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Sampling Practices in Communication Studies: A Decade of Research in Four Top Journals

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Abstract: *Background***:** The ability to draw accurate inferences from research depends heavily on the quality and representativeness of research samples. Research samples in the social sciences, including communication, are frequently criticized for being small and unrepresentative, yet there is substantial variation in sample characteristics. *Objective:* The objective of this project was to undertake a systematic examination of the characteristics of human samples used in communication research in major communication journals, in order to respond to the criticisms that such samples are small, underpowered, and lacking in external validity. *Method:* To ascertain the status of human samples in communication research, this project examined every empirical study published between 2010 and 2019 in four top communication journals—*Communication Monographs, Communication Research, Human Communication Research,* and *Journal of Communication*—that reported data from human subjects. The data set included 1,264 individual studies and a total sample size of 932,060 participants. *Results and Conclusion:* Sample sizes ranged from 10 to 57,847 participants, with an average of 740.12 participants, and were larger for non-experiments than experiments, quantitative than qualitative studies, and secondary than primary data analyses. Ninety-four countries were represented in the samples, although more than 70% of samples were recruited exclusively from the United States. Compared to U. S. demographics, such studies oversampled younger participants, female participants, and white participants.

Keywords: Samples, Representativeness, Statistical Power

1. Introduction

Sample representativeness is a key methodological consideration in human-subjects research, because the ability to draw accurate inferences about a population from a sample depends heavily on its characteristics [12]. Many indications are that the social sciences fare poorly in this endeavor, as concerns have been raised about drawing inferences from both inadequately sized and inadequately research samples [14, 27]. In particular, Henrich et al. offered the compelling critique that empirical claims in the social sciences are rendered suspect by a substantial overreliance on samples from Western, educated, industrialized, rich, and democratic (WEIRD) societies [22].

The communication discipline is not immune to these criticisms. Many scholars have critiqued samples in communication studies with respect to their sizes and/or levels of diversity and inclusion [1, 5, 8, 46]. These researchers encourage communication scholars to allocate greater attention to the representativeness of the samples they collect—yet exactly how limited existing samples are in the communication field is not well adjudicated.

This study aims to evaluate the samples used in human-subjects research in the communication discipline. Toward that end, we examined every empirical study published between 2010 and 2019 in four major communication journals—*Communication Monographs, Communication Research, Human Communication Research,* and *Journal of Communication*—that reported data from human participants. As described subsequently, our goal was to describe these samples with respect to their size and representativeness, and also to attend to methodological characteristics that influence sample quality. A discussion of these attributes follows, along with specific research questions and predictions.

1.1. Sample Sizes

One issue that reflects the quality of samples in communication research is their size. Particularly in quantitative research, samples are recruited and studied in order to generate justifiable inferences about the populations they represent. The larger the sample, the more information about the population that is available to researchers, which is relevant for multiple reasons. First, larger samples more closely approximate the population, resulting in lower standard errors and increased confidence in the precision of findings, as indicated by narrower confidence intervals [2]. Second, larger samples offer greater statistical power, reducing the likelihood of beta errors [33]. Third, as multiple scholars have argued, the results of studies with larger sample sizes are more likely to be successfully reproduced and replicated [29, 32, 56]. Reproducibility—and the likelihood that published findings cannot be replicated—has become a major concern in the social sciences [37], including in communication research [25, 31].

A fourth observation is that larger sample sizes tend to be associated with smaller effect sizes [13, 28], which are likely better approximations of the magnitudes of effects in the population [11]. Small samples, that is, run an elevated risk of overestimating effect sizes [57]. Finally, there is an ethical dimension to sample sizes. Given that small, underpowered samples are at elevated risk of producing inconclusive results, it may be considered unethical to expose participants to the risks associated with the research when the study's ability to produce accurate, useful information is impaired. An analogous argument could be made that overpowered studies—with larger-than-required samples—are likewise unethical because they expose more participants to the risks of participation than is necessary to acquire the knowledge being sought. Studies with larger-than-required samples may also increase alpha error rates because of elevated statistical power.

Given these observations, how do the social sciences, and communication in particular, fare with respect to their average sample sizes? Surprisingly little research has addressed this question. In psychology, Sassenberg and Ditrich examined 1,300 studies from 466 articles published in four top journals[1] between 2009 and 2018 [44]. Across years and journals, the average sample sizes ranged from 145 to 165 participants (M=154, SD=10.52), and the authors documented a significant increase in sample sizes between 2011 and 2016. Likewise, Shen et al. coded articles published in Journal of Applied Psychology from 1995 to 2008 and reported an average median sample size of 173 [45]. In the field of communication, Afifi and Cornejo's analysis of 332 interpersonal communication studies published in eight communication journals[2] found that the average sample sizes (across publication years) ranged from 8.71 to 562.64 participants (M=259.22, SD=175.74) [1].[3] To our knowledge, no research has analyzed average sample sizes in the communication discipline writ large.

1.2. Sample Representativeness: The WEIRD Problem

It is well documented that the social sciences have a "WEIRD" problem [5, 20, 36]. Given that social scientists seek to understand humans by observing samples and then generalizing their observations to larger populations, it follows that those samples need to represent the populations. Many do not. Instead, many samples are what Henrich et al. deemed WEIRD—Western, educated, industrial, rich, and democratic [22]. *Western*, *industrial,* and *democratic* refer to characteristics of the countries from which samples are recruited, whereas *educated* and *rich* relate to the socioeconomic status of the people in those samples. More than a decade ago, Henrich et al. warned that treating WEIRD people as "standard subjects" who represent humanity will not lead to valid, generalizable results.

At issue is the observation that WEIRD samples are not representative of the global population. For one, most of the population is not from western societies. Indeed, 7.8% of people reside in North America, compared to 59.5% in Asia and 17.4% in Africa [51]. Known as the "Majority World," Asia, Africa, Latin America, and the Caribbean comprise most of the global population [48]. Politically, only 44.9% of countries classify as democracies [49].

WEIRD samples are also unrepresentative of the education level and wealth of the majority of the world. According to UNESCO, only 53% of people around the world complete secondary education (i.e., high school), and the median level of attainment is primary school (i.e., elementary) [50]. In low-income countries, approximately 61% of adolescents do not attend school, compared to only 8% in high-income countries [50]. Economically, nearly 650 million people worldwide experience extreme poverty (i.e., living on less than 1.90 international dollars per day) [44]. Further, only 14.78% of countries are classified as developed, industrialized countries based on per capita income, exported products, and international financial involvement [23].

These statistics highlight the discrepancy between samples' demographic makeup and global representation. Even within WEIRD countries such as the United States, most of the population is not highly educated or wealthy [54]. Many people recruited for social science research are undergraduate students [40]. WEIRD undergraduates represent a tiny slice of

[1]Journal of Experimental Social Psychology, Journal of Personality and Social Psychology, Personality and Social Psychology Bulletin, and Social Psychology and Personality Science.

[2]Communication Monographs, Human Communication Research, Journal of Communication, Journal of Applied Communication Research, Journal of International and Intercultural Research, Communication and Cultural Studies, Howard Journal of Communication, and Asian Journal of Communication.

