

# Collaborative Research in Sociology: Trends and Contributing Factors

Laura Hunter · Erin Leahey

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**Abstract** To what extent do sociologists collaborate? Has this changed over time? What factors contribute to research collaboration among sociologists? To answer these questions, we examine trends in collaboration over a 70 year period and empirically test a variety of explanations for the increase in collaboration that we find. We analyze data collected from a stratified random sample of articles in two leading sociology journals between 1935 and 2005 ( $n=1274$ ). Most of our analyses are descriptive and display trends over time. However, we pool the data across all years and estimate logistic regression models to assess the relative contribution of various factors. We find that the importance of geographical location has been waning since the 1950s, although the growth in cross-place collaborations stagnated between 1980 and 2005. We find that quantitative research is more likely to be collaborative, as are projects requiring data collection, though this may change because the collaboration rate among secondary data users is increasing at a faster rate. We find no significant gender differences in rates of collaboration, although male sole-authorship remains the most common form of publication. We also find the institutional prestige of coauthors is typically higher than that of sole-authors. Our results elucidate the extent of collaboration in sociology and reveal how several factors have contributed to this major shift in work organization.

**Keywords** Research · Collaboration · Sociology · Coauthorship

Anecdotal and empirical evidence suggest that within scientific fields, research collaboration is on the rise, and that collaboration can be beneficial for individual scholars (Presser 1980) and for scientific progress more generally (Hara et al. 2003). While investigations of collaboration in other fields have been conducted (Davis and Wilson 2001; Endersby 1996; Fisher et al. 1998), less is known about the field

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L. Hunter (✉) · E. Leahey  
Department of Sociology, University of Arizona, Social Sciences Building, Room 400,  
1145 E. South Campus Drive, Tucson, AZ 85721, USA  
e-mail: lahunter@u.arizona.edu

sociology. In fact, in their 1999 *American Sociologist* article, Babchuk et al. (1999:6) stated that “inquiries to date have not systematically explored, either for purposes of description or explanation, the extent to which cooperation in collaborative research and publication is becoming more common in sociology....” In this paper, we take Babchuk, Keith, and Peters’ work as a starting point. Like them, we examine trends in collaboration over time using empirical data from sociology journals. Then, we move the research forward by not only theorizing but also empirically assessing various explanations for the increase in collaboration, such as changes in the demographic composition of the field and increases in communication-enhancing technology.

There are important reasons to study scientific collaboration. Collaboration, which is typically operationalized through coauthor relationships, is now normative and ubiquitous in most scientific disciplines (e.g., over 95% of articles in major periodicals in physics, biochemistry, biology, and chemistry are coauthored (Babchuk et al. 1999)). Moreover, this normative style of research constitutes a major shift in work organization (Wenger 1998). This new mode of work organization is related to other important social trends, including: ties between science, policy, and economic activity (Hellstrom 2003); increases in work-based inequality and the importance of professional networks (Kanter 1994); and the stimulation of innovation (McKelvey et al. 2003). In this paper we assess the extent of this shift in work organization for the field of sociology and we examine how various factors—technology, research methods, data accessibility, authors’ gender, and institutional prestige—contribute to the shift.

## What Promotes Collaboration?

### Technology and Place

Most social scientists agree that even with globalization and rapid advancements in information and communication technology, physical place still matters (Olsen and Olsen 2000). In recent years, social scientists have been exploring the impact that shared space (neighborhoods, workplaces, schools) has had on individual behavior, including scientific collaboration. Scholars have found that spatial proximity encourages collaboration because it encourages informal communication (Bozeman and Corley 2004; Katz and Martin 1997:5). Collaboration decreases exponentially with distance, especially for kinds of research that are bound to a laboratory (Landry and Amara 1998; Walsh and Bayma 1996).

But the importance of physical place may be waning relative to virtual space. Over a century ago, Karl Marx predicted that time would annihilate space in the modern era; that distances would no longer matter given the technological advances in communication and transportation (Griswold and Wright 2004). To what extent is this true for scientific collaboration? Several scholars have theorized about the role that information technology may have on collaboration, but few have examined it empirically. Anecdotal evidence regarding the importance of information technology abounds: track-change capabilities in Microsoft Word that facilitate co-writing and editing of papers; access to datasets and research publications via the Internet, and

licenses to common computer programs, which ease the division of labor associated with data analysis. One mathematician cited in Walsh and Bayma (1996:670) relayed his experience collaborating with a distant scholar: “We communicate via email. It’s a critical component of my work. I can’t remember what it was like before...I use it to keep in touch with research...Ask a question about the literature. Ask questions of collaborators.” Information technology, especially computer-mediated communication, allows physically distant scholars to find each other easily, remain in touch inexpensively (even as they travel), and work interdependently, efficiently, and perhaps with greater trust given that email exchanges are automatically logged. As Beaver (2001) suggests, the Internet may encourage collaboration across research institutes, states, regions, and even countries. We hypothesize that information technology has provided scholars with the opportunity to expand their academic networks into distant geographic locales.

