

HOW DO WE READ? LET'S COUNT THE WAYS

Comparing Digital, Audio, and Print-Only Readers



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Comparing Digital, Audio, and Print-Only Readers

March 2020

NATIONAL ENDOWMENT FOR THE ARTS

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Washington, D.C. 20506

202-682-5400

arts.gov

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About the Report

This report analyzes data from the 2017 Survey of Public Participation in the Arts (SPPA), which the National Endowment for the Arts conducted in partnership with the U.S. Census Bureau. It gives a statistical overview of how the nation's adults engage with leisure reading and other literary activities, such as author readings, book clubs, and creative writing. The survey identifies three groups of adults: nonreaders, print-only readers, and digital/audio readers. (The latter category describes adults who read e-books or listened to audiobooks, but who also may have read books in print.)

Previous reports from the National Endowment for the Arts have shown long-term declines in book-reading and in the reading of literary texts—e.g., novels and short stories. For those who care about the future of books and literature, the new report attests to the vitality of digital and audio platforms in today's literary culture. For example, when we account for adults who listen to audiobooks, the total number of adults who engage with books is more comparable to figures from previous years. Also, the data show that while older readers read books at higher rates than do younger adults, digital/audio reading is more common among younger than older readers. Indeed, digital/audio readers consume more books on average and engage in other cultural activities at higher rates than do print-only readers.

Results in Brief

- 1. More than half of all U.S. adults (55 percent, or 132 million) engage in some form of book-reading, whether via print or digital media, or listening to audiobooks.**
 - Digital/audio readers now represent a larger share of adults than do print-only readers.
 - Previous research has shown a decline in the percentage of adults who read books. However, when the 2017 percentage is adjusted to include adults who listen to audio-books, the overall rate of book-reading is somewhat closer to those in previous years.
- 2. Younger readers, especially 18-24-year-olds, are more likely than older adults to be digital/audio readers who also may be reading print books.**
 - Digital/audio readers consume more books per year than do other types of readers.
 - Adults aged 65 and older are more likely than other age groups to be print-only readers.
- 3. Readers of poetry and graphic novels are more likely to be digital/audio readers than print-only readers.**
 - By contrast, readers of novels or short stories or works of biography, history, and religion, are more likely to be print-only readers.
- 4. Digital/audio readers frequently engage in other cultural activities and support the arts.**
 - Print-only readers engage with and support the arts more than nonreaders do, but they consistently report lower levels of support than digital/audio readers.

For decades, the Arts Endowment has enriched the literary arts in America by funding projects such as online journals, literary websites, author readings, and print publications. The agency sponsors two national literary initiatives: NEA Big Read and Poetry Out Loud. Additionally, the Arts Endowment supports American literature through creative writing fellowships and brings foreign works of literary excellence to American readers through translation fellowships.

Preface

This report is designed to improve public understanding of how Americans from various backgrounds engage with books and literature. Using nationally representative data, the report looks at who is reading books in print and who is reading in digital formats. It also considers whether reading on different platforms is linked with other forms of literary and arts participation. Greater awareness of these factors and relationships can enable cultural service providers to reach into segments of the U.S. population that are more disposed to reading or art-going than otherwise may be apparent.

The primary data source for this report is the 2017 Survey of Public Participation in the Arts (SPPA). The SPPA, which is conducted periodically by the Arts Endowment in partnership with the U.S. Census Bureau, was also the source for three previous reports on reading: *Reading at Risk* (2004), *To Read or Not To Read* (2007), and *Reading on the Rise* (2008).

Those earlier reports chronicled persistent declines in book-reading and in the reading of specific literary genres, notwithstanding a small gain for fiction-reading in 2007. More recent SPPA data suggest that book-reading rates are holding flat, while the reading of fiction (novels and short stories) is occurring at an even lower rate than before. On the other hand, in 2017, for the first time in the survey's history, the poetry-reading rate actually doubled.

The present report examines how this story is affected by the rise of new digital platforms for engaging with literature. In particular, the report considers how smartphones, tablets, e-readers, and online reading in general are affecting the total composition of book-readers in this country and their other literary and cultural practices. This analysis is possible largely because of question-items unique to the 2017 SPPA. By including the share of U.S. adults who listened to audio-books, as well as those who read via digital platforms, a new picture of the contemporary reader begins to emerge.

Office of Research & Analysis
National Endowment for the Arts
March 2020

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Terms and Definitions

Technology has expanded the range of opportunities for Americans to read books and engage with other types of literary activity. In this analysis, based on question-items from the 2017 Survey of Public Participation in the Arts (SPPA),¹ we identify three categories of adults according to whether they reported reading or listening to books in the prior 12 months:

- **Nonreaders**
 - Did *not* read *any* books outside work or school, whether print or digital, *and* . . .
 - . . . did *not* listen to audiobooks
- **Print-only readers**
 - Read books outside work or school, *but* . . .
 - . . . did *not* use an electronic device to read or listen to books
- **Digital/audio readers**
 - Read books outside work or school, *and* . . .
 - . . . used an electronic device to read and/or listen to books
 - . . . *may* have read print books as well

For the third category (**digital/audio readers**), the 2017 SPPA allows us to delve more deeply and arrive at three subgroup classifications:

- **eBook readers**
 - Used an electronic device to read books, *but* . . .
 - . . . did *not* listen to audiobooks
 - . . . *may* have read print books as well
- **Audiobook listeners**
 - Listened to audiobooks, *but* . . .
 - . . . did *not* use an electronic device to read books
 - . . . *may* have read print books as well
- **Digital readers and listeners**
 - Used an electronic device to read books, *and* . . .
 - . . . listened to audiobooks
 - . . . *may* have read print books as well

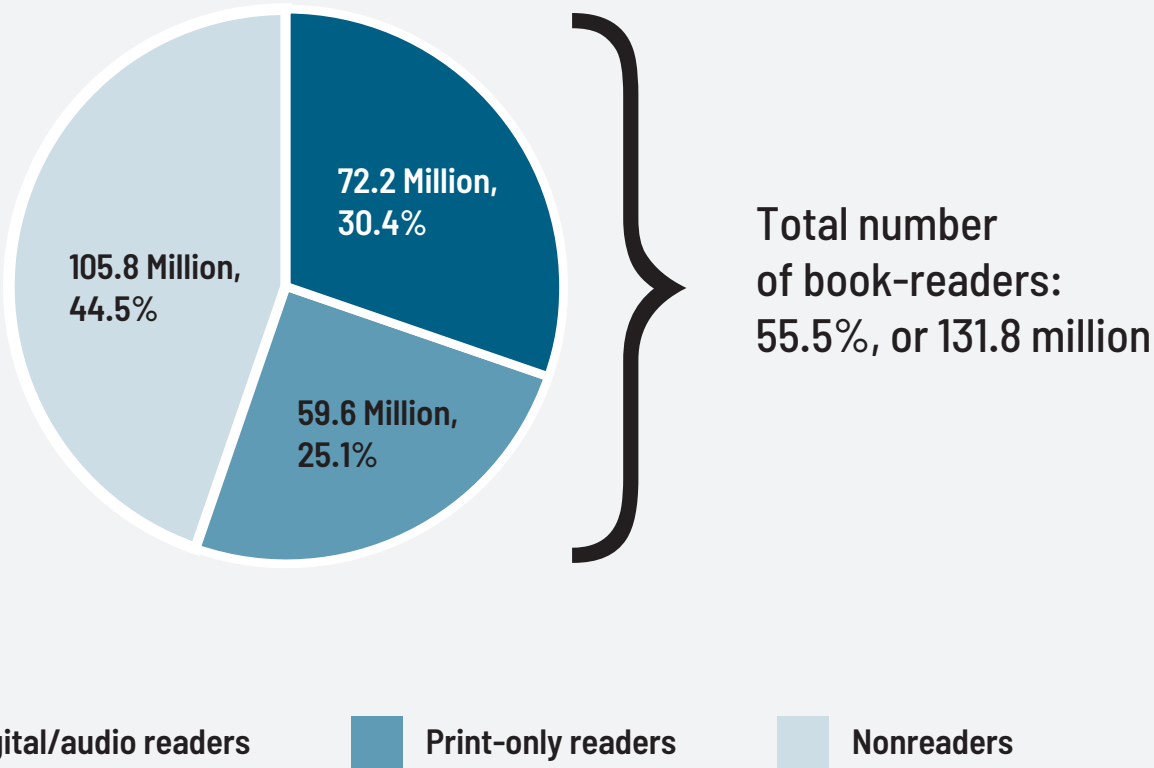
Using these reader categories, we can compare various characteristics of digital/audio readers with those of print-only readers and nonreaders. Among those characteristics are demographic traits, frequency of reading, preferences for different literary genres, and levels of engagement with other literary and cultural activities. For information on the historical background for this analysis, see Appendix A.

¹ The analysis incorporates responses to three different survey questions: one that asks respondents whether they read books outside work or school; another that asks adults who responded affirmatively to that question whether any books were read with electronic devices, and another that asks respondents (no matter whether they responded affirmatively to the first question) whether they listened to audiobooks (see the Technical Appendix p. 54 for more details). The question about audiobooks does not ask respondents to exclude audiobooks that may have been required for work or school.

Executive Summary

1. More than half of U.S. adults (55 percent, or 131.8 million) read books in some format, whether through digital/audio or print-only media. Digital/audio readers now represent a larger share of adults than do print-only readers.

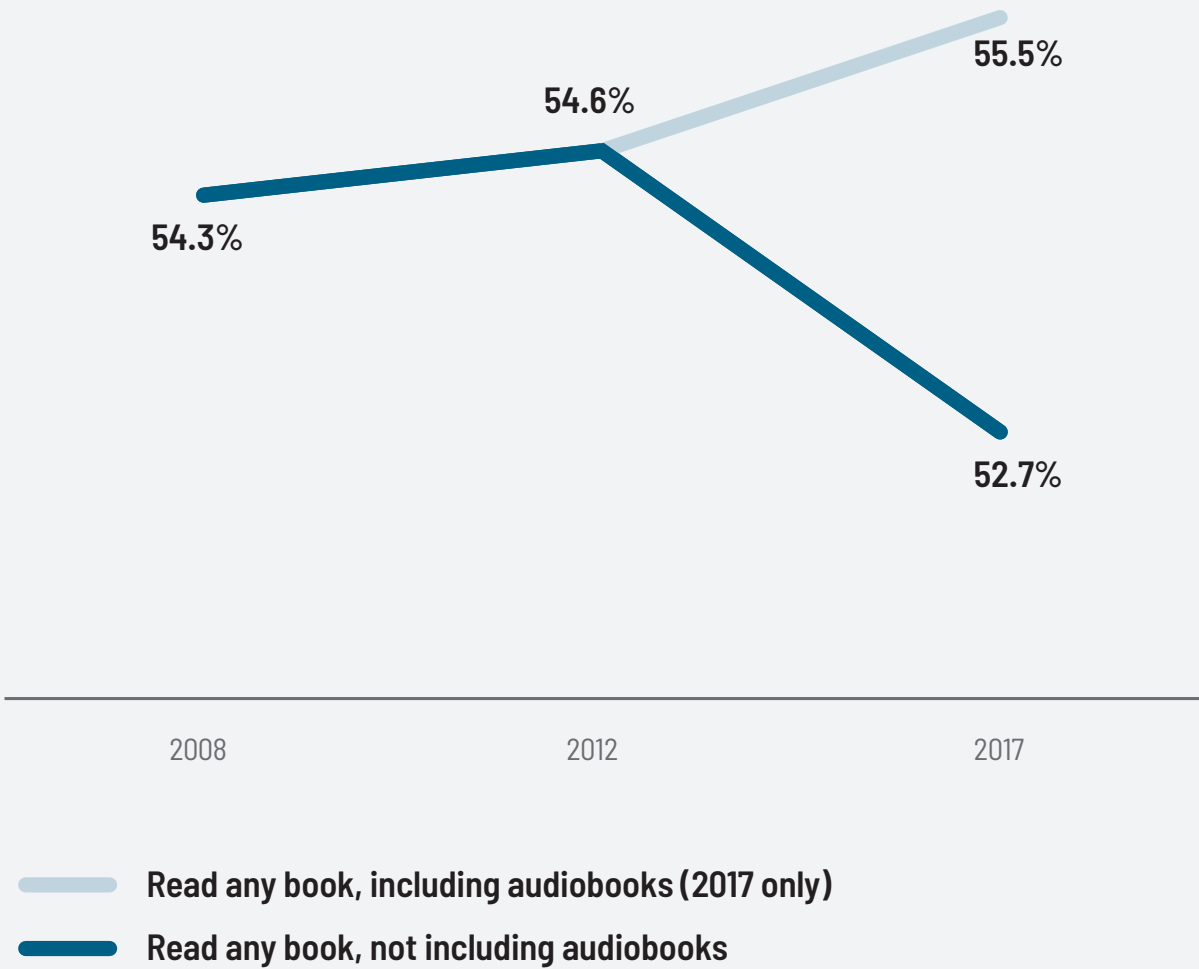
Percentage of U.S. adults who are digital/audio readers, print-only readers, and nonreaders: 2017



Notes: Digital/audio readers may have read books in print. Detail may not add to total due to rounding.
Source: National Endowment for the Arts, 2017 SPPA

2. The overall percentage of U.S. adults who read books in 2017 is more comparable to the 2012 and 2008 rates when audiobook-listening is counted, as it was in 2017.

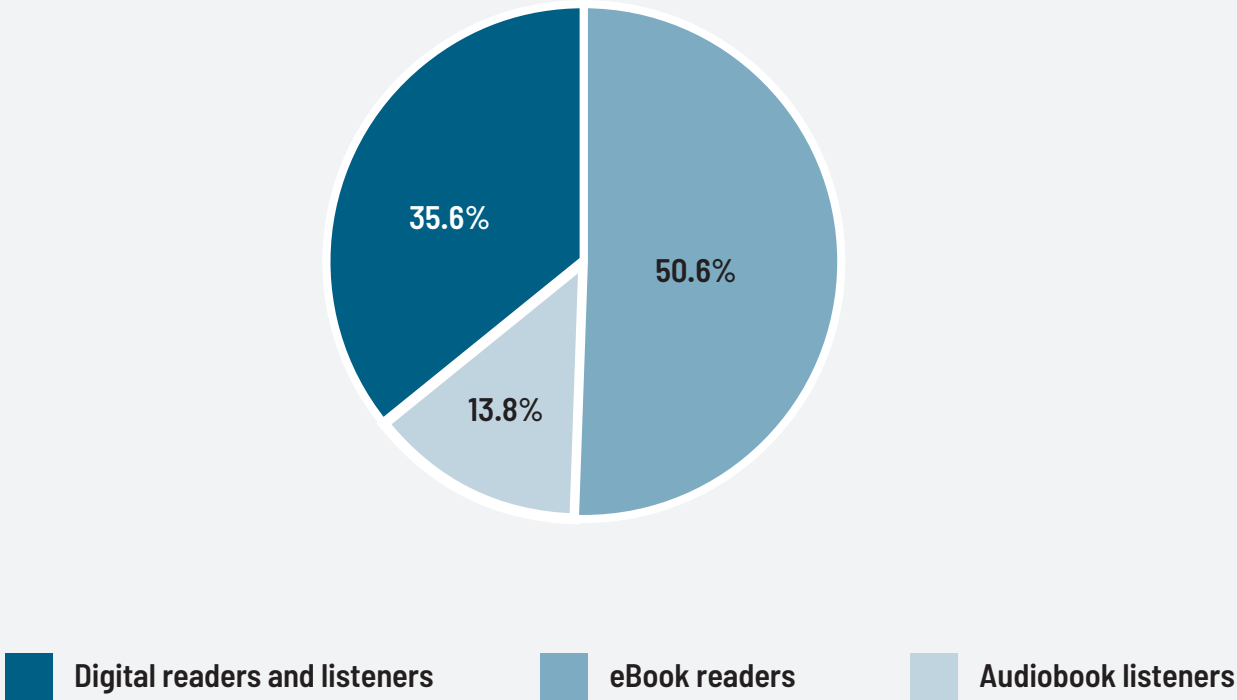
Percentage of U.S. adults who reported reading outside school or work in the past 12 months: 2008-2017



Source: National Endowment for the Arts, SPPA

3. Among all digital/audio readers, just over half read eBooks. Adults who digitally engage with reading *only* by listening to audiobooks are far less common.

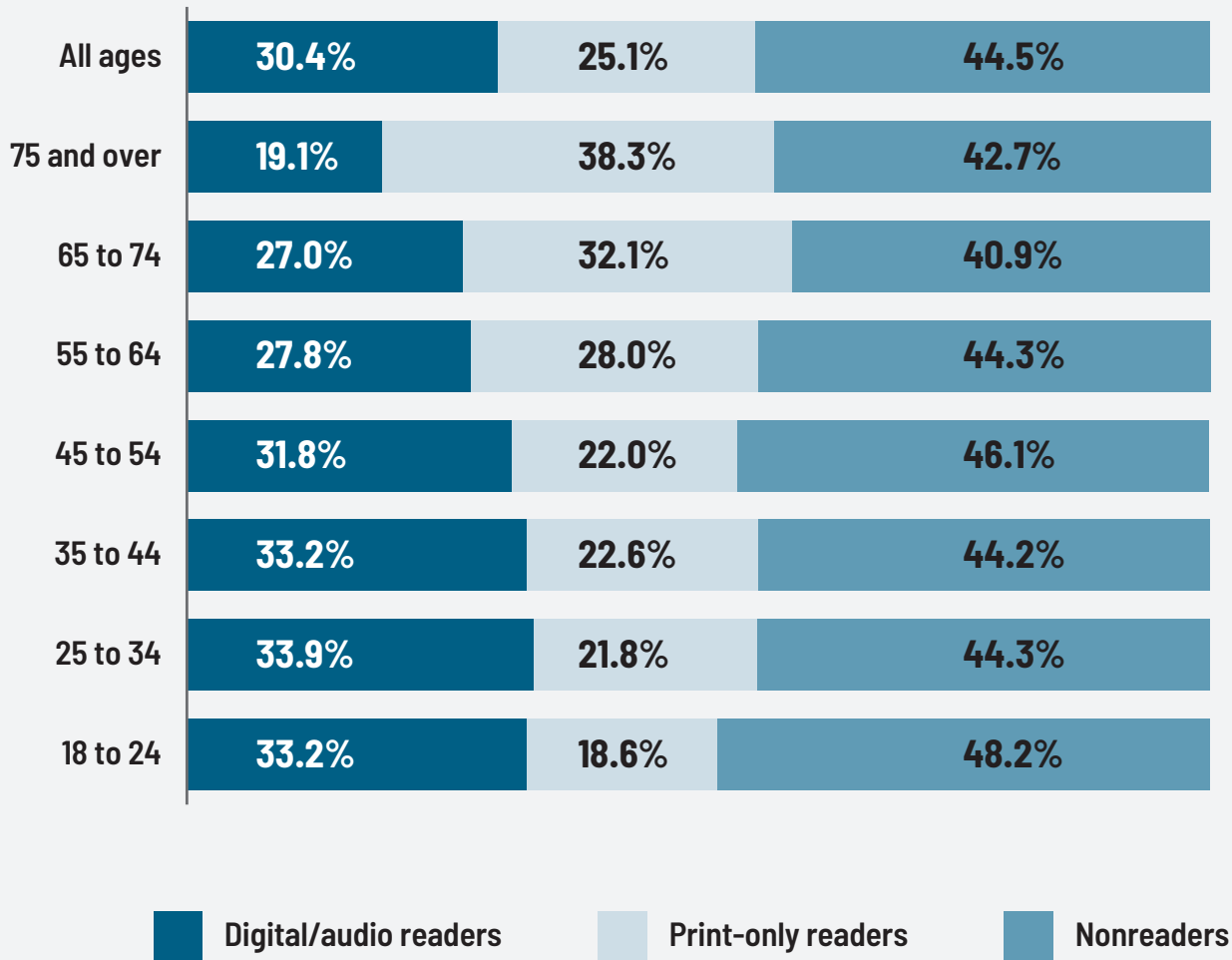
Percentage of digital/audio readers who are eBook readers, audiobook listeners, and digital readers and listeners: 2017



Source: National Endowment for the Arts, 2017 SPPA

4. Older Americans (aged 65 and older) are more likely than other age groups to be print-only readers. Younger readers, especially those aged 18-24, are more likely to be digital/audio readers who also may be reading print books.