[3]These descriptive statistics are not reported in Afifi and Cornejo (2020) but were calculated from descriptive data presented in their Table 13.1 (p. 243).

humanity and, according to Henrich et al., they "may represent the worst population on which to base our understanding of Homo sapiens" (p. 82) [22].

WEIRD samples differ from non-WEIRD samples in multiple cognitive and behavioral aspects, including spatial reasoning, inferential induction, visual perception, categorization, moral reasoning, and self-concepts [22]. Compared to similar samples from Eastern countries, U. S. samples also differ in income, health, family size, and gender roles [4]. These differences are probably greater than what the empirical literature suggests, as sample demographic information is not required for all journal articles, leading to inconsistent reporting across journals [40].

Despite Heinrich et al.'s observations, little progress has been made at increasing sample diversity [40]. Most critiques of WEIRD samples and proposed methodological improvements to combat the WEIRD problem are found in psychology journals [20, 36], but communication scholars also contribute to the WEIRD problem. Chakravartty and colleagues' #CommunicationSoWhite article highlights a clear discrepancy in racial composition of publication rates and editorial positions of scholars in the communication discipline with non-White scholars being underrepresented in these areas [8]. The authors point to how "communication scholarship normalizes Whiteness" as those who have long controlled the discipline maintain power via institutional politics that keep WEIRD samples at the forefront of communication research (p. 262) [8]. Bates's editorial challenges communication scholars to answer the call for greater sample inclusivity and to acknowledge the glaring differences between the ubiquitous college student convenience samples and the general population [5]. Simply put, these samples "are not representative of most human beings" (p. 1) [8]. Bates's recommendation for greater accountability is a sign of hope that communication scholarship will steadily become less WEIRD.

Some research in the communication field has documented these biases in research samples. In their survey of interpersonal communication studies, Afifi and Cornejo found that populations from Asia, Africa, Europe, and South America were underrepresented, relative to their percentages of world population, whereas populations from Australia/New Zealand and North America were overrepresented. Similarly, white participants were overrepresented (at a rate of 4.16 times their percentage of world population), whereas Black/Brown participants were underrepresented (at a rate of 0.25 times their percentage of world population) [1].

1.3. Methodological Influences on Samples

It is likely that sample attributes—and sample sizes, in particular—vary as a function of multiple methodological characteristics. One such characteristic is whether the study is experimental or non-experimental. Common attributes of experimental design, such as random assignment to conditions and control over extraneous sources of variation, enhance statistical power by reducing error variance [9]. Consequently, fewer participants are necessary to identify statistically significant patterns of covariation than is the case in non-experimental designs such as surveys. We therefore anticipate that average sample sizes will be larger in non-experimental studies than in experiments.

Similarly, it is probable that average sample sizes are smaller in qualitative than in quantitative studies. Quantitative research acknowledges a linear relationship between sample size and statistical power, leading to average sample sizes exceeding 300 in interpersonal communication research [1]. In comparison, qualitative research often instead strives for saturation, the point in the data collection process when collecting more data yields no further theoretical insights [16], which empirical research suggests can be achieved with as few as 9 to 17 interviews or 4 to 8 focus groups [21]. On average, therefore, it is likely that samples are significantly larger in quantitative than qualitative research.

Finally, we anticipate that samples will be larger in studies presenting secondary analyses of data than in studies offering primary analyses. Studies in the latter category present analyses of data collected specifically for those studies, whereas papers offering secondary analyses are analyzing data collected as part of another project [24]. Although secondary analyses can certainly be performed on data sets of average size, they frequently are performed on data from large (often nationally representative) samples, such as the National Health and Nutrition Examination Survey, the Midlife in the United States survey, and multiple large Census-based data sets [7, 41, 55]. On average, therefore, it is reasonable to expect that studies presenting secondary data analyses will draw on larger sample sizes than those presenting primary analyses.

Three additional methodological characteristics with the potential to influence sample sizes, and perhaps representativeness, are whether the study a) performed an *a priori* power analysis, b) was preregistered, and/or c) was externally funded. An *a priori* power analysis calculates a sample size necessary to achieve a specified level of statistical power to identify effects of a specified magnitude, given a specified significance criterion [26]. Such an analysis alerts researchers to their target sample size so that they can recruit a sample that is neither underpowered nor overpowered. Absent such guidance, the sample size may be smaller than it needs to be (or even larger than necessary) to identify the target effects. Preregistration of a study's methods and predictions is intended to reduce problems such as HARKing (hypothesizing after results are known) and p-hacking (manipulating analyses and degrees of freedom to produce significant results) [18, 35]. With preregistration, researchers document their method (including their sample), their predictions, and/or their analytic plan online, prior to collecting or examining data, in a manner that cannot be retroactively edited. Preregistration outlets include Open Science Framework, AsPredicted.org, and ClinicalTrials.gov. The intention is to reduce the reporting of *post hoc* analyses as if they had been preplanned, and it is possible that the pre-planning necessary to preregister a study induces enhanced attention to the characteristics of one's sample. Finally, studies that are externally funded may have the ability to collect larger and more representative samples than unfunded studies, simply due to the availability of financial resources for recruiting participants or buying access to a large data set. As noted below, we investigate these three characteristics without making *a priori* predictions about their effects.

1.4. The Present Study

The goal of the present study is to evaluate the characteristics of human-subjects samples in the communication discipline. Toward that end, we examined every empirical study reporting data from human samples published in a ten-year period (2010-2019) in four top communication journals, with an eye toward documenting their characteristics (including sample size) and representativeness. Our study was guided primarily by the following question:

RQ1: What are the characteristics of human-subjects samples in research published in four top communication journals during the decade of 2010-2019?

With respect to representativeness, we documented (among other things) the locations where the samples were recruited. Insofar as we anticipated that a large majority of samples would be U. S.-based, we also asked how exclusively U. S. samples compared to U. S. population demographics.

RQ2: What proportion of the research uses exclusively U. S. samples, and which other countries are represented?

RQ3: Among U. S. samples, how do sample characteristics compare to U. S. demographics?

Finally, we examined study characteristics that may account for variance in sample sizes. We predicted that research design, data type, and the primary/secondary analysis distinction would all exert effects on *N*, insofar as a) experiments offer tighter control over error variance than non-experiments, b) quantitative studies are more attuned to the need for statistical power than qualitative studies, and secondary analyses are frequently performed on larger data sets than primary analyses. We also examined, in the form of research questions, whether power analysis, preregistration, and/or funding affected sample size. Accordingly, we propose the following hypothesis and research questions.

H1: Samples are larger for a) non-experiments than experiments; b) quantitative than qualitative studies; and c) secondary than primary data analyses.

RQ4: What proportion of studies report an *a priori* power analysis, and how, if at all, does the report of a power analysis affect *N*?

RQ5: What proportion of studies are preregistered, and how, if at all, does preregistration status affect *N*?

