

**Is There a Digital Divide?
Ethnic and Racial Differences in Access to Technology and Possible Explanations**

Final Report to the University of California, Latino Policy Institute and California Policy
Research Center

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Executive Summary

In recent years, a plethora of public and private programs in the United States have been created to close the "Digital Divide." Interestingly, however, we know very little about the underlying causes of racial differences in rates of computer and Internet use. Using data from the Computer and Internet Use Supplement to the September 2001 Current Population Survey (CPS), I document and explore the underlying causes of ethnic and racial differences in home computer and Internet use. The Supplement to the CPS, which is conducted by the U.S. Census Bureau and Bureau of Labor Statistics, contains detailed information on computer and Internet use by individuals not found in other government data sources. In this report, 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 home computer and Internet use. To date, we know very little about the importance of these potential causes.

The main findings are:

- The Digital Divide is large and does not appear to be disappearing soon. Blacks and Latinos are much less likely to have access to home computers than are white, non-Latinos (42.0 and 41.8 percent compared to 66.3 percent). They are also less likely to use the Internet at home (27.1 and 22.7 percent compared to 50.0 percent).
- Asians have home computer and Internet use rates that are higher than white, non-Latino rates (75.4 and 52.6 percent), and Native Americans have lower rates (48.9 and 31.3 percent).
- Among Latino groups, Mexicans have the lowest home computer and Internet use rates followed by Cubans who have the next lowest rates. Although Puerto Ricans, Central and South Americans, and Other Latinos have higher rates, all Latino groups are substantially less likely to own a computer or use the Internet at home than are white, non-Latinos.
- Less than one half of all black and Latino school-age children have access to a home computer and approximately 1 out of 4 use the Internet at home (compared to 83.6 and 55.2 percent of white, non-Latino children). Ethnic and racial disparities in home computer and Internet use rates are larger for children than for adults.
- Computer ownership and Internet use rates are higher in California than national levels for all ethnic and racial groups, however, disparities in home computer and Internet use rates are generally similar to those for the entire United States.
- The results are mixed for other measurable dimensions of the digital divide. Among computer owners, whites on average have more computers than blacks and Latinos, but do not appear to have newer computers, and among Internet

users whites are no more likely to have access to a high-speed connection at home than are blacks and Latinos.

- Nearly 40 percent of blacks and Latinos report that cost is the main reason that they do not use the Internet at home. Among whites, only 20 percent report that cost is the main reason that they do not currently have the Internet at home
- Income differences across groups are not entirely responsible, however. Even among individuals with family incomes of at least \$60,000, blacks and Latinos are substantially less likely to own a computer or use the Internet at home than are whites.
- Using regression models and special decomposition techniques, I find that lower levels of income among blacks account for 27.4 percent of the disparity between white, non-Latinos and blacks in computer ownership and 24.7 percent of the disparity in Internet use at home. White/black differences in education levels account for 9.4 percent of the home computer rate gap and 15.2 percent of the Internet use rate gap.
- Relatively low levels of income among Latinos also contribute to why their rates of computer ownership and Internet use are lower than white, non-Latinos (these factors explain 26.6 and 21.0 percent of the gaps, respectively). Latinos have substantially lower levels of education than whites. These lower levels of education account for 22.5 percent of the white/Latino gap in home computer rates and 36.4 percent of the gap in Internet use rates.
- The explanations for low rates of computer and Internet use among Mexicans are similar to those found for all Latinos, however, the explanations differ somewhat for Cubans and Puerto Ricans. Education and income explain less of the Cuban/white gap in computer ownership, and education and income explain nearly 75 percent of the gap between Puerto Ricans and white, non-Latinos.
- Low levels of income explain 36.2 percent of the gap in computer ownership and 33.0 percent of the gap in home Internet use between Native Americans and whites. Low levels of education also explain a sizeable portion of the gaps (13.3 and 24.5 percent, respectively). Another factor that explains part of the gaps (4.2 and 4.7 percent) is the higher likelihood of Native Americans living in rural areas than whites.
- Language is an important determinant of computer ownership and Internet use even after controlling for education, family income and immigrant status. Spanish-speaking Latinos, especially Mexicans, have strikingly low rates of computer ownership and home Internet use.
- Only 1 out of 5 Mexicans in Spanish-speaking households has access to a home computer and less than *1 out of 20* Mexicans in Spanish-speaking households uses

the Internet at home. In fact, the 4.5 percent rate of Internet use for this group is only slightly higher than the national rates in Mexico (3.6 percent) and China (2.6 percent). Even after controlling for differences in education, family income, and other characteristics only 30.9 percent of Spanish-speaking Mexicans have access to home computers and a strikingly low 9.5 percent use the Internet at home. These rates are both nearly *50 percentage points* lower than the white, non-Latino rates.

- Concerns over privacy on the Internet do not appear to be contributing to racial disparities in Internet use. Estimates from the CPS indicate that 51.8 percent of whites are more concerned about privacy on the Internet than over the telephone. In comparison, 47.7 percent of blacks and 46.4 percent of Latinos expressed more concern about providing information over the Internet than over the telephone.

1. Introduction

A recent report entitled, "A Nation Online: How Americans Are Expanding Their Use of the Internet" by the U.S. Department of Commerce (2002) 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. A closer look at the data, however, reveals that we have a long way to go.¹ For example, less than 1 out of every 3 Latinos use the Internet and only 40 percent of African-Americans use the Internet. In contrast, 60 percent of white, non-Latinos use the Internet (U.S. Department of Commerce 2002).

This "Digital Divide" may have serious economic consequences for disadvantaged minority groups as information technology skills become increasingly important in the labor market, and the Internet is "expected to become a primary medium for communications, commerce, education, and entertainment in the 21st century" (U.S. General Accounting Office 2001).² Future economic, education and political

¹ 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 Servon 2002 for example). Inequality in access to technology, however, is an important metric for the digital divide and, as documented below, remains at alarming levels.

² The U.S. Department of Labor's 2002-03 Occupational Outlook Handbook lists Computer Software Engineers-Applications, Computer Support Specialists, Computer Software Engineers-Systems Software, Network and Computer Systems Administrators, and Network Systems and Data Communications Analysts as the five occupations that are projected to grow the fastest from 2000 to 2010. Freeman (2002) also provides evidence that 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. Furthermore, online-job search is also becoming increasingly popular. Monster.com posted 3.9 million resumes and 430,000 jobs in August 2000 (Autor 2001), and 15 percent of unemployed workers in December 1998 reported using the Internet to search for jobs (Kuhn and Skuterud 2000). Finally, Kuhn and

advancement for these groups may depend on access to computers, the Internet and broadband technology.³

Based on these concerns, a plethora of public and private programs in the United States have been created in recent years 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 (Puma, Chaplin, and Pape 2000). As of February 2001, \$5.8 billion has been committed to E-rate applicants.

Using data from the Computer and Internet Use Supplement to the September 2001 Current Population Survey (CPS), I document and explore the underlying causes of ethnic and racial differences in home computer and Internet use. The Supplement to the CPS, which is conducted by the U.S. Census Bureau and Bureau of Labor Statistics, contains detailed information on computer and Internet use by individuals not found in other government data sources.⁴ In this report, I examine whether ethnic and racial differences in the most likely "suspects" -- family income, education, occupation, and

Skuterud (2001) provide evidence that on-line job search reduces unemployment spells, and Fairlie (2003) finds that home computers increase school enrollment among teenagers.

³ Access to the Internet may also be increasingly important for consumers as it has lowered the price of many goods and services, provides extensive information on many products, and has made shopping more convenient (see Morton, Zettelmeyer and Risso 2000, Bakos 2001, Borenstein and Saloner 2001, and Ratchford, Talukdar and Lee 2001).

⁴ The CPS is representative of the entire U.S. populations and interviews approximately 50,000 households. The 2001 data are the most recent available and the next survey will be conducted in October 2003.

family structure -- have independent effects on disparities in home computer and Internet use. To date, we know very little about the importance of these potential causes.

2. Is There a Digital Divide?

Blacks and Latinos are substantially less likely to have a computer at home than are white, non-Latinos.⁵ Figure 1 and Table 1 report the fraction of all adults (ages 18 and over) who have a computer at home. Estimates from the 2001 CPS indicate that 66.3 percent of whites have access to a home computer. In contrast, only 42.0 percent of blacks and 41.8 percent of Latinos have access to a home computer. Asians have the highest rate of computer ownership at 75.4 percent, and Native Americans have a relatively low rate of ownership at 48.9 percent. For most groups, computer ownership rates are precisely estimated as evidenced by the small reported standard errors. Even the 95 percent confidence interval for the Native American home computer rate, which is the least precisely estimated adult rate for major ethnic and racial groups, is relatively small (46.3 to 51.6 percent).