## Method

Previous researchers have claimed that methodological approach—quantitative or qualitative—has affected rates of collaboration (Babchuk et al. 1999; Endersby 1996; Moody 2004; Presser 1980). Why may this be so? If, as these scholars have suggested, collaboration increases efficiency through the division of labor, then methodological approaches that can be divided easily should lend themselves best to collaboration. For example, the various tasks involved in ethnographic fieldwork may be difficult coordinate if more than one researcher is involved. On the other hand, the tasks involved in quantitative research, such as coding, programming, cleaning, and analyzing, may be more easily divisible among several scholars. Additionally, quantitative methods have become increasingly complex and may require more extensive knowledge and equipment; thus the expertise of several scholars may be needed (Endersby 1996; Hudson 1996). Previous findings indicate that coauthorship is not evenly distributed across sociological work and is more likely in specialties that admit to an easier division of labor, such as the Sociology of Health and Medicine (Moody 2004). Additionally, lower collaboration trends in history (Endersby 1996) and anthropology (Babchuk et al. 1999) lend support to our working hypothesis: that papers employing quantitative methods, which are more amenable to the division of labor, are more likely to be collaborative.

## Data Accessibility

Whereas several researchers have addressed the role of methodology in collaboration patterns, few scholars have addressed the role of data accessibility—that is, whether the data come from extant, secondary sources, or whether the data were collected by the researchers themselves. Moody (2004) suggests but does not empirically assess that the rise of large-scale data collection in the social sciences lends itself well to a team-production model that collaboration implies. Fisher et al. (1998) also contend that both large-scale primary data collection efforts and the availability of large secondary datasets from archival depositories (e.g., ICPSR) increase collaboration in political science. To date, no empirical data have been available to test these conjectures. In this paper we are able to determine if a relationship between data

accessibility and collaboration exists and if the relationship has changed over time, possibly coinciding with technological developments, such as electronic data archives. We anticipate that papers using secondary, rather than primary, data sources are more likely to be collaborative.

## Gender

Because women are less integrated into professional networks than men (Kyvik and Teigen 1996), they may also be less involved in collaborative relationships (Cole 1981; Kyvik and Teigen 1996; McDowell and Smith 1992). Among economists, McDowell and Smith (1992) found that there is a significant propensity for researchers to select coauthors of the same sex. Therefore, the disproportionately large number of men in certain academic fields—even sociology, especially among tenured faculty (Roos and Jones 1993)—raises the possibility that women may have fewer opportunities to collaborate, especially if they work in small departments (McDowell and Smith 1992). Men are more likely than women to serve as additional authors (i.e. not first authors), supporting the argument that women may not have as many opportunities to collaborate (Clemens et al. (1995).

However, other empirical evidence suggests that women are more likely to collaborate, possibly arising out of sex differences in desire to collaborate. Fisher et al. (1998) found that coauthorship is the most prevalent form of publication for women, whereas sole authorship is the most common type for men. Bypassing concerns that proportions will seem larger for the minority group (in this case, women) in a minority–majority group comparison (Rytina and Morgan 1982), Moody (2004) works with odds derived from multivariate analyses, finding that women have a 50% greater odds of collaborating compared to men. The discrepancies in desired and actual collaboration between the sexes may arise out of differences in professional confidence. Reskin (1978) suggests that women may be less confident in their professional careers, making them more reliant on support from their work environment and colleagues.

Given the conflicting evidence, we refrain from stating directional hypotheses about the relationship between gender and collaboration. We explore whether gender informs the likelihood of collaborating, and how gendered collaboration patterns have changed over time. And because previous research suggests that institutional prestige may be more determinative of a first-authored publication in a top journal for women than for men (Clemens et al. 1995), we also assess whether gender interacts with another factor of interest to us: institutional prestige.

## *Institutional Prestige*

We expect authors' institutional prestige to be positively related to collaboration patterns, though the casual direction remains unclear. It may be the case that researchers housed in prestigious institutions receive more invitations to collaborate and accept them. Although institutional prestige is more than simply an amalgamation of members' productivity (Keith and Babchuk 1994), institutional prestige continues to serve as an indicator of quality (Clemens et al. 1995), such that members of prestigious departments may have greater success when attempting to

publish in prominent journals (Keith et al. 2002). For this reason, and perhaps because they have special competencies that are in demand (Melin 2000), members of prestigious departments may be solicited as prospective collaborators more frequently than their peers in less prestigious institutions. Conversely, it may be the case that greater levels of collaboration enhance institutional prestige through the career mobility process. If collaboration enhances the quantity (De Solla Price and Beaver 1966) and quality (Stephan and Levin 1987; Presser 1980) of work as well as the likelihood of acceptance (Lawani 1986), then researchers who collaborate may disproportionately be offered positions at top institutions.

