ORIGINAL ARTICLE

A cross-sectional bibliometric study showed suboptimal journal endorsement rates of STROBE and its extensions

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Abstract

Objectives: The STrengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement provides guidance on reporting observational studies. Many extensions have been created for specialized methods or fields. We determined endorsement prevalence and typology by journals in extension-related fields.

Study Design and Setting: A published protocol defined search strategies to identify journals publishing observational studies (2007−2017) across seven fields relating to STROBE extensions. We extracted text regarding STROBE, seven STROBE extensions, reporting guidelines Consolidated Standards of Reporting Trials and Preferred Reporting Items for Systematic Reviews and Meta-Analyses, and transparent reporting documents/groups: International Committee of Medical Journal Editors, Committee on Publication Ethics (COPE), and the Enhancing the QUAlity and Transparency Of health Research (EQUATOR) networks. Relationships between endorsing STROBE, endorsing other guidelines, and journal impact factor were tested using chi square and Mann-Whitney tests.

Results: Of 257 unique journals, 12 (5%) required STROBE on submission, 22 (9%) suggested use, 12 (5%) recommended a "relevant guideline," 72 (28%) mentioned it indirectly (via editorial policies or International Committee of Medical Journal Editors recommendations), and 139 (54%) did not mention STROBE. The relevant extension was required by 2 (<1%) journals; 4 (1%) suggested use. STROBE endorsement was not associated with journal impact indices but was with Consolidated Standards of Reporting Trials and Preferred Reporting Items for Systematic Reviews and Meta-Analyses endorsements.

Conclusion: Reporting guideline endorsement rates are low; information is vague and scattered. Unambiguous language is needed to improve adherence to reporting guidelines and increase the quality of reporting. © 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: Observational studies; Epidemiologic research design; Guidelines as topic; Information dissemination/methods; STROBE; Reporting guidelines

What is new?

Key findings

- We identified ambiguities in language of endorsement and proposed a classification of endorsement to be used for future studies focused on endorsement. We established that endorsement rates of STROBE and its extensions are low across seven fields.

What this adds to what was known?

- This is the first study to our knowledge that assessed the endorsement of several STrengthening the Reporting of Observational Studies in Epidemiology extensions.

What is the implication and what should change now?

- Journal editors should consider endorsing relevant guidelines and the placement (i.e., in the author instructions) and strength of the endorsement(s). Researchers need to consider their definitions of endorsement and look for information in more places than just author guidelines. Open source data sets encompassing journals included in our study and the relevant source and endorsement coding data are available for use.

1. Introduction

The STrengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement was created in 2007 to provide guidance on how to completely and transparently report the results of cross-sectional, case-control, and cohort studies [1]. In the decade since STROBE's creation, many field-specific extensions [2–14] have been published to provide more nuanced advice for particular methods (e.g., response-driven sampling) or fields (e.g., rheumatology). Through instructions to authors and editorial policies, journals can endorse or support reporting guidelines by requiring authors to submit completed checklists or by simply suggesting their use.

Although journals wield much power in this regard, the impact of STROBE endorsement is unclear. In one study, endorsement had no effect on the reporting on confounding [15], and in another, there was insufficient evidence to determine the relationship between endorsement and the completeness of reporting [16]. However, journals that endorsed the extension for genetic association studies (STrengthening the REporting of Genetic Association Studies [STREGA]) had more complete reporting than those that did not [17].

If editors lack confidence in the impact of reporting guidelines, they will be less willing to endorse them. Research shows that a lack of endorsement could be related to editor's views that their current policies are already sufficient and that stricter requirements could result in a loss of submissions with authors submitting to journals with less-stringent rules [8,18,19]. Editorial staff could also be unaware of the existence of guidelines, as demonstrated by low endorsement rates in dentistry (12.8%, $n = 109$ [20]), oncology and hematology (13.4%, $n = 231$ [21]), oncology only (33.3%, $n = 21$ [22]), otorhinolaryngology (60%, $n = 5$ [23]), pediatrics (4%, $n = 69$ [24]), urology, and nephrology (5.4%, $n = 55$ [18]). Other than Nevodic et al.'s study on endorsement of STREGA, which showed endorsement rates around 16% (29/180, [17]), to our knowledge, no other studies have evaluated the uptake of the STROBE extensions.