RQ6: What proportion of studies are funded, and how does funding status affect *N*?[4]

We acknowledge that these methodological features may also affect sample representativeness. Unlike with sample size, however, there is no readily measurable index of representativeness, apart from comparing multiple sample characteristics to the attributes of the population (as in RQ3). To do so for each methodological feature would quickly become unwieldy, so we focused attention in H1 and RQ4-6 on sample sizes, specifically.

2. Method

2.1. Selection Criteria

The sampling frame comprised every empirical study of human subjects published between 2010 and 2019 in four top communication journals: *Communication Monographs, Communication Research, Human Communication Research,* and *Journal of Communication*.

To be included in the analysis, studies had to meet four criteria:

1 The study reported data from human subjects.
2 The unit of analysis was individuals rather than groups, teams, or organizations.
3 The study was not a meta-analysis or systematic review
4 The analyses were not re-analyses of previously published data (although original analyses of pre-existing data sets were included).

We began by identifying all articles (of all varieties) published between 2010 and 2019 in *Communication Monographs, Communication Research, Human Communication Research,* and *Journal of Communication*. This comprised 1,640 articles. We then excluded articles that were editorial in nature (such as an erratum, editor note, presidential address, book review, introduction to special issue, eulogy, retraction, invited debate, commentary), of which there were 261. This left 1,379 articles, which were screened according to the four criteria delineated above. This screening process eliminated an additional 361 articles, leaving 1,018 articles that met our sampling criteria. These 1,018 articles reported 1,264 individual empirical studies representing 932,060 participants.[5]

A PDF of each study was obtained for coding. A PRISMA flow diagram depicting the full selection process appears in Figure 1 [34]. The study's design and analytical strategy were preregistered with AsPredicted.org on June 11, 2021.[6]

2.2. Coding

Studies were grouped by journal and year and each study was coded for the following: a) design (whether survey or experiment); b) nature of data analysis (quantitative, qualitative, or mixed); c) whether the study reported original data or secondary analyses; d) the *N*; e) percentage of *N* who identified as female; e) percentage of *N* who identified as white; f) lowest and highest age; g) mean age; h) whether sample comprised students, non-students, or both; i) whether inclusion/exclusion criterion-oriented, convenience, or probability sampling was employed; j) whether socioeconomic data were reported for the sample; k) whether an *a priori* power analysis was reported; l) the effect size and

[4] For transparency's sake, we acknowledge that RQ6 was not preregistered (although the remaining questions and predictions were).

[5] The data for this project are available at https://osf.io/329aq/?view_only=7a7329377a374f48bf2fcc677c57c84a

[6] An anonymized version of the preregistration is viewable at https://aspredicted.org/blind.php?x=g7iz76

power level sought (if an *a priori* power analysis was reported); m) whether the study was funded; n) whether the study was preregistered on an independent registry such as Open Science Framework (https://osf.io), Clinical Trials (https://clinicaltrials.gov), or AsPredicted (https://aspredicted.org), and o) which country or countries were represented in the sample.

The following coding parameters were enforced:

For longitudinal (multi-wave) studies, the final-wave *N* and demographics were coded.

"Studies" were based on unique samples. When a given article reported more than one sample, these were coded as separate studies. When two or more studies used the same sample, these were coded as one study.

Samples from pilot studies were not coded.

Samples described as comprising students could be students of any age group, not just college students.

Power analyses were coded as present only if an *a priori* power analysis was reported; *post hoc* power analyses/sensitivity analyses were not included.

Socioeconomic characteristics and power analyses were coded as present only if reported in the article being coded; if not reported in the article, these were coded as absent even if they may have been reported in other publications using the same data sets.

The authors independently coded these variables for 15% of the sample to establish interrater reliability. Reliability estimates, based on Krippendorf's alpha, appear in Table 1. Discrepancies were resolved via discussion, and then the remainder of the sample was divided among the authors for coding.

Table 1. *Intercoder Reliability Estimates, Based on Krippendorf's Alpha, for Coded Characteristics.*

Characteristic	Alpha
Study design	.88
Data type	.87
Data source	.76
Sample size	.97
Percentage female	1.00
Percentage white	1.00
Low age	1.00
High age	.98
Mean age	.91
Sample	.87
Sampling technique	.81
Socioeconomic status reported	.84
Power analysis reported	1.00
Power level sought	1.00
Effect size sought	1.00
Preregistration	.99
Funding	1.00
Countries	1.00

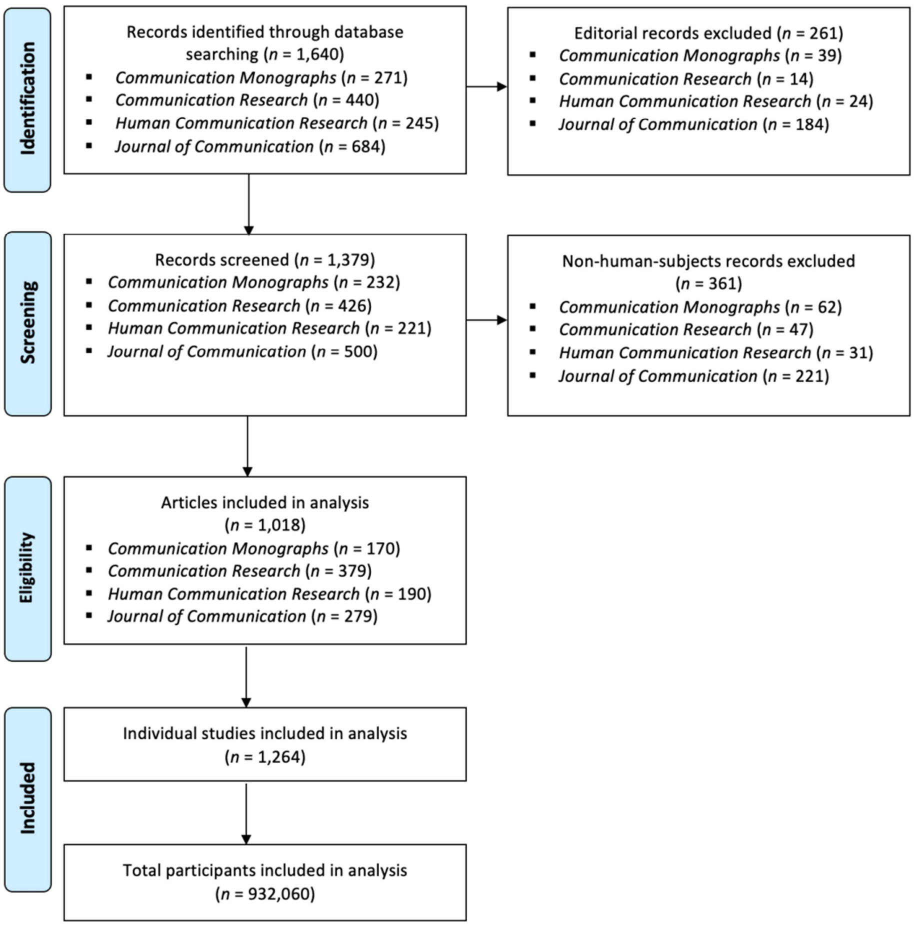


Figure 1. *PRISMA Flow Diagram of Selection Process.*

3. Results

3.1. Descriptive Analyses

The 1,264 studies analyzed were approximately evenly split between those reporting experimental (53.3%) and non-experimental (46.7%) studies. The overwhelming majority (94.6%) reported exclusively quantitative data, whereas 5.2% reported qualitative data and 0.2% reported both types of data. A large majority (94.3%) also reported original data analyses, whereas 5.7% reported secondary analyses of data.