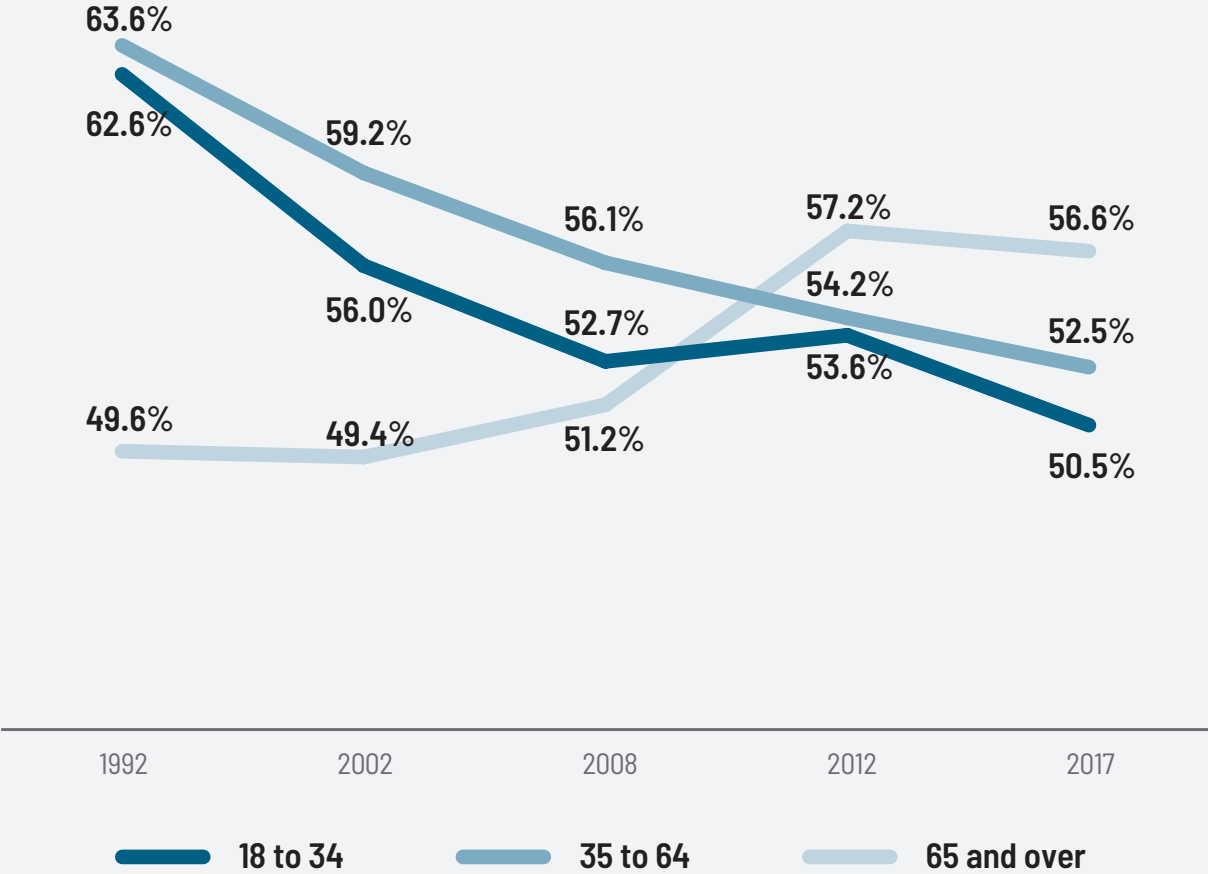
Percentage of digital/audio readers, print-only readers, and nonreaders, by age group: 2017



Notes: Digital/audio readers may have read books in print. Detail may not add to total due to rounding.
 Source: National Endowment for the Arts, 2017 SPPA

5. **Regardless of the format they use, older Americans read books at generally higher rates** than younger readers. This was not always the case. Before 2012, greater proportions of adults aged 18-24 consistently reported reading a book in the past 12 months than did adults aged 65 and older.

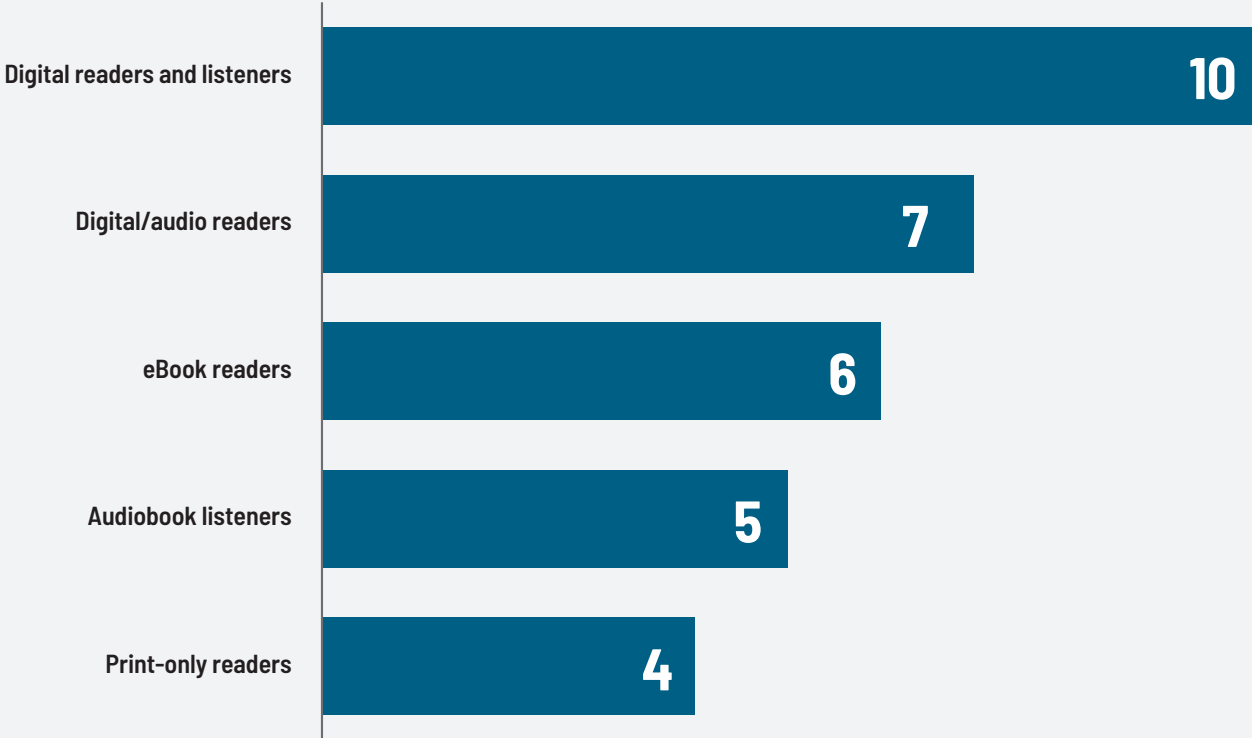
Percentage of adults that reported reading a book outside school or work in the past 12 months by age group: 1992-2017



Source: National Endowment for the Arts, SPPA

6. Digital readers and listeners (those who both read eBooks and listen to audiobooks) consume the most books per year, relative to other types of readers.

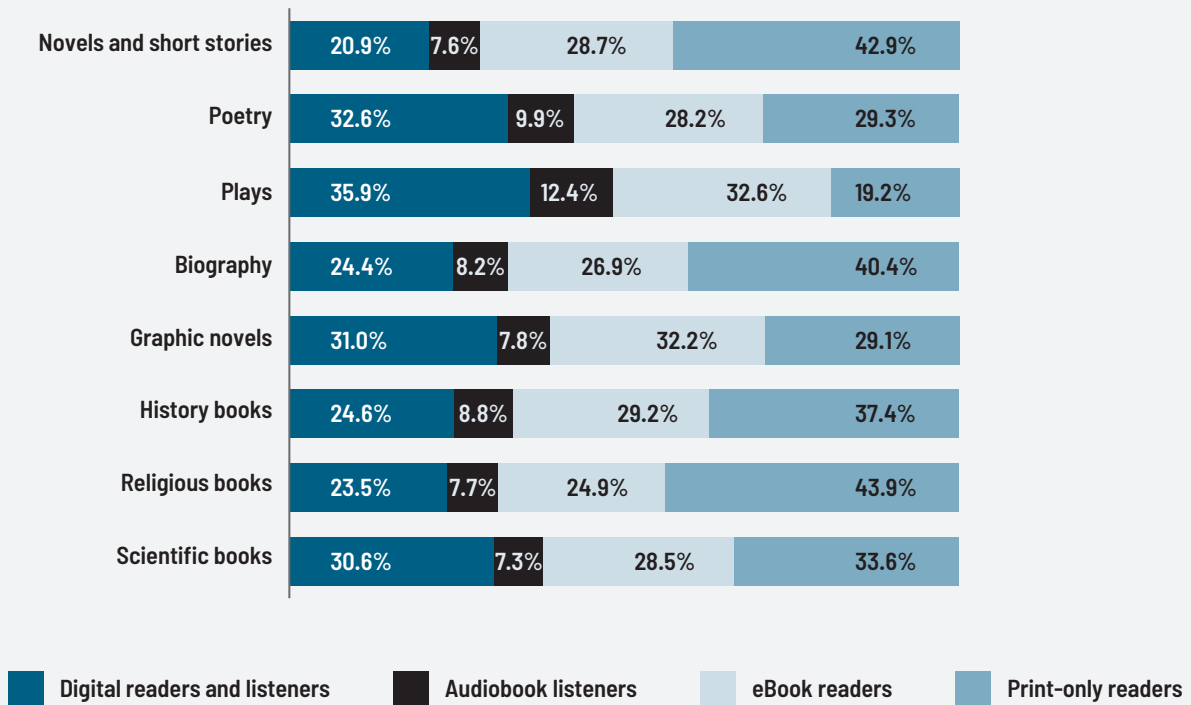
Median number of books read outside school or work in the past 12 months, by type of media used: 2017



Note: eBook readers, audiobook listeners, and digital readers and listeners may have read books in print.
Source: National Endowment for the Arts, 2017 SPPA

7. Digital/audio readers make up a far greater share of the readership for poetry, plays, and graphic novels than for novels, biography, history, and religion.

Percentage of U.S. adults reading in various genres, by type of media used: 2017

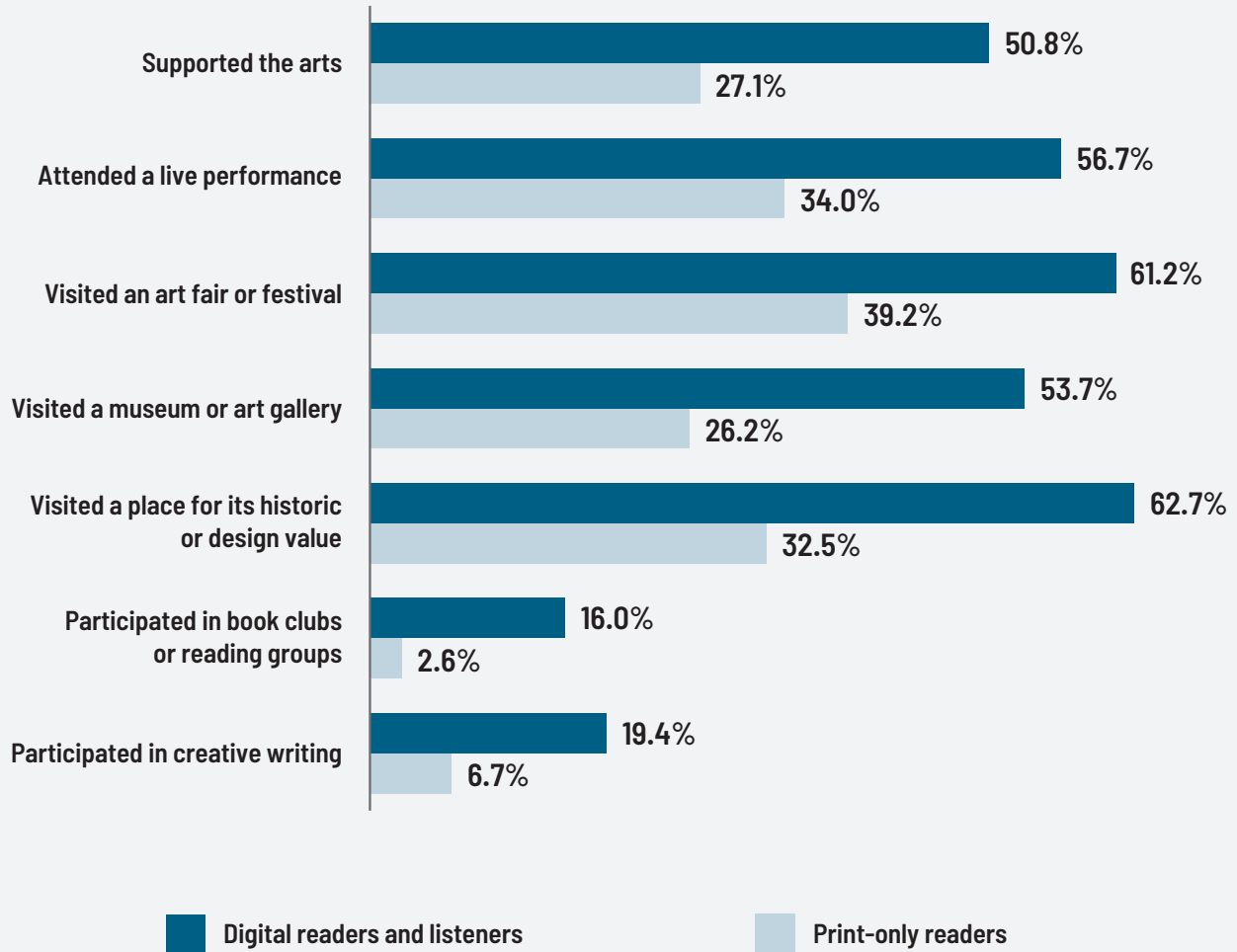


Notes: eBook readers, audiobook listeners, and digital readers and listeners may have read some books in print. Detail may not add to total due to rounding.

Source: National Endowment for the Arts, 2017 SPPA

8. Adults who are digital/audio readers frequently engage in cultural activities and support the arts (i.e., volunteering, subscribing to arts organizations, donating to arts organizations, or purchasing works of art).