Further complicating the issue, when journals endorse reporting guidelines, the detail and strength of endorsement are extremely varied [19]. Language used in author guidelines ranges from requiring a completed checklist on submission to suggesting use of specific guidelines by name (i.e., Consolidated Standards of Reporting Trials [CONSORT], STROBE, and so forth), vague references to "appropriate" guidelines, or mentioning resources that encourage reporting guideline use (e.g., the EQUATOR network). Defining the typology of endorsements should help eliminate ambiguous or meaningless language and identify the best phrasings to communicate endorsement most effectively.

A byproduct of the proliferation of STROBE extensions is a potential increase in awareness of the original checklist as these extensions reference the original. Despite this greater dissemination network, journals endorsing too many different reporting guidelines might cause confusion and actually weaken the impact of endorsement as an intervention to improve research reporting. Extensions offer targeted nuanced guidance written by experts in their respective fields; thus, they may be more useful to authors than STROBE. Authors need to identify the relevant reporting guideline for their study, so journals should provide tools targeted for the articles they publish [25].

As stated in our protocol [26], we aimed to assess endorsement of STROBE and seven extensions [2–6,10,12]. The other six extensions had been published for less than 1 year [7–9,11,13,14], so we excluded these to not bias results, allowing a 1 year time buffer for guideline endorsement. The included extensions focus on antimicrobial stewardship programs (STROBE-AMS), infectious disease molecular epidemiology (STROME-ID), molecular epidemiology (STROBE-ME), rheumatology (STROBE-EULAR), genetic association studies (STREGA), routinely collected health data (RECORD), and response-driven sampling (STROBE-RDS). In addition to establishing endorsement prevalence, we deductively analyzed language used and developed a classification schema to categorize variability in endorsement phrasing and identify potentially more effective methods of endorsement.

2. Methods

Detailed search methods were established a priori and can be found in the protocol [26]. We identified journals through targeted search strategies related to the scope of the extensions [26], considering only journals for which there is an appropriate STROBE extension. Broad subject terms (BSTs) from the National Library of Medicine provided structured targeting of topic areas. The BSTs used for each extension are shown in Table 3 in the protocol [26]. After downloading BST data, extraneous columns were removed, data sets were stacked when extensions had multiple BSTs, and results were deduplicated.

Next, eligibility criteria (English, currently publishing, periodical) were extracted from the National Library of Medicine journal listing, and journals were matched by "Entrez ID" to ensure that journals were indexed in MEDLINE. We then ran search strategies in Ovid to identify observational studies within the identified journals and combined this with field-specific search strategies (Results Detailed in Additional File 1). The search time period was restricted to 2 years before the relevant extension publication until July 2017 (protocol Table 1 [26]), when all searches were performed.

The initial data set contained over 94,000 abstracts, including nonobservational studies. Because it was not feasible to screen the entire collection, we scanned abstracts to identify if a journal published at least one observational study in a human population. We used the same screening process for field-specific search strategies. Inclusion criteria were modified slightly for two extensions: STROBE-AMS and STREGA. Articles specifically focused on antimicrobial stewardship programs were rare, so we broadened the scope to include those focused on antibiotic resistance or antimicrobial/antibiotic use (e.g., in hospital settings or in a database). For genetic association studies, we excluded articles comparing statistical models, tests, or algorithms.

The websites of eligible journals were then systematically searched to extract data on endorsement. Publicly available (i.e., not needing account creation) author guidelines, peer reviewer guidance, editorial policies, and other relevant directions for authors were extracted using a standardized form. The entire journal pool was randomly ranked in Microsoft Excel and three random samples of 10% were used for (1) initial schema development; (2) refinement; and (3) extraction using the final schema on which inter-rater reliability (using Cohen's kappa coefficient) was calculated. Thus, 30% of the journal pool was extracted by two independent reviewers (R.T. and M.K.S.). The remaining 70% was extracted by R.T. and checked by M.S.; disagreements were resolved through discussion. If multiple forms of endorsement were mentioned (i.e., required and recommended in different sources), the strongest endorsement was used. Information was extracted from October 2017 to March 2018.

