 3.4 What explains the digital divide in home Internet access?

Generally the same factors that explain racial disparities in computer access rates are responsible for group differences in home Internet access (estimates are reported in Table 7). The most notable change is that education is now a more important factor. For Mexicans, in fact, the contribution from low education levels is essentially the same as the contribution from low income levels. The increase in importance of education in explaining Internet differences may reflect the increasing importance of tastes or content relative to income. Ethnic and racial differences in income, however, continue to be important and explain from 24.5 to 41.3 percent of the gaps in Internet access. For blacks and Native Americans, income disparities remain a substantially more important determinant of differences in home Internet access than education differences.

**Table 7** Decomposition of racial/ethnic gaps in home Internet access rates, current population survey, October 2003

	Black	Latino	Mexican	Cuban	Puerto Rican	Central/South Amer.	Native Amer.
White/minority gap in home Internet rate	0.245	0.278	0.339	0.198	0.145	0.226	0.305
Contributions from racial differences in:							
Sex and age	-0.010 -4.3%	-0.026 -9.3%	-0.017 -9.0%	0.015 7.5%	-0.017 -14.3%	-0.0 -13.3%	-0.017 -5.7%
Marital status and children	0.020 8.3%	-0.001 -0.4%	-0.006 -1.8%	0.006 3.0%	0.015 10.3%	0.001 0.6%	0.015 5.1%
Education	0.028 11.5%	0.068 24.6%	0.081 24.1%	0.037 18.5%	0.042 28.6%	0.063 28.0%	0.047 15.3%
Income	0.073 29.8%	0.075 26.8%	0.083 24.5%	0.054 27.3%	0.0 41.3%	0.077 33.9%	0.108 35.4%
Region	0.007 3.0%	-0.010 -3.8%	-0.01 -3.3%	0.001 0.7%	-0.007 -4.9%	-0.014 -6.0%	-0.008 -2.5%
Central city status	0.001 0.3%	-0.001 -0.4%	-0.001 -0.2%	-0.006 -2.9%	-0.001 -2.9%	-0.002 -0.8%	0.010 3.3%
Employment / Occupation	0.004 1.8%	0.016 5.8%	0.021 6.1%	0.005 2.6%	0.003 1.9%	0.017 7.7%	0.008 2.6%
All included variables	0.123 50.4%	0.1230 43.2%	0.136 40.3%	0.112 56.7%	0.090 61.9%	0.113 50.1%	0.163 53.4%

Notes: (1) The sample consists of adults ages 25 and over (2) Contribution estimates are mean values of the decomposition using 1000 subsamples of whites. See text for more details

## 4 Explanations for remaining differences

### 4.1 Language barriers

Language may represent another important factor limiting home computer and Internet access among non-English speaking minorities, especially Latinos. As it turns out, the Internet is less global than it is sometimes portrayed—the overwhelming majority of sites are in English. Spooner and Rainie [39] report estimates from VilaWeb.com indicating that 68 percent of Web pages are in English, whereas only 3 percent are in Spanish. The Organization for Economic Cooperation and Development [29] also reports that 94 percent of links to secure servers are in English. Estimates from 2002 indicate that nearly three quarters of public Internet sites are primarily in English compared to only 3 percent of public Internet sites being primarily in Spanish [28]. Although computer software is available in languages other than English it is not clear how widely it is used. Perhaps because of this, Latinos living in households where Spanish was the only language spoken were less than half as likely to use the Internet as other Latinos [49]. Although these results do not control for differences in income or education they are suggestive of the importance of language and content.