The most common sampling strategy in these studies (68.3%) was convenience sampling, followed by inclusion/exclusion criterion-oriented sampling (24.6%). Only 7.1% used a random or Census-matched sampling strategy. Most studies (73.3%) did not report data regarding participants' socioeconomic status, whereas 26.7% of studies did include SES data.

Table 2 reports these study characteristics separately by journal.

Table 2. *Study Traits by Journal and Year (N=1,203 studies).*

Year	Trait	Options	*HCR*	*CR*	*CM*	*JOC*
2010	Design	Experimental	27	27	4	11
		Non-experimental	9	19	15	17
	Data	Quantitative	36	46	16	28
		Qualitative	0	0	3	0
		Both	0	0	0	0
	Analyses	Original	35	43	19	22
		Secondary	1	3	0	6
	Sampling	Convenience	33	42	9	14
		Criterion-oriented	3	4	10	4
		Random	0	0	0	6
	SES	Reported	35	30	14	21
		Not reported	1	16	5	7
2011	Design	Experimental	13	16	1	22
		Non-experimental	16	16	12	25
	Data	Quantitative	29	32	7	42
		Qualitative	0	0	6	5
		Both	0	0	0	0
	Analyses	Original	25	29	13	47
		Secondary	4	3	0	0
	Sampling	Convenience	23	26	1	24
		Criterion-oriented	5	5	11	17
		Random	0	0	1	6
	SES	Reported	24	20	9	37
		Not reported	5	12	4	10
2012	Design	Experimental	15	20	5	45
		Non-experimental	13	19	11	14
	Data	Quantitative	26	38	13	59
		Qualitative	2	1	3	0
		Both	0	0	0	0
	Analyses	Original	26	36	14	57
		Secondary	2	3	2	2
	Sampling	Convenience	21	34	9	46
		Criterion-oriented	7	4	7	8
		Random	0	1	0	5
	SES	Reported	22	27	11	50
		Not reported	6	12	5	9
2013	Design	Experimental	19	17	3	23
		Non-experimental	14	20	17	20
	Data	Quantitative	32	37	16	39
		Qualitative	0	0	4	4
		Both	0	0	0	0
	Analyses	Original	31	32	20	42
		Secondary	2	5	0	1
	Sampling	Convenience	29	28	10	22
		Criterion-oriented	4	7	10	15
		Random	0	2	0	6
	SES	Reported	30	21	11	27
		Not reported	3	16	9	16

Year	Trait	Options	*HCR*	*CR*	*CM*	*JOC*
2014	Design	Experimental	19	27	5	19
		Non-experimental	15	25	10	15
	Data	Quantitative	34	53	15	33
		Qualitative	0	0	0	1
		Both	0	0	0	0
	Analyses	Original	32	48	13	32
		Secondary	2	5	2	2
	Sampling	Convenience	25	31	9	20
		Criterion-oriented	8	12	5	9
		Random	1	7	0	4
	SES	Reported	26	42	10	26
		Not reported	8	11	5	7
2015	Design	Experimental	15	27	13	22
		Non-experimental	11	17	10	16
	Data	Quantitative	26	44	19	35
		Qualitative	0	0	3	3
		Both	0	0	1	0
	Analyses	Original	25	39	23	37
		Secondary	1	5	0	0
	Sampling	Convenience	22	34	9	16
		Criterion-oriented	4	5	12	14
		Random	0	4	0	8
	SES	Reported	21	35	18	19
		Not reported	5	9	5	19
2016	Design	Experimental	17	43	8	15
		Non-experimental	13	11	13	11
	Data	Quantitative	30	54	17	19
		Qualitative	0	0	3	6
		Both	0	0	1	0
	Analyses	Original	28	52	21	26
		Secondary	2	2	0	0
	Sampling	Convenience	27	42	11	20
		Criterion-oriented	2	9	9	4
		Random	0	3	1	2
	SES	Reported	21	45	20	19
		Not reported	9	9	1	7
2017	Design	Experimental	15	21	11	5
		Non-experimental	5	25	12	11
	Data	Quantitative	20	46	21	14
		Qualitative	0	0	2	2
		Both	0	0	0	0
	Analyses	Original	20	45	22	16
		Secondary	0	1	1	0
	Sampling	Convenience	16	27	18	8
		Criterion-oriented	4	16	3	3
		Random	0	2	2	5
	SES	Reported	17	32	17	8
		Not reported	3	14	6	8
2018	Design	Experimental	17	29	2	16
		Non-experimental	6	25	12	11
	Data	Quantitative	23	54	8	23
		Qualitative	0	0	6	4
		Both	0	0	0	0
	Analyses	Original	23	53	13	24
		Secondary	0	1	1	2
	Sampling	Convenience	15	29	6	14
		Criterion-oriented	8	19	8	5
		Random	0	4	0	8
	SES	Reported	10	40	8	19
		Not reported	13	14	6	8
2019	Design	Experimental	14	28	11	7
		Non-experimental	8	24	13	13

Year	Trait	Options	*HCR*	*CR*	*CM*	*JOC*
	Data	Quantitative	22	51	20	18
		Qualitative	0	1	4	2
		Both	0	0	0	0
	Analyses	Original	22	52	19	14
		Secondary	0	0	5	6
	Sampling	Convenience	14	38	16	12
		Criterion-oriented	8	10	7	1
		Random	0	3	1	7
	SES	Reported	13	44	12	15
		Not reported	9	8	12	5