During schema development, it was decided to only code mentions of International Committee of Medical Journal Editors (ICMJE) if it was in reference to article writing; mentions in reference to conflicts of interest, authorship, or trial registration were not coded. Given the structure and length of the ICMJE recommendations, authors may be guided toward relevant sections of the document (i.e., roles and responsibilities of authors, contributors, reviewers, editors, publishers, and owners). Therefore, unless phrasing makes explicit mention of writing or guidelines, authors can interpret

Table 1. Screening journals

Screening stage	AMS	MEID	ME	EULAR	STREGA	RECORD	RDS	Total [a]
Initial total [a]	299	445	413	101	349	747	818	3,172
Total ineligible	276	404	348	82	279	669	803	2,861
Manual screen excluded	143	155	143	50	113	400	519	1,523
Language	9	7	4	7	7	5	62	101
Out of date range	109	143	134	41	103	361	440	1,331
Format/access issues	25	5	5	2	3	34	17	91
MEDLINE excluded	29	49	47	21	80	117	115	458
Observational search excluded	57	147	138	11	75	132	91	651
Field-specific excluded	47	53	20	NA	11	20	78	229
Total eligible	23	41	65	17[c]	71[b]	78	15	310

Abbreviations: AMS, antimicrobial stewardship; ME, molecular epidemiology; EULAR, European league against rheumatism; STREGA, STrengthening the REporting of Genetic Association Studies; RECORD, REporting of studies Conducted using Observational Routinely collected health Data; RDS, respondent-driven sampling studies.

[a] Total counts include duplicate journals due to overlapping broad subject terms and topic areas of extensions. Initial total is after initial deletion of duplicates.

[b] Since the original search, one journal split into three and another stopped publishing. These changes were discovered during the final data extraction phase.

[c] Two journals had supplements already included in the pool.

ICMJE endorsement in a piecemeal manner and not always as instructions to follow the reporting guidelines section.

Regarding protocol deviations, we originally stated that we would also extract publisher data. During extraction, we determined that this information would add little value as it was often difficult to access and not extractable in a systematic manner. In addition, the protocol detailed a qualitative assessment of the content in the STROBE extensions. This complementary project deserved a separate discussion and thus results were published elsewhere [27].

2.1. Statistical analyses

We calculated counts and percentages for endorsement of STROBE and extensions. As data extraction created the endorsement schema, we did not establish a priori endorsement categories. We coded endorsement based on a deductive qualitative approach to detect nuances in phrasings. However, for statistical tests, the use of five categories (active strong, active weak, passive moderate, passive weak, and none) would be impractical, difficult to interpret, and the distinction would be statistically meaningless

(examples shown in Table 2). Therefore, we grouped data to allow for better interpretations and for flexibility in judgments from readers/editors (i.e., "passive," a broader generous interpretation vs. "active," a more meaningful explicit endorsement). For analyses using dichotomous evaluations of STROBE endorsement, we grouped data as any endorsement, active or passive, and as active endorsement only. This dual dichotomization was used for testing associations with other reporting guidelines (i.e., CONSORT and Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA]), endorsement of COPE, and impact factor indices. The chi-squared test was used because we could not calculate unadjusted odds ratios for all tests due to zero-cell counts.

It was stated in the protocol that we would use journal impact factor (JIF) [26]. Due to variability in the size of fields and their potential impact on results, we decided to also use CiteScore Metrics from Scopus. We specifically used the Source Normalized Impact per Paper (SNIP), the measure of actual citations relative to citations expected for the serial's subject field, and the SCImago Journal Rank, a measure of weighted citations received by the