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 1 displays the percent of adults (18 and over) who have access to a home computer by race for selected years from 1984 to 2001. These estimates are from the computer use supplements to the CPS and are reported in U.S. Bureau of the Census (1984, 1989, 1993, 1997). I calculate the estimates for 2000 and 2001 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 home computers. Over the past two decades, the racial gaps have declined in percentage terms, 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.

PATTERNS OF INTERNET USE

Racial differences in Internet use are also a cause of concern among policymakers. For example, the U.S. Department of Commerce (2000) has argued that economic advancement, educational advancement, and community participation are increasingly dependent on access to the Internet. Similarly, U.S. Department of Commerce (2002) 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 use the Internet at home. Half of all white, non-Latinos use the Internet at home. In contrast, only 27.1 percent of blacks and 22.7 percent of Latinos use the Internet at home. Asians have the highest rate of home Internet use at 52.6 percent and Native Americans have a relatively low rate at 31.3 percent.

Racial disparities in home Internet use have existed for several years (estimates are displayed in Figure 3). In 1997, the fraction of white, non-Latinos ages 18 and over that used the Internet at home was 16.7 percent. In contrast, only 5.8 and 5.7 percent of blacks and Latinos used the Internet at home, respectively (U.S. Bureau of the Census 1997). Both of these rates are roughly 35 percent of the white rate. Although Internet use has increased dramatically since 1997, racial disparities have changed only slightly.

⁵ Individuals of black, Asian, or Native American race can be of any Hispanicity.

Using the same age group (ages 18 and over) in 2001, I find that 50.0 percent of whites use the Internet at home, whereas only 27.1 percent of blacks and 22.7 percent of Latinos use the Internet at home. These estimates imply that the black/white ratio in home Internet use is 0.542 and the Latino/white ratio is 0.454. 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 in 1997 to more than 20 percentage points in 2001.

Estimates from March-May 2002 surveys by the Pew Internet & American Life Project indicate similar relative patterns of Internet use by race (Lenhart 2003). 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 use of the Internet anywhere.⁶ The U.S. Department of Commerce (2002) reports use of the Internet anywhere using the 2001 CPS. The Internet use anywhere rates are 59.9 percent for whites and 39.8 percent for blacks. Estimates from the March-May 2002 may also differ from the September 2001 estimates because of growth in the Internet population. Interestingly, Lenhart (2003) reports that estimates from ongoing Pew surveys indicate that growth in the Internet population has slowed or even stopped since late 2001. This finding is important and may suggest that the digital divide is also remaining stagnant.

⁶ The focus here is on Internet use at home because it most likely represents the highest quality access in terms of availability and represents by far the most common location of use (U.S. Department of Commerce 2002). Of those individuals who use the Internet anywhere, more than 80 percent use it at home.

LATINOS

Latinos are a heterogeneous group. It is well known, for example, that economic and educational outcomes differ greatly across Latino groups (U.S. Bureau of the Census 1993). Figure 1 and Table 1 report home computer and Internet rates for several Latino groups. As expected, computer and Internet use rates also differ across Latino groups. Mexican-Americans have the lowest rates among all reported Latino groups followed by Cubans who have the next lowest rates. Puerto Ricans, Latinos from Central and South America, and Other Latinos have higher rates. All Latino groups, however, are substantially less likely to own a computer or use the Internet at home than are white, non-Latinos.

The difference between Mexican-Americans and whites is striking. Less than 40 percent of Mexican-Americans own a computer, and less than one out five use the Internet 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 use among Latino groups. Only 41.4 percent of Cubans have a home computer and 24.9 percent use the Internet at home. These estimates, however, have relatively large standard errors of 2.5 and 2.2 percentage points, respectively.⁷ The low rates are somewhat surprising as Cubans have high income levels compared to other Latino groups (U.S. Bureau of the Census 1993). Puerto Ricans, Central and South Americans, and Other Latinos have higher rates of access to home computers and Internet use.

⁷ The 95% confidence intervals for these estimates are 41.4 percent plus or minus 5.0 percentage points and 24.9 percent plus or minus 4.6 percentage points, respectively.

CHILDREN

Children are more likely to have access to a home computer than are adults. Table 1 and Figure 4 report home computer rates by race/ethnicity for children ages 5 to 17. Most Latino groups are not reported separately due to small sample sizes. Among white, non-Latino school-age children, 83.6 percent have a home computer. In contrast, less than half of all black and Latino children have access to a computer at home. Among Mexican-American children, only 44.5 percent have access to a home computer. These ethnic and racial disparities in access among children are extremely large. 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. For example, the gap between white and Latino children is 35.1 percentage points compared to a white/Latino gap of 24.5 percentage points for adults. The gap between white and black children is 36.5 percentage points compared to 24.3 percentage points for adults.

Children also have a higher likelihood of using the Internet at home than do adults for most reported groups, but the differences are not large. Slightly more than 55 percent of white children use the Internet at home, compared to 27.2 and 23.0 percent of black and Latino children, respectively. These racial gaps in Internet use are slightly larger than those for adults. Asian children have the highest rate of home Internet use, however, their rate of use is not statistically different from the white rate.

CALIFORNIA

Are ethnic and racial patterns of access to technology different in California than in the rest of the United States? Table 2 and Figures 5 and 6 report estimates of computer ownership and home Internet use rates among Californians. Computer ownership and Internet use rates are higher in California than national levels for all reported groups. Several ethnic/racial groups are not reported for California because of small sample sizes. Even though home computer and Internet use rates are higher in California, blacks and Latinos have very low rates of use.⁸ Approximately half of all blacks residing in California have access to a home computer and only 34.6 percent use the Internet at home. Rates of use among Latinos are even lower. Only 44.4 percent of Californian Latinos have a home computer and only 21.0 percent use the Internet at home. Finally, only 41.9 percent and less than 1 out of 5 Mexican-Americans living in California have a computer and use the Internet at home, respectively.

Another interesting finding is that ethnic and racial differences in home computer and Internet use rates are roughly similar to those for the entire United States. Perhaps the only exception to this is that the white/Latino and white/Mexican Internet use rate gaps are larger in California than in the United States.

CHARACTERISTICS OF ACCESS TO TECHNOLOGY

Although access to home computers and the Internet represent the most common measures of inequality in access to technology, it may be useful to examine ethnic and

⁸ Estimates from statewide surveys conducted by the Public Policy Institute of California from 1999 to 2001 also provide evidence of ethnic and racial differences in computer and Internet use anywhere (Public Policy Institute of California 2001).

racial patterns in measures of other characteristics of access to computers or the Internet.⁹ For example, examining rates of computer ownership 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, blacks and Latinos are slightly more likely than are whites to own computers that were purchased in 2000 or 2001. The percent of white, black and Latino computer owners with computers purchased in 2000 or 2001 are 47.8, 48.7 and 52.7 percent, respectively.

White computer owners appear, however, to have access to more computers on average than do blacks and Latinos. Among white computer owners, 28.8 percent have access to 2 or more computers.¹⁰ In contrast, only 21.0 and 17.1 percent of black and Latino computer owners have access to 2 or more computers. Of course, not conditioning on computer ownership would accentuate these differences and suggests that whites, on average, have access to a much larger number of home computers than do blacks or Latinos.¹¹ Furthermore, blacks and Latinos tend to live in larger households than do whites suggesting that ethnic and racial disparities in "per capita" rates may be even larger.

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

⁹ Servon (2002) argues that the digital divide can be measured in terms of access, training, and content. She criticizes policymakers for focusing on access and not addressing these other measures.

¹⁰ The CPS questionnaire instructed the respondent to exclude old computers that are not used from the total.

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. Among white home Internet users, 19.7 percent have a high-speed connection. 16.1 percent of Black Internet users and 18.3 percent of Latino Internet users have high-speed connections. The results are consistent with Prieger (2003) who finds little evidence of unequal availability of broadband based on black or Hispanic concentrations across geographical areas.

4. What are the Underlying Causes of the Digital Divide?

REPORTED REASONS FOR NOT HAVING 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 responses to questions on reasons for nonuse. 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 3 reports the percent of responses to the Internet question by race/ethnicity.