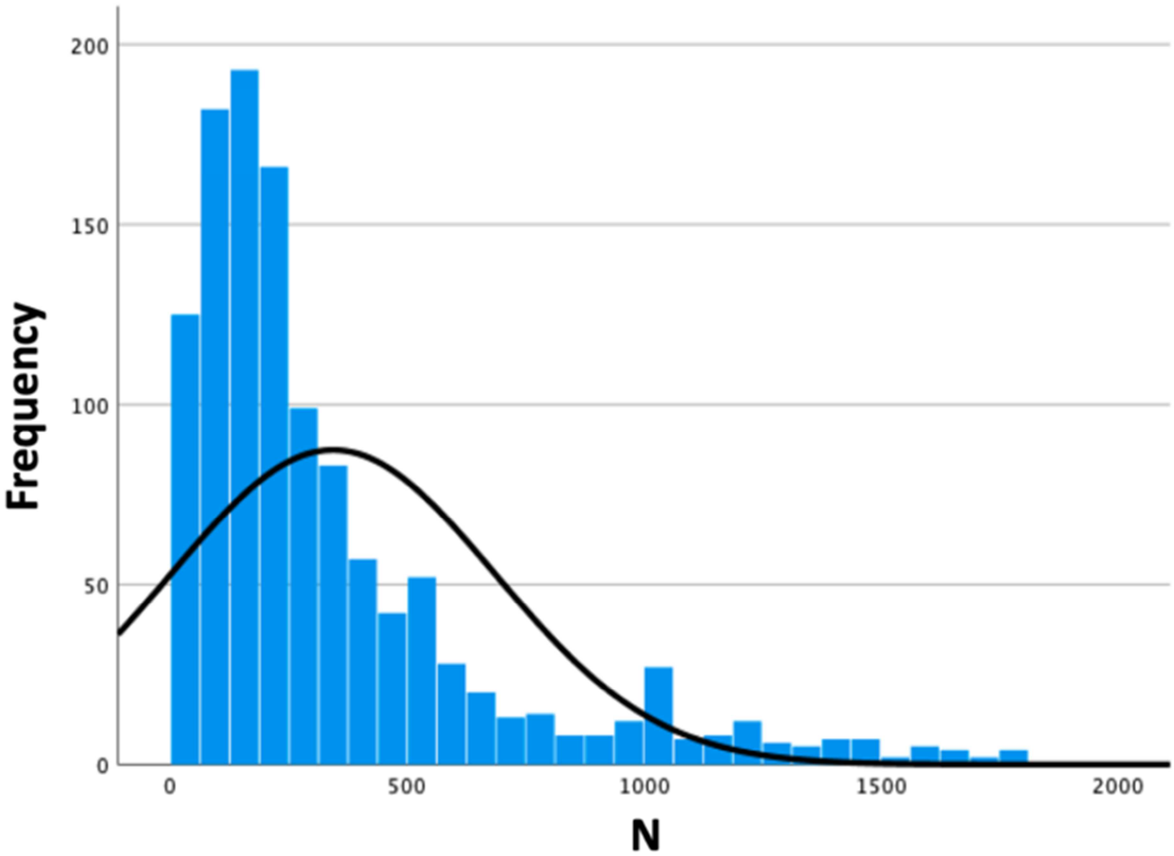
Notes. HCR=Human Communication Research; *CR*=Communication Research; *CM*=Communication Monographs; *JOC*=Journal of Communication. Studies with samples ≥ 1,817.5 were suppressed.

3.2. Research Question 1

The first research question focused on the attributes of the human samples represented in communication research. To address the question, we explored the sample sizes and the characteristics (age, gender, race, student status, nationality) of the samples represented in these four top communication journals for the 2010-2019 period.

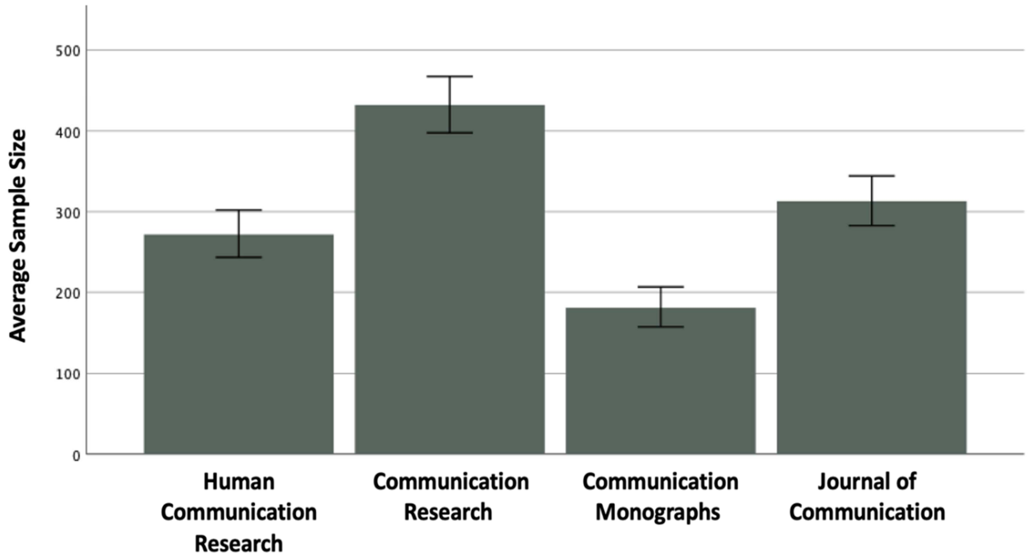
3.2.1. Sample Sizes

Sample sizes ranged from 10 to 57,847 participants, with an average of 740.12 participants (*SD*=2,920.40). The median sample size was 236, however, suggesting that the average was skewed by a small number of studies with very large samples. The interquartile range of the sample sizes was calculated (IQR=655) and used to identify major outliers. Any *N* exceeding 1,817.5 was identified as a major outlier. There were 61 such studies in the sample, with sample sizes ranging from 1,843 to 57,847. When these studies were temporarily suppressed, the average sample size was 343.39 (*SD*=342.04), which is likely a more accurate representation of samples in the communication literature. With outliers removed, the median sample size was 220 but the modal *N* was 120. The distribution was positively skewed (skewness=1.91) but mesokurtotic (kurtosis=3.54). A distribution of the sample sizes appears in Figure 2.



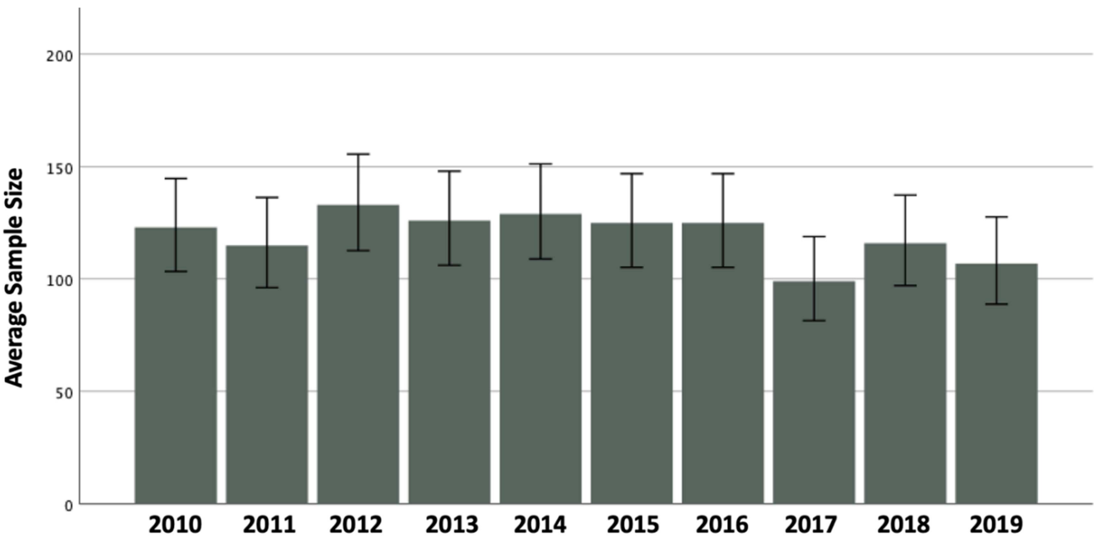
Notes. Studies with samples ≥ 1,817.5 were suppressed.