Table 2. Endorsement schema examples

Type	Definition	Examples
Active strong	A requirement of a completed checklist with article submission (e.g., "must," "are required to")	Authors of articles reporting observational epidemiology studies should follow the STROBE guidelines (https://www.strobe-statement.org/index.php?id=strobe-home) and complete the relevant checklist for the type of study they have conducted. The completed checklist should be supplied as part of the article submission process. (The Journal of antimicrobial chemotherapy) We require authors to follow available recommendations for different study designs. The examples include PRISMA for meta-analyses of randomized controlled trials, STROBE for reporting observational studies in epidemiology, CONSORT for randomized controlled trials… (Journal of comparative effectiveness research)
Active weak	A suggestion that authors are "encouraged" or "should" reference or follow a specific guideline	Authors of other types of reports are encouraged to use relevant reporting guidelines, such as STROBE, PRISMA, and TREND. (Research in nursing and health) Authors are encouraged to adhere to recognized research reporting standards. The EQUATOR network collects more than 370 reporting guidelines for many study types, including for randomized trials: CONSORT, Observational studies: STROBE, Systematic reviews: PRISMA…. (Genetic epidemiology)
Passive (by proxy) moderate	A suggestion that author should adhere to "relevant" reporting guidelines	We…heartily encourage the authors to make sure that their articles report the studies in the most appropriate form as recommended by the corresponding reporting guideline. Check the one that fits your study type at the EQUATOR network webpage. (Rheumatology International)
Passive (by proxy) weak	References documents (e.g., ICMJE or editorial policies) which mention reporting guidelines	All authors of original work submitted to this journal should conform to the Uniform Requirements for Manuscripts Submitted to Biomedical Journals, prepared by the International Committee of Medical Journal Editors (ICMJE). (Scandinavian journal of rheumatology)
None	No mention of any reporting guidelines	Not applicable

serial. The nonparametric Wilcoxon rank test was performed for the 2016 JIF, 5-year JIF, SNIP, and SCImago Journal Rank, we visually represented results using the receiver operating characteristic curve. The area under the curve measures discrimination (e.g., the ability to correctly classify journals that use active or any endorsement of STROBE from those that do not when using IF as a classifier). Its value lies between 0.5 and 1; 0.5 denotes a bad classifier, and one denotes an excellent classifier. All confidence intervals are provided at the two-sided 95% level.

3. Results

After screening for field-specific observational studies, there were a total of 310 eligible journals (Table 1, Additional File 2). As there is overlap between fields, particularly for molecular epidemiology, infectious disease epidemiology, and genetic association studies, 257 of the 310 journals are unique. Accordingly, any analyses evaluating endorsement of STROBE, CONSORT, PRISMA, mentions of ICMJE, COPE, or EQUATOR use the unique journal pool data set to avoid double counting.

The inter-rater reliability, as assessed by Cohen's kappa coefficient, was 0.72, 0.24, 0.81, 0.92, 0.86, 0.34, and 0.60 for endorsement of STROBE, an extension, CONSORT, PRISMA, COPE, ICMJE, and EQUATOR, respectively. Disagreements were largely around ICMJE coding (e.g., specifying relationship to writing and not other topics like conflict of interest disclosure) and its relation to the coding of other items (e.g., EQUATOR is mentioned in ICMJE as is "relevant" reporting guidelines use). The endorsement schema, detailed in Table 2, established the categories and was applied to STROBE, the extensions, CONSORT,

and PRISMA. Uniform language appeared throughout sources with apparent clustering by publisher. All extracted text and source documents can be found in the open source data set [28]. Table 3 shows the prevalence of endorsement types for STROBE and all extensions.

Of the 257 unique journals, more than half (54%) did not endorse STROBE in any manner. When endorsement was active (13%), it was in author guidelines 94% of the time; when STROBE was required (i.e., active strong, 5%), it was always mentioned in author guidelines. Of the 310 journals in extension-related fields, 171 (55%) did not mention of relevant extensions. "By proxy" or passive endorsement represented most of the extension endorsements, requiring extra effort to find "relevant" guidelines. Of note, STREGA was mentioned by seven additional journals outside the genetic-specific journal pool, indicative of the growing popularity of genetic association studies. Active endorsement of STROBE was significantly associated with active endorsement of CONSORT, PRISMA, and COPE [χ^2 (1, $n = 257$) = 88.62; χ^2 (1, $n = 257$) = 109.43; χ^2 (1, $n = 257$) = 23.55; $P < 0.001$]. Any endorsement of STROBE was significantly associated with any endorsement of CONSORT and PRISMA [χ^2 (1, $n = 257$) = 175.61; χ^2 (1, $n = 257$) = 230.02; $P < 0.001$]. Any endorsement of STROBE was significantly associated with explicit references to COPE (i.e., present in website text and not in secondary documents), χ^2 (1, $n = 257$) = 59.69; $P < 0.001$.