## Data and Methods

To examine and explain trends in collaboration over time, we collected historical data using archival material. We focused on the discipline of sociology and collected data from scholarly journals. We limited our analysis to two historically and currently top sociology journals that have been at the core of the discipline since their founding in the late 19th and early 20th centuries. These are general sociology journals that circulate among sociologists more widely than specialized journals. Because these are the top journals in the discipline, they have consistently published innovative, pioneering work. For these reasons, their opportunity to influence others' work and establish trends is probably enhanced (Turner and Turner 1990). Although not representative of all sociological research, articles in leading journals tell us something about "disciplinary standards and ideals" (Platt 1996:126), and have been used widely in previous research on the discipline of sociology (Clemens et al. 1995; Leahey 2005).<sup>1</sup>

We collected data from a 20% stratified random sample of articles published between 1935 and 2005 in the *American Journal of Sociology* and *American Sociological Review*, thus supplementing the sample used by Leahey (2005). We stratified by journal and by issue in order to obtain a sufficient number of articles from each year. We chose not to stratify by year itself, as that could have resulted in a series of articles from the same thematic issue to the exclusion of other issues published in the same year. Stratifying by issue guarantees that oddities associated with particular issues will be fully represented. After eliminating erroneous inclusions, 1,274 articles remained<sup>2</sup>, 424 of which were coauthored.

## Dependent Variable

We use coauthorship to measure research collaboration. We focus on coauthorship as a measure of collaboration to ensure that our results will be compatible with previous research (Bozeman and Corley 2004; De Solla Price and Beaver 1966; Endersby 1996; Martin-Sempere et al. 2002; Melin 2000; Merton 1973). In addition, output

<sup>1</sup> We thank an anonymous reviewer for pointing out that because there may be a relationship between collaboration and the likelihood of publishing in a prestigious journal, rates of collaboration documented here may not adequately represent all sociological work.

<sup>2</sup> From the sampling frame we excluded research and teaching notes, book reviews, comments and replies, bibliographies, obituaries, and all articles in supplemental issues.

from coauthor relationships is more tangible than other forms of collaboration (e.g., sharing data, exchanging ideas over coffee, helping a colleague to learn a new technique), providing a clear and unambiguous measure of research collaboration. By recording the number of authors on each article, we were able to construct a continuous count variable that we use for descriptive purposes. We use a binary version of this measure (which distinguishes sole- and coauthored articles) as our dependent variable. This measure, while conservative, appears warranted: of the scholars that Melin (2000) studied, only 6% cited an instance in which a truly collaborative piece resulted in only a single-authored publication. Moreover, coauthorship captures the two key elements of collaboration more generally: working together for a common goal and sharing knowledge (Hara et al. 2003).

### Explanatory Variables

In addition to collecting information about year of publication, which is necessary to understand trends over time, we recorded and coded various kinds of information about each journal article and its authors. We collected data about the authors, including their gender, institutional affiliation, department prestige, and relative locations, and also data about the articles, particularly their methodological approach (quantitative or qualitative) and data source (primary or secondary).

We used several sources to determine each author's *gender*. Often, the name was often a clear indicator of the gender (e.g., Charles and Linda). If a name could be applied to either gender, or if initials were used, we looked for websites with pictures or reviews of the author's work that included pronouns (e.g., "she" or "his"). The article itself was also used when it indicated the author's gender. Knowing the gender of each author allowed us to construct article-level descriptors of the gender composition of each set of coauthors, such as whether it was an all-female, all-male, or mixed-sex collaboration. In a few cases, we were unable to determine an author's gender and these cases are excluded from analyses of gendered patterns in collaboration. Gender is critical to examine in an analysis of collaboration trends because the gender composition of the field of sociology has changed over time.

We obtained information about each author's institution directly from the journal article itself, and used this as a basis for our measure of *institutional prestige*. To capture institutional prestige, we include the number of times the author's department or organization was represented in our sample five years prior to the publication date, which ranges from 0 to 17. This sample-based measure, which assesses the visibility and perhaps reputation of institutions in the field, was necessary because extant measures of department prestige (e.g., the National Research Council ratings) do not include applied research centers such as the Census Bureau, which were represented frequently in our sample.

The authors' institutional affiliations also allowed us to measure the *geographic distance* among coauthors. We created binary variables for whether two or more of the authors were affiliated with different institutions, states, regions, and countries. While the names of the institutions sufficed as a proxy for whether the authors were at different universities, we had to find the location of each author's institution to determine the state, region, and country of residence. We used the nine Census Bureau regions to establish whether authors residing in the United States were in

different regions<sup>3</sup>. When necessary, we used the Internet to help determine the location of universities or institutions. For a few of the older articles we could not determine the state, region, or country of a coauthor's institution, and thus had to exclude these cases from our analysis of geographic co-location.