To investigate this issue further, I use information in the CPS on whether Spanish is the only language spoken among adults in the household to examine whether Latinos in Spanish-speaking households are less likely to have access to home computers and the Internet. The CPS question allows one to identify individuals who reside in households where Spanish is the only language spoken by all adult members of the household. Thus, for the following analysis, Spanish speaking households are defined as ones in which Spanish is the only language spoken by adults in the household and non-Spanish speaking households are defined ones in which no Spanish or both Spanish and English are spoken by adults in the household. Unfortunately, the CPS does not provide any additional information on the extent of Spanish speaking by the individual and information on other languages. Table 8 reports adjusted and unadjusted home computer rates for each Latino group living in Spanish speaking and non-Spanish speaking households. The adjusted estimates control for group differences in gender, age, marital status, children, education, family income, region, urbanicity, employment, and occupation.

Mexicans in Spanish-speaking households are much less likely to have access to home computers and the Internet than are Mexicans in non-Spanish speaking households. Their home computer and Internet rates are alarmingly low. Only 22.2 percent of Mexicans in Spanish-speaking households has access to a home computer and 13.1 percent of Mexicans in Spanish-speaking households has home Internet access. In fact, the rate of home Internet access in the United States for this group is only 5.6 percentage points higher than the national rate in Mexico of 7.5 percent for 2002 [17]. Clearly, a “Nation Online” is not an accurate description for all groups in the United States.

Perhaps a first response to a comparison of technology use among Mexicans who speak only Spanish at home to use among Mexicans who do not speak only Spanish at home is that these two groups may differ substantially in terms of education, family income, and other factors affecting technology use. Table 8 also reports adjusted computer and Internet rates that control for group differences in gender, age,

**Table 8** Adjusted home computer and Internet access by race/ethnicity, United States current population survey, October 2003

	Unadjusted computer rates	Adjusted computer rates	Adjusted computer rates II	Unadjusted Internet rates	Adjusted Internet rates	Adjusted Internet rates II	Sample size
Adults (ages 25+)							
White	73.7%	73.7%	73.7%	67.2%	67.2%	67.2%	56,904
Latino							
Mexican / non-Spanish	51.1%	54.3%	55.8%	40.1%	54.2%	55.0%	2,712
Mexican / Spanish only	22.2%	33.8%	36.4%	13.1%	30.3%	31.7%	1,100
Puerto Rican / non-Spanish	62.0%	65.2%	65.0%	56.7%	66.4%	66.3%	580
Puerto Rican / Spanish only	38.6%	68.8%	68.8%	3.4%	73.4%	73.4%	74
Cuban / non-Spanish	67.3%	69.0%	71.1%	58.1%	67.9%	69.1%	225
Cuban / Spanish only	29.1%	51.6%	54.5%	20.2%	44.7%	46.3%	91
Central/South American / non-Spanish	65.5%	65.8%	68.3%	56.7%	66.2%	67.6%	768
Central/South American / Spanish only	33.2%	48.6%	51.6%	24.4%	46.8%	48.5%	400

Notes: (1) The sample consists of adults ages 25 and over. (2) Unadjusted estimates are calculated using sample weights provided by the CPS. (3) Adjusted estimates control for group differences in gender, age, marital status, children, education, family income, region, urbanicity, employment, and occupation. (4) Adjusted II estimates control for group differences in immigrant status in addition to those listed in (3)

marital status, children, education, family income, region, urbanicity, employment, and occupation. Controlling for these factors narrows the gap between the two Mexican groups, but makes little ground in explaining why Spanish-speaking Mexicans have home computer and Internet access rates that are remarkably lower than white, non-Latino rates. Controlling for differences in education, family income, and other characteristics only 33.8 percent of Spanish-speaking Mexicans have access to home computers and 30.3 percent have access to the Internet at home. These rates are both roughly 40 percentage points lower than the white, non-Latino rates.

For every other Latino group, home computer and Internet rates are substantially lower among those who speak only Spanish at home and those who do not. These differences lessen somewhat after controlling for education, family income and other factors, however, home computer and Internet rates remain very low for Spanish-speaking Latinos.