ICMJE guidance was sometimes cited inappropriately, either as the outdated uniform requirements or as the current recommendations with no link (17%) (Table 4). Otherwise, it was not cited a majority of the time (62%). Of the other relevant guidance documents and organizations, COPE was the most frequently mentioned (explicit: 42%;

Table 3. STROBE and Extension Endorsement

Reporting guideline	Endorsement type				
	Active strong *n* (%)	Active weak *n* (%)	Passive moderate *n* (%)	Passive weak *n* (%)	None *n* (%)
STROBE (257[a])	12 (5)	22 (8)	12 (5)	72 (28)	139 (54)
AMS (23)	0	0	9 (39)	9 (39)	5 (22)
ME-ID (41)	0	0	8 (19)	15 (37)	18 (44)
ME (65)	0	0	7 (11)	16 (25)	42 (64)
EULAR (17)	0	1 (6)	3 (18)	5 (29)	8 (47)
STREGA (71)	2 (3)	1 (1)	6 (9)	20 (28)	42 (59)
RECORD (78)	0	0	11 (14)	18 (23)	49 (62)
RDS (15)	0	0	1 (6)	7 (47)	7 (47)
CONSORT (257[a])	38 (15)	44 (17)	3 (1)	55 (21)	117 (46)
PRISMA (257[a])	24 (10)	29 (11)	8 (3)	62 (24)	134 (52)

Abbreviations: STROBE, STrengthening the Reporting of Observational studies in Epidemiology; STROBE-AMS, STROBE antimicrobial stewardship; STROME-ID, STRO of Molecular Epidemiology for infectious diseases; STROBE-ME, STROBE-molecular epidemiology; RECORD, REporting of studies Conducted using Observational Routinely collected health Data; STREGA, STrengthening the REporting of Genetic Association Studies; STROBE-EULAR, STROBE-European League Against Rheumatism; STROBE-RDS, STROBE for Respondent-Driven Sampling studies; CONSORT, Consolidated Standards of Reporting Trials; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

[a] Number of unique journals.

Table 4. Mention of relevant groups and documents

Guidance documents or networks (*n* = 257)	*n* (%)
ICMJE[a]	
Yes, appropriate recommendation with link	55 (21)
Yes, appropriate recommendation with no link	3 (1)
Yes, not appropriate recommendation (i.e., requirements) with link	35 (14)
Yes, not appropriate recommendation (i.e., requirements) with no link	4 (2)
No mention of ICMJE	160 (62)
COPE	
Yes, explicit in text	105 (41)
Yes, explicit on site (e.g., standalone logo)	1 (<1)
Yes, mentioned in editorial policies	57 (22)
Yes, mentioned in ICMJE	23 (9)
No immediately apparent reference	71 (28)
EQUATOR	
Yes, link in text	30 (12)
Yes, no link	8 (3)
Yes, mentioned in reference document—editorial policies	29 (11)
Yes, mentioned in reference document—ICMJE	46 (18)
No mention anywhere	144 (56)

[a] Only coded in relation to article writing and preparation, not conflict of interest disclosure, authorship criteria, trial registration, and so forth.

by proxy: 31%). Standard language in author guidelines was common in relation to authorship disputes and qualifications, conflict of interest disclosures, and plagiarism. The mentions of EQUATOR network were primarily by proxy through editorial policies or the ICMJE documents (29%).