In addition to data on authors, we collected a few pieces of information about the articles themselves that we thought would be related to collaboration. By reading key parts of the article, we determined whether each article was based on empirical evidence, or theoretical in nature, and then we distinguished empirical articles based on whether they used *qualitative or quantitative data and methods*. Thus, we use a more valid measure of quantitative work than others have. Moody (2004), for example, used the existence of tables in an article as proxy for quantitative work, relying on the assumption that qualitative articles rarely present results in tabular form. Additionally, the ability to assess trends over time is particularly important given the changes in sophistication of quantitative methods that may affect the rates of collaboration. For quantitative articles, we also collected whether the authors used *primary data* (which they collected themselves) or *secondary data* (which they simply obtained from an existing source). Because this was more difficult for qualitative pieces (e.g., coding newspaper is based on extant sources (secondary data), but involves the construction of an entirely new dataset (primary data)), we limit this part of our analysis to the articles using quantitative data.

With these data, we describe trends in collaboration over time, and how they relate to characteristics of the coauthors (e.g., their gender, co-location, and institutional prestige) and characteristics of the articles themselves (e.g., whether they are quantitative and whether they use primary or secondary data). Most of our analyses are descriptive; we graphically present means and proportions of variables over time to examine trends of interest to us. Toward the end of our analysis, we pool the data across all years and estimate logistic regression models to explain the trends in collaboration and assess the relative contribution of various factors.

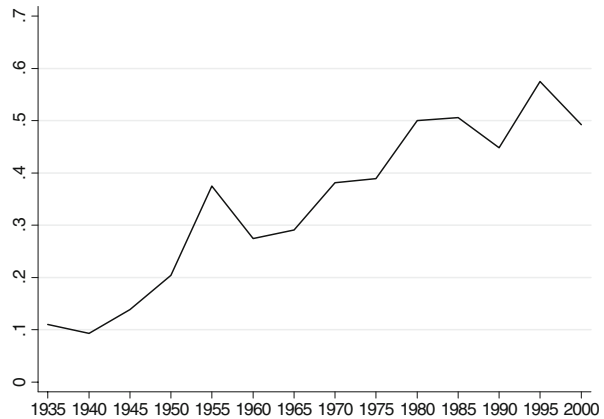
## Results

### Collaboration Trends over Time

Based on our probability sample ( $n=1,274$ ), 33% of the articles published in *AJS* and *ASR* from 1935 to 2005 were collaborative, i.e., authored by two or more individuals. Variation in this average, based on 5-year intervals, is depicted in Fig. 1. Between 1935 and 1940 (the 5-year interval labeled “1935”), only 11% of *ASR* and *AJS* articles were coauthored. In contrast, almost half of all articles published between 2000 and 2005 were coauthored. The peak in this trend occurred between 1995 and 2000, during which 57% of articles were coauthored. This dramatic increase in coauthorship among sociologists publishing in their field's top journals is

<sup>3</sup> Of the research teams that had at least two researchers residing outside the United States, researchers sharing a country shared an institution as well, in all cases but one. In this case, the researchers were at two different universities in one Canadian province, therefore, they were coded as residing in the same state and region.



**Fig. 1** Proportion of articles coauthored, by year

consistent with previous findings from sociology (Endersby 1996; Moody 2004), political science (Fisher et al. 1998), ophthalmology (Davis and Wilson 2001), as well as psychology and economics (Endersby 1996).

Not only has the rate of collaboration increased over time, but the average number of authors per article has also risen. In Fig. 2 we examine the average number of authors listed on collaborative articles using 5-year intervals. The average number of authors increased from 2.1 in 1935–1940 to almost 2.6 in 2000–2005. Despite this increase, the average number of authors per article is still low relative to other fields: whereas there was a maximum of five coauthors in our sample of sociology articles, the maximum in a recent study of ophthalmologists was 120 (Davis and Wilson 2001).