Percentage of U.S. adults reporting literary and cultural engagement and support for the arts, by reader type: 2017



Note: eBook readers, audiobook listeners, and digital readers and listeners may have read books in print.
 Source: National Endowment for the Arts, 2017 SPPA

Chapter 1: How We Read Today

Americans have access to a growing range of devices that facilitate engagement with long-form literary content—from computer laptops and tablets to e-readers and smartphones. For the purpose of analysis, this chapter groups individuals who reported reading (or not reading) at least one book over a recent (2017) 12-month period, and it distinguishes them by three broad categories:

- **Nonreaders**—Adults who did not read a book outside work or school, and who did not listen to an audiobook, in the past 12 months;
- **Print-only readers**—Adults who read a book outside work or school in the past 12 months but did not use an electronic device to read,² and who did not listen to an audiobook; and
- **Digital/audio readers**—Adults who read a book outside work and school in the past 12 months and used an electronic device to read, and/or who listened to audiobooks. Note: these adults *may* have read print books as well.³

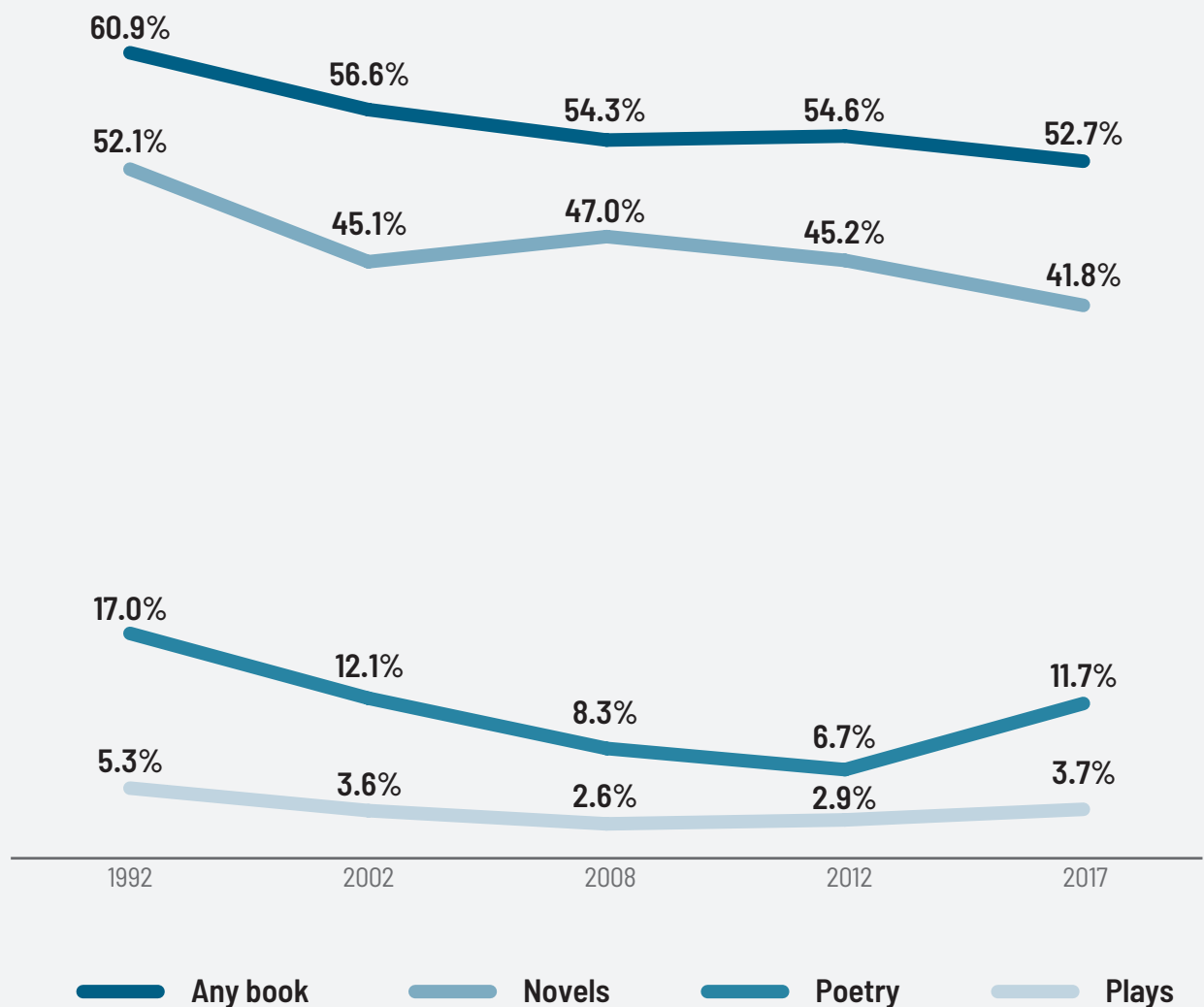
The SPPA clearly shows that since 1992, the percentage of American adults who report they have read outside of school or work in the past 12 months has consistently fallen, though in recent years the change has not been statistically significant (Figure 1). In 1992, the share of the adult population that reported reading books, when not asked specifically about audiobooks, was 60.9, while the comparable rate in 2017 was lower, at 52.7 percent.

The same trend applies to the reading of novels and short stories. In 1992, 52.1 percent of Americans reported reading novels or short stories in the past 12 months, and that percentage was 41.8 in 2017. A much smaller percentage of U.S. adults read plays; however, even this figure declined from 5.3 percent in 1992 to 3.7 percent in 2017. The only genre that has experienced a substantial increase since 1992 is poetry. In 2012, the percentage of Americans who reported reading poetry in the past 12 months was 6.7 percent, the lowest number since 1992; however, the current 2017 estimate is much higher—at 11.7 percent.

2 Electronic devices can include eReaders, tablets, laptops, computers, and cell phones.

3 It is important to note that digital/audio readers may also read printed materials. The SPPA does not include a question about reading printed material only versus digital material only. Rather, the survey asks whether individuals read any books in the past 12 months and, if yes, whether the respondent read using an electronic device. Thus, if a respondent answers “no” to using an electronic device (and “no” to listening to audiobooks), we assume the respondent only read printed materials. If a respondent answers “yes” to reading an electronic device, we do not know whether the respondent only read with electronic devices. See Appendix C for more details on how we define the reader types.

Figure 1. Percentage of U.S. adults who reported reading in the preceding 12 months: 1992-2017



Source: National Endowment for the Arts, SPPA

An important question we address below is whether digital engagement with literature helps to explain these trends in reading. In particular, is the decline in the percentage who report reading books of any kind, as well as novels and plays, truly a decline, or is it a reflection of readers' growing engagement with literature by digital means? The literature suggests print-based readers are listening to audiobooks and reading other forms of digital literature but not substituting digital platforms for print-based books (Sweney, 2019; Perrin 2016). Secondly, does the recent, promising increase in rates of reading poetry reflect a greater likelihood among readers in a digital environment to engage with poetry than in previous years?

Print-only readers, digital/audio readers, and nonreaders

Figure 2 shows the number and percentage of U.S. adults categorized as print-only readers or digital/audio readers, as well as U.S. adults who were deemed “nonreaders,” based on responses to the 2017 SPPA. This figure shows that more adults are digital/audio readers (72.2 million, 30.4 percent) than print-only readers (59.6 million, 25.1 percent).

Moreover, if we combine digital/audio readers (including those who listen to audiobooks) and print-only readers, the percentage of Americans who reported reading or listening to any book is about 55.5. This number is comparable to estimates of the percentage, from past surveys, of the population that reported reading books in general. In particular, this number is higher than the 2008 rate (54.3 percent) but slightly lower than the 2002 rate (56.6 percent) and substantially lower than the 1992 rate (60.9 percent). Even when we consider digital participation, however, about 44.5 percent of the population (105.8 million people) still reported no reading in the past 12 months.

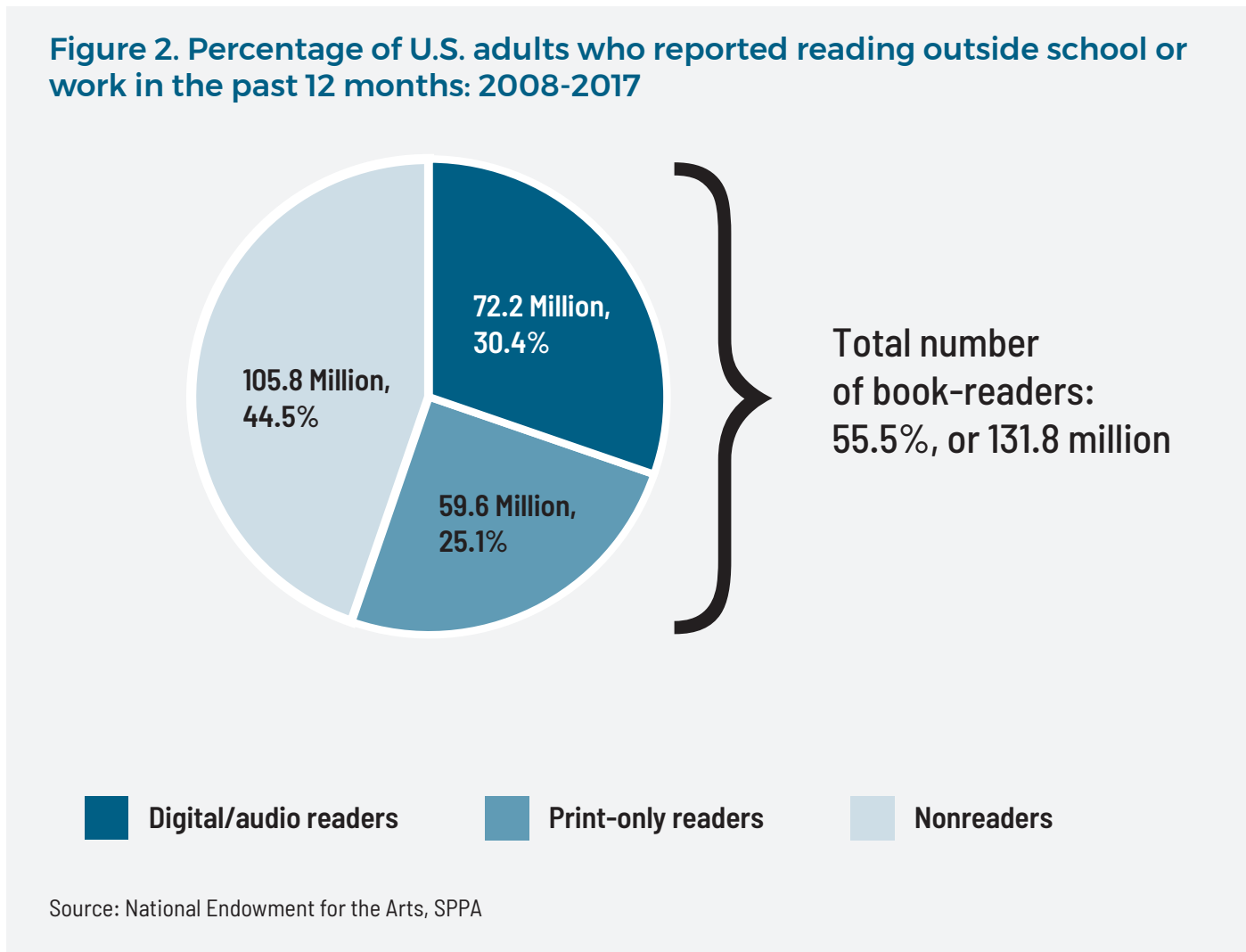


Table 1 (Appendix A) explores differences, by demographic subgroup, in the percentage of U.S. adults who are nonreaders, print-only readers, and digital/audio readers, using 2017 SPPA data. There are several notable differences shown in the table—for example, the large number of men versus women who are non-readers (53 percent of men and 37 percent of women). Nonetheless, we single out four main findings for discussion below, based on results from the table and underlying regression model (Table B-1 in Appendix B):

1. Adults with higher education levels reported higher levels of both digital/audio reading and print-only reading.
2. Older adults more often reported print-only reading, while younger adults more often reported digital reading and audio-listening. Despite this difference, older adults report reading more often than younger adults.
3. Adults who have a higher income more often reported digital/audio reading, while print-only reading does not seem to vary by income group.
4. Adults who have serious difficulty concentrating, remembering, or making decisions and adults who are blind or have serious difficulty seeing are more likely to be nonreaders than readers (of any type). However, among adults with these disabilities who do read, those who have serious difficulty concentrating, remembering, or making decisions are more likely to be digital/audio readers than print-only readers, while adults who are blind or have serious difficulty seeing are equally as likely to be digital/audio readers as print-only readers. The other disability types in the SPPA have no association with reading one way or the other after controlling for other demographic factors (e.g., age, education).

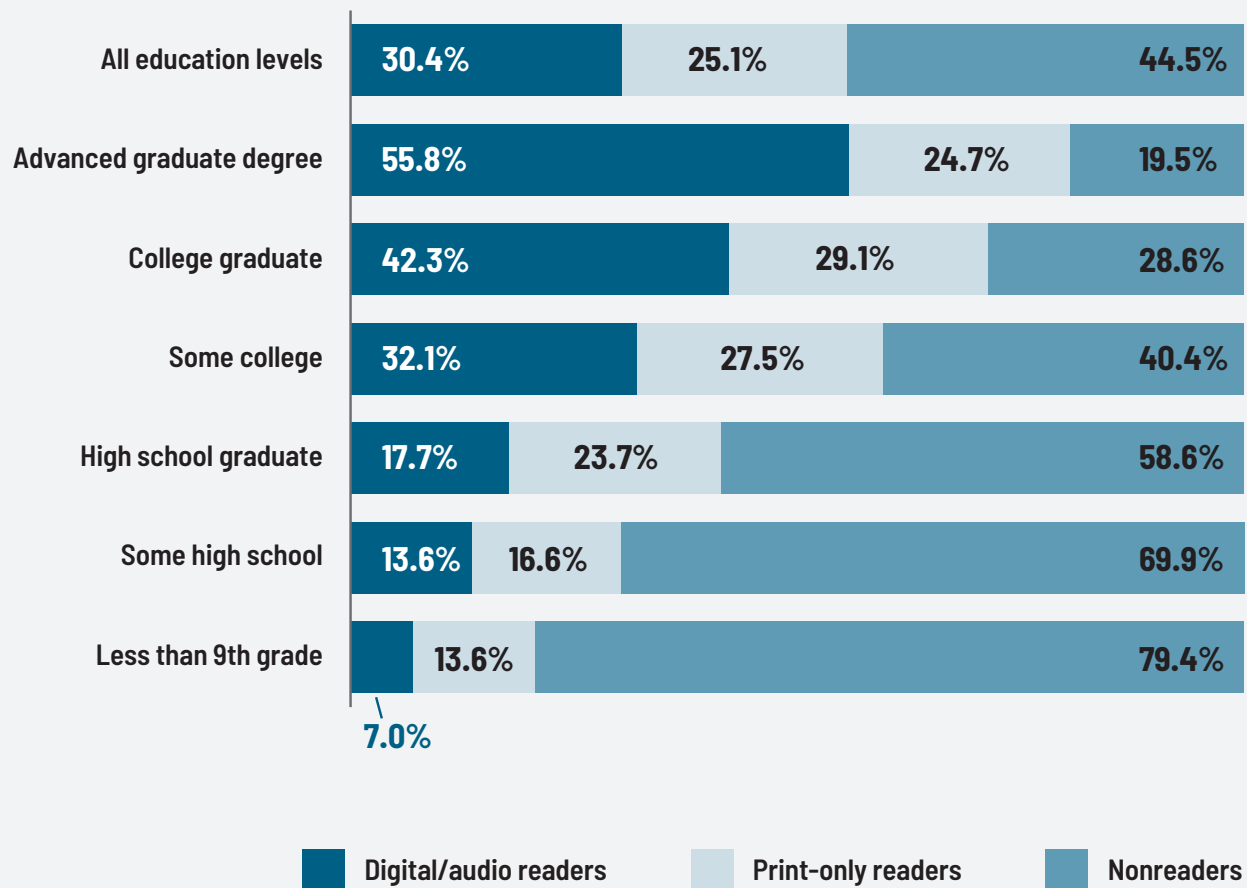
Americans who read more overall

Figure 3 provides a snapshot, by education level, of the percentage of U.S. adults who are nonreaders, print-only readers, and digital/audio readers, using data from the 2017 SPPA. Only 19.5 percent of Americans with an advanced graduate degree did not report any reading in the past 12 months, compared to 79.4 percent of Americans who have less than a ninth-grade level of education. More than 70 percent of Americans with a college degree and with an advanced graduate degree reported either print or digital reading and listening in the past 12 months. Although Figure 1 confirms that reading overall is decreasing in prevalence, Figure 3 shows that it is still a very popular activity for Americans with higher education levels.

Figure 3 also shows that adults with more education are more likely to be digital/audio readers than print-only readers. A full 55.8 percent of people with an advanced graduate degree reported digital reading and audiobook listening, while only 24.7 percent reported print-only reading. For adults with a high school education or less, this finding is reversed; about 23.7 percent of adults with a high school education report print-only reading, while 17.7 percent report digital reading and/or audiobook listening.

The findings by education level remain statistically significant in a regression model that controls for associated demographic factors, such as age and income (see Table B-1 in Appendix B). Therefore, strong evidence shows that education is an important pathway to discovering and engaging with literature in print and digitally. The regression model also shows that gender and race/ethnicity remain significant factors after controlling for other demographic variables; however, the findings by education level are much stronger and more substantive.

Figure 3. Percentage of U.S. adults are digital/audio readers, print-only readers, and nonreaders, by education level: 1992-2017

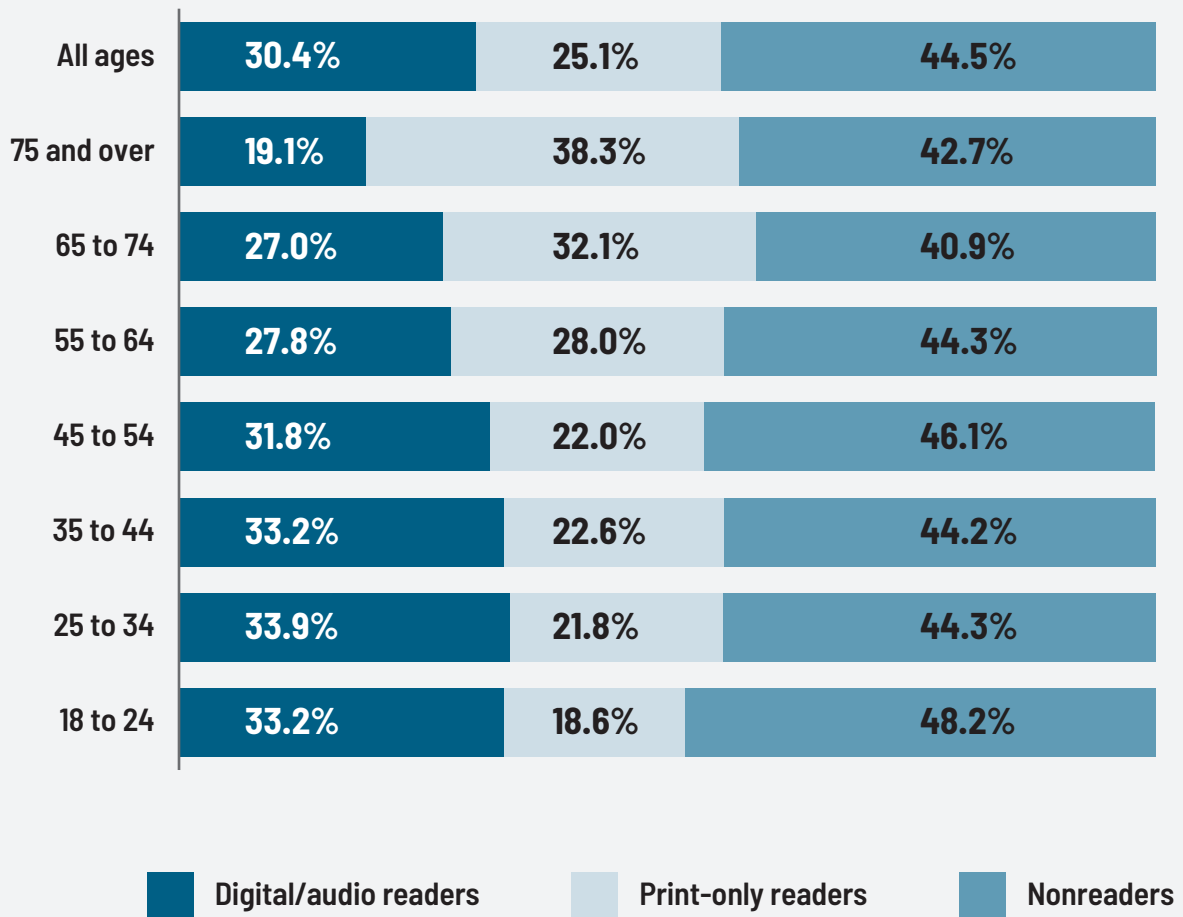


Note: Detail may not add to total due to rounding.
 Source: National Endowment for the Arts, 2017 SPPA

Print-only vs. digital/audio readers

Figure 4 shows the percentage of U.S. adults who are nonreaders, print-only readers, and digital/audio readers by age group. The figure shows a generational difference in how Americans read. The percentage of adults who are print-only readers rises to more than 30 percent for adults aged 65–74 and aged 75 and older. For those aged 75 and older, 38.3 percent reported print-only reading—double the percentage that reported digital reading and audiobook listening (19.1 percent). These numbers contrast with numbers for adults aged 18–24 years, of whom 18.6 percent are print-only readers and 33.2 percent are digital/audio readers. These findings remain statistically significant in a regression model that controls for other demographic factors (see Table B-1 in Appendix B). The 2017 SPPA shows that older adults are more likely to report print-only reading, while younger adults are more likely to report digital/audio reading.