As expected, cost is an important factor for disadvantaged minority groups. Nearly 40 percent 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, only 20 percent report that cost is the main reason that they do not currently have the Internet at home. Roughly 30 percent of Asians and Native Americans report cost as the main

¹¹ On average, whites have access to at least 0.91 home computers, whereas blacks and Latinos have access to 0.53 and 0.51 home computers, respectively.

factor. 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.

Ethnic and racial groups differ somewhat in the percentage who report that they do not have the Internet at home because they can use it somewhere else. None of the groups, however, has a high percentage of responses in this category. 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 libraries, community technology centers or friends' houses. The small percentages of responses also have important implications for how we think about Internet use. Apparently, Internet use at other locations is not a perfect substitute for use at home.

Very few adults reported that the main reason for not subscribing to Internet service was because of concerns about how children use it. The percentage in this category ranges from 0.0 to 2.6. Interestingly, however, a separate question in the CPS posed to all adults with children who did or did not have access to the Internet at home indicated higher levels of concern. The question asks "Compared to the material on television, how concerned are you about the kind of material children may be exposed to on the Internet?" Among whites, 70.4 percent reported that they were more concerned. Levels of concern among blacks and Hispanics were lower at 66.4 and 60.2 percent, respectively, suggesting that exposure concerns cannot explain a significant portion of the digital divide.

For all ethnic/racial groups, a large percentage of individuals reported that they did 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 (U.S. Department of Commerce 2002). Many individuals may 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.

HOME COMPUTER AND INTERNET USE 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 computer ownership and home Internet use are related to the characteristics of individuals. In particular, do the large ethnic and racial disparities in home computer and Internet use exist even after controlling for income? It is well known that ethnic and racial groups differ substantially in average levels of income (U.S. Census Bureau 1993) and that home computer and Internet use increase with income (Fairlie 2002). Figures 7 and 8 display home computer and Internet use 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 use the Internet. Even among individuals with family incomes of at least \$60,000, blacks and Latinos are substantially less likely to own a computer or use the Internet at home than are whites. Clearly, there must be additional factors at play.

THE CONTRIBUTIONS OF INCOME AND OTHER FACTORS TO THE DIGITAL DIVIDE IN COMPUTER OWNERSHIP?

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 use, we know very little about the underlying causes of these differences. A recent report by the U.S. Department of Commerce (2000) 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.¹² A simple "shift-share" analysis is used, however, to calculate this estimate, which 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 computer and Internet use. 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 computer and Internet use. The separate and independent effects of these variables will be estimated using regression models and decomposition techniques (e.g. Blinder 1973 and Oaxaca 1973). The decomposition techniques combine regression estimates and sample means to identify

how much a factor, such as income or education, explains of the disparity between two racial or ethnic groups in a specific outcome, such as computer or Internet use. They have been widely used to examine the causes of minority/white differences in wages (see Trejo 1997 for example). The technique is described in more detail in Fairlie (1999).

Table 4 reports estimates from this procedure for decomposing the gap in computer ownership rates between white, non-Latinos and each ethnic/racial group.¹³ 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, which are reported in Specification 1. The white/black gap in the home computer rate gap is large (0.244 or 24.4 percentage points). 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 computer ownership 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. In the sample of adults ages 25 and over, only 44.5 percent of blacks are currently married compared to 67.8 percent of whites. Lower marriage rates among

¹² Using selected years from 1984 to 1997, Krueger (2000) finds that family income and region of residence explain a large percentage of the gap between black and white children in computer use at school.

¹³ Estimates for California are not substantially different.

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 sample, only 12.2 percent of blacks have a Bachelor's degree, and only 5.4 percent of blacks have a graduate-level degree. In contrast, 19.0 and 10.3 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 9.4 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 27.4 percent of the white/black gap in the probability of having 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, they do not explain the entire gap. This finding, although more carefully estimated here, is similar to that discussed above. Thus, low levels of computer ownership among blacks are not simply due to an inability to purchase computers. In fact, 80.7 percent of blacks with family incomes of \$60,000 or more have a home computer, whereas 88.3 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 computer ownership. Racial differences in regional

distributions explain 3.8 percent of the gap, and racial differences in central city status explain virtually none of the gap. Although blacks are much more likely to live in the central city than are whites, the contribution is essentially zero because central city status does not affect home computer ownership. Finally, racial differences in employment/occupational distributions explain only 2.8 percent of the white/black gap.

The disparity between the rate of computer ownership among white, non-Latinos and Latinos is also large (0.242). Specification 2 of Table 4 reports the decomposition results for this gap. 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 7.6 percent of Latinos have Bachelor's degrees and 3.7 percent have graduate degrees compared to 19.0 and 10.3 percent for whites, respectively. The decomposition results indicate that these lower levels of education are a major cause of why relatively few Latinos own home computers. Racial differences in education explain 22.5 percent of the white/Latino gap in home computer rates.

Relatively low levels of income among Latinos also contribute greatly to the gap in computer ownership. The results indicate that 26.6 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 75.1 percent of Latinos

have a home computer compared to 88.3 percent of whites. To be sure, income differences are important, but they cannot explain everything.

Occupational differences explain a smaller part of the gap. 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 than Latinos overall. The white/Mexican gap in computer rates is 0.296 or 29.6 percentage points. The explanations for the disparities are similar, however. Mexicans are less likely to own computers than are white, non-Latinos because they have lower levels of education and income, on average. These two factors alone explain nearly half of the gap in home computer rates.

The explanations differ somewhat for other Latino groups. Education and income explain less of the Cuban/white gap in computer ownership. The smaller contribution is due to the higher levels of education and family income found among Cubans than Latinos overall or Mexicans. In contrast, education and income explain nearly 75 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 0.139 or 13.9 percentage points. Finally, the results for Central/South Americans are fairly similar to those for the entire Latino group. Again, education and income are the key factors.

Native Americans also have a relatively low rate of computer ownership (the gap is 0.199 or 19.9 percentage points). Low levels of income among Native Americans appear to be the most important factor explaining 36.2 percent of the gap. Low levels of education also explain a sizeable portion of the gap (13.3 percent). Another factor that explains part of the gap (4.2 percent) is the higher likelihood of Native Americans living in rural areas than whites.

WHAT EXPLAINS THE DIGITAL DIVIDE IN HOME INTERNET USE?

Generally the same factors that explain racial disparities in computer ownership are responsible for group differences in home Internet use (estimates are reported in Table 5).¹⁴ The most notable change is that education is now a more important factor. In fact, for all of the Latino groups relatively low education levels have replaced low-income levels as the most important factor explaining disparities in Internet use. 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 15.6 to 33.0 percent of the gaps in Internet use. For blacks and Native Americans, relatively low levels of income remain the most important determinant of disparities in home Internet use.

4. Explanations for Remaining Differences

LANGUAGE BARRIERS

Language may represent another important factor limiting computer and Internet use 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 (2001) 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 (2001) also reports that 94 percent of links to secure servers are in English. 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 (U.S. Department of Commerce, 2002). 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 use computers and the Internet. Unfortunately, I cannot examine patterns for ethnic/racial groups speaking other languages. Table 6 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.

¹⁴ Estimates for California are not substantially different.

Mexicans in Spanish-speaking households are much less likely to have a home computer and use the Internet than are Mexicans in non-Spanish speaking households. Their rates of computer ownership and home Internet use are alarmingly low. Only 1 out of 5 Mexicans in Spanish-speaking households has access to a home computer and less than *1 out of 20* Mexicans in Spanish-speaking households uses the Internet at home. In fact, the 4.5 percent rate of Internet use is only slightly higher than the national rates in Mexico (3.6 percent) and China (2.6 percent) (International Telecommunications Union 2003). 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 6 also reports adjusted computer and Internet rates that control for group differences in gender, age, 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 computer ownership and home Internet use rates that are remarkably lower than white, non-Latino rates. Controlling for differences in education, family income, and other characteristics only 30.9 percent of Spanish-speaking Mexicans have access to home computers and a strikingly low 9.5 percent use the Internet at home. These rates are both nearly *50 percentage points* lower than the white, non-Latino rates.

For every other Latino group, home computer and Internet use 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 use 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. A second set of adjusted rates is reported in Table 6. 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 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 computer ownership and Internet use even after controlling for education, family income and immigrant status. Spanish-speaking Latinos, especially Mexicans, have strikingly

low rates of computer ownership and home Internet use. 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.

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?" Estimates from the CPS indicate that 51.8 percent of whites are more concerned about privacy on the Internet than over the telephone. In comparison, 47.7 percent of blacks and 46.4 percent of Latinos expressed more concern about providing information over the Internet than over the telephone. Concerns over privacy on the Internet do not appear to be contributing to racial disparities in Internet use.