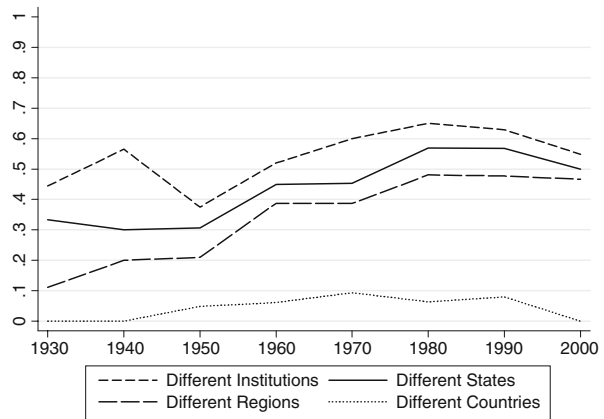
### Location, Location, Location

Did the communication technologies of the 1980s and 90s ease communication among scholars and thereby increase collaboration across distant locales? To assess this, we examine the respective geographic locations of coauthors over time, focusing on whether collaborating researchers are increasingly located in different

**Fig. 2** Average number of authors for coauthored articles, by year



**Fig. 3** Proportion of coauthors at different institutions, states, regions, and countries, by year



institutions, states, regions, and even nations. For this set of analyses, we restrict our analysis to the subset of coauthored articles for which the geographic location of each coauthor's institution could be determined ( $n=409$ ).

Collaboration among researchers at different universities increased steadily since the 1950s, with a slight downturn since the early 1980s (see Fig. 3). Fifty-two percent of coauthored articles were written by researchers at separate institutions in the 1960s; this number increased to a peak of 65% in the 1980s.<sup>4</sup> But because authors at two separate universities could still be geographically near, we turn to an examination of coauthors' place of residence (their respective states, regions, and nations) to understand how communication-related technology might be influencing collaboration across geographic locales.

Coauthors were more likely to represent multiple states and regions since the 1950s (see Fig. 3), with a peak of 57% between 1980 and 1990 of researchers in different states. Collaborative articles written by researchers in different regions also peaked in the 1980s. Although there has been an increase in collaboration across states and regions in the latter half of the twentieth century, few collaborative research teams represent more than one country. As Fig. 3 shows, there were no cross-country collaborations in the 1930s, and only 10% at the peak in 1970–75.

Although the declines in geographic dispersion of coauthors evident in the 1980s and 90s are slight (approximately 1%) and could be due to sampling error, they also suggest that technology has had minimal impact on collaboration across distant locales. While it is not surprising that the Internet did not have a dramatic effect on collaboration among researchers in different countries since communication-related technology cannot overcome other barriers facing researchers in different countries, including language, networking opportunities and possibly different approaches to research, we expected the Internet to promote collaboration across institutions,

<sup>4</sup> These results hold even when we eliminate collaborative teams that may represent advisor-student pairs (i.e., when we eliminate collaborate teams that include a graduate student or assistant professor). Thus, we are confident that advisors and students who *wrote* papers at the same institution, but who happened to be at separate institutions in the year of publication, do not artificially inflate our estimate of research teams at "different institutions."

states, and regions in the 1990s and beyond. Instead, the biggest increases started in the 1950s and leveled off in the 1980s, making a technological explanation difficult. Thus, we conclude that physical place still matters in the modern era. While the Internet may have made collaborative work easier across space, it has not greatly increased the overall rate of collaboration across great distances. Perhaps technology changed the nature of collaborative work rather than the amount collaboration.

### Collaboration and Quantification

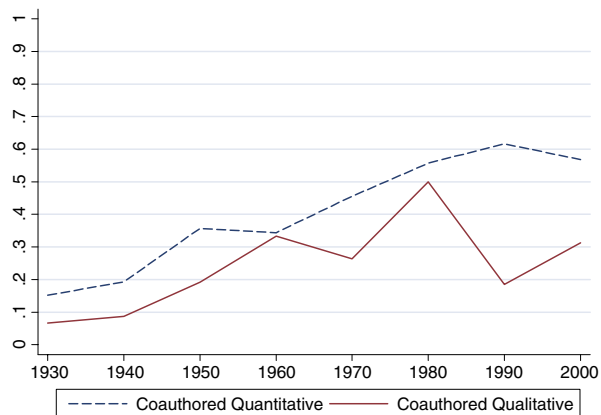
Throughout the twentieth century, collaboration has been more likely when quantitative, rather than qualitative, data are analyzed (see Fig. 4). Moreover, this difference has grown since the early 1960s, when collaboration rates were roughly equal. As of 2005, 57% of quantitative articles were coauthored, compared to only 31% of the qualitative articles. This finding, also demonstrated by Moody (2004), may attest to the ease with which quantitative analysis can be divided among multiple authors, especially relative to the more typically holistic approaches to analyzing qualitative data. This is also evident from Fig. 5, which demonstrates that consistently over the twentieth century, coauthored articles were about 20% more likely to employ quantitative data than sole-authored articles. Between 2000 and 2005, 80% of collaborative pieces used quantitative methods, compared to only 60% of sole-authored pieces.