Figure 2. *Hstogram of Sample Sizes, with Normal Distribution Line.*



Notes. Studies with samples ≥ 1,817.5 were suppressed. Error bars indicate 95% confidence intervals.

Figure 3. *Sample Sizes by Journal.*



Notes. Studies with samples ≥ 1,817.5 were suppressed. Error bars indicate 95% confidence intervals.

Figure 4. *Sample Sizes by Year.*

A 4×10 ANOVA compared sample sizes by journal and by publication year, with outliers suppressed. The ANOVA produced a significant main effect for journal, F (3, 1197)=11.44, p <.001, η^2 =.03, as well as a significant journal-by-year interaction, F (27, 1197)=1.77, p=.009, η^2=.04. Table 3 depicts average sample sizes by journal and year, denoting significant cell differences, per post-hoc Tukey test. The main effect for journal indicated that the average sample size in *Journal of Communication* (M=404.95, SD=406.71) was significantly greater than that of *Communication Research* (M=366.67, SD=341.97) and *Human Communication Research* (M=292.92, SD=300.91), whose average sample sizes were significantly greater than that of *Communication Monographs* (M=256.13, SD=236.00). *Communication Research* and *Human Communication Research* did not differ significantly from each other. Figure 3 depicts sample sizes by journal, and Figure 4 depicts sample sizes by year.

Table 3. *Sample Sizes by Journal and Year (N=1,203 studies).*

Year	*HCR*	*CR*	*CM*	*JOC*
2010	191.03_b	327.71_b	256.37_b	595.52_c
2011	282.21_b	470.31_b	139.15_b	326.24_b
2012	257.92_b	382.00_b	214.36_b	426.79_b
2013	240.15_b	451.15_b	351.25_b	336.20_b
2014	283.82_b	355.71_b	236.43_b	308.24_b
2015	328.00_b	443.17_b	129.35_a	500.51_b
2016	265.97_b	298.12_b	305.19_b	333.04_b
2017	339.75_b	336.64_b	333.27_b	494.92_b
2018	488.91_b	354.13_b	214.00_b	399.15_b
2019	365.53_b	330.42_b	311.14_b	488.75_b

Notes. HCR=Human Communication Research; *CR*=Communication Research; *CM* = Communication Monographs; *JOC*=Journal of Communication. Studies with samples ≥ 1,817.5 were suppressed. Cells with different subscripts differ significantly, per Tukey post-hoc test.

Table 4. *Sample Demographic Characteristics (N=932,060).*

Characteristic	Min	Max	*M*	*SD*
Low age	0	57	18.36	5.24
High age	2	104	48.42	22.84
Average age	1	68	28.24	11.30
Percentage white	0	100	59.59	16.21
Percentage female	0	100	66.22	26.58

3.2.2. Demographic Characteristics

Table 4 describes the demographic characteristics of the full sample of 932,060 participants.

Age. From sample descriptions, coders identified the minimum age, maximum age, and average age of participants when reported. Minimum age was reported in 43.4% (*n*=549) of studies. As Table 3 reports, minimum ages ranged from 0 (< 1 year of age) to 57 years, with an average of 18.36 years. The median (18) and the mode (18) were similar to the mean. The distribution was positively skewed (skewness=1.99) and leptokurtotic (kurtosis=12.75). Maximum age was reported in 41.6% (*n*=526) of studies and ranged from 2 to 104 years, with an average of 48.42 years. The median (45) was similar to the mean, but the modal maximum age was 27. The distribution was non-skewed (skewness=.34) and platykurtotic (kurtosis=-1.04).

Average age was reported in 73.3% (*n*=927) of studies and ranged from 1 to 68 years, with an average of 28.24 years. The median (21.98) and mode (20) were lower than the mean. The distribution was slightly positively skewed (skewness=.93) and platykurtotic (kurtosis=-.05).

Gender. Gender was coded as a function of the percentage of the sample identified as female. Gender was reported in 84.4% of studies (*n*=1,067). As Table 3 indicates, the percentage female ranged from 0 to 100%, with an average of 59.59% (median=58, mode=50). The distribution was not skewed (skewness=-.10) and platykurtotic (kurtosis=1.95).

Race. Race was coded as a function of the percentage of the sample identified as white. Race was reported in 45.9% of studies (*n*=581). As Table 3 reports, the percentage of participants identifying as white ranged from 0 to 100%, with an average of 66.22% (median=76.0, mode=0). The distribution was negative skewed (skewness=-1.38) and platykurtotic (kurtosis=1.07).

Student status. Most individual studies (99.4%) reported whether their samples comprised students, non-students, or both. Slightly more than half (*n*=662, 52.2%) comprised students, whereas 503 studies (39.7%) used non-student samples and 87 studies (6.9%) had both students and non-students in their samples.

3.3. Research Question 2

The vast majority of samples (94.4%) sampled from only one country (*M*=1.25 countries, *SD*=2.39), although the number of countries sampled in a single study ranged from 1 to 47. More than two thirds of the samples (*n*=901, 71.3%) were recruited exclusively from the United States, and participants from the United States were included in 939 of the studies coded (75.6%). Ninety-three other countries were represented in the samples, although with substantially less frequency: Argentina, Armenia, Australia, Austria, Bangladesh, Belgium, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Canada, Cape Verde, Chile, China, Columbia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Ivory Coast, Japan, Jordan, Kenya, Kuwait, Latvia, Lebanon, Lesotho, Liberia, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, The Netherlands, New Zealand, Nigeria, Norway, Pakistan, Palestinian Territory, Peru, The Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Senegal, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Tanzania, Thailand, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, Vietnam, Zambia, and Zimbabwe. Figure 5 depicts the frequencies with which these countries were sampled in the research reviewed here.

Twenty-six of these countries were represented in only one of the 1,264 studies, and 66 of the countries were represented in five or fewer studies. The United States comprises approximately 4% of the world's population [3] yet accounts for more than 70% of the samples in these four journals during the 2010-2019 period, indicating that communication research is substantially oversampling U. S. American participants.

A 4 × 10 ANOVA comparing journals and publication years on the number of countries represented per study produced nonsignificant main and interaction effects. Chi-squared tests compared journals and publication years with respect to whether studies did or did not use exclusively U. S. American samples. The journals differed significantly, ^{2} (3) =29.93, *p* < .001. Crosstabs revealed that the relative proportions of "exclusively U. S." and "not exclusively U. S." samples were as expected in *HCR* and *JOC*. Studies in *CR* were less likely than expected to have exclusively U. S. samples, whereas studies in *CM* were more likely than expected to have exclusively U. S. samples. Publication year had no effect on whether studies used exclusively U. S. samples, ^{2} (9) =13.09, *p*=.16.

3.4. Research Question 3

To address the third research question, we examined only those studies that used an exclusively U. S. American sample (*n*=901) and compared their characteristics to U. S. demographics.