5. Conclusions

Estimates from the Computer and Internet Use Supplements to the September 2001 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 home computers and use the Internet at home than are white, non-Latinos. Asians have home computer and Internet use rates that are higher than white, non-Latino rates, and Native Americans have lower rates. The Digital Divide also appears to be

larger for children than for adults, but generally similar in magnitude in California as in the entire United States.

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

Estimates also indicate that language is an important determinant of computer ownership and Internet use 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 computer ownership and home Internet use. 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.

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, healthcare, or job training, that it warrants redistributive policies.¹⁵ Policy makers cannot agree on an answer to this question.¹⁶ The Department of Agriculture, Commerce, Education, Health

¹⁵ Access to information technology may also help disadvantaged minorities overcome some of these other problems by enabling them to earn more and accumulate wealth (Noll, et al. 2000 and Thomas Rivera Policy Institute 2002).

¹⁶ See Noll, et al. (2000) and Crandall (2000) for an example of the academic debate.

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 \$5.8 billion as of February 2001 (Puma, Chaplin, and Pape 2000). More recently, however, the current Chairman 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 (Servon 2002).

The finding that language barriers among Latinos are a leading cause of the digital divide is especially important for California state policy. Recently the Department of Motor Vehicles introduced a new Spanish language web site. In addition, there is a new California Courts' Online Self-Help Center providing legal information in Spanish and a few other languages. As of Fall 2003, however, these appear to be the only web sites linked to the official State of California Web Page that offer access in Spanish. Surprisingly, *none* of the direct links to educational or employment resources from www.ca.gov is in Spanish.

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. 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 on closing the digital divide. In fact, they may have little effect at all if Latinos continue to have low rates of computer

and Internet use. Perhaps an expansion of access to computers and the Internet in community technology centers and libraries is needed to address these concerns. Expanding access along these lines may represent a good use of funds from the recently created Digital Divide Fund administered by the California Public Utilities Commission.

Finally, the findings from this research have 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 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 disadvantaged schoolchildren at an educational disadvantage.¹⁷

¹⁷ Furthermore, Fairlie (2003) finds evidence that home computers increase the likelihood of school enrollment among teenagers.

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Figure 1
Home Computer and Internet Use by Race/Ethnicity among Adults (Ages 18+), United States
Current Population Survey , 2001

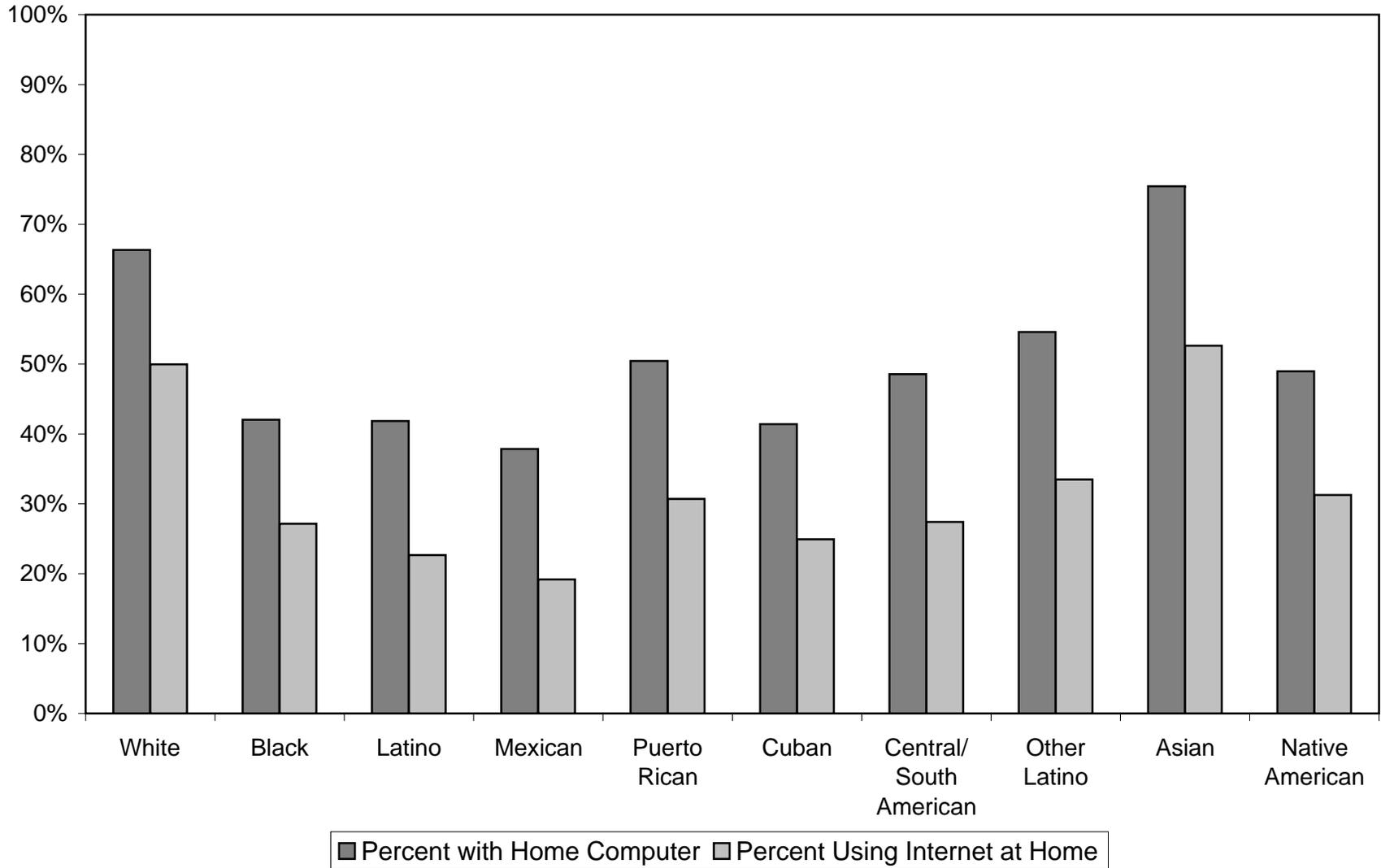


Figure 2
Percent of U.S. Population (Ages 18+) with Access to a Home Computer by Race/Ethnicity
Current Population Survey, 1984-2001