### Data Accessibility

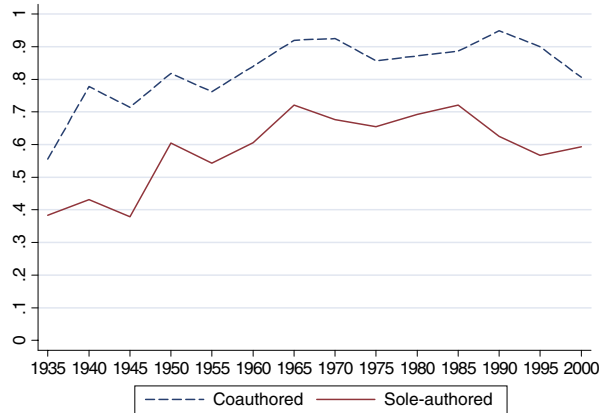
Are researchers more likely to collaborate when they collect their own data, or when secondary data are available? And has this relationship changed over time? For our sample of articles, we were able to determine whether the subset of quantitative articles used primary or secondary data, so we use this subset of articles ( $n=842$ ) to examine the role of data accessibility.

Collaboration has increased over time for both articles based on secondary data and those using primary data, though the rates are different (see Fig. 6). Likely due to the fact that collecting data is a very labor-intensive task, rates of collaboration among

**Fig. 4** Proportion of quantitative and qualitative articles that are coauthored, by year. *Note:* this figure compares collaboration trends between articles using quantitative and qualitative data; removing theoretical (non-empirically based) articles that do not use any data reduced the sample size from 1,274 to 1,008



**Fig. 5** Proportion of coauthored and sole-authored articles using quantitative analysis, by year

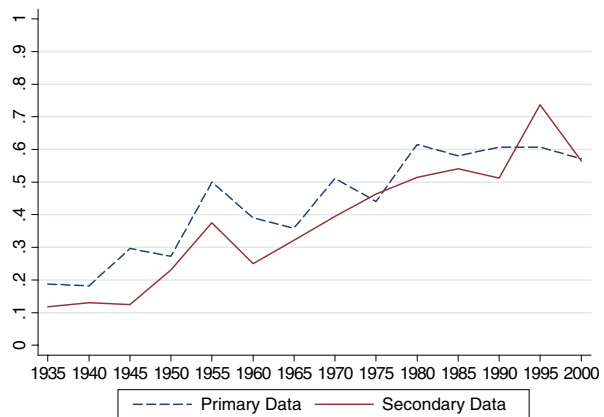


articles using primary data are generally higher. However, collaboration among articles using secondary data has increased at a greater rate, relative to articles using primary data. This may attest to the increasing sophistication and complexity of secondary data. When complex national survey designs—with their multi-stage sampling procedures, thousands of observations, multiple data modules, and reams of technical documentation—became the norm starting in the 1960s (Coleman 1986), perhaps researchers needed to collaborate to master this complexity.

### Gendered Patterns

Women's inroads into professional sociology are apparent in their increased representation as authors (Grant and Ward 1991; Roos and Jones 1993). The proportion of all articles ( $n=1,274$ ) with females as first or sole-authors remained both low (around 10%) and relatively stable until 1985, after which there was a steady and marked increase in the proportion of articles with a woman serving as the sole or first author (up to 32% in the early 2000s). Despite this increase, a strong majority (68%) of publications still have male scholars as the first or sole-author.

**Fig. 6** Collaboration rates for quantitative articles, by data source (primary and secondary data) and year



A gendered pattern of collaboration is evident from Fig. 7. Since the 1930s, male sole-authorship has been the most common form of publication in *ASR* and *AJS*, although this has steadily been declining. Conversely, cross-sex collaboration has steadily been increasing, and as of 2000, is the second-most common form of publication in these two journals. Female sole-authorship accounts for approximately 10% of the articles since the 1930s and is the least common form of publication in 2000, which is perhaps surprising given women's influx into sociology. All-male collaboration increased until the 1980s, the decade in which all-female collaboration started to rise. Interestingly, these two forms of publication converge in 2000 and are roughly equal. This is notable in that there are more men in sociology and therefore more potential male coauthors, yet same-sex research teams are roughly equal for the two genders in 2000.

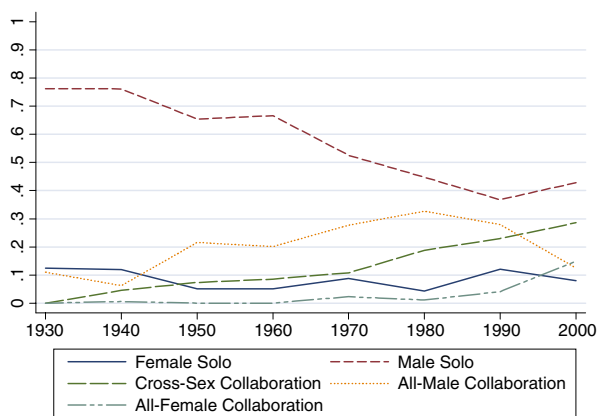
### Institutional Prestige

Do trends in collaboration reflect differences in institutional prestige? Examining the subsets of sole-authored and coauthored articles (see Fig. 8) reveals that research teams have a higher average institutional prestige score than sole-authors. Although the two trend lines almost merge in the 1960s and remain close thereafter, the average institutional prestige of coauthors remains higher than that of sole-authors. Collaborators had an average prestige score that was over a half point greater than the prestige score of sole-authors in the most recent period under study (2000–2005). Recalling that our measure of institutional prestige is the number of times the institution appeared in our sample in the previous five years, this suggests that collaborators' institutions were represented in the field's top journals almost one additional time, relative to sole-authors' institutions.