The median 2016 and 5-year JIFs were 2.47 (IQR 1.75, 3.73; *n* = 213) and 2.70 (IQR 1.94, 4.07; *n* = 208), respectively. The median SNIP for 246 journals was 0.90 (IQR .69, 1.18) and the SCImago Journal Rank (SJR) for 251 journals was 1.01 (IQR .60, 1.70; *n* = 252). Active or any endorsement of STROBE did not appear to be associated with 2016 JIF, 5-year JIF, SNIP, SJR (Fig. 1, Table 5). Because the values of the AUC ranged from 0.48 to 0.55, and all associated 95% confidence interval included 0.5, no impact factor indices were good predictors of endorsement of STROBE.

4. Discussion

As in previous studies, we found that overall endorsement rates of STROBE and other reporting guidelines were low [29]. Previous literature in dentistry, oncology and hematology, pediatrics, and urology and nephrology gives estimates in the range of 4.0−13.4% [18,20,21,24]. In our pool, only 13% of journals required or recommended STROBE and an extension was mentioned only 2% of the time. Most extensions did not have any previous research citing endorsement rates, and endorsement was extremely low or nonexistent in our pool of journals (0−6%). Our observed endorsement rate for STREGA (4%) was much lower than a previous estimate (16%) [17].

Mentions of reporting guidelines in general editorial policies seemed to be relatively frequent—between 22% and 28% for STROBE, CONSORT, and PRISMA. This is troublesome as this may not be an intuitive place for authors looking for guidance on article submission. We suggest that endorsement information be made explicit in author guidelines (i.e., using language falling in the "active strong" category). Any reporting guideline or guidance document/ group endorsement should be accompanied with a current link to the correct source. Language should be unambiguous and clear, highlighting actionable items (i.e., submission of a completed checklist as an Additional File 3).

Our classification of "by proxy" endorsement (33%) identified journals that already endorse reporting guidelines in some manner. These identified journals can be targeted to survey or persuade editors to endorse relevant guidelines and to do so in more direct and meaningful ways [28]. Some journals may not be aware of reporting guidelines so this corpus of journals provides a unique opportunity to propose those that are particularly relevant to their authors [20].

There are debates regarding the usefulness of recommending the use of a reporting guideline but not requiring a completed checklist to be submitted with an article [20,30]. We believe that without an enforcement mechanism, that is, editors verifying that a relevant checklist has been submitted alongside an article and/or peer reviewers using a checklist, endorsement is a mere suggestion. To reduce burden on editorial staff and potentially authors, only those articles proceeding to the peer review stage could be required to submit a completed checklist.

Our estimates of CONSORT (32%) endorsement are aligned with previous research, in pediatrics (20%), hematology and oncology (33%), cardiology (53%), emergency medicine (56%), and oncology (76%) [22,24,31−33]. Similarly, PRISMA (21%) endorsement is consistent with previous estimates in emergency medicine (21%) and nursing (44%) [32,34]. The association between endorsement of different reporting guidelines was also reproduced in this study as journals mentioning CONSORT or PRISMA were also more likely to mention STROBE [35]. The EQUATOR Network (a portal for a large number of guidelines) was mentioned by 15% of journals in our pool, also similar to previous estimates of 7.8, 10.1, and 33.3% in hematology and oncology, dentistry, and emergency medicine [20,31,33]. Any mention of ICMJE, whether appropriate or not, was 39% in our sample, which is within the range of previous estimates 7−67% [19,20,24,31,33,36].
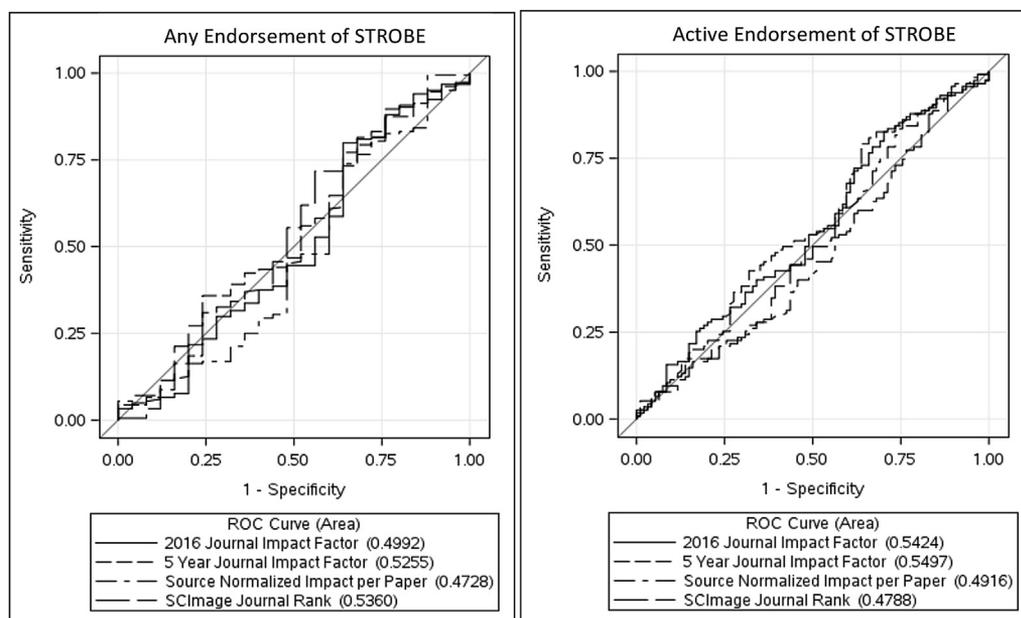
Fig. 1. ROC curves comparing STROBE endorsement and journal impact indices. STROBE, STrengthening the Reporting of Observational Studies in Epidemiology.