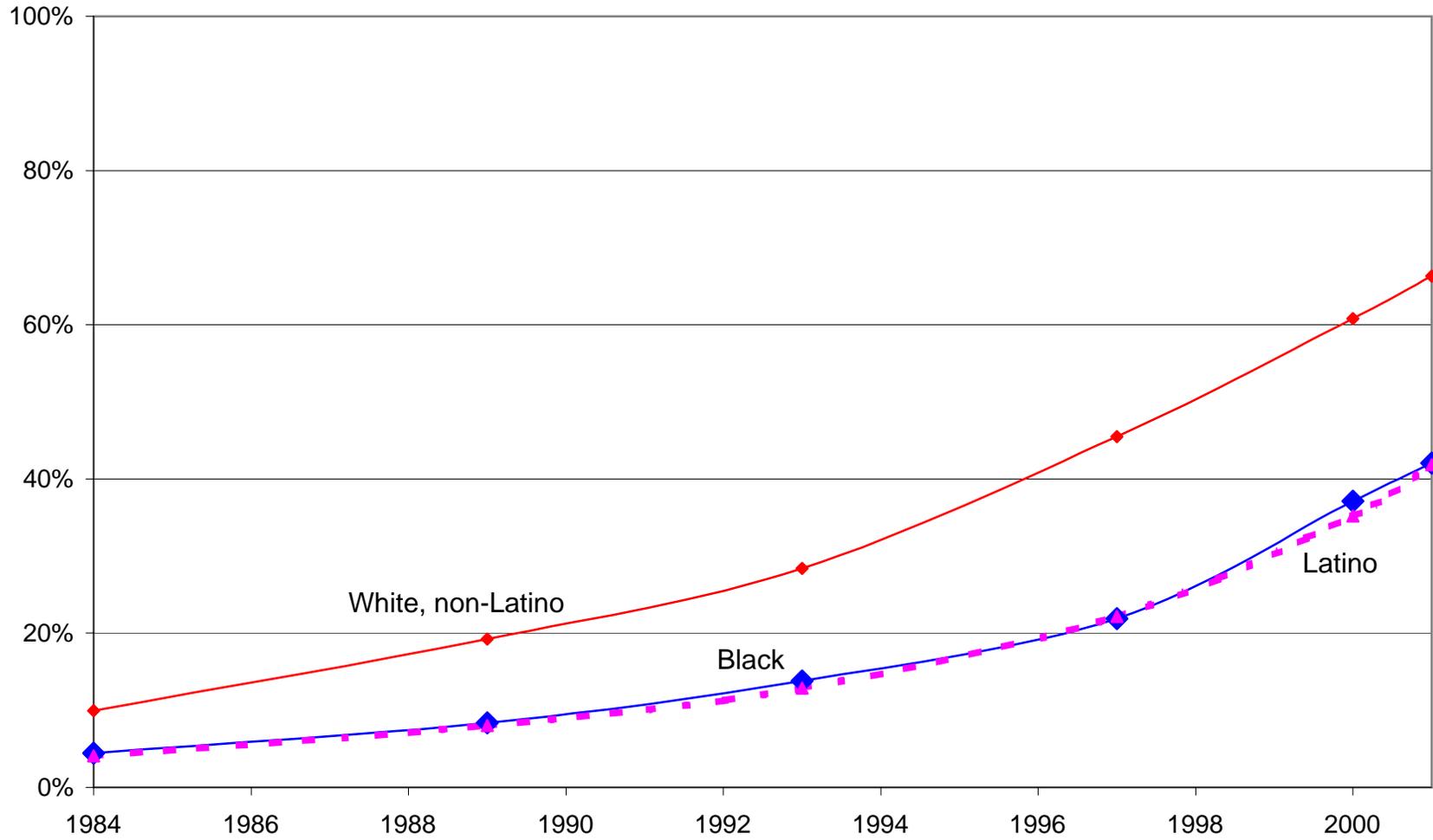


Figure 3
Percent of U.S. Population (Ages 18+) Who Use the Internet at Home by Race/Ethnicity
Current Population Survey, 1997-2001

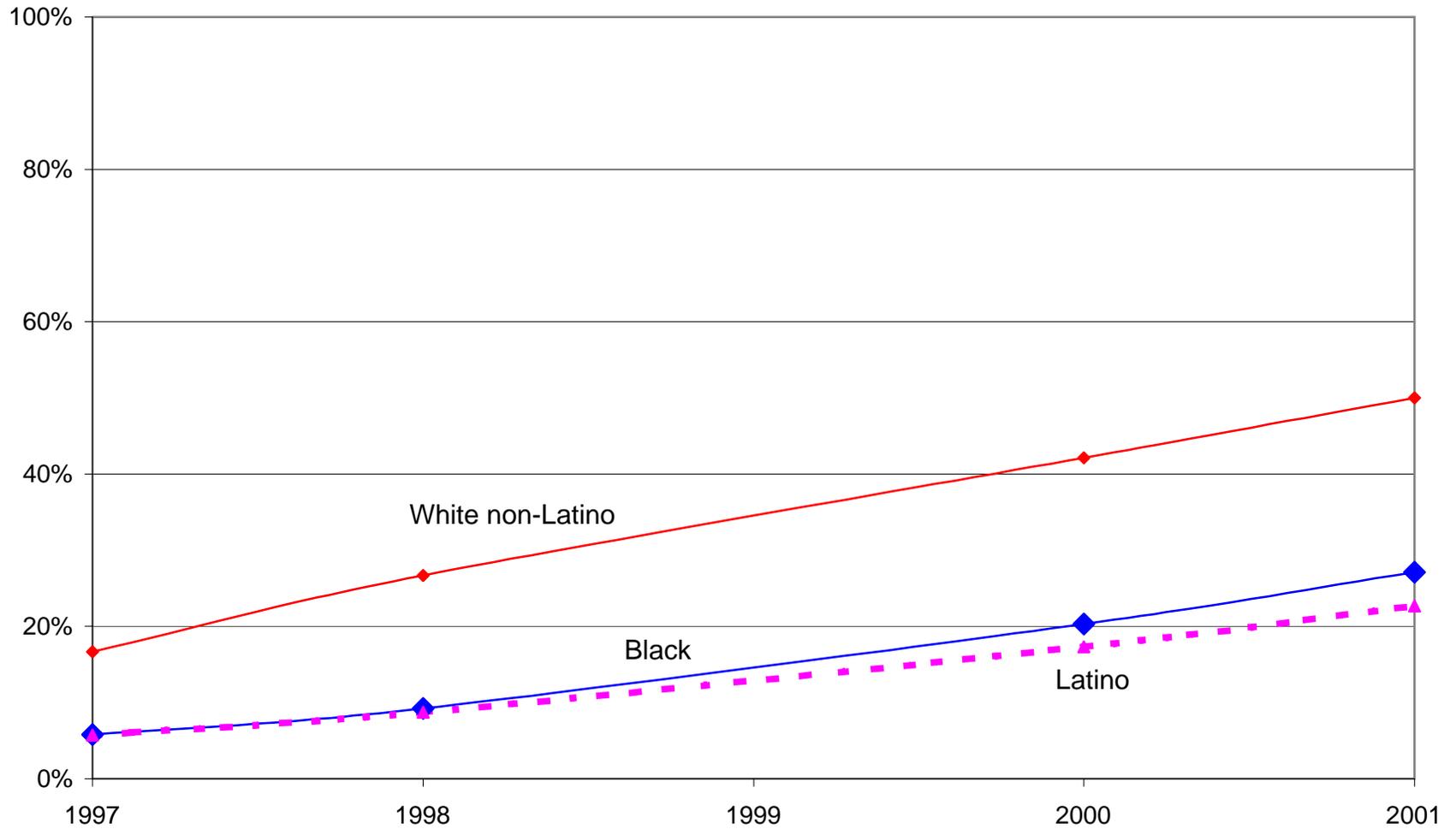


Figure 4
Home Computer and Internet Use by Race/Ethnicity among Children (Ages 5-17), United States
Current Population Survey , 2001