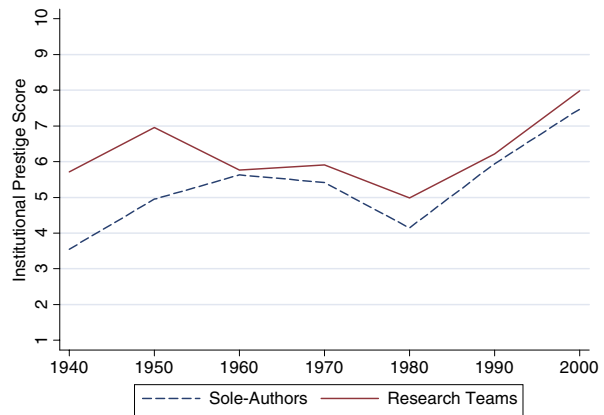
### Interaction of Gender & Prestige

Although collaboration is more likely among scholars at highly-ranked sociology departments, we were curious about the relative differences in institutional prestige

**Fig. 7** Patterns of authorship for all articles, by gender and year



**Fig. 8** Institutional prestige for sole-authors and research teams, by year. *Note:* institutional prestige for research teams was calculated as the average institutional prestige of all coauthors



among coauthors themselves. Specifically, were mixed-gender collaborations more likely when the females on the research team were affiliated with more prestigious departments than the males on the research team? Descriptive statistics suggest no significant differences overall (results not shown). Female coauthors were not more likely to have a higher institutional prestige than their male coauthors. In 27% of mixed-sex articles, the women had higher institutional prestige scores than the men, in 26% the men had higher prestige, and the rest had equal institutional prestige scores for the male and female authors.

### Multivariate Results

To assess some of these effects more systematically, we specified a logistic regression model to understand what factors affect the probability that an article is collaborative (see Table 1). Based on the descriptive trend depicted in Fig. 1, we included a curvilinear time specification (including the variable *year*, which ranges from 1935 to 2005, and *year*<sup>2</sup>), both of which are statistically significant and suggest a general positive trend in collaboration with a leveling off in the latter part of the twentieth century and early twenty-first century. More specifically, a 1-year increase is associated with a 3% increase in the log odds of collaboration. We find that even after controlling for the first-author's characteristics such as gender and institutional prestige, papers using quantitative methods are over four times ( $e^{1.42}$ ) as likely to be coauthored, relative to theoretical papers that do not use empirical data (see Model 1). And among the subset of quantitative papers (for which we know whether primary or secondary data were employed), we find that papers emerging from data collection projects are also more likely to be coauthored—specifically, about 25% more likely (in Model 2, the odds ratio for *collected primary data* is 1.25 ( $e^{0.024}$ )). We also find that collaboration is more likely when first authors reside at prestigious institutions: as institutional prestige increases one point (that is, as the author's institution appears in our sample once more), the odds of collaborating increases by 5%. Although we found some interesting trends in gender among all coauthors in our descriptive results, we find here that gender of the first author has no significant effect on the probability of collaborating.

**Table 1** Factors affecting research collaboration 1935–2005: logistic regression model results

	Model 1: all articles		Model 2: quantitative articles	
	Coefficient	S.E.	Coefficient	S.E.
Time specification				
Year	0.09**	0.03	0.11**	0.04
Year2	−0.0004 <sup>+</sup>	0.00	−0.0006*	0.00
Article characteristics				
Used qualitative methods (yes = 1, no = 0)	0.30	0.29	–	–
Used quantitative methods (yes = 1, no = 0)	1.42***	0.21	–	–
Theoretical paper [reference category]	–	–	–	–
Collected primary data (yes = 1, no = 0)	–	–	0.024 <sup>+</sup>	0.14
First author characteristics				
Gender (female = 1, male = 0)	0.11	0.19	0.22	0.21
Institutional prestige (scale)	0.06**	0.02	0.05*	0.02
Constant	−6.09***	1.23	−5.52***	1.37
Log-likelihood	−673.91		−542.76	
Pseudo- $R^2$	0.12		0.06	
Sample size	1,177		836	

<sup>+</sup>  $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ 

## Discussion

In this paper we confirmed that collaboration rates among sociologists have increased dramatically since 1935. Approximately half of articles published in *ASR* and *AJS* are now coauthored, an increase of 39 percentage points since the 1930s. Whereas other scholars have also documented such trends and theorized possible explanations for the increase, our data allowed us to empirically investigate these explanations, such as data type (Babchuk et al. 1999), method (Moody 2004), and gender (Grant and Ward 1991), and to examine a factor that has been typically neglected: institutional prestige. We also advance the literature on collaboration by examining the role of geographic co-location and data accessibility, which have been overlooked in the past.