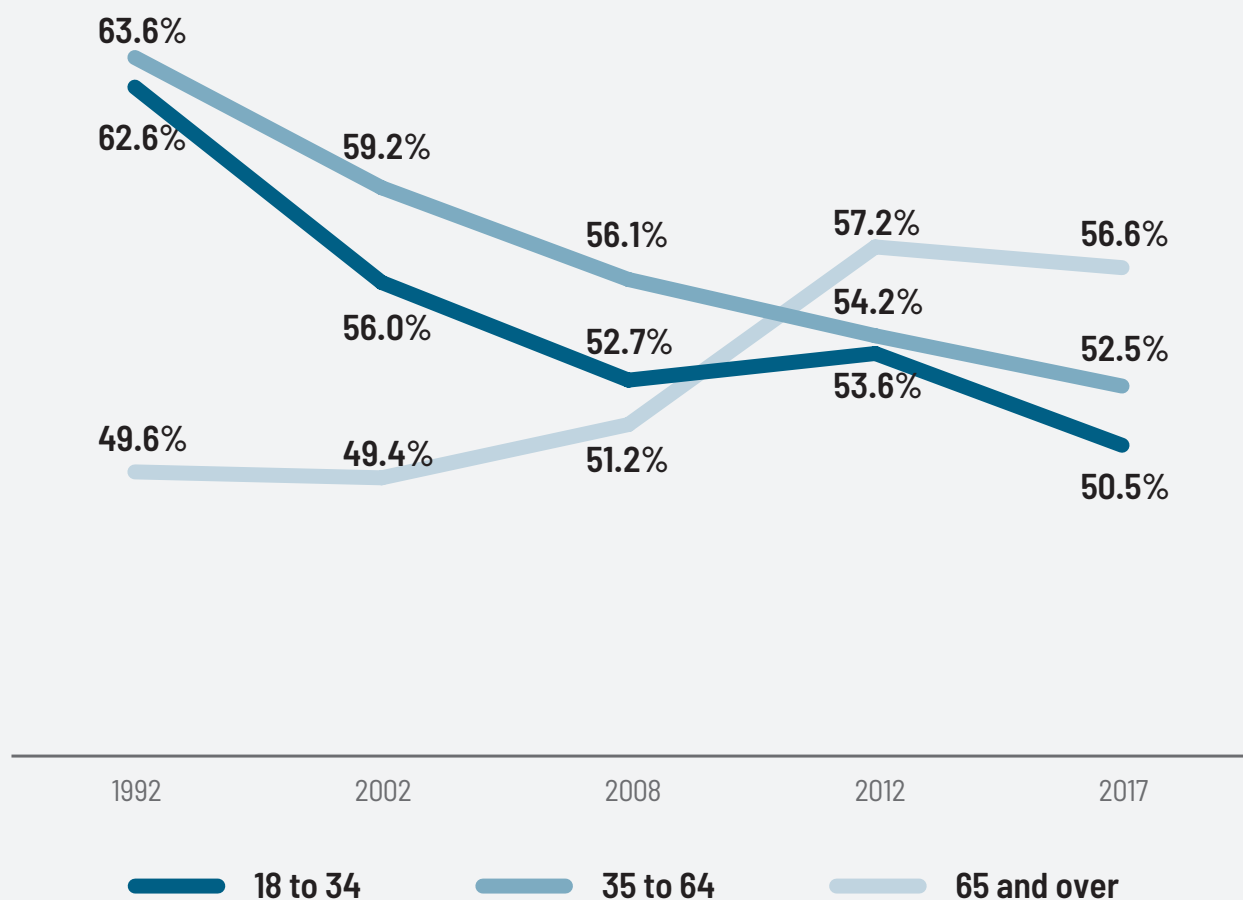
Figure 4. Percentage of digital/audio readers, print-only readers, and nonreaders, by age group: 2017



Notes: Digital/audio readers may have read books in print. Detail may not add to total due to rounding.
 Source: National Endowment for the Arts, 2017 SPPA

The figure also suggests that adults aged 65 and older may generally read more than younger adults. Nonreaders make up 48.2 percent of adults aged 18–24, while 40.9 percent of adults aged 65–74 and 42.7 percent of adults aged 75 and older are nonreaders. Figure 5 investigates these numbers further, showing the percentages of Americans aged 18–34, 35–65, and 65 and older who reported reading a book outside work or school from 1992 to 2017. Figure 5 confirms that since 2012, adults aged 65 and older have reported reading more often than younger adults. This is a reversal from previous years. In 1992, 62.6 percent of adults aged 18–34, 63.6 percent of adults aged 35–64, and 49.6 percent of adults aged 65 and older reported reading. By 2017, only 50.5 percent of adults aged 18–34 and 52.5 percent of adults aged 35–64 reported reading. On the other hand, the percentage of adults aged 65 and older who reported reading was higher, at 56.5 percent, than in 1992 (49.6 percent).

Figure 5. Percentage of adults that reported reading a book outside school or work in the past 12 months by age group: 1992-2017



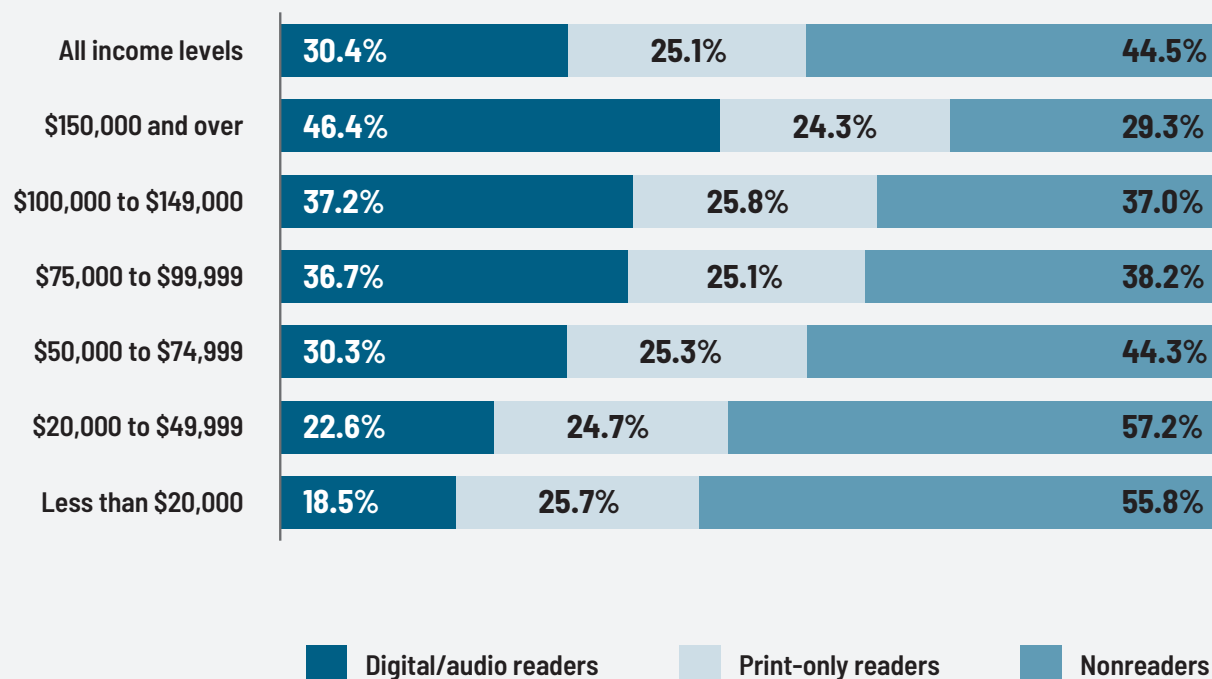
Source: National Endowment for the Arts, SPPA

Although there is a generational difference in who reads printed material, the oldest adults are reading more than ever and still reported digital reading and listening in significant numbers. While younger adults are reading less, when they do read, they often utilize digital technologies to read and listen to books. These trends show the prevalence of various forms of engagement with literature in the Digital Age.

Using the 2017 SPPA data, Figure 6 shows differences in the percentage, by income category, of U.S. adults in the three reading categories.⁴ The findings show that, in addition to there being a generational shift in the way adults engage with reading, wealthier adults are more likely to report digital reading and listening. Nearly half (46.4 percent) of adults with annual household incomes of \$150,000 or more reported digital reading and/or listening, compared to just 18.5 percent of Americans with household incomes of less than \$20,000. These findings remain statistically significant in the regression model shown in Table B-1 in Appendix B. The findings are not driven by other factors associated with income, such as education level.

⁴ For more information about how the SPPA defines income, see the basic CPS items booklet <https://www2.census.gov/programs-surveys/cps/techdocs/questionnaires/Labor%20Force.pdf>

Figure 6. Percentage of U.S. adults who are digital/audio readers, print-only readers, and nonreaders, income category: 2017



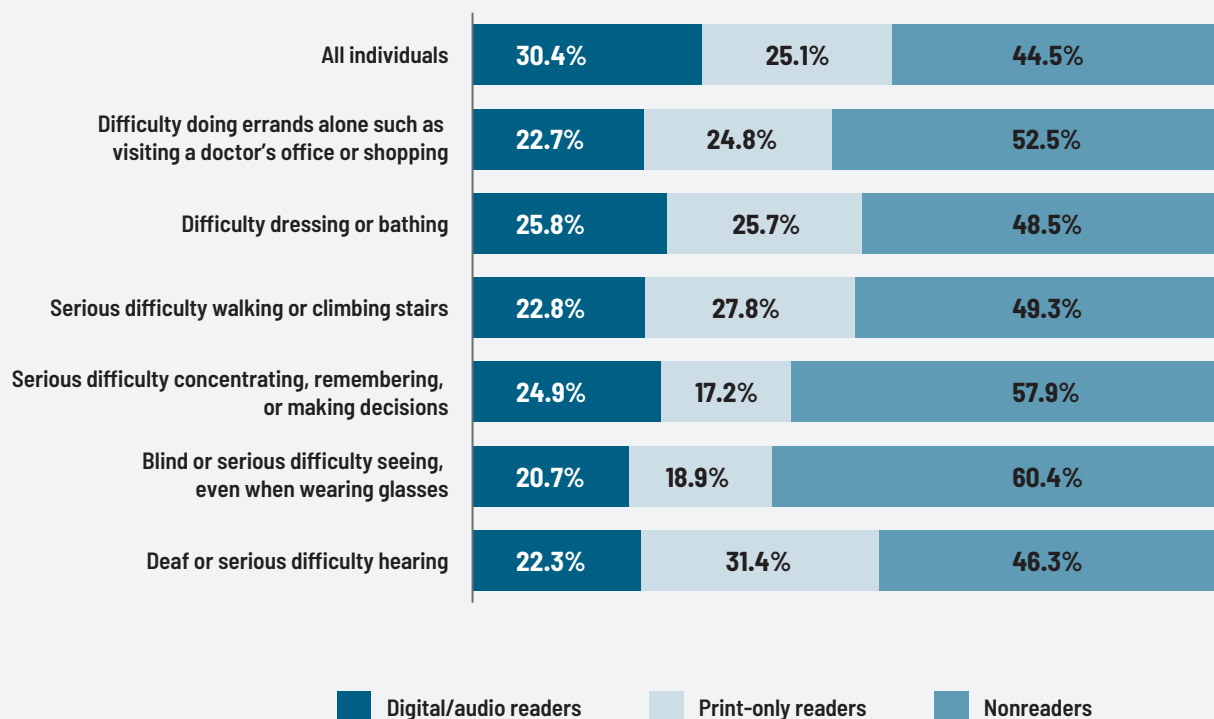
Note: Detail may not add to total due to rounding.
 Source: National Endowment for the Arts, 2017 SPPA

Interestingly, the percentage of Americans who reported print-only reading stays roughly the same, at about 25 percent across all the income categories. Only the percentage that reported digital reading and/or listening changed significantly.

Figure 7 shows the percentage of U.S. adults who are nonreaders, print-only readers, and digital/audio readers, by disability categories. The figure shows that most adults with disabilities are equally as likely to be nonreaders as they are to be readers; for most disability categories, the percentage of nonreaders is about 50 percent. One exception is that adults with blindness or serious difficulty seeing were more likely to report no reading. (The same applies for adults with serious difficulty concentrating, remembering, or making decisions.) Moreover, most U.S. adult readers with disabilities were as likely to be print-only readers as digital readers. There is some evidence that individuals with deafness or serious difficulty hearing are more likely to be print-only readers than digital readers (31.4 percent compared to 22.3 percent); however, this finding is not statistically significant in a regression model that controls for other demographic factors (see Table B-1 in Appendix B). Only U.S. adults with serious difficulty concentrating, remembering, or making decisions were more likely to be digital/audio readers than print-only readers (24.9 percent compared to 17.2 percent). This finding is statistically significant in a regression model that controls for other factors (see Table B-1 in Appendix B).

These findings suggest that adults with memory problems or difficulty concentrating or difficulty making decisions may have an easier time engaging with literature using digital technology. Prior research (e.g., Wolf, 2018) suggests that print reading requires more concentration and focus than digital reading or listening. The advent of new digital technologies may lead to increased engagement with literature among populations with disabilities, especially individuals with concentration, memory, or decision-making difficulties.

Figure 7. Percentage of U.S. adults who are digital/audio readers, print-only readers, and nonreaders, by disability category: 2017



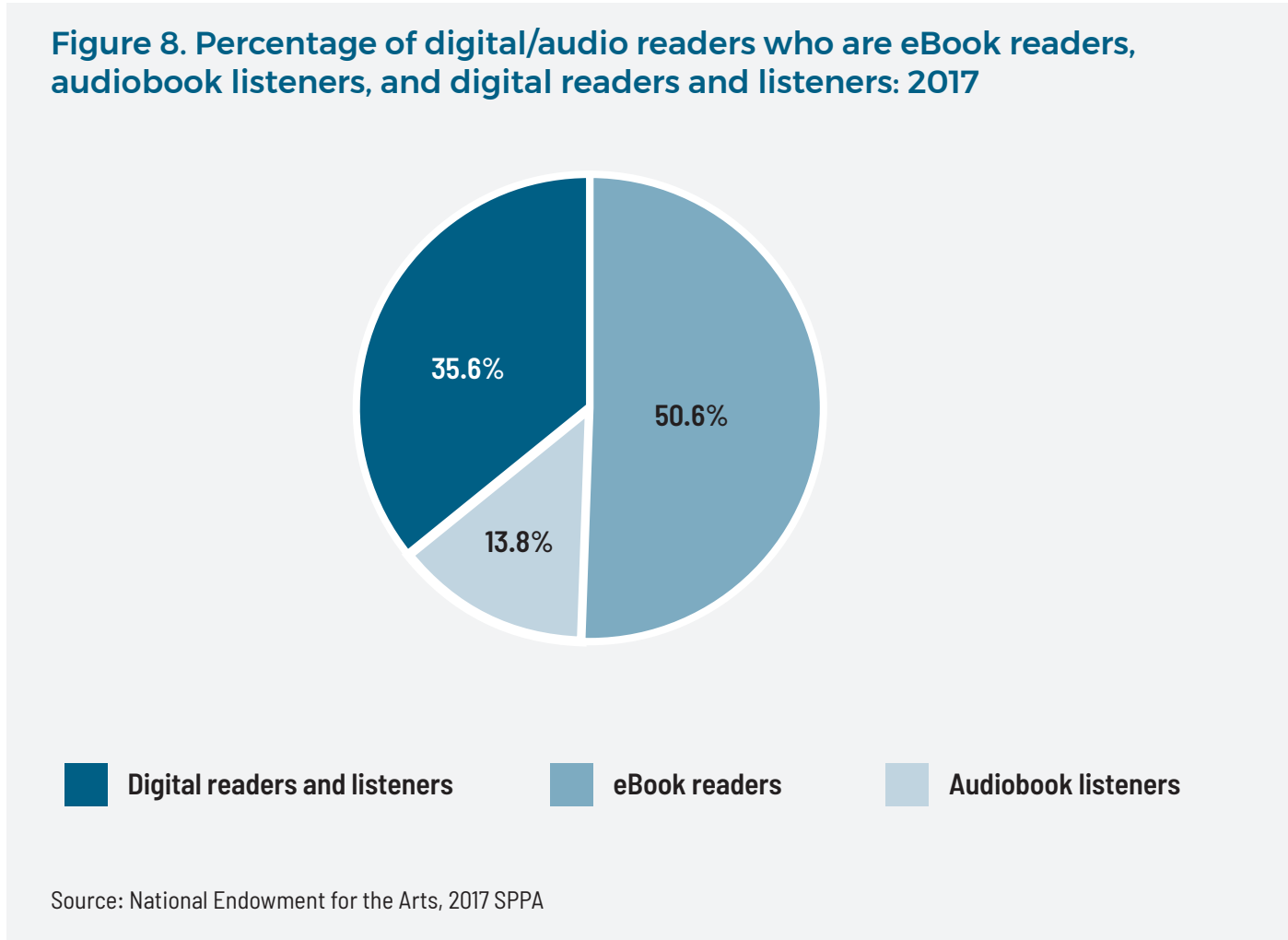
Note: Detail may not add to total due to rounding.
 Source: National Endowment for the Arts, 2017 SPPA