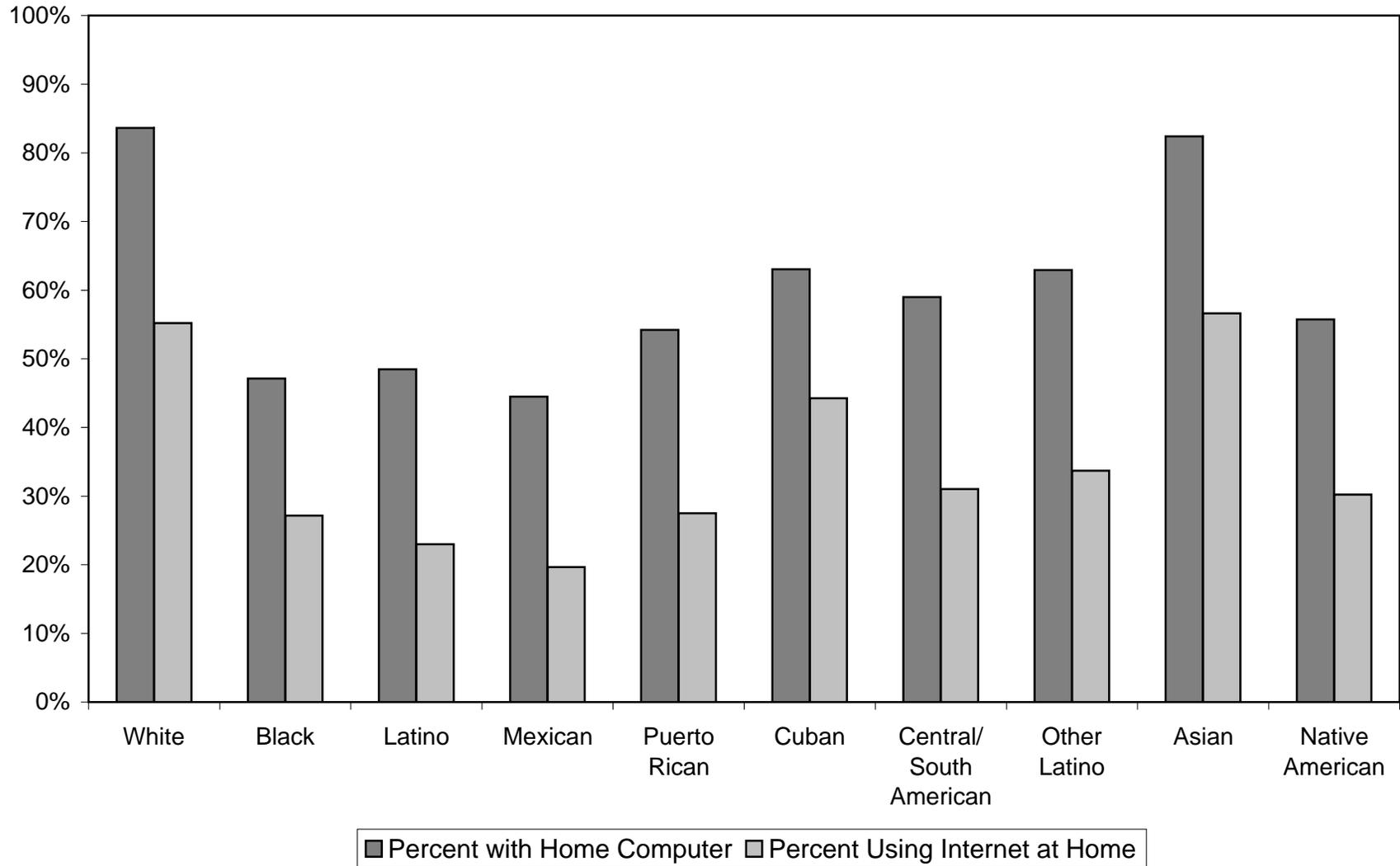


Figure 5
Home Computer and Internet Use by Race/Ethnicity among Adults (Ages 18+), California
Current Population Survey , 2001

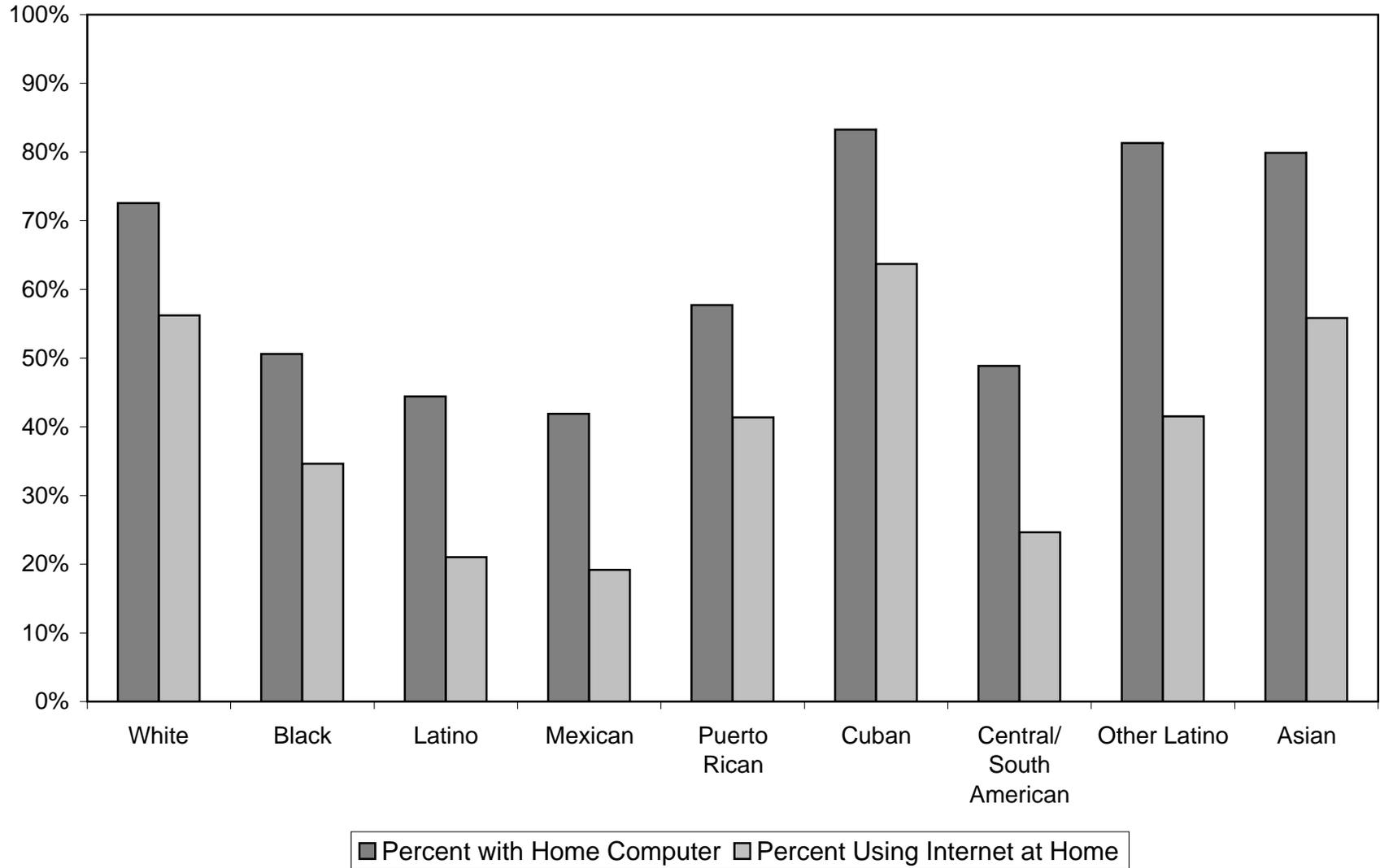


Figure 6
Home Computer and Internet Use by Race/Ethnicity among Children (Ages 5-17), California
Current Population Survey , 2001

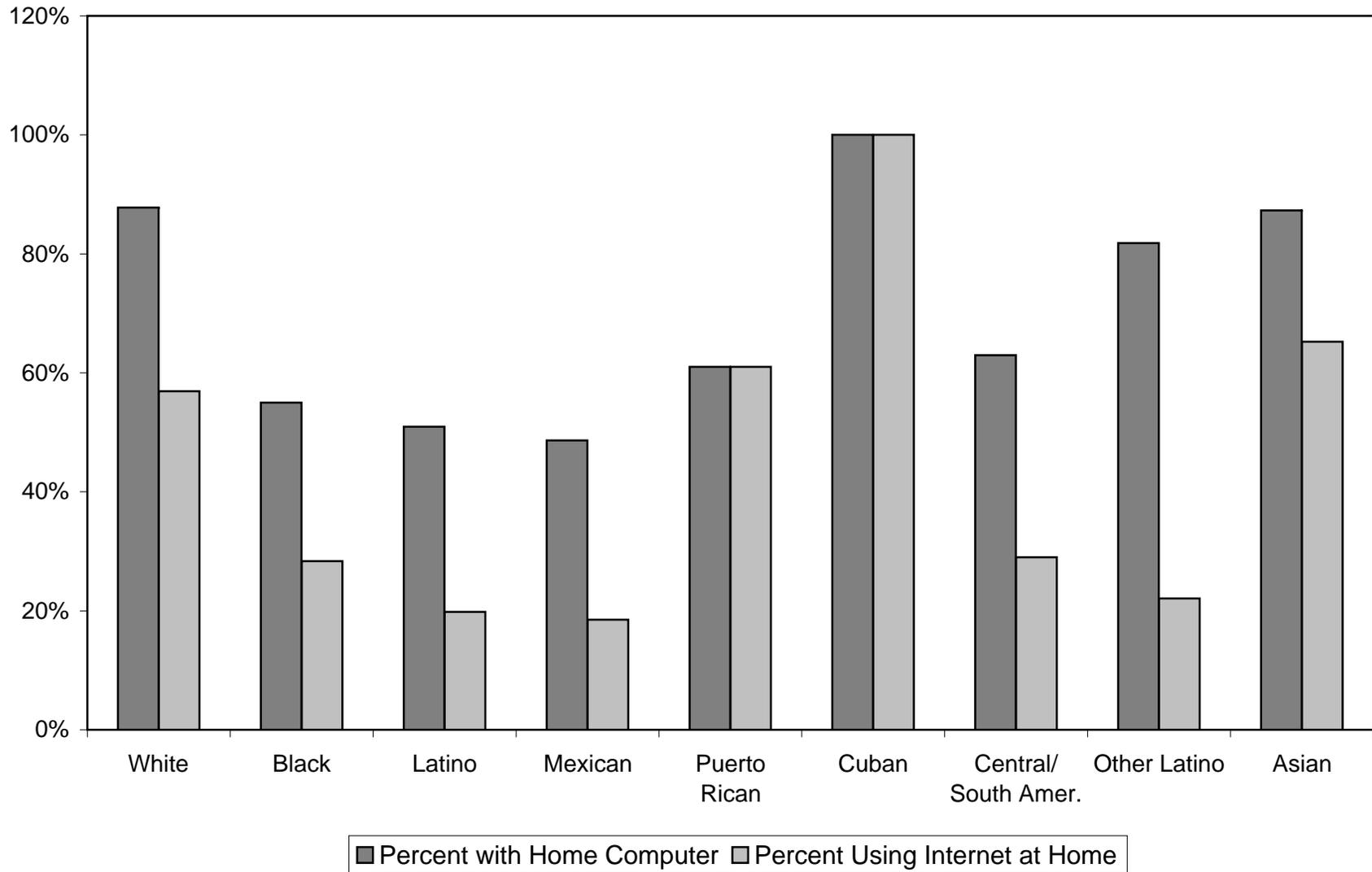


Figure 7
Percent of Adults (Ages 18+) who Have a Home Computer by Income and Race/Ethnicity
United States, Current Population Survey, 2001