Inappropriate citations of ICMJE guidance was 17% of our sample, lower than previous estimates between 25% and 68% [19,20]. It is difficult to place our results into context as studies used different classifications for endorsement and not all assessed the appropriateness of citations.

Our results add to the debate regarding the relationship between impact factor and the endorsement of reporting guidelines as we found no relationship between any of the four impact factor indices and STROBE endorsement. This is different from Hua et al.'s study which found that, of 109 MEDLINE or SCIE dentistry journals, higher impact journals were more likely to suggest reporting guideline use [20].

Our study has several limitations. First, it included only MEDLINE-indexed English journals publishing for at least 1 year in one of the seven medical areas related to a STROBE extension. Second, the focus of this project was on the extensions, thus, a large portion of journals were excluded after running field-specific searches, so we may be missing a part of the picture for endorsement of the other more generalized guidelines like STROBE, CONSORT, and PRISMA. In contrast to previous studies, we have made most data open source and welcome anyone to use it, provide feedback, or request additional information. Open data include the final journal pool including impact factor indices, endorsement coding, and extracted text (and source documents), and a corpus of mostly observational studies.

The refined detail of our endorsement schema and dual dichotomization of endorsement type across seven fields offer a broader view than previous work. Differing classifications of endorsement across studies makes difficult to synthesize information. We hope that our results generate discussions regarding the wording of endorsement and encourage journals to be clearer in their requests regarding reporting guideline use. Although our estimates for STROBE endorsement are aligned with previous studies, they are not encouraging as rates are still low. Extension authors need to more thoroughly consider communication and dissemination plans of their work, as their uptake in our study is extremely low. As with many efforts in biomedicine, multiple stakeholders are involved and at fault. It will take concerted efforts on the part of editors, journals, and authors to increase reporting guideline adherence.

Table 5. Area under the curve for STROBE endorsement and journal impact indices

ROC model	Active endorsement		Any endorsement	
	AUC (SE)	95% CI	AUC (SE)	95% CI
2016 Journal impact factor	0.50 (0.07)	0.36, 0.64	0.54 (0.04)	0.46, 0.62
5-Year journal impact factor	0.53 (0.07)	0.40, 0.66	0.45 (0.04)	0.38, 0.53
Source normalized impact per paper	0.47 (0.07)	0.33, 0.61	0.50 (0.04)	0.42, 0.58
SCImago journal rank	0.54 (0.07)	0.40, 0.67	0.48 (0.04)	0.40, 0.56

Abbreviations: AUC, area under the curve; CI, confidence interval; ROC, receiver operating characteristic.

n = 208 due to dropping of missing data.

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Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jclinepi.2018.11.006.

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