An important question is whether Spanish language is simply a proxy for immigrant status. If immigrants are less likely to own computers or use the Internet at home, possibly because of network effects, then the comparison between Spanish-speaking and non-Spanish speaking may capture this. Latino Immigrants may also differ from U.S. born Latinos in their demand for content. A second set of adjusted rates is reported in Table 8. These adjusted estimates control for group differences

in immigrant status in addition to differences in gender, age, marital status, children, education, family income, region, urbanicity, employment, and occupation. For all groups, the adjusted home computer rates essentially stay the same or increase only slightly suggesting that relatively low rates of access to home computers among Latinos cannot be explained by immigrant status. Furthermore, there is virtually no convergence between the Spanish-speaking and non-Spanish speaking rates implying that language is not simply a proxy for immigrant status. For most groups, the adjusted home Internet use rates increase more, but not substantially. There also appears to be little convergence between Spanish and non-Spanish speaking rates suggesting that language has a very large independent effect on Internet use.

Overall, the results clearly indicate that language is an important determinant of home computer and Internet access even after controlling for education, family income and immigrant status. Spanish-speaking Latinos, especially Mexicans, have strikingly low rates of home computer and Internet access. The Digital Divide between white, non-Latinos and this group are on par with the Digital Divide between the United States and many developing countries.

#### 4.2 Privacy and the Internet

Do ethnic and racial differences exist in concerns over privacy on the Internet and, if so, are these differences partly responsible for the digital divide? The CPS asked the question “Compared to providing personal information over the telephone, how concerned are you about providing personal information over the Internet?”<sup>14</sup> Estimates from the CPS indicate that 47.4 percent of whites are more concerned about privacy on the Internet than over the telephone. In comparison, 57.8 percent of blacks and 45.7 percent of Latinos expressed more concern about providing information over the Internet than over the telephone. These patterns are roughly consistent with those reported in [14]. Concerns over privacy on the Internet do not appear to be contributing to white/Latino disparities in home Internet access and do not contribute substantially to the white/black gaps in home Internet access.

### 5 Conclusions

Estimates from the Computer and Internet Use Supplements to the October 2003 Current Population Survey (CPS) indicate that the “Digital Divide” is large and does not appear to be disappearing soon. Blacks and Latinos are much less likely to have access to computers and the Internet at home than are white, non-Latinos. Asians have home computer and Internet access rates that are higher than white, non-Latino rates, and Native Americans have lower rates. Estimates from the CPS also indicate substantial differences in access rates across detailed Latino groups with Mexican-Americans having the lowest rates. Another important finding is that ethnic and

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<sup>14</sup>Unfortunately, the CPS does not distinguish between types of information and to whom the information is provided. Concerns over privacy issues may differ substantially based on these distinctions. The CPS also does not contain any information about privacy expectations, which also may be important [8].

racial disparities in home computer and Internet access are larger for children than for adults.

Income and education inequalities were found to be leading causes of the disparities in access to technology. It is important to note, however, that these two factors explain less than half of the gap in home computer and Internet access between white, non-Latinos and most disadvantaged minority groups. In fact, large disparities in home computer and Internet access rates were found between blacks and Latinos, and white, non-Latinos in high-income families.

Estimates also indicate that language is an important determinant of home computer and Internet access above and beyond its correlation with factors such as education, family income and immigrant status. Spanish-speaking Latinos, especially Mexicans, have strikingly low rates of home computer and Internet access. The differences between white, non-Latinos and this group are not substantially different than the differences between the United States and many developing countries.

What are the policy implications of these findings? Should we view the digital divide simply as a disparity in utilization of goods and services arising from income differences just as we might view disparities in purchases of other electronic goods, such as cameras, stereos, or televisions? Or, should we view the digital divide as a disparity in a good that has important enough externalities, such as education, health-care, or job training, that it warrants redistributive policies.<sup>15</sup> Policy makers cannot agree on an answer to this question.<sup>16</sup> The Department of Agriculture, Commerce, Education, Health and Human Services, Housing and Urban Development, Justice and Labor, each have programs addressing the digital inclusion of various groups, and spending on the E-rate program, which provides discounts to schools and libraries for the costs of telecommunications services and equipment, totaled \$12.9 billion from 1998 to 2003 [54]. However, the former chair of the Federal Communications Commission, Michael Powell, referred to the digital divide as “a Mercedes divide. I’d like to have one; I can’t afford one,” and the funding for several technology-related programs affecting disadvantaged groups is in jeopardy [38].