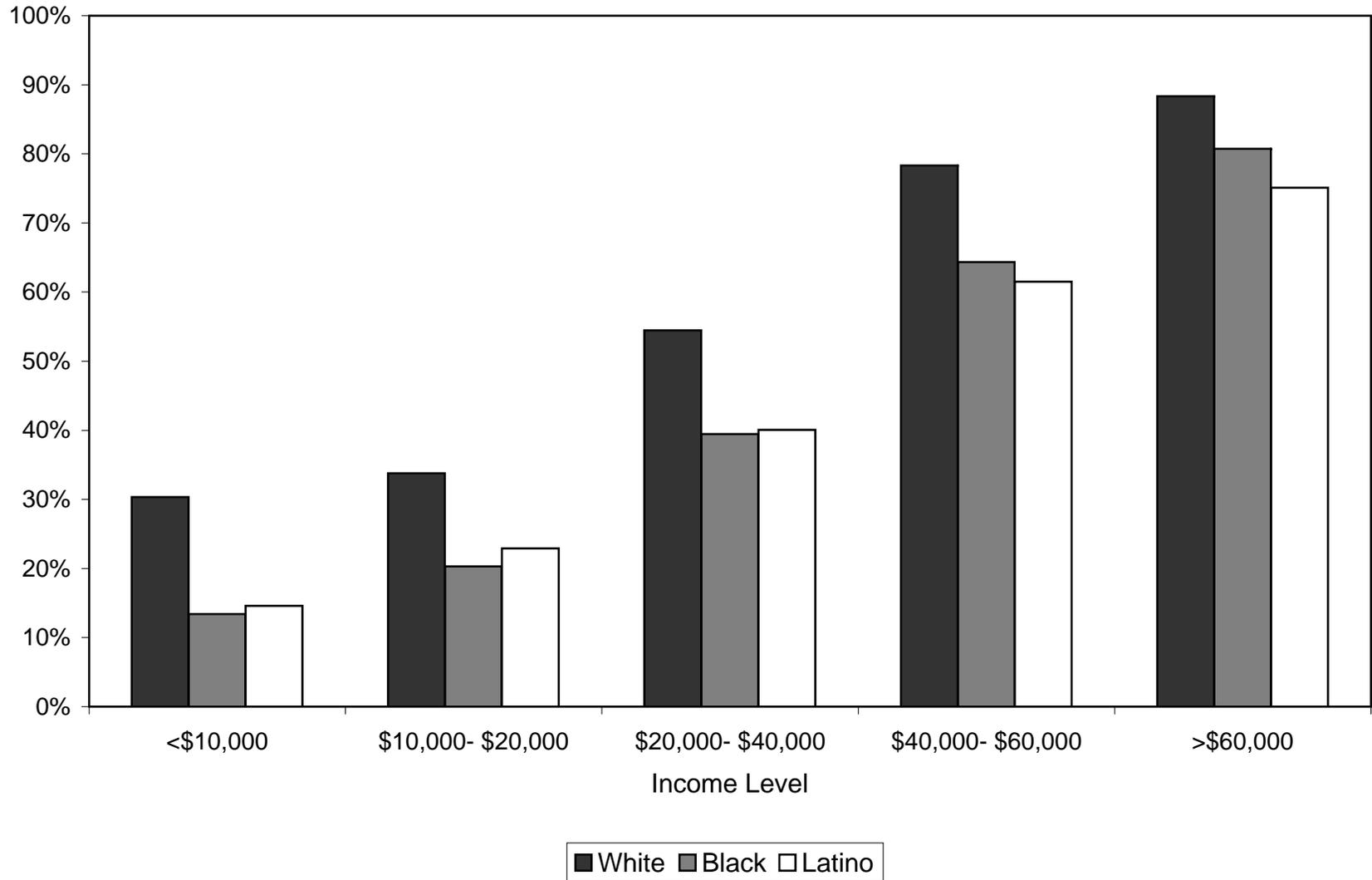


Figure 8
Percent of Adults (Ages 18+) who Use the Internet at Home by Income and Race/Ethnicity
United States, Current Population Survey, 2001

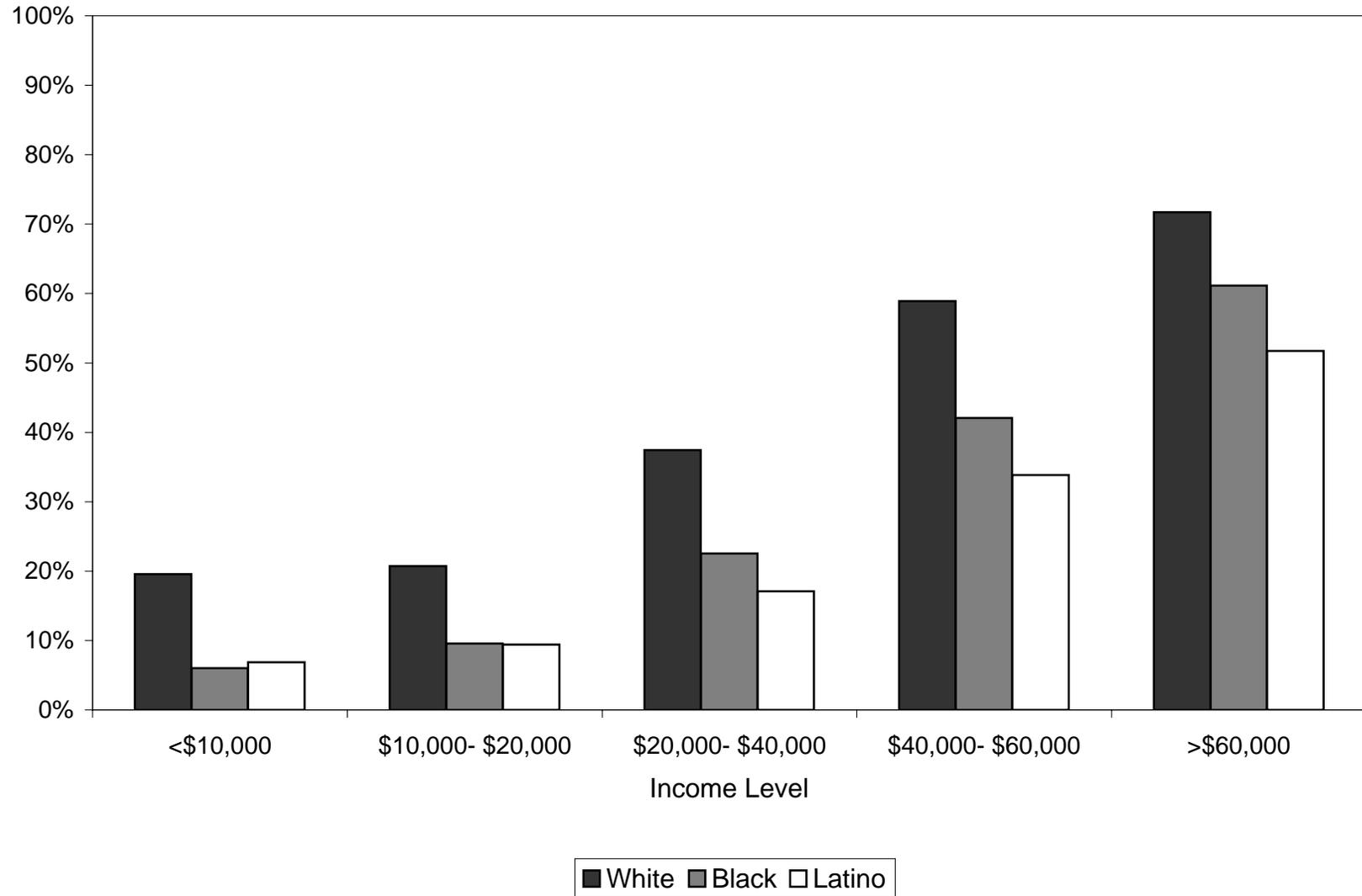


Table 1
Home Computer and Internet Use by Race/Ethnicity, United States
Current Population Survey, 2001