3.4.1. Age

In studies with exclusively U. S. American samples, the average age ranged from 1 to 68 years, with an average of 27.42 years (*SD*=11.11). The median age for exclusively U. S. American samples was 21.06 years, substantially younger than the median age of the U. S. population of 38.4 years [47]. This result suggests that younger participants are being oversampled in the research reviewed here, relative to the broader population from which those samples were drawn.

3.4.2. Gender

In studies with exclusively U. S. American samples, the average percentage of female participants was similar to that of the full sample, at 60.96% (*SD*=15.98). Relative to the adult population of the United States [54], in which approximately 50.8% of individuals identify as female, this result suggests that women are being oversampled in the research reviewed here, relative to the broader population from which those samples were drawn.

3.4.3. Race

In studies with exclusively U. S. American samples, the average percentage white was moderately higher that of the full sample, at 69.37% (*SD*=22.20). In the United States, 60.1% of the population identifies as white and not Hispanic or Latino/a [53], suggesting that white participants are being oversampled in the research reviewed here, relative to the broader population from which those samples were drawn.[7]

3.4.4. Student Status

In studies with exclusively U. S. American samples, fewer studies (35.2%) comprised non-student samples and more studies (57.8%) comprised exclusively student samples, with the percentage of samples including both students and non-students being identical to that of the full study at 6.9%. As of 2019, approximately 25% of the U. S. population aged 3 years or older is enrolled in school at some level [52], suggesting that students may be oversampled in the research reviewed here, relative to the broader population from which those samples were drawn.

3.5. Hypothesis 1

We addressed these predictions after having suppressed those studies whose sample sizes were deemed outliers (see above), although all the results were the same when outliers were not suppressed. H1a predicted that sample sizes are larger for non-experiments than for experiments, and as hypothesized, non-experiments (*M*=443.12, *SD*=409.69) had significantly larger average sample sizes than did experiments (*M*=264.23, *SD*=250.72), Welch's t (829.54)=8.82, p < .001, Cohen's d=.52. H1a is supported.

H1b predicted that sample sizes are larger for quantitative studies than for qualitative studies.[8] As hypothesized, samples were substantially larger in quantitative studies (*M*=360.66, *SD*=344.24) than in qualitative studies (*M*=53.69, *SD*=59.62), Welch's t (438.34)=24.24, p < .001, d=1.24. H1b is supported.

Finally, H1c predicted that sample sizes are larger in studies using secondary data analysis than in studies using primary data analyses. As hypothesized, samples were substantially larger in studies reporting secondary data analyses (*M*=734.00, *SD*=556.86) than in studies reporting primary data analyses (*M*=328.28, *SD*=321.93), Welch's t (45.16)=4.86, p < .001, d=.89. H1c is supported.

3.6. Research Question 4

Among the 1,264 studies analyzed, only 26 (2.1%) reported the results of an *a priori* power analysis. Those studies sought, on average, 78% power to identify a medium (.29) effect size. Those studies reporting a power analysis had substantially lower sample sizes (*M*=234.73, *SD*=146.04) than studies that did not report a power analysis (*M*=750.78, *SD*=2950.05), Welch's t (921.62)=5.81, p (two-tailed)<.001, d=.18.

3.7. Research Question 5

Among the 1,264 studies analyzed, not a single study reported that it was preregistered on an independent registry.

3.8. Research Question 6

Among the 1,264 studies analyzed, 381 (30.1%) reported a funding source. Funded studies had a slightly higher average sample size (*M*=754.43, *SD*=1,989.33) than did unfunded studies (*M*=721.25, *SD*=3,236.35), but the difference was nonsignificant, Welch's t (1116.03)=.22, p (two-tailed)=.83.

4. Discussion

The ability to draw justifiable inferences from social science research samples is directly affected by the size and representativeness of those samples. Nonetheless, many social scientists have sounded the alarm that human-subjects samples, including in the field of communication, routinely fare poorly in these characteristics, and especially in their overreliance on participants from Western, educated, industrial, rich, and democratic societies. To remedy such problems in the communication discipline requires understanding how limited existing samples are in the first place. Toward that end, we coded multiple characteristics of every human-subjects study published in a ten-year period in four top communication journals. In this discussion, we review our findings and their implications for existing scholarship, offer data-driven recommendations for future practice, and then discuss strengths and limitations of the current investigation.

4.1. How Limited Are Communication Samples

Our review suggests that existing human-subjects samples in the communication discipline are limited in their ability to support justifiable generalizations in multiple ways. Perhaps the most striking is that, among the studies surveyed here, U. S. American participants are substantially overrepresented. More than three quarters of the samples include U. S. American participants, and 71% of those samples use U. S. American participants *exclusively,* yet the United States represents only about 4% of the world's population. U. S.-centric sampling procedures are perhaps understandable, insofar as both major

[7] As a caveat to this conclusion, few studies in this review (if any) specified the percentage of participants who identified both as white and as non-Hispanic and non-Latino/a. In virtually every study reporting on participant race, only a number or percentage of participants identifying as white was reported.

[8] The test of this hypothesis suppressed the two studies that reported both qualitative and quantitative data.

professional associations (National Communication Association and International Communication Association) are headquartered in the United States—and, as of this writing, five of six editors-in-chief of the journals we surveyed are U. S.-based. Nonetheless, the substantial overreliance on U. S. American participants poses a threat to external validity, at least to the extent that communication researchers attempt to generalize their findings beyond the U. S. population.

Given that most studies sampled exclusively from the United States, we also assessed how representative those samples were of U. S. demographics. As reported, our analyses suggested that communication samples overrepresent younger participants, female-identifying participants, white participants, and students, relative to the frequencies of these groups in the U. S. population. Insofar as more than two-third of the studies used a convenience sampling strategy, it is likely that samples overrepresent undergraduate communication students, and such students may be younger and more likely to be female and white than the average U. S. American adult. Samples composed exclusively of college students also likely represent a higher educational achievement than the average U. S. American adult. To reiterate Bates's critique, such samples "are not representative of most human beings" (p. 1), which impairs the ability to generalize from such samples even to the broader U. S. population (let alone to non-U. S. populations) [5].

Although sample representativeness is relatively poor, average sample sizes in communication studies exceed those of other social sciences. We ascertained an average sample size of 740 participants, although this was likely inflated by outliers. Once outliers were removed, the average sample size was 343, which exceeds the N's of 154 identified in psychology [44], 173 identified in applied psychology [45], and even 259 identified in interpersonal communication [1]. Insofar as larger samples are more representative than smaller samples of the populations from which they were drawn, this finding suggests that communication research fares relatively well on this characteristic. As reported, average sample sizes were higher for studies that a) were non-experimental; b) were quantitative; c) performed secondary data analyses; and d) did not report an *a priori* power analysis. External funding was not a significant influence on sample size (although N's were slightly higher in funded than in non-funded studies), and no studies were preregistered, precluding an examination of preregistration's effect on sample size.