The finding that language barriers among Latinos are a leading cause of the digital divide has important policy implications. Improving access to political, health, employment, education, public services, and consumer information in Spanish may increase computer and Internet use among Latino groups because of the importance of language barriers.<sup>17</sup> On the other hand, income and educational differences are also major causes of the digital divide among Latino groups potentially limiting the effectiveness of these policies to close the digital divide. In fact, they may have little effect at all if Latinos continue to have low rates of home computer and Internet access. Perhaps an expansion of access to computers and the Internet in community technology centers and libraries is needed to address these concerns.

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<sup>15</sup> Access to information technology may also help disadvantaged minorities overcome some of these other problems by enabling them to earn more and accumulate wealth [25, 40]. See also [30] for a discussion of how disparities in information technology relate to social inequality.

<sup>16</sup> See [6, 24, 25] for examples of the academic debate.

<sup>17</sup> Many government web pages provide information in other languages. Two early examples are the State of California Department of Motor Vehicles Spanish web site and an online self-help center providing legal information in Spanish and a few other languages.

The finding of especially large racial disparities in home access to computers and the Internet among children has implications for the controversial issue of whether schools should replace textbooks with CD ROMs or Internet-based materials. Arguments for the use of CD ROMs range from the exorbitant costs of textbooks to the “backbreaking” weight of textbooks. Arguments against these proposals have centered around the lack of access to home computers and the Internet among some groups of schoolchildren. Without addressing the causes of limited access to computers at home, these proposals may place black, Latino and other minority schoolchildren at an educational disadvantage. Additionally, there is some evidence in the literature indicating that access to home computers improves educational outcomes [1, 3, 12, 37]. Policies that address the financial, informational and technical constraints limiting the optimal level of investment in personal computers among disadvantaged families may be needed. One solution is to expand the relatively new programs that provide one-to-one school computing through laptop computers both in terms of the number of schools participating and the ability of schoolchildren to take these computers home. Tax breaks or special loans for educational computer purchases and computer donations may also help.

Another important issue is whether policies that solely address disparities in access to computers and the Internet are enough to bridge the digital divide. Although blacks and Latinos appear to use computers and the Internet for roughly the same purposes as whites, they are less likely to report using computers and the Internet conditional on home access. Policies that also address disparities in skills and content are also needed. One example is community technology centers, which provide not only access to technology, but also training in using the computer and other types of technology, homework assistance and tutoring for young people, leadership training, community development, and other services for people of all ages [22].

## References

1. Attewell, P., & Battle, J. (1999). Home computers and school performance. *The Information Society*, 15, 1–10.
2. Bakos, Y. (2001). The emerging landscape for retail e-commerce. *Journal of Economic Perspectives*, 15(1), 69–80.
3. Beltran, D. O., Das, K. K., & Fairlie, R. W. (2005). *The effects of home computers on educational outcomes: Evidence from the current population survey and national longitudinal survey of youth 1997*. University of California, Santa Cruz Working Paper.
4. Borenstein, S., & Saloner, G. (2001). Economics and electronic commerce. *Journal of Economic Perspectives*, 15(1), 3–12.
5. Blinder, A. S. (1973). Wage discrimination: Reduced form and structural variables. *Journal of Human Resources*, 8, 436–455.
6. Crandall, R. W. (2000). *Bridging the digital divide: Universal service, equal access, and the digital divide*. Paper presented at Bridging the Digital Divide: California Public Affairs Forum, Stanford University.
7. DiMaggio, P. J., & Hargittai, E. (2001). *From digital divide to digital inequality: Studying Internet use as penetration increases*. Princeton University: Sociology Department.
8. Earp, J. B., Antón, A. I., Aiman-Smith, L., & Stufflebeam, W. H. (2005). Examining Internet privacy policies within the context of user privacy values. *IEEE Transactions on Engineering Management*, 52(2), 227–237.
9. Fairlie, R. W. (1999). The absence of the African-American owned business: An analysis of the dynamics of self-employment. *Journal of Labor Economics*, 17(1), 80–108.