Types of digital/audio readers

The results above seem to confirm that many Americans are reading digitally and that there is variation across demographic subgroups (such as education, age, and income) in terms of who reads and listens digitally. Two additional questions emerge: (1) How do digital/audio readers engage with literature? (2) Is this different from how print-only readers engage? To answer these questions, we further break down the definition of digital/audio readers into more nuanced categories:

- **eBook readers**—individuals who used an electronic device to read but did not listen to any audiobooks in the past 12 months and *may* have read print books as well
- **Audiobook listeners**—individuals who listened to audiobooks but did not read with an electronic device in the past 12 months and *may* have read print books as well
- **Digital readers and listeners**—individuals who both listened to audiobooks and read with an electronic device in the past 12 months and *may* have read print books as well

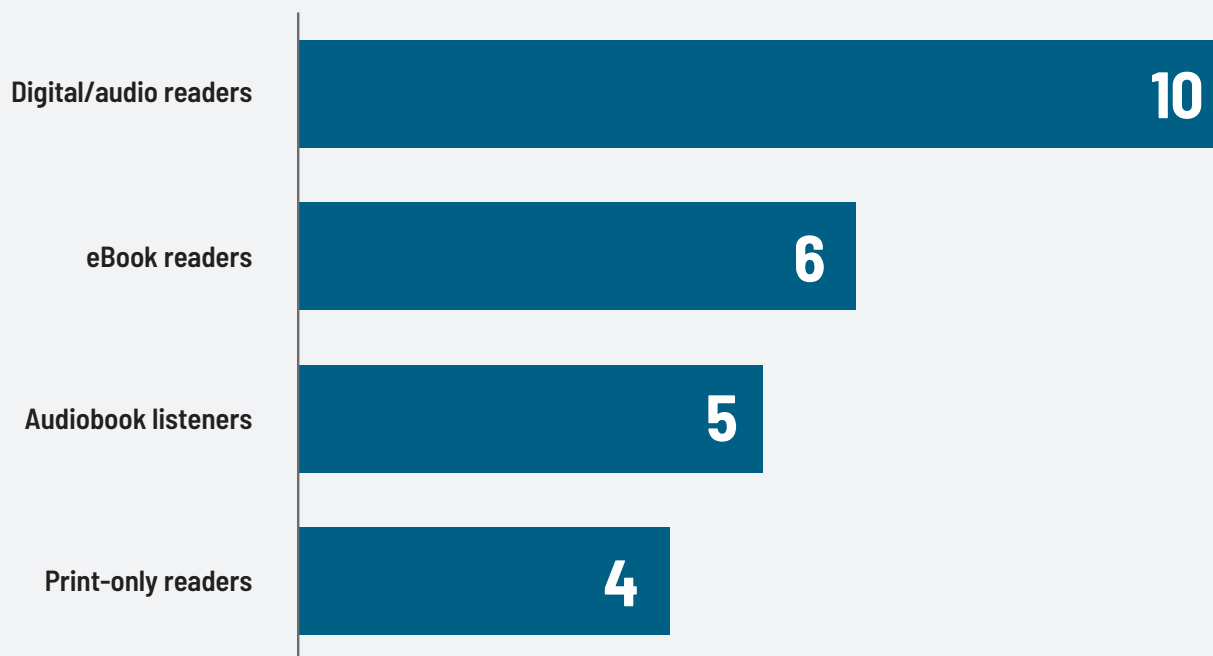
Figure 8 shows the percentage of digital/audio readers who are eBook readers, audiobook listeners, and digital readers and listeners. Slightly more than half (50.6 percent) are eBook readers, while audiobook listeners are less common (13.8 percent). Digital readers and listeners comprise a little more than a third of digital/audio readers (35.6 percent). Below, we review how each of the digital reader types compare to each other and to print-only readers in terms of reading frequency and genres of reading.



Frequency of reading

Figure 9 shows the median reported number of books read in the past 12 months for print-only readers, eBook readers, audiobook listeners, and digital readers and listeners. The figure shows that digital readers and listeners were found to read the most (a median of 10 books in the past 12 months), followed by eBook readers (6 books). Print-only readers were found to read the least (4 books), and audiobook listeners ranked second to last (5 books). Statistical tests show no significant difference in the median number of books read in the past 12 months for audiobook listeners and eBook readers or for audiobook listeners versus print-only readers. The findings show digital/audio readers, especially those who are digital readers and listeners, read at higher frequencies. There is some evidence that although reading rates have fallen overall, Americans who read and listen digitally are doing so frequently.

Figure 9. Median number of books read outside school or work in the past 12 months, by type of media used: 2017

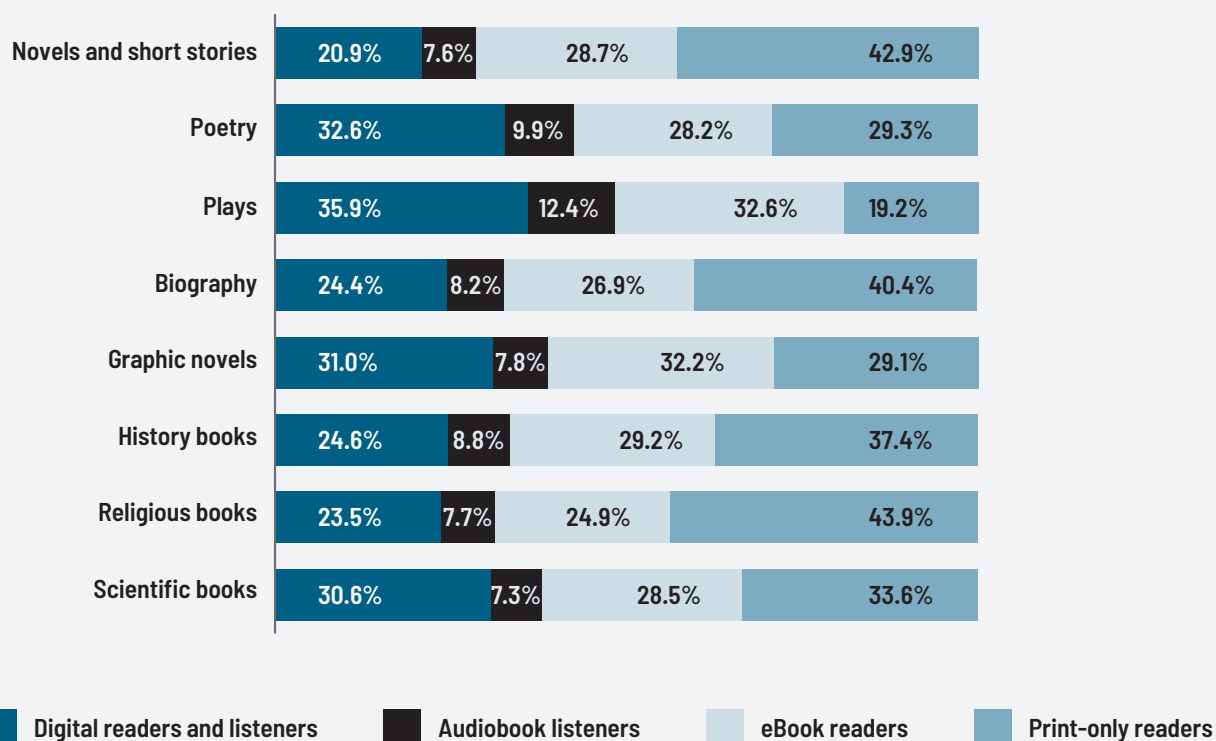


Note: eBook readers, audiobook listeners, and digital readers and listeners may have read books in print.
Source: National Endowment for the Arts, 2017 SPPA

Genres of reading

Other questions are whether print-only and digital/audio readers differ in the genres of literature they read and, in particular, whether the recent rise in poetry-reading (see Figure 1) implies that poetry is especially conducive to digital/audio reading. Figure 10 shows the percentage who are digital readers and listeners, audiobook listeners, eBook readers, and print-only readers among U.S. adults who reported reading several different genres in the past 12 months. The findings show almost a third of poetry readers (32.6 percent) are digital readers and listeners, 9.9 percent are audiobook listeners, and 28.2 percent are eBook readers, while 29.3 percent are print-only readers. Digital/audio readers (digital readers and listeners, audiobook listeners, and eBook readers combined) thus compose more than two thirds (70.7 percent) of all poetry-readers.

Figure 10. Percentage of U.S. adults reading in various genres, by type of media used: 2017



Notes: eBook readers, audiobook listeners, and digital readers and listeners may have read some books in print. Detail may not add to total due to rounding.

Source: National Endowment for the Arts, 2017 SPPA

Readers of plays are even more likely to be digital/audio readers than poetry readers are. Digital readers and listeners make up 35.9 percent of play readers and eBook readers make up 32.6 percent. Only 19.2 percent of play readers are print-only readers, and this percentage is not statistically different, with at least 90 percent confidence, from the percentage of play readers who are audiobook listeners (12.4 percent). Similar to poetry, digital/audio readers (digital readers and listeners, audiobook listeners, and eBook readers combined) are much more common among graphic novel readers than print-only readers (71 percent compared to 29.1 percent).

Figure 10 also shows that print-only readers are more common among the religious genre (43.9 percent), novels and short stories (42.9 percent), the biography genre (40.4 percent), and the history genre (37.4 percent) than are digital readers and listeners, audiobook listeners, or eBook readers. Thus, there is some evidence to indicate that print-only readers tend to prefer novels, religious texts, and nonfiction including biography and history. The science genre is more evenly distributed, as 30.6 percent are digital readers and listeners, 28.5 percent are eBook readers, and 33.6 percent are print-only readers, with audiobook listeners making up 7.3 percent.

In summary, Figure 10 shows that while digital/audio readers are the most common reader type, there is some variation in terms of what different reader types tend to read. Play readers are more likely to be digital readers and listeners and eBook readers than print-only readers, while religious genre readers, novel readers, biography readers, and history readers are more likely to be print-only readers. Digital/audio readers as a whole are more likely to be poetry readers and graphic novel readers than print-only readers. Science readers are about as likely to be print-only readers as digital/audio readers.

Chapter 2: Participation in Other Literary Activity

The SPPA permits analysis of adult participation in several types of literary activity, in addition to reading books and literature. These data can be analyzed in tandem from at least two other federal data sources, the Arts Basic Survey (ABS) and the American Time Use Survey (ATUS). Together, such activities include:

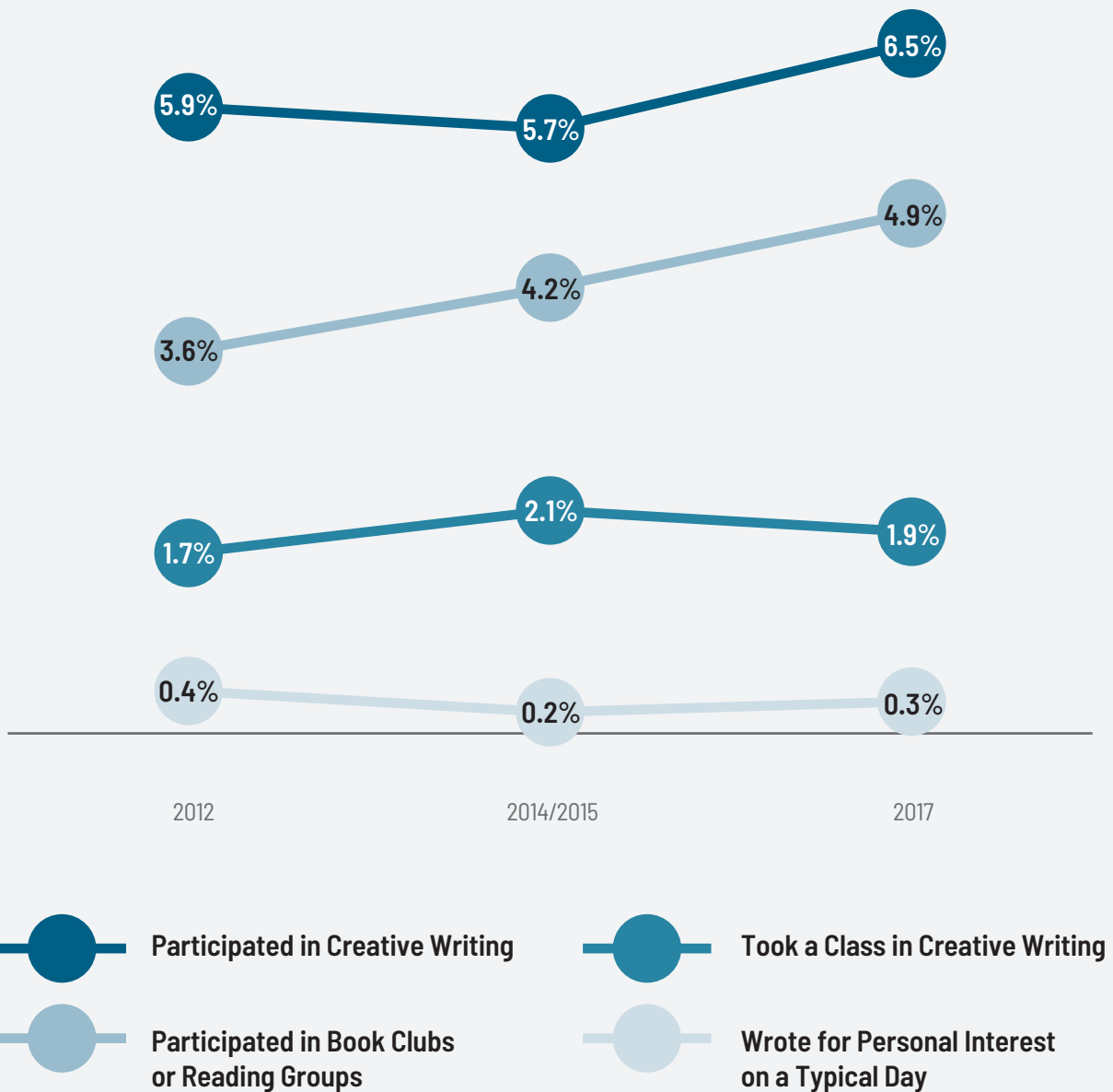
- attending an event featuring a poet or writer,⁵
- doing creative writing,
- taking a class in creative writing,
- participating in book clubs or reading groups, and
- writing for personal interest on a typical day.⁶

Figure 11 shows the percentage of U.S. adults who reported participation in each of the above literary activities in 2017, 2015, and 2012. Overall, participation in these literary activities is very low compared to rates of reading, and the activities show little change over time. Although the percentage of adults who reported creative writing increased from 5.7 percent in 2014 to 6.5 percent in 2017, the change was not statistically significant. Only the percentage who reported participation in book clubs or reading groups increased significantly, from 3.6 percent in 2012 to 4.9 percent in 2017.

5 We do not compare this activity over time due to changes in the survey question from year-to-year.

6 The data for writing for personal interest comes from the U.S. Bureau of Labor Statistics' American Time Use Survey.

Figure 11. Percentage of U.S. adults who reported participation in literary activities: 2012-2017



Note: The 2014/2015 estimate shown for participating in book or reading groups was derived by averaging the 2012 and 2017 SPPA estimates of this activity.

Sources: Survey of Public Participation in the Arts (2012 and 2017); Arts Basic Survey (2015); and American Time Use Survey (2012, 2014, 2015, 2017).

Table 2 (see Appendix A) delineates the 2017 SPPA rates of participation by demographic subgroup. The table shows that younger adults aged 18–24 reported participation in creative writing more than older adults aged 75 or older (11.7 percent compared to 3.1 percent, respectively). This additional evidence complements the finding in Chapter 1 that young adults are more likely to be digital/audio readers—that young adults *do* engage in literature, just in different ways than older adults. Another finding that complements Chapter 1 is that adults with higher education levels report much higher participation in specific literary activities. Specifically,

- 2.4 percent of adults with a high school degree or less reported attending an event featuring a poet or writer compared to 14 percent of those with a graduate degree;
- 3.1 percent of adults with a high school degree or less reported participating in creative writing compared to 12.7 percent of those with a graduate degree; and
- 3.2 percent of adults with a high school degree or less reported participating in book clubs or reading groups compared to 9.5 percent of those with a graduate degree.

Women and men report participation in literary activities at roughly the same rates, apart from participation in book clubs or reading groups, which a regression model (see Table B-2 in Appendix B) confirms is significantly higher for women (6.9 percent compared to 2.8 percent). Similarly, adults with different levels of income reported participation in literary activities at roughly the same rate across all income levels. The regression models (see Table B-2 in Appendix B) show that once other demographic factors are controlled for, there is no significant difference in the percentage of adults of different income levels who reported attending an event featuring a poet or writer.

Of note, adults in the middle income categories—earning \$55,000 to \$74,999 and \$75,000 to \$99,999—reported slightly higher participation in creative writing classes, compared to adults in the lowest income category (2.8 and 3.0 percent compared to 0.8 percent). Participation in book clubs or reading groups was the only literary activity for which adults with higher incomes consistently reported higher rates of attendance. This category ranged from 2.6 percent for those earning less than \$20,000 per year to 8.3 percent for those earning \$150,000 or more per year.

Finally, most literary activity participation did not vary across race/ethnicity categories. For example, 7.1 percent of non-Hispanic, non-white Americans attended an event featuring a poet or writer; that share was similar to the 6.6 percent of non-Hispanic whites attending. One difference of note, however, was that non-Hispanic whites reported the highest level of participation in creative writing (7.6 percent.)

All other differences across race/ethnicity categories were insignificant, after accounting for other demographic and socioeconomic factors.