	Percent with Home Computer	Standard Error	Percent Using Internet at Home	Standard Error	Sample Size
Adults (Ages 18+)					
White	66.3%	0.2%	50.0%	0.2%	81,306
Black	42.0%	0.5%	27.1%	0.4%	10,064
Latino	41.8%	0.5%	22.7%	0.4%	8,833
Mexican	37.9%	0.7%	19.2%	0.5%	5,422
Puerto Rican	50.5%	1.7%	30.7%	1.5%	892
Cuban	41.4%	2.5%	24.9%	2.2%	384
Central/South American	48.6%	1.3%	27.4%	1.2%	1,442
Other Latino	54.6%	1.9%	33.5%	1.8%	693
Asian	75.4%	0.7%	52.6%	0.8%	4,155
Native American	48.9%	1.3%	31.3%	1.2%	1,407
Children (Ages 5-17)					
White	83.6%	0.3%	55.2%	0.4%	19,365
Black	47.1%	0.8%	27.2%	0.7%	3,589
Latino	48.5%	0.9%	23.0%	0.7%	3,288
Mexican	44.5%	1.1%	19.7%	0.8%	2,196
Puerto Rican	54.2%	2.6%	27.5%	2.3%	368
Central/South American	59.0%	2.4%	31.0%	2.3%	407
Asian	82.4%	1.1%	56.6%	1.5%	1,107
Native American	55.7%	2.0%	30.2%	1.8%	648

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

Table 2
Home Computer and Internet Use by Race/Ethnicity, California
Current Population Survey, 2001

	Percent with Home Computer	Standard Error	Percent Using Internet at Home	Standard Error	Sample Size
Adults (Ages 18+)					
White	72.6%	0.7%	56.2%	0.8%	3,730
Black	50.6%	2.3%	34.6%	2.2%	488
Latino	44.4%	1.1%	21.0%	0.9%	2,062
Mexican	41.9%	1.2%	19.2%	1.0%	1,672
Central/South American	48.9%	2.9%	24.7%	2.5%	294
Asian	79.9%	1.4%	55.9%	1.7%	877
Children (Ages 5-17)					
White	87.8%	1.2%	56.9%	1.8%	793
Black	55.0%	3.9%	28.4%	3.5%	164
Latino	51.0%	1.7%	19.8%	1.3%	874
Mexican	48.7%	1.8%	18.5%	1.4%	749
Asian	87.3%	2.3%	65.2%	3.3%	207

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

Table 3
Main Reason for not Having the Internet at Home among Adults (Ages 18+) by Race/Ethnicity
Current Population Survey, 2001

	Too Expensive	Can Use It Somewhere Else	Concerned about How Children Use It	Don't Want It	Other	Sample Size
White	19.4%	5.1%	1.3%	54.8%	19.4%	32,506
Black	38.9%	3.6%	1.1%	39.5%	16.9%	6,566
Latino	39.5%	2.9%	1.6%	38.7%	17.4%	5,904
Mexican	39.1%	3.1%	1.6%	38.9%	17.3%	3,942
Puerto Rican	36.6%	1.9%	0.1%	42.6%	18.8%	492
Cuban	38.3%	1.7%	0.0%	46.8%	13.2%	237
Central/South American	46.0%	3.8%	2.6%	31.3%	16.4%	858
Other Latino	32.2%	1.2%	2.3%	41.3%	23.0%	375
Asian	30.0%	8.2%	1.9%	40.3%	19.5%	1,382
Native American	32.3%	3.6%	1.2%	38.7%	24.1%	870

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.

Table 4
Decomposition of Racial/Ethnic Gaps in Home Computer Rates

	Black	Latino	Mexican	Cuban	Puerto Rican	Central/ South Amer.	Native Amer.
White/minority gap in home computer rate	0.244	0.242	0.296	0.224	0.139	0.170	0.199
Contributions from racial differences in:							
Sex and age	-0.011 -4.6%	-0.025 -10.5%	-0.028 -9.6%	0.005 2.4%	-0.020 -14.4%	-0.028 -16.6%	-0.021 -10.5%
Marital status and children	0.023 9.6%	-0.001 -0.2%	-0.004 -1.3%	0.009 3.8%	0.011 7.7%	0.000 0.2%	0.011 5.4%
Education	0.023 9.4%	0.054 22.5%	0.063 21.3%	0.033 14.7%	0.045 32.1%	0.044 25.5%	0.027 13.3%
Income	0.067 27.4%	0.064 26.6%	0.072 24.3%	0.046 20.4%	0.063 45.2%	0.048 28.4%	0.072 36.2%
Region	0.009 3.8%	-0.010 -4.1%	-0.013 -4.3%	0.005 2.2%	-0.002 -1.3%	-0.009 -5.0%	-0.011 -5.6%
Central city status	0.001 0.3%	-0.002 -0.8%	-0.002 -0.5%	-0.006 -2.9%	-0.002 -1.3%	-0.004 -2.3%	0.008 4.2%
Employment / Occupation	0.007 2.8%	0.015 6.3%	0.019 6.3%	0.006 2.8%	0.006 4.0%	0.017 9.7%	0.009 4.4%
All included variables	0.119 48.6%	0.096 39.7%	0.107 36.1%	0.097 43.3%	0.100 72.0%	0.068 40.0%	0.094 47.4%

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

Table 5
Decomposition of Racial/Ethnic Gaps in Home Internet Use Rates

	Black	Latino	Mexican	Cuban	Puerto Rican	Central/ South Amer.	Native Amer.
White/minority gap in home computer rate	0.234	0.274	0.319	0.234	0.176	0.232	0.193
Contributions from racial differences in:							
Sex and age	-0.020 -8.5%	-0.045 -16.5%	-0.051 -16.0%	0.002 0.8%	-0.036 -20.6%	-0.046 -20.0%	-0.035 -18.2%
Marital status and children	0.018 7.8%	0.000 -0.1%	-0.002 -0.7%	0.001 0.5%	0.010 5.6%	-0.001 -0.5%	0.010 5.2%
Education	0.037 15.6%	0.101 36.6%	0.121 38.0%	0.049 20.9%	0.074 42.0%	0.077 33.2%	0.049 25.6%
Income	0.057 24.4%	0.057 20.8%	0.062 19.5%	0.039 16.6%	0.054 30.8%	0.050 21.6%	0.065 33.8%
Region	0.004 1.7%	-0.007 -2.5%	-0.008 -2.6%	-0.003 -1.1%	-0.001 -0.5%	-0.006 -2.8%	-0.008 -4.0%
Central city status	0.000 0.2%	-0.001 -0.5%	-0.001 -0.3%	-0.005 -2.1%	-0.002 -0.9%	-0.003 -1.2%	0.009 4.6%
Employment / Occupation	0.010 4.2%	0.022 7.9%	0.026 8.1%	0.009 4.0%	0.008 4.8%	0.024 10.3%	0.014 7.3%
All included variables	0.106 45.5%	0.126 45.8%	0.147 45.9%	0.093 39.7%	0.108 61.2%	0.094 40.6%	0.105 54.4%

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

Table 6
Adjusted Home Computer and Internet Use by Race/Ethnicity, United States
Current Population Survey, 2001

	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	68.1%	68.1%	68.1%	51.2%	51.2%	51.2%	60,467
Latino							
Mexican / non-Spanish	46.0%	47.0%	47.1%	23.9%	27.8%	29.6%	2,769
Mexican / Spanish only	21.2%	30.9%	31.1%	4.5%	9.5%	11.5%	980
Puerto Rican / non-Spanish	57.3%	64.1%	64.1%	33.9%	41.4%	40.9%	538
Puerto Rican / Spanish only	31.9%	54.6%	54.6%	16.9%	36.3%	35.9%	104
Cuban / non-Spanish	54.0%	57.8%	58.0%	31.8%	32.8%	36.7%	186
Cuban / Spanish only	26.3%	35.3%	35.5%	15.8%	23.7%	27.9%	117
Central/South American / non-Spanish	62.8%	62.0%	62.3%	36.5%	36.8%	41.8%	669
Central/South American / Spanish only	30.9%	40.1%	40.4%	9.8%	16.7%	20.3%	343

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).