10. Fairlie, R. W. (2002). *Race and the digital divide*. Joint Center for Poverty Research Working Paper 307.
11. Fairlie, R. W. (2004). Race and the digital divide. *Berkeley Electronic Journals, Contributions to Economic Analysis & Policy*, 3(1), 1–38.
12. Fairlie, R. W. (2005). The effects of home computers on school enrollment. *Economics of Education Review*, 24(5), 533–547.
13. Fairlie, R. W. (2006, forthcoming). An extension of the Blinder-Oaxaca decomposition technique to logit and probit models. *Journal of Economic and Social Measurement*.
14. Fox, S., Rainie, L., Horrigan, J., Lenhart, A., Spooner, T., & Carter, C. (2000). *Trust and privacy online: Why Americans want to rewrite the rules*. Washington: The Pew Internet & American Life Project.
15. Freeman, R. B. (2002). *The labour market in the new information economy*. National Bureau of Economic Research Working Paper No. 9254.
16. Goolsbee, A., & Guryan, J. (2006, forthcoming). *The impact of Internet subsidies in public schools*. Review of Economics and Statistics.
17. International Telecommunications Union (2005). *World telecommunication indicators database*.
18. Jung, J., Qiu, J., & Kim, Y. (2001). Internet connectedness and inequality: Beyond the divide. *Communication Research*, 28(4), 507–535.
19. Kvasny, L. (2005). The role of the habitus in shaping discourses about the digital divide. *Journal of Computer Mediated Communication*, 10(2).
20. Kvasny, L., & Keil, M. (2006). The challenges of redressing the digital divide: A tale of two U.S. cities. *Information Systems Journal*, 16(1), 23–53.
21. Lenhart, A. (2003). *The ever-shifting Internet population: A new look at Internet access and the digital divide*. Pew Internet & American Life Project.
22. London, R. A., Pastor, M. Jr., Servon, L. J., Rosner, R., & Wallace, A. (2006). *The role of community technology centers in youth skill-building and empowerment*. University of California, Santa Cruz, Center for Justice, Tolerance and Community Working Paper.
23. Morton, F. S., Zettelmeyer, F., & Siva Risso, J. (2000). *Internet car retailing*. Yale University Working Paper.
24. Mossberger, K., Tolbert, C., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Washington: Georgetown University Press.
25. Noll, R. G., Older-Aguilar, D., Rosston, G. L., & Ross, R. R. (2000). *The digital divide: Definitions, measurement, and policy issues*. Paper presented at Bridging the Digital Divide: California Public Affairs Forum, Stanford University.
26. Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge: Cambridge University Press.
27. Oaxaca, R. (1973). Male–female wage differentials in urban labor markets. *International Economic Review*, 14(October), 693–709.
28. O'Neill, E. T., Lavoie, B. F., & Bennett, R. (2003). Trends in the evolution of the public web. *D-Lib Magazine*, 9(4).
29. Organization for Economic Cooperation and Development (2001). *Understanding the digital divide*.
30. Patterson, R., & Wilson, E. (2002). New IT and social inequality: Resetting the research and policy agenda. *The Information Society*, 16, 77–86.
31. Pew Internet & American Life Project (2005). *Usage over time*. <http://www.pewInternet.org/trends/UsageOverTime.xls>.
32. Puma, M. J., Chaplin, D. D., & Pape, A. D. (2000). *E-rate and the digital divide: A preliminary analysis from the integrated studies of educational technology*. Urban Institute.
33. Prieger, J. E. (2003). The supply side of the digital divide: Is there equal availability in the broadband Internet access market? *Economic Inquiry*, 41(2), 346–363.
34. Ratchford, B. T., Talukdar, D., & Lee, M.-S. (2001). A model of consumer choice of the Internet as an information source. *International Journal of Electronic Commerce*, 5(3), 7–21.
35. Schement, J. R. (1998). Thorough Americans: Minorities and the new media. In A. K. Garner (Ed.), *Investing in diversity*. Washington: Aspen Institute.
36. Schement, J. R., & Forbes, S. C. (2000). Identifying temporary and permanent gaps in universal service. *The Information Society*, 16, 117–126.
37. Schmitt, J., & Wadsworth, J. (2004). *Is there an impact of household computer ownership on children's educational attainment in Britain?* Centre for Economic Performance Discussion Paper No. 625.