Chapter 3: The Relationship of Literary Participation to an Engaged Society

This chapter analyzes the relationship between print-only or digital/audio reading and several types of engagement in literary and cultural life. Those activities include:

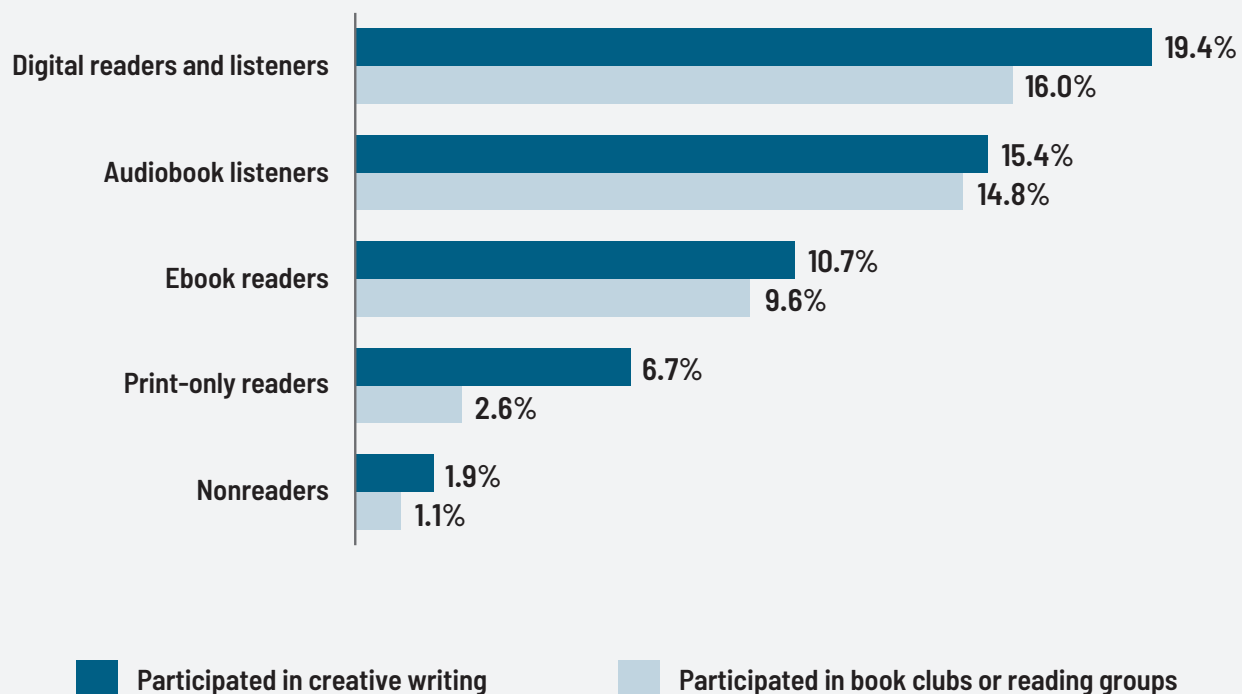
- Doing creative writing and participating in book clubs or reading groups;⁷
- Attending live performances, visiting museums or art galleries, visiting fairs or festivals, and visiting places for their historic or design value; and
- Supporting the arts, as evidenced by
 - volunteering for arts organizations, groups, or projects;
 - subscribing to arts organizations;
 - donating money, goods, or services to arts organizations, groups, or projects; or
 - purchasing or acquiring artworks such as paintings, drawings, sculpture, pottery, or other visual art pieces.

Engagement in literary activity

Figure 12 shows the percentage, by reader type, of U.S. adults who reported participation in book clubs or reading groups and creative writing. The findings clearly show that digital/audio readers are much more likely than print-only readers to report participation in literary activities overall. The percentage of digital readers and listeners who reported participation in book clubs or reading groups is 16.0, compared to only 2.6 percent for print-only readers, and the percentage of digital readers and listeners who reported doing creative writing is 19.4, compared with only 6.7 percent of print-only readers. The results are similar for audiobook listeners, compared with print-only readers, and for eBook readers, compared with print-only readers. Digital readers and listeners also seem to have higher participation rates than eBook readers.

⁷ We were not able to test the relationship of reading types to participation in events featuring poets or writers because the survey question for the events question comes from Core II of the survey, while the reading types come from Core I. No respondent answered both Cores. In addition, we were not able to test the relationship of reading types to participation in creative writing classes. The sample sizes for the estimates are so small that any reported estimates would have large amounts of error and would therefore be unreliable.

Figure 12. Percentage of U.S. adults who reported participation in literary activities, by reader type: 2017



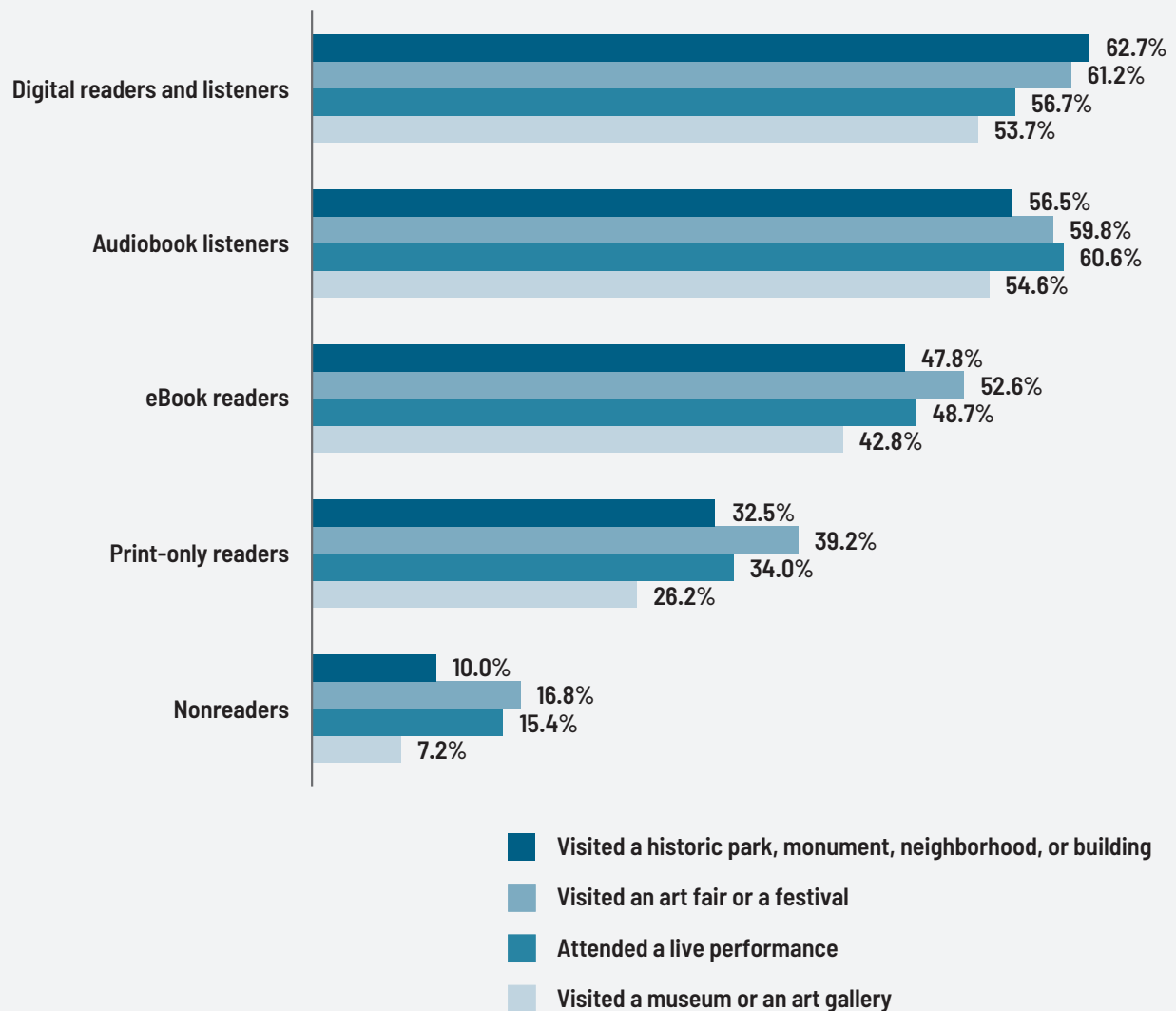
Source: National Endowment for the Arts, 2017 SPPA

However, earlier results discussed in this report show that digital/audio readers have higher general reading rates than print-only readers and, in some cases, different demographic makeups. These differences may be driving the results in Figure 12. To assess this possibility, we specified a regression model that accounted for the differences in reading frequency and demographic factors among the different reading types. The results of the model are in Table B-4 in Appendix B. The findings show that even when controlling for reading frequency and demographic factors, digital readers and listeners and audiobook listeners are more likely to report doing creative writing than print-only readers, and all three types of digital/audio readers are more likely to report attending book clubs or reading groups than are print-only readers. There is thus good evidence that digital/audio readers participate more in other literary activity than print-only readers.

Engagement in cultural activity

Figure 13 shows the percentage of U.S. adults who reported participation in cultural activities. Similar to the results for literary activity, the findings show that digital/audio readers, especially digital readers and listeners and audiobook listeners, report higher levels of engagement in cultural activity than print-only readers. The biggest difference is in the percentage who report visiting a historic park or monument or a neighborhood or building for historic design value; 62.7 percent of digital readers and listeners and 56.5 percent of audiobook listeners reported this activity, compared to only 32.5 percent of print-only readers. Similar differences exist between digital readers and listeners and audiobook listeners and print-only readers for the other cultural activities in the figure.

Figure 13. Percentage of U.S. adults who reported participation in cultural activities, by reader type: 2017



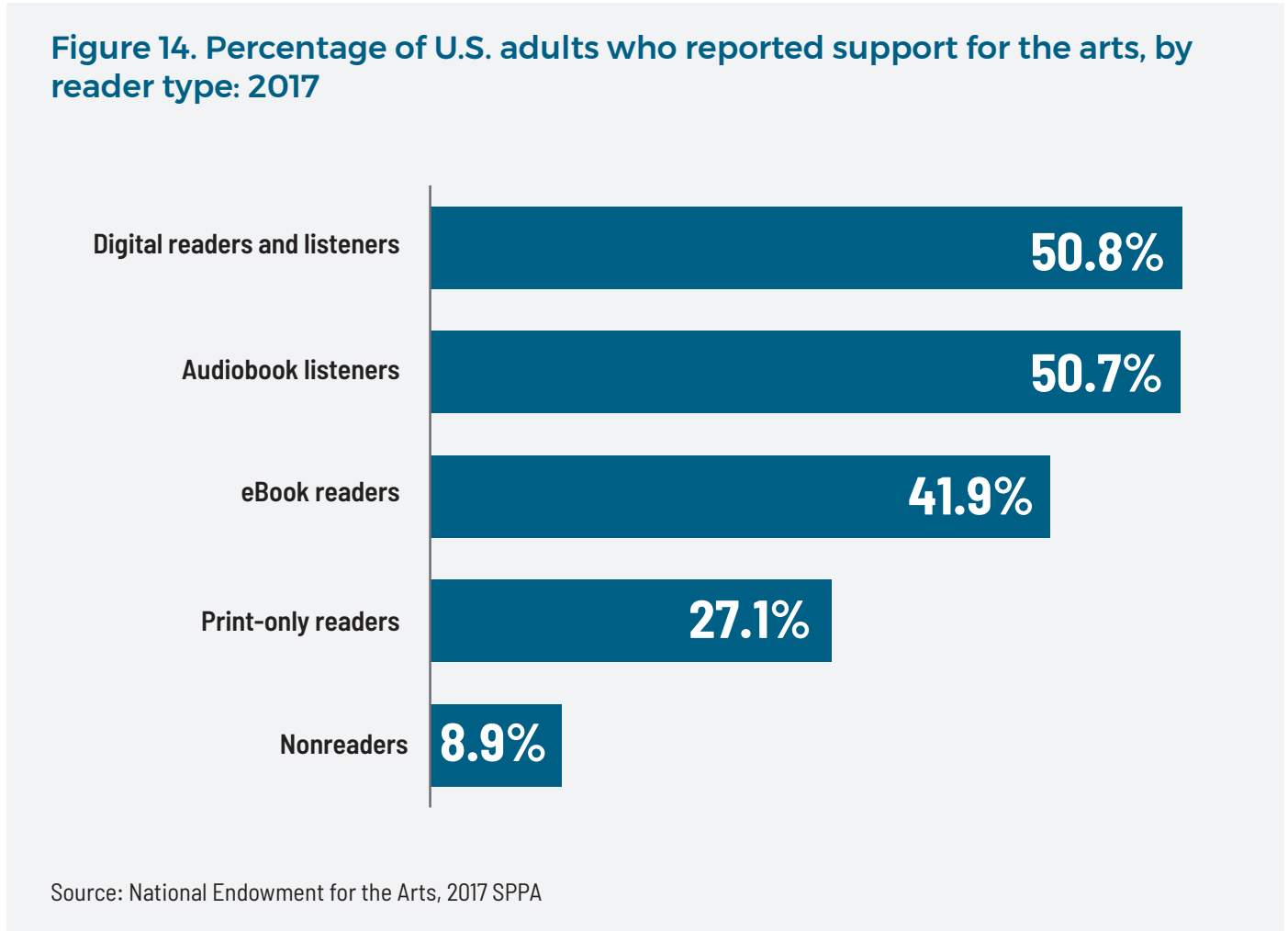
Source: National Endowment for the Arts, 2017 SPPA

EBook readers and print-only readers are more similar in terms of participation in cultural activities, but there are still large differences. For example, 42.8 percent of eBook readers reported visiting a museum or art gallery, compared to 26.2 percent of print-only readers. Additionally, the regression models (see Table B-5 in Appendix B) show that these differences remain statistically significant, even when controlling for reading frequency and demographic factors.

The results are clear. Digital/audio readers have more engagement with cultural activity and literary activity. This difference is especially true for digital readers and listeners and audiobook listeners, although eBook readers also have more engagement than print-only readers. Print-only readers do have more engagement than nonreaders, but less than do digital/audio readers.

Support for the arts

Figure 14 shows the final comparison between nonreaders, print-only readers, and the types of digital/audio readers: how each group reports support for the arts. Again, the differences between nonreaders, print-only readers, and digital/audio readers are large. Only 8.9 percent of nonreaders reported support for the arts. A higher percentage of print-only readers reported support for the arts (27.1 percent). Large percentages of digital/audio readers reported support for the arts: specifically, 41.9 percent of eBook readers, 50.7 percent of audiobook listeners, and 50.8 percent of digital readers and listeners. Moreover, as with the results for literary activities and cultural activities, the difference between print-only readers and digital/audio readers remains statistically significant in a regression model that controls for reading frequency and demographic factors (see Table B-6 in Appendix B).



The findings in this chapter suggest that U.S. adults who are digital/audio readers generally report more engagement in cultural society as well. Adults who report reading only printed materials generally report lower levels of engagement, and adults who report no reading reported the lowest levels of engagement.

Chapter 4: Conclusions

Taken as a whole, the findings in this report tell a story more nuanced than one of declining reading rates. We confirm that U.S. adults reported less reading in 2017 than in previous years; however, if we add together digital/audio readers and print-only readers, the percentage of adults engaging with books is more comparable to the percentage who reported reading books in 2008 and 2012. Moreover, we find that digital/audio readers report more reading and engagement in cultural life overall. Many adults still read books and are actively engaged in other literary and cultural activities.

Several findings in this report also shed light on findings from previous Arts Endowment reports. In *Reading at Risk*, the Arts Endowment reported that the reading decline was most prominent among young Americans aged 18–24. Notwithstanding this decline, we find that that same age group is more likely to report digital reading and audiobook listening, and we find that digital/audio readers are more likely to report reading a larger number of books than print-only readers. We also confirm the finding from the recent Arts Endowment (2018) report that the reading of poetry has increased since 2012. We add that digital/audio readers are more likely to report reading poetry than print-only readers and suggest that the increase in reading poetry could, in part, be explained by an expansion of technologies available to people engaging with literature.

We further find that participation in other forms of literary engagement have remained relatively stable over time. Perhaps the most intriguing finding in this report is that, compared with print-only readers, digital/audio readers (who also may have read books in print) report much higher levels of engagement in literary activity, cultural activity, and support for the arts. This finding suggests that a strong association between literary reading and cultural engagement (one documented in the 2007 Arts Endowment report *To Read or Not To Read*) exists even when Americans read both print and digital materials.

Limitations of the work

An important limitation of this research is that we are unable to distinguish between individuals who read only, or predominantly, using digital technology and individuals who read a blend of print and digital material. Our measure of digital/audio reading includes people who reported reading books and reading or listening with an electronic device, but it can include people who read or listen to only digital materials and people who read both printed materials and digital materials. In addition, our results could be interpreted as showing that survey respondents who read both print and digital material drive the association with higher reading frequency, more literary and cultural engagement, and support for the arts. We are not certain whether the reading of digital material itself is associated with more engagement; we only know that reading print-only is associated with less engagement, and not reading at all is associated with even less engagement.

It is also possible that respondents whom we classify as digital/audio readers are more predisposed to participate in multiple activities, and that is why they answered “yes” to reading a book in the past 12 months, reading using an electronic device, and listening to audiobooks in the past 12 months. In addition to showing a preference for digital engagement, the measure could also reflect a preference for engagement in social/cultural activities overall. We do attempt to mitigate this issue by controlling for the number of books read in the past 12 months with a regression model and determining whether the findings remain statistically significant.

A third limitation of this work is that we are unable to assess whether the quality of the reading experience is the same when an individual read with an electronic device or listened to an audiobook, compared to when an individual read printed material. If the reading experience is less rich when using digital technology, there could be important consequences considering the large number of Americans who engage with literature digitally. As the SPPA evolves, it may more clearly distinguish different types of readers and more fully answer questions about what impact digital/audio reading continues to have on American society.

Directions for future research

The findings and limitations of this research led to some follow-up questions, which additional research efforts may seek to answer.

- How many adults engage with literature either exclusively or primarily through the use of digital technology? Do findings of increased engagement still hold for these individuals when compared to print-only readers or individuals who read both print and digital material? Are differences in genres more apparent when comparing digital-only to print-only readers? As digital-only participation increases, are certain literary genres more likely to decline than others?
- How does the quality of the reading experience using digital technology compare to reading printed material? Is there an association between increased literacy and other educational or academic outcomes and reading predominantly through the use of digital technology? What can/should be done to ensure high-quality literature continues to be read in the Digital Age?
- If education and income predict more digital reading and listening, what can be done to reduce income barriers to digital literary engagement and increase reading among both less-educated and lower-income individuals?