4.2. What Needs Fixing

We contend that these findings support at least two specific recommendations for empirical practice, and we acknowledge that these suggestions may be more applicable to quantitative than qualitative studies, insofar as generalizability may not be an explicit goal in qualitative inquiry [6].

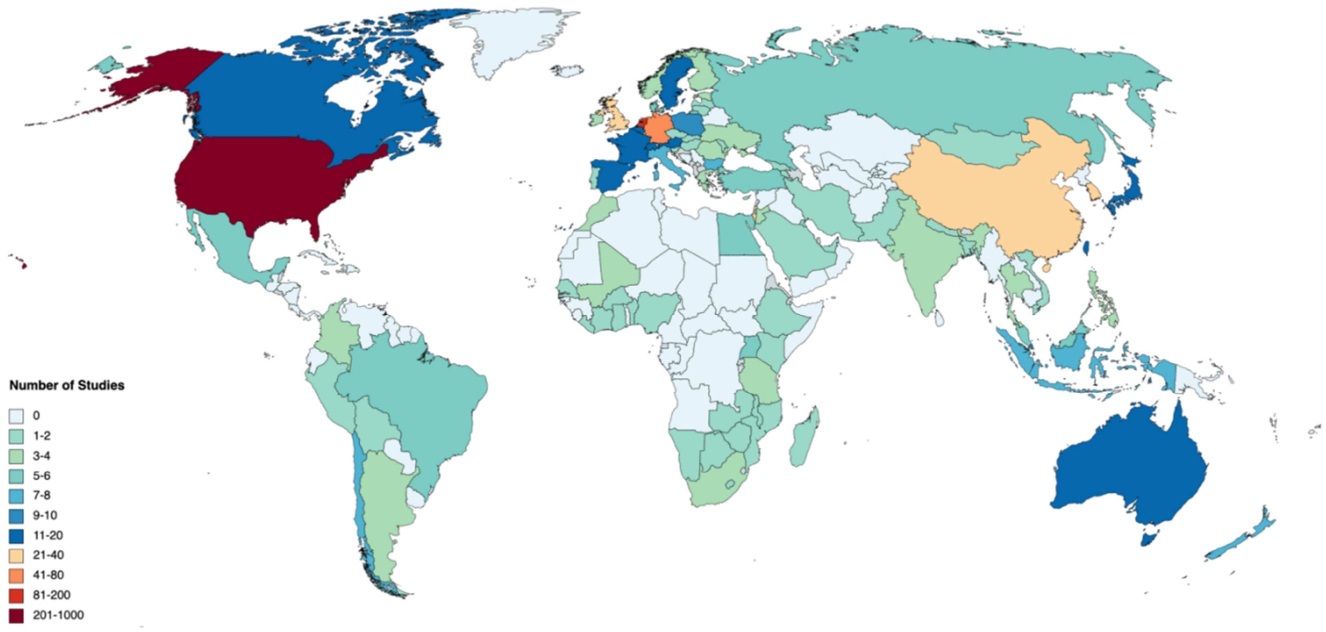


Figure 5. *Number of Studies Coded in Review, by National Origin of Sample.*

First, to the extent that communication scholars aim to generate knowledge that is applicable to humans, and not just to U. S. Americans, it is critical to expand sample representation beyond the United States. Although it is laudable that 93 non-U. S. countries were represented in the samples coded for this project, nearly 95% of the studies sampled from one country only, and 70% of the studies sampled only from the United States. As Figure 5 depicts, even non-U. S. sampling prioritizes countries that can reasonably be characterized as WEIRD, including Australia, Canada, France, Germany, and Sweden. Asian, South American, and (particularly) African countries are substantially underrepresented in communication research. Whereas sampling outside of one's own country may have been logistically complex and cost-prohibitive in years past, the availability of online data collection infrastructures, such as Mechanical Turk (MTurk) and Prolific, makes collecting geographically diverse samples substantially easier. These data collection methods are imperfect and have been criticized for their inherent limitations [17], yet those limitations may be offset by the ability to obtain a more geographically diverse sample, including participants from historically underrepresented countries and regions.

Second, we contend that convenience sampling should be used more selectively. Among the studies coded here, convenience sampling was the most common sampling strategy, and for studies that sampled exclusively U. S. American participants, it is likely that this contributed to the overrepresentation of participants who were younger, more likely to be female, more likely to be white, and more likely to be students than the average U. S. American adult. Convenience sampling is common precisely *because it is convenient,* yet it increases the likelihood that results are skewed, biased, and nongeneralizable [15, 19]. We fully acknowledge that not all social scientific studies aim to generalize to the population at large, focusing instead on more specific populations, such as single fathers [10], breast cancer patients [30], or cult survivors [38]. For studies aiming to generalize to the broader population, however, representative or Census-matched samples are easier than ever to collect via online portals such as MTurk and Prolific, and although such samples are more expensive to obtain than a convenience sample of undergraduate students, they warrant substantially more justifiable inferences about the population, even when that population is centered in one country only. An additional strategy for obtaining more-representative samples is to conduct secondary analyses of large, publicly available data sets, many of which were originally generated using random/representative sampling techniques.

We recognize that these recommendations—even if supported by data—are unlikely to affect behavior without some specific structural support. For example, to the extent that researchers, including graduate students, can be trained and mentored in the process of seeking external funding, they may be better able to acquire resources that would support the collection of representative, Census-matched samples, reducing the need to rely on convenience samples.

5. Strengths, Liabilities, and Conclusions

A strength of this project is that it included all human-subjects studies published in four top communication journals over a ten-year period, rather than a selection of such studies. This approach resulted in a substantial sample of more than 1,200 individual studies and nearly one million human participants. We contend that this is a robust sample from which to draw conclusions about the status of sampling characteristics in the communication discipline.

At the same time, our sample of studies was limited to four journals. Given the top-tier status of these journals, one might surmise that the samples are of higher quality (larger, more representative) than those typically seen in other publication outlets. Thus, had studies in regional journals (e.g., *Communication Quarterly, Western Journal of Communication*) and/or specialty journals (e.g., *Health Communication, Journal of Family Communication*) also been included in our review, this may have altered our conclusions about sample quality. Consequently, broadening the sampling frame represents a potentially fruitful focus for future research on the sampling characteristics of communication research.

Our sample was also limited to ten years' worth of research. Even in only four journals, that period represented a substantial number of studies (>1,200), but an alternative for future research would be to randomly sample human-subjects studies across a wider time range, representing more than one specific decade, so that trends in sampling might better be adjudicated. We also did not code all possible demographic characteristics of samples, such as employment status, relationship status, sexual orientation, and political affiliation, although these characteristics are reported substantially less frequently in published research than the attributes of age, gender, and race/ethnicity.

Despite these limitations, the present study offered a detailed analysis of the state of human-subjects samples in the contemporary communication discipline. This analysis indicated that communication research fares relatively well with respect to sample size, at least within the social sciences, but routinely oversamples particular segments of the population (thus, undersampling other segments), which has direct implications for the legitimacy and external validity of the conclusions drawn from that work.

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Conflicts of Interest

The authors declare that they have no competing interests.

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