Our results also suggest that method and data accessibility matter for sociological collaboration. Quantitative research is more often coauthored, likely because it is more amendable to a division of labor than qualitative work. Also, the increasing sophistication of statistical analysis may promote collaboration by requiring the addition of specialized experts to research teams. Projects requiring data collection are more likely to be collaborative, though collaboration rates for projects utilizing secondary data sources are increasing. As more data become available electronically, and as datasets become increasingly complex, collaboration rates among secondary data users may soon exceed collaboration rates among those who collect their own data.

Our multivariate analyses indicate no significant difference between men and women's rates of collaboration. Descriptively, we found some interesting trends over time. For example, female authorship has risen consistently since the 1930s, when only 10% of the authors were women; now women constitute about one-third of all authors. Although cross-sex collaboration increased, particularly after 1985, female sole-authorship remains the least common form of publication. However, we rely more heavily on the multivariate results because they account for time (and it appears

that most gender differences in collaboration can be attributed to women's inroads into sociology) and because proportions of majority–minority group comparisons (e.g., the percent of men collaborating versus percent of women collaborating) are dependent upon relative group size (Rytina and Morgan 1982).

Regarding co-location of authors, we found that the importance of place began waning in the 1950s. The number of collaborating researchers at different universities, states, and regions has been increasing. However, technology does not seem to be the primary force behind this increase, as the most rapid change occurred before personal computers became widely available (1980s) and before the Internet revolution (1990s). While technology—such as computers and email—may have eased communication among distant scholars, it has not greatly increased the rate of collaboration among them. Therefore, since technology does not appear to be the main determinant of increases in collaboration across space, future research should investigate why collaboration among distant scholars increased steadily from 1950–1980. Perhaps the increase in distant collaboration we see during this time reflects the post-war boom in universities, when research productivity outpaced journal space, and scholars consequently joined forces in order to publish and gain tenure. As more journals came into existence, cross-place collaboration leveled off.<sup>5</sup>

With our data we were also able to document a positive relationship between institutional prestige and collaboration. We cannot, however, clarify the causal direction of this relationship, but future research may be able to. By looking at collaboration at different career stages and subsequent job placement for individuals, it would become apparent which factor—collaboration or institutional prestige—precedes the other.

Other possible explanations for increasing collaboration have been suggested. While we lack empirical data to analyze these explanations, we briefly address two of them: professional socialization and tenure and promotion concerns. Babchuk et al. (1999) argue that professional socialization—such as mentor–student relationships—can account for differences in rates of collaboration across disciplines. They argue that in some fields (e.g., chemistry), students have little freedom to pursue research interests independent of their advisor's concerns, whereas in other fields (e.g., sociology), students can pursue problems peripheral to their mentor's interests and publish their findings independent of their advisors and therefore collaborate less often. However, professional socialization may not only account for differences in rates of collaboration across disciplines, but also may explain changes over time within a discipline. Perhaps the advisor–advisee relationship in sociology has changed over time in a manner that promotes collaboration.

It has also been argued that collaboration increased because the large number of faculty recruited in the 1960s and 70s required high levels of productivity to gain tenure, and consequently engaged in collaboration to achieve this goal (Stephan and Levin 1992), but Babchuk et al. (1999) argue that this thesis is not easy to support and we agree. A large number of scholars who collaborate are employed in nonacademic environments and often those publishing together in academia are already established faculty (Babchuk et al. 1999). In the subset of collaborative

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<sup>5</sup> We thank an anonymous reviewer for suggesting this possibility.



articles for which we have position information ( $n=249$ ), 44% of the collaboration teams include only associate professors, full professors, or applied researchers. Therefore, we agree with Babchuk et al. (1999) that a large proportion of collaborative research does not seem to be directly linked with tenure concerns.

In closing, collaboration in sociology has increased dramatically since 1935. Collaboration is becoming normative in sociology and it is important to understand both the causes and implications of this major shift in work organization. Our findings suggest several avenues for future research. For example, why did cross-place collaboration increase from the 1950s to the 1980s, but not thereafter? Moreover, the role of professional socialization and its effect on collaboration within sociology should be investigated. Additional research is also required to establish the causal direction of institutional prestige and collaboration.

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