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Appendix A: Tables

Table 1. Percentage of U.S. adults who are nonreaders, print-only readers, and digital/audio readers, by demographic subgroup: 2017

Demographic Subgroup	Total Population (Millions)	Nonreaders	Print-only Readers	Digital/Audio Readers
Total	246.7	44.5%	25.1%	30.4%
Age				
18 to 24	29.7	48.2%	18.6%	33.2%
25 to 34	44.0	44.3%	21.8%	33.9%
35 to 44	40.0	44.2%	22.6%	33.2%
45 to 54	41.8	46.1%	22.0%	31.8%
55 to 64	41.7	44.3%	28.0%	27.8%
65 to 74	29.4	40.9%	32.1%	27.0%
75 and older	20.1	42.7%	38.3%	19.1%
Education				
Less than 9th grade	9.1	79.4%	13.6%	7.0%
Some high school	16.5	69.9%	16.6%	13.6%
High school graduate	72.4	58.6%	23.7%	17.7%
Some college	69.2	40.4%	27.5%	32.1%
College graduate	51.2	28.6%	29.1%	42.3%
Advanced graduate degree	28.4	19.5%	24.7%	55.8%
Employment status				
Not in labor force	85.7	44.5%	29.2%	26.2%
Unemployed	7.0	49.3%	23.5%	27.2%
Employed	154.0	44.3%	22.9%	32.8%
Sex				
Female	127.7	36.9%	28.0%	35.1%
Male	119.0	52.7%	22.0%	25.3%

Demographic Subgroup	Total Population (Millions)	Nonreaders	Print-only readers	Digital/Audio readers
Income				
Less than \$20,000	32.6	55.8%	25.7%	18.5%
\$20,000 to \$49,999	70.9	52.7%	24.7%	22.6%
\$50,000 to \$74,999	48.4	44.3%	25.3%	30.3%
\$75,000 to \$99,999	31.0	38.2%	25.1%	36.7%
\$100,000 to \$149,999	34.8	37.0%	25.8%	37.2%
\$150,000 and over	29.0	29.3%	24.3%	46.4%
Race/ethnicity				
Non-Hispanic white	157.6	37.8%	28.8%	33.4%
Non-Hispanic black	29.1	51.4%	23.2%	25.4%
Non-Hispanic Asian/Pacific Islander	15.3	49.4%	17.4%	33.2%
Non-Hispanic other	5.2	42.7%	27.1%	30.2%
Hispanic, any race	39.4	64.8%	14.2%	20.9%
Disability				
Deaf or serious difficulty hearing	8.2	46.3%	31.4%	22.3%
Blind or serious difficulty seeing even when wearing glasses	4.1	60.4%	18.9%	20.7%
Serious difficulty concentrating, remembering, or making decisions	9.3	57.9%	17.2%	24.9%
Serious difficulty walking or climbing stairs	17.2	49.3%	27.8%	22.8%
Difficulty dressing or bathing	4.9	48.5%	25.7%	25.8%
Difficulty doing errands alone such as visiting a doctor's office or shopping	10.4	52.5%	24.8%	22.7%

Note: Digital/audio readers may also read books in print.
Source: National Endowment for the Arts, SPPA, 2017, Core I.

Table 2. Percentage of U.S. adults who reported different literary activities, by demographic subgroup: 2017

Demographic Subgroups	Attended an Event Featuring a Poet or Writer	Participated in Creative Writing	Took a Creative Writing Class	Participated in a Book Club or Reading Club
Total	6.0%	6.5%	1.9%	4.9%
Age				
18 to 24	6.5%	11.7%	29.5%	6.5%
25 to 34	6.8%	9.2%	2.2%	4.4%
35 to 44	6.7%	7.1%	0.8%	4.6%
45 to 54	4.5%	4.3%	0.3%	4.5%
55 to 64	5.5%	5.0%	1.1%	4.5%
65 to 74	7.2%	4.4%	0.8%	5.3%
75 and older	4.9%	3.1%	0.6%	5.7%
Education				
High school or less	2.4%	3.1%	0.8%	3.2%
Some college	5.2%	7.3%	3.3%	4.3%
College graduate	9.4%	9.1%	1.8%	6.8%
Graduate degree	14.0%	12.7%	2.0%	9.5%
Employment status				
Unemployed or not in the labor force	5.6%	5.3%	1.5%	5.4%
Employed	6.3%	7.3%	2.1%	4.7%
Sex				
Female	7.0%	7.3%	1.8%	6.9%
Male	5.0%	5.8%	1.9%	2.8%
Income				
Less than \$20,000	4.2%	5.7%	0.8%	2.6%
\$20,000 to \$49,999	4.7%	5.1%	1.2%	3.8%
\$50,000 to \$74,999	6.9%	6.4%	2.8%	5.1%
\$75,000 to \$99,999	5.6%	8.1%	3.0%	5.1%
\$100,000 to \$149,999	8.0%	8.2%	1.8%	6.3%
\$150,000 and over	8.1%	7.4%	1.8%	8.3%

Demographic Subgroups	Attended an Event Featuring a Poet or Writer	Participated in Creative Writing	Took a Creative Writing Class	Participated in a Book Club or Reading Club
Race/ethnicity				
Non-Hispanic, white	6.6%	7.6%	1.8%	5.2%
Non-Hispanic, non-white only	7.1%	5.3%	2.8%	4.9%
Hispanic, any race	2.1%	3.9%	0.8%	3.9%

^aTo improve the accuracy of the estimates, demographic subgroups were combined in cases for which the coefficient of variation was greater than 30 percent.

Source: National Endowment for the Arts, SPPA, 2017, Core II, Module C, Module D, and Module E.

Appendix B: Detailed Regression Results

Table B-1. Multinomial logit estimating the likelihood of being each reader type, by demographic subgroup

Independent variables	Log odds of being a print-only reader compared to a nonreader	Log odds of being a digital/ audio reader compared to a nonreader	Log Odds of being a digital/ audio reader compared to a print-only reader
Age (base = 18 to 24)			
25 to 34	0.071	-0.277*	-0.347**
35 to 44	0.104	-0.359**	-0.463**
45 to 54	0.025	-0.418**	-0.443**
55 to 64	0.252*	-0.509**	-0.761**
65 to 74	0.397**	-0.486**	-0.883**
75 and older	0.626**	-0.664**	-1.29**
Education (base = Less than 9th grade)			
Some high school	0.154	0.572*	0.418
High school graduate	0.54**	0.834**	0.294
Some college	1.087**	1.738**	0.65*
College graduate	1.459**	2.305**	0.846**
Advanced graduate degree	1.657**	2.993**	1.336**
Employment status (base = Not in labor force)			
Unemployed	-0.08	-0.144	-0.063
Employed	-0.162	-0.122	0.04
Sex (base = Female)			
Male	-0.608**	-0.753**	-0.145*

Independent variables	Log odds of being a print-only reader compared to a nonreader	Log odds of being a digital/ audio reader compared to a nonreader	Log Odds of being a digital/ audio reader compared to a print-only reader
Income (base = Less than \$20,000)			
\$20,000 to \$49,999	-0.087	0.157	0.244**
\$50,000 to \$74,999	-0.062	0.316**	0.378**
\$75,000 to \$99,999	-0.003	0.512**	0.515**
\$100,000 to \$149,999	-0.022	0.388**	0.409**
\$150,000 and over	0.08	0.691**	0.611**
Race/ethnicity (base = Non-Hispanic white only)			
Non-Hispanic black only	-0.342**	-0.334**	0.008
Non-Hispanic Asian or Hawaiian/Pacific Islander	-0.88**	-0.618**	0.262
Non-Hispanic other	-0.021	-0.094	-0.073
Hispanic, any race	-0.898**	-0.599**	0.299**
Disability (base = Not having the disability category)			
Deaf or serious difficulty hearing	0.127	0.113	-0.014
Blind or serious difficulty seeing even when wearing glasses	-0.558**	-0.366	0.193
Serious difficulty concentrating, remembering, or making decisions	-0.618**	0.054	0.673**
Serious difficulty walking or climbing stairs	-0.109	-0.059	0.05
Difficulty dressing or bathing	0.048	0.268	0.22
Difficulty doing errands alone such as visiting a doctor's office or shopping	0.008	-0.131	-0.139

Note: The symbols ** and * represent significance values of $p \leq 0.05$ and $p \leq 0.1$, respectively. Numbers are coefficients from the model that represent the difference in log odds of a respondent being the reader type for the particular subgroup compared to the base subgroup.

Source: National Endowment for the Arts, SPPA, 2017, Core I.

Table B-2. Logits estimating the likelihood of participation in literary activities, by demographic subgroup

Independent Variables	Attended an Event Featuring a Poet or Writer	Participated in Creative Writing	Took a Creative Writing Class	Participated in a Book Club or Reading Club
Age (base = 18 to 24)				
25 to 34	-0.359	-0.614**	-3.024**	-0.68*
35 to 44	-0.409*	-0.926**	-3.999**	-0.694**
45 to 54	-0.735**	-1.399**	-4.852**	-0.689**
55 to 64	-0.506**	-1.241**	-3.644**	-0.667**
65 to 74	-0.301	-1.488**	-3.931**	-0.518
75 and older	-0.585**	-1.746**	-4.159**	-0.335
Education (base = High school or less)				
Some college	0.686**	0.798**	0.949**	0.191
College graduate	1.388**	1.162**	0.770*	0.728**
Advanced graduate degree	1.902**	1.681**	1.241**	1.08**
Employment status (base = Not in labor force or unemployed)				
Employed	-0.050	-0.038	-0.0603	-0.171
Sex (base = Female)				
Male	0.359**	-0.219	-0.00254	-0.958**
Income (base = Less than \$20,000)				
\$20,000 to \$49,999	-0.015	-0.224	0.498	0.372
\$50,000 to \$74,999	0.183	-0.232	1.033*	0.582**
\$75,000 to \$99,999	-0.147	-0.0797	1.369**	0.537*
\$100,000 to \$149,999	0.032	-0.201	0.641	0.766**
\$150,000 and over	-0.155	-0.515**	0.667	0.888**
Race/ethnicity (base = Non-Hispanic white only)				
Hispanic, any race	0.856**	-0.621**	0.349	-0.0250
Non-Hispanic non-white only	0.111	-0.462**	0.368	-0.0243

Note: The symbols ** and * represent significance values of $p \leq 0.05$ and $p \leq 0.1$, respectively. Numbers are coefficients from the model that represent the difference in log odds of a respondent participating in the literary activity for the particular subgroup compared to the base subgroup.

Source: National Endowment for the Arts, SPPA, 2017, Core II, Module C, Module D, and Module E.

Table B-3. Logits estimating the likelihood of participation in cultural activities, by demographic subgroup

Independent Variables	Attended a Live Performance	Visited a Museum or Art Gallery	Attended an Art Fair or Festival	Visited a Historical Monument, Park, Neighborhood, or Building
Age (base = 18 to 24)				
25 to 34	-0.462**	-0.381**	-0.109	-0.104
35 to 44	-0.396**	-0.332**	-0.34**	-0.042
45 to 54	-0.402**	-0.514**	-0.316**	-0.063
55 to 64	-0.35**	-0.542**	-0.311**	-0.165
65 to 74	-0.076	-0.42**	-0.185	-0.049
75 and older	-0.345**	-0.538**	-0.663**	-0.445**
Education (base = Less than high school)				
High school graduate	0.354**	0.541**	0.629**	0.608**
Some college	0.929**	1.41**	1.149**	1.077**
College graduate	1.488**	2.124**	1.486**	1.632**
Advanced graduate degree	1.724**	2.49**	1.733**	2.018**
Employment status (base = Not in labor force)				
Unemployed	0.024	-0.198	-0.244	-0.095
Employed	0.084	-0.033	0.067	0.091
Sex (base = Female)				
Male	-0.416**	-0.31**	-0.255**	-0.191**
Income (base = Less than \$20,000)				
\$20,000 to \$49,999	0.147	0.148	0.247**	-0.011
\$50,000 to \$74,999	0.408**	0.227	0.441**	0.309**
\$75,000 to \$99,999	0.748**	0.355**	0.682**	0.622**
\$100,000 to \$149,999	0.734**	0.516**	0.659**	0.686**
\$150,000 and over	0.963**	0.825**	0.725**	0.812**
Race/ethnicity (base = Non-Hispanic white only)				
Non-Hispanic black only	-0.094	-0.245*	-0.395**	-0.504**
Non-Hispanic Asian or Hawaiian/Pacific Islander	-0.781**	-0.282**	-1.122**	-0.645**
Non-Hispanic other	-0.312	-0.21	-0.369	-0.185
Hispanic, any race	0.231**	-0.131	-0.31**	-0.442**

Note: The symbols ** and * represent significance values of $p \leq 0.05$ and $p \leq 0.1$, respectively. Numbers are coefficients from the model that represent the difference in log odds of a respondent participating in the cultural activity for the particular subgroup compared to the base subgroup.

Source: National Endowment for the Arts, SPPA, 2017, Core I.

Table B-4. Logits estimating the likelihood of participation in literary activities by reader type, reading frequency, and demographic subgroup

Independent Variables	Participated in Creative Writing	Participated in Book Clubs or Reading Groups
Reader type (base = Print-only readers)		
eBook readers	0.291	1.261**
Audiobook listeners	0.715*	1.871**
Digital readers and listeners	0.919**	1.774**
Reading frequency		
Number of books read	0.006	0.019**
Age (base = 18 to 24)		
25 to 34	-0.73*	-0.235
35 to 44	-0.876**	-0.268
45 to 54	-1.44**	-0.324
55 to 64	-1.061**	-0.553
65 to 74	-1.789**	0.044
75 and older	-1.939**	0.442
Education (base = High school or less)		
Some college	0.45	0.131
College graduate	0.809**	0.282
Advanced graduate degree	1.123**	0.412
Employment status (base = Not in labor force or unemployed)		
Employed	-0.253	-0.449*
Sex (base = Female)		
Male	0.053	-0.788**
Income (base = Less than \$20,000)		
\$20,000 to \$49,999	-0.494	0.386
\$50,000 to \$74,999	-0.095	0.933
\$75,000 to \$99,999	-0.59	0.901
\$100,000 to \$149,999	-0.658	0.728
\$150,000 and over	-0.716	1.019*

Independent Variables	Participated in Creative Writing	Participated in Book Clubs or Reading Groups
Race/ethnicity (base = Non-Hispanic white only)		
Non-Hispanic non-white only	-0.34	0.101
Hispanic, any race	0.17	1.016

Note: The symbols ** and * represent significance values of $p \leq 0.05$ and $p \leq 0.1$, respectively. Numbers are coefficients from the model that represent the difference in log odds of a respondent participating in the literary activity for the particular subgroup compared to the base subgroup. The number of books read is a continuous variable; the coefficient can be interpreted as the difference in log odds of a respondent participating in the literary activity given an increase in the number of books read by 1 book.

Source: National Endowment for the Arts, SPPA, 2017, Core I, Module C, and Module D.

Table B-5. Logits estimating the likelihood of participation in cultural activities by reader type, reading frequency, and demographic subgroup

Independent Variables	Attended a Live Performance	Visited a Museum or Art Gallery	Visited an Art Fair or Festival	Visited a Historical Monument, Park, Neighborhood, or Building
Reader type (base = Print-only readers)				
eBook readers	0.393**	0.544**	0.398**	0.408**
Audiobook listeners	0.839**	0.968**	0.67**	0.707**
Digital readers and listeners	0.673**	0.886**	0.738**	0.986**
Reading frequency				
Number of books read	0.009**	0.004	0	0.003
Age (base = 18 to 24)				
25 to 34	-0.243	-0.262	-0.005	0.008
35 to 44	-0.332*	-0.262	-0.253	0.135
45 to 54	-0.291	-0.325*	-0.131	0.137
55 to 64	-0.152	-0.422**	-0.19	0.006
65 to 74	0.268	-0.21	-0.001	0.191
75 and older	-0.072	-0.367	-0.574**	-0.211
Education (base = Less than high school)				
High school graduate	0.021	0.072	0.461**	-0.162
Some college	0.537**	0.754**	0.659**	0.089
College graduate	1.022**	1.436**	0.972**	0.572**
Advanced graduate degree	1.073**	1.585**	1.071**	0.759**
Employment status (base = Not in labor force)				
Unemployed	0.034	-0.082	-0.217	0.009
Employed	0.157	-0.09	0.072	0.099
Sex (base = Female)				
Male	-0.264**	-0.102	-0.138*	-0.012

Independent Variables	Attended a Live Performance	Visited a Museum or Art Gallery	Visited an Art Fair or Festival	Visited a Historical Monument, Park, Neighborhood, or Building
Income (base = Less than \$20,000)				
\$20,000 to \$49,999	0.022	0.311*	0.243	0.095
\$50,000 to \$74,999	0.152	0.395**	0.466**	0.392**
\$75,000 to \$99,999	0.575**	0.445**	0.543**	0.601**
\$100,000 to \$149,999	0.614**	0.641**	0.658**	0.763**
\$150,000 and over	0.758**	1.036**	0.582**	0.999**
Race/ethnicity (base = Non-Hispanic white only)				
Non-Hispanic black only	-0.149	-0.233	-0.34**	-0.451**
Non-Hispanic Asian or Hawaiian/ Pacific Islander	-0.724**	-0.095	-1.025**	-0.254
Non-Hispanic other	-0.383	-0.279	-0.449	-0.175
Hispanic, any race	0.401**	0.266	-0.025	-0.059

Note: The symbols ** and * represent significance values of $p \leq 0.05$ and $p \leq 0.1$, respectively. Numbers are coefficients from the model that represent the difference in log odds of a respondent participating in the cultural activity for the particular subgroup compared to the base subgroup. The number of books read is a continuous variable; the coefficient can be interpreted as the difference in log odds of a respondent participating in the cultural activity given an increase in the number of books read by 1 book.

Source: National Endowment for the Arts, SPPA, 2017, Core I.

Table B-6. Logit estimating the likelihood of support for the arts by reader type, reading frequency, and demographic subgroup

Independent Variables	Support for the Arts
Reader type (base = Print-only readers)	
eBook readers	0.451**
Audiobook listeners	0.831**
Digital readers and listeners	0.797**
Reading frequency	
Number of books read	0.015**
Age (base = 18 to 24)	
25 to 34	-0.842**
35 to 44	-0.626**
45 to 54	-0.674**
55 to 64	-0.608*
65 to 74	-0.449
75 and older	-0.077
Education (base = Less than 9th grade)	
Some high school	-1.6
High school graduate	-0.696
Some college	-0.087
College graduate	0.12
Advanced graduate degree	0.324
Employment status (base = Not in labor force)	
Unemployed	-0.225
Employed	0.185
Sex (base = Female)	
Male	0.068
Income (base = Less than \$20,000)	
\$20,000 to \$49,999	1.179**
\$50,000 to \$74,999	1.189**
\$75,000 to \$99,999	1.206**
\$100,000 to \$149,999	1.164**
\$150,000 and over	1.473**

Independent Variables	Support for the Arts
Race/ethnicity (base = Non-Hispanic white only)	
Non-Hispanic black only	0.211
Non-Hispanic Asian or Hawaiian/Pacific Islander	-0.466
Non-Hispanic other	0.793*
Hispanic, any race	0.3

Note: The symbols ** and * represent significance values of $p \leq 0.05$ and $p \leq 0.1$, respectively. Numbers are coefficients from the model that represent the difference in log odds of a respondent supporting the arts for the particular subgroup compared to the base subgroup. The number of books read is a continuous variable; the coefficient can be interpreted as the difference in log odds of a respondent supporting the arts given an increase in the number of books read by 1 book.