38. Servon, L. (2002). *Bridging the digital divide: Community, technology and policy*. Blackwell.
39. Spooner, T., & Rainie, L. (2001). *Hispanics and the Internet*. Pew Internet & American Life Project.
40. Thomas Rivera Policy Institute (2002). *Latinos and information technology: The promise and the challenge*. Prepared for the IBM Hispanic Digital Divide Task Force.
41. Trejo, S. J. (1997). Why do Mexican Americans earn low wages? *Journal of Political Economy*, 105(6), 1235–1268.
42. U.S. Bureau of the Census. (1984). *Computer use in the United States: 1984, current population reports P23-155*. Washington: U.S.G.P.O.
43. U.S. Bureau of the Census. (1989). *Computer use in the United States: 1989, current population reports P23-171*. Washington: U.S.G.P.O.
44. U.S. Bureau of the Census. (1993). *1990 census of population: Persons of hispanic origin in the United States, 1990 CP-3-3*. Washington: U.S.G.P.O.
45. U.S. Bureau of the Census. (1993). *Computer use in the United States: 1993, detailed tables*. <http://www.census.gov/population/www/socdemo/computer/computer93.html>.
46. U.S. Bureau of the Census. (1997). *Computer use in the United States: October 1997, current population reports P20-522*. Washington: U.S.G.P.O.
47. U.S. Census Bureau. (2004). *America's families and living arrangements: 2004, families and living arrangements, current population survey (CPS) reports*. <http://www.census.gov/population/www/socdemo/hh-fam.html>.
48. U.S. Department of Commerce. (2000). *Falling through the net: Toward digital inclusion*. Washington: U.S.G.P.O.
49. U.S. Department of Commerce. (2002). *A nation online: How Americans are expanding their use of the Internet*. Washington: U.S.G.P.O.
50. U.S. Department of Commerce. (2004). *A nation online: Entering the broadband age*. Washington: U.S.G.P.O.
51. U.S. Department of Education. (2005). *Youth indicators, 2005: Trends in the well-being of American youth*. Institute of Education Sciences, National Center for Education Statistics. <http://nces.ed.gov/programs/youthindicators/>.
52. U.S. Department of Labor. (2005). *Occupational outlook handbook*. Washington: U.S.G.P.O.
53. U.S. General Accounting Office. (2001). *Telecommunications: Characteristics and choices of Internet users*. Washington: U.S.G.P.O.
54. Universal Services Administration Company. (2003). *Annual report*. <http://www.universalservice.org/download/pdf/2003AnnualReport.pdf>.
55. Van Dijk, J., & Hacker, L. (2003). Digital divide as a complex and dynamic phenomenon. *The Information Society*, 19(4), 315–326.
56. Warschauer, M. (2002). Reconceptualizing the digital divide. *First Monday*, 7, 7.

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