Journal of Clinical Epidemiology 162 (2023) 10−18

Journal of Clinical Epidemiology

ORIGINAL ARTICLE

Observational studies of antidepressant use and suicide risk are selectively published in psychiatric journals

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Accepted 24 July 2023; Published online 5 August 2023

Abstract

Objectives: To investigate if observational studies showing favorable results for antidepressants on suicidal behavior (reduced risk) are preferably and more easily published in psychiatric journals and cited more often compared to studies with unfavorable results (increased risk).

Study Design and Setting: Prespecified secondary analysis, including 27 original studies selected through a systematic review of observational studies reporting associations between the use of newer antidepressant drugs and suicide risk.

Results: Independent of study quality, studies reporting favorable results were more frequently published in psychiatric than nonpsychiatric journals and were more often conducted by lead authors with financial conflicts of interest (fCOI). Within psychiatric journals, lead authors with fCOI published in journals with a higher impact factor (IF) and ranking. Within psychiatric journals, favorability of results also correlated with citation frequency, IF, and journal ranking, but these associations became weaker and inconclusive after adjusting for study quality. Results for ease of publishing were inconclusive.

Conclusion: Studies reporting unfavorable results (increased suicide risk with antidepressant exposure) are less likely to be published in psychiatric journals. Lead authors with fCOI report more favorable results, and their studies are published in the most prestigious psychiatric journals. This may create a biased evidence base and an unbalanced dissemination and appraisal of findings within psychiatry.

Keywords: Selective reporting; Publication bias; Observational study; Citation; Conflicts of interest; Antidepressants; Suicide

1. Introduction

Double-blind randomized controlled trials (RCTs) are widely considered the gold standard in evidence-based medicine, for differences between a drug and the placebo comparator can be attributed causally to the pharmacological effect of the drug. Limitations arise when it comes to the detection of rare adverse events. In this case, very large RCTs or meta-analyses of many smaller RCTs are needed [1]. However, potential harms may still go undetected because, in publications of RCTs, the analysis of safety data is largely inadequate and harms are often underreported [2−4]. Another problem with RCTs is that the trial population may differ notably from the typical patient population seen in routine clinical practice [5,6]. In view of these limitations of RCTs, observational studies provide an important additional source of evidence [1,7]. In observational studies, a treated group is compared to a nonrandomized control group, raising the problem of treatment selection. It is possible to statistically account for treatment selection with adjustment in regression models or matching procedures. These techniques may not fully eliminate treatment selection, but across medical fields, RCTs and observational studies typically come to comparable conclusions [8,9]. Nevertheless, for some outcomes, such as mortality, the agreement is far from perfect [10], and there is consensus that residual confounding due

Data availability: Data and code are freely available online on the OSF; https://osf.io/avhg4/.

Ethical standards: This analysis is a secondary analysis of already published studies.

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https://doi.org/10.1016/j.jclinepi.2023.07.015

What is new?

Key findings

- Based on a systematic review and meta-analysis of 27 observational studies reporting associations between antidepressant use