Source: National Endowment for the Arts, SPPA, 2017, Core I and Module D.

Appendix C: Methods

Analytical variables

The study team developed several analytical variables for the analysis described in this report. Below we describe how each analytical variable was defined using survey data.

Reader types

The study team created two categorical analytical variables to capture reader types with 2017 SPPA survey data, **READ_TYPE** and **READ_TYPE2**. Both analytical variables were defined from the following variables in the 2017 SPPA data file:

- **PEC1Q14A** – Read any books in the past 12 months
- **PEC1Q18A** (asked only of those respondents who had answered yes to **PEC1Q14A**) – Read any books in the past 12 months using electronic devices, such as eReaders, tablets, laptops, computers, or cell phones (only asked of respondents that answer “yes” to **PEC1Q14A**)
- **PEC1Q17A** – Listened to any audiobooks in the past 12 months

Table C-1 provides the categories of the analytical variable **READ_TYPE** and their definitions in terms of the 2017 SPPA variables. Table C-2 provides the categories of the analytical variable **READ_TYPE2** and their definitions in terms of the 2017 SPPA variables.

Table C-1. Categories of analytical variable Read_type that measure reader types

Category of READ_TYPE	Definition
PRINT_ONLY – Read books outside of work or school in the past 12 months but did not use an electronic device to read or listen to audiobooks	READ_TYPE = PRINT_ONLY if PEC1Q14A = “yes” and both PEC1Q18A and PEC1Q17A = “no”
DIGITAL_AUDIO – Read books outside of work and school in the past 12 months and used an electronic device to read and/or listen to audiobooks	READ_TYPE = DIGITAL_AUDIO if PEC1Q18A = “yes” or PEC1Q17A = “yes”
NONREADER – Did not read a book outside of work or school or listen to a book in the past 12 months	READ_TYPE = NONREADER if both PEC1Q14A and PEC1Q17A = “no”

Table C-2. Categories of analytical Variable Read_type2 that measure digital reader types

Category of READ_TYPE2	Definition
eBOOK – Used an electronic device to read but did not listen to any audiobooks in the past 12 months	READ_TYPE2 = DIGITAL if PEC1Q18A = “yes” and PEC1Q17A = “no”
LISTENER – Listened to audiobooks but did not read with an electronic device in the past 12 months	READ_TYPE2 = LISTENER if PEC1Q18A = “no” and PEC1Q17A = “yes”
DIGITAL_AND_AUDIO – Both listened to audiobooks and read with an electronic device in the past 12 months	READ_TYPE2 = DIGITAL_AND_AUDIO if PEC1Q18A = “yes” and PEC1Q17A = “yes”

Reading genres

Table C-3 provides the specific survey variables used to define each of the analytical variables capturing reading genres from the 2017, 2012, 2008, 2002, and 1992 SPPA. Although there are data available from the 1997 SPPA, we intentionally excluded this year because the methodology of the survey data collection was different in this year and the technical documentation for the SPPA advises against comparing estimates from this year to other years.

Table C-3. Survey variables that define analytical variables of reading genres

Analytical Variable	SPPA 2017	SPPA 2012a	SPPA 2008	SPPA 2002 and 1992b
BOOK – Read any books outside of work or school in the past 12 months	PEC1Q14A	BOOKS_PC	PEQ12A	BOOKS
NOVEL – Read any novels or short stories in the past 12 months	PEC1Q15A	NOVELS_PC	PEQ13AA1	READ_NOVELS
POETRY – Read any poetry in the past 12 months	PEC1Q15B	POETRY_PC	PEQ13AA2	READ_POETRY
PLAYS – Read any plays in the past 12 months	PEC1Q15C	READPLAYS_PC	PEQ13AA3	READ_PLAYS
LITERARY – Read any novels, poetry, or plays in the past 12 months	Composite of NOVEL , POETRY , and PLAYS	Same	Same	Same
HISTORY – Read any nonfiction books about history in the past 12 months	PEC1Q16A	N/A	N/A	N/A
SCIENCE – Read any nonfiction books about science and technology in the past 12 months	PEC1Q16B	N/A	N/A	N/A
BIO – Read any biographies or memoirs in the past 12 months	PEC1Q16C	N/A	N/A	N/A
GRAPHIC – Read any graphic novels or books in comic-strip format in the past 12 months	PEC1Q16D	N/A	N/A	N/A
RELIGIOUS – Read any religious texts or books about religion or spirituality in the past 12 months	PEC1Q16E	N/A	N/A	N/A

^a The 2012 SPPA includes respondent and spouse/partner responses.

^b Data source was the combined 1992–2012 SPPA data file; all other years use the data file for the individual year.

Other literary activities

To measure other literary activities, the study team used survey variables to create five analytical variables capturing (1) attendance at an event featuring a poet or writer, (2) participation in creative writing, (3) taking classes in creative writing, (4) participation in book clubs or reading groups, and (5) writing for personal interest. The data on other literary activities comes from multiple sources, including the SPPA, ABS, and ATUS. Table C-4 describes the survey variables used to define each analytical variable capturing participation in other literary activities.

Table C-4. Survey variables that define analytical variables of literary activities

Analytical Variable	2017 Variable	2014/2015 Variable	2012 Variable
EVENT – Attended an event featuring a poet or writer in the past 12 months	PEC2Q1F (SPPA) – Attended an event featuring a poet or writer (this could include book signings, readings, or poetry slams)	BOOK_READING (ABS 2015) – Attended a live book reading/poetry reading/storytelling event, respondent and spouse/partner combined	READINGEVENT_PC (SPPA) – Attended a live book reading or a poetry or storytelling event, respondent and spouse/partner combined
CREATIVE – Participated in creative writing in the past 12 months	PEMC07 (SPPA) – Did creative writing such as fiction, nonfiction, poetry, or plays	WRITING (ABS 2014) – Did creative writing such as fiction, nonfiction, poetry, or plays, respondent and spouse/partner combined	PEC8 (SPPA) – Did any creative writing such as fiction, nonfiction, poetry, or plays
CLASS – Took a class in creative writing in the past 12 months	PEMEQ3F (SPPA) – Took lessons/classes in creative writing (respondents that are aged 18–24) PEMEQ3FF (SPPA) – Took lessons/classes in creative writing (respondents that are aged 25 and older)	LESSONWRITING (ABS 2015) – Took classes in creative writing, respondent and spouse/partner combined	PEE6D (SPPA) – Took classes in creative writing
CLUB – Participated in book clubs or reading groups in the past 12 months	PEMDQ1J (SPPA) – Participated in book clubs or reading groups	N/A	BOOKCLUB_PC (SPPA) – Participated in a book club or reading group, respondent and spouse/partner combined
WRITE – Wrote for personal interest on a typical day	T120313 (ATUS) – Wrote for personal interest	T120313 (ATUS 2015) – Wrote for personal interest	T120313 (ATUS) – Wrote for personal interest

Cultural activities

To measure cultural activities, the study team used survey variables to create four analytical variables capturing (1) attendance at live performances; (2) visits to museums or art galleries; (3) visits to art fairs or festivals; and (4) visits to historic parks or monuments or touring buildings or neighborhoods for historic or design value. Table C-5 describes the survey variables used to define each analytical variable capturing participation in cultural activities.

Table C-5. Survey variables that define analytical variables of cultural activities

Analytical Variable	SPPA 2017	SPPA 2012a	SPPA 2008	Label
LIVE – Attended a live performance in the past 12 months	PEC1Q1A	JAZZ_PC	PEQ1A	Attended live jazz performance
	PEC1Q2A	SALSA_PC	PEQ2A	Attended live Latin, Spanish, or salsa music performance
	PEC1Q3A	CLASSICAL_PC	PEQ3A	Attended live classical music performance
	PEC1Q4A	OPERA_PC	PEQ4A	Attended live opera music performance
	PEC1Q5A	MUSICAL_PC	PEQ5A	Attended live musical stage play
	PEC1Q6A	PLAY_PC	PEQ6A	Attended live performance of a nonmusical stage play
	PEC1Q7A	BALLET_PC	PEQ7A	Attended live ballet performance
	PEC1Q8A	DANCE_PC	PEQ8A	Attended live dance performance other than ballet
VISIT – Visited a museum or art gallery in the past 12 months	PEC1Q10A	ARTMUSEUM_PC	PEQ9A	Visited art museum or gallery
FESTIVAL – Visited an art fair or festival in the past 12 months	PEC1Q11A	CRAFTFAIR_PC	PEQ10A ^b	Visited a craft fair or a visual arts festival
	PEC1Q12A	OUTDOORFESTIVAL_PC	PEQ10A ^b	Visited an outdoor festival that featured performing artists
PARK – Visited a historic park or monument or toured a building or neighborhood for its historic or design value in the past 12 months	PEC1Q13A	PARK_PC	PEQ11A	Visited historic park or monument or building or neighborhood

^a The 2012 SPPA includes respondent and spouse/partner responses.

^b The 2008 SPPA did not distinguish between craft fairs, visual arts festivals, and outdoor festivals like later years did.

^c Among the three SPPA waves, wording of the question item pertaining to visiting places for their historic or design value varied.

Frequency of reading

To measure the frequency of reading, the study team created an analytical variable **BOOKS_COUNT** that was defined by the survey variable:

- **PTC1Q14B** – About how many books did you read during the past 12 months

Support for the arts

Table C-6 provides the survey variables used to create the analytical variable SUPPORT, which measures support for the arts using 2017 SPPA survey data.

Table C-6. Survey variables that define analytical variable of support for the arts

Analytical Variable	Variables in 2017 SPPA
SUPPORT – Adults who supported the arts with time or money in the past 12 months	PEMDQ3 – Volunteered for an arts organization, group, or project PEMDQ4 – Subscribed to an arts organization PEMDQ5 – Donated any money, goods, or services to an arts organization, group, or project PEMDQ6 – Purchased or acquired any pieces of art, such as paintings, drawings, sculpture, pottery, or other visual art

Sample weights

Each of the survey datasets have sample population weights that facilitate accurate estimates of the population the survey is meant to represent. The 2017 SPPA, ABS, and ATUS all have a single weight that was applied in all analyses. Earlier years of the SPPA used multiple weights that pertain to specific variables/modules of the survey. The study team applied the appropriate weight to each analysis using data from prior years of the SPPA by consulting the technical documentation for the data file. Table C-7 provides the sample weights used for analysis of each analytical variable.

Table C-7. Sample weights used for each analytical variable

Analytical Variable	SPPA 2017	SPPA 2012	SPPA 2008	SPPA 2002 and 1992 (combined file)	ABS	ATUS
READ_TYPE and READ_TYPE2	PWSUPWGT	-	-	-	-	-
BOOK, NOVEL, POETRY, PLAYS, and LITERARY	PWSUPWGT	PWOWGT	CWGT	WEIGHT	-	-
HISTORY, SCIENCE, BIO, GRAPHIC, and RELIGIOUS	PWSUPWGT	-	-	-	-	-
EVENT	PWSUPWGT	PWSWGT	-	-	PWABSWGT	-
CREATIVE	PWSUPWGT	PWNWGT	-	-	PWABSWGT	-
CLASS	PWSUPWGT	PWNWGT	-	-	PWABSWGT	-
CLUB	PWSUPWGT	PWSWGT	-	-	PWABSWGT	-
WRITE	-	-	-	-	-	TUFINLWGT
LIVE, VISIT, FESTIVAL, and PARK	PWSUPWGT	PWOWGT	CWGT	-	-	-
BOOKS_COUNT	PWSUPWGT	-	-	-	-	-
SUPPORT	PWSUPWGT	-	-	-	-	-

Missing data

The SPPA and other data sources have missing data due to the survey design (i.e., modules of the SPPA are randomly assigned and not given to all respondents), refusal to answer questions, and other issues. The study team discarded all missing data prior to analysis. Following guidance in the technical documentation for the CPS supplements, we assumed that any missing data were missing completely at random; thus, deleting the cases did not introduce bias into the estimates. Throwing out the missing data did impact estimates of population counts. To remedy this issue, the study team applied the adjustment factors to all estimates of the population that are provided by CPS in the technical documentation (source and accuracy statements) of the SPPA and other data files. Table C-8 provides the adjustment factors used for analyses with SPPA 2017 data, and Table C-9 provides the adjustment factors used for analyses with SPPA 2012 data. No adjustment factors were necessary for SPPA 2008, ABS, or ATUS data for the research in this report.

Table C-8. SPPA 2017 Supplement weighting factors

Factor	Description
2	Estimates involving items from one Core
2.5	Estimates involving items from one Module
5	Estimates involving items from one Core and one Module
10	Estimates involving items from two different Modules
20	Estimates involving items from one Core and two Modules

Table C-9. SPPA 2012 Supplement weighting factors

Factor	Core/Module Weight Used
1	PWOWGT, PWTWGT, or PPAWGT
2.25	PWSWGT
1.75	PWNWGT

Variance and standard error estimation

In addition to apply sampling weights, it is also important to account for the design effect of the survey when estimating variances and standard errors. If this is not done, it is possible to find erroneous evidence of statistical significance, which can lead to false claims that a change or an association is statistically meaningful when it is not. The 2017, 2012, and 2008 SPPA, as well as the data files for the ABS and ATUS, each have 160 replicate weights provided by CPS that facilitate accurate estimation of variances and standard errors that accounts for the effect of the survey design. For analyses using these data, the study team applied the replicate weights and used the Successive Difference Replication (SDR) method in Stata to estimate variance and standard errors. The SDR method is recommended for use with CPS data in technical documentation provided by the Integrated Public Use Microdata Series (IPUMS).

It is the study team's understanding that the CPS did produce replicate weights for the SPPA in years prior to 2008; however, the data do not appear to be available on the CPS website. The combined 1982 to 2012 SPPA data file in the National Archive of Data on Arts & Culture includes variables that indicate strata and primary sampling units that facilitate the Taylor series linearization estimation method (the default in Stata) for estimating variance, which is less accurate than SDR but still highly rigorous and valid. We use this method to estimate variances for the SPPA data from 2002 and earlier.

Finally, small sample sizes were an issue for some of the analyses using subgroups. If the coefficient of variation for a subgroup in an analysis was less than 30 percent, the study team combined subgroups to improve the accuracy of the estimate.

Methods to test statistical significance

Between years and groups

To test for statistical significance of differences between years or subgroups in the analyses above, the study team calculated the 90 percent confidence interval of the estimate in each year or subgroup using the following formula:

$$CI = X \pm 1.645 * SE$$

where X is the estimate and SE is the estimate's standard error. The study team then compared the confidence intervals of each year or subgroup and determined whether they overlap. If confidence intervals overlap, we report that the estimate is not significant with at least 90 percent confidence.

Multivariate regressions

The study team also specified several multivariate regression models to understand whether differences between subgroups were statistically significant, controlling for other factors. We describe each model below.

The study team specified a multinomial logistic regression that facilitated testing the statistical significance of the association between a particular demographic subgroup and reading types, controlling for the other subgroups. The results of this model are in Table B-1 in Appendix B.

The multinomial logistic regression for each respondent i in the 2017 SPPA data took the form

$$\ln \left(\text{READ_TYPE}_i = \begin{cases} \text{PRINT_ONLY}_i \\ \text{DIGITAL_AUDIO}_i \end{cases} \right) = \alpha + \beta X_i + \epsilon_i$$

where α is a constant term, β is a matrix of coefficients for each subgroup X that estimates the log odds of a member of the subgroup being in each category of READ_TYPE compared to the reference category NONREADER , and ϵ is a random error term. If a coefficient in β is statistically significant with 90 percent confidence, the study team reported that there is evidence that the subgroup is associated with the particular type of reading.

The study team also specified logistic regression models that facilitated testing the statistical significance of the association between a particular demographic subgroup and the analytical variables measuring literary activity (see Table C-4) and cultural activity (see Table C-5), controlling for the other subgroups. The results of these models are in Table B-2 and Table B-3 in Appendix B. Each logistic regression for each respondent i in the 2017 SPPA took the form

$$\ln(y_i = 1) = \alpha + \beta X_i + \epsilon_i$$

where y is the variable measuring literary activity or cultural activity; α is a constant term; β is a matrix of coefficients for each subgroup in X that estimates the log odds of a member of the subgroup participating in y compared to the reference category of the subgroup; and ϵ is a random error term. If a coefficient in β is statistically significant with 90 percent confidence, the study team reported that the subgroup is associated with the activity represented by dependent variable y .

Finally, the study team specified logistic regression models that facilitated testing the statistical significance of the association between reader types and literary activity, cultural activity, and support for the arts, controlling for demographic subgroups and the frequency of reading. The results of these models are in Table B-4, Table B-5, and Table B-6 in Appendix B. Each logistic regression for each respondent i in the 2017 SPPA took the form

$$\ln(y_i = 1) = \alpha + \beta X_i + \delta \text{READ_TYPE2}_i + \epsilon_i$$

where y is the variable measuring literary activity, cultural activity, or support for the arts; α is a constant term; β is a matrix of coefficients for each demographic subgroup and the variable BOOKS_COUNT in X that estimates the log odds of a member of the subgroup participating in y compared to the reference category of the subgroup or, in the case of BOOKS_COUNT, the change in the log odds of participating in y given an increase in the number of books read by 1 book; δ is a vector of coefficients for each reader type, either eBook, LISTENER, or DIGITAL_AND_AUDIO, that estimates the log odds of an individual of the reader type participating in y compared to the reference category (PRINT_ONLY), and \mathcal{E} is a random error term. If a coefficient in δ is statistically significant with 90 percent confidence, the study team reported that the reader type is associated with the activity represented by dependent variable y , controlling for the variables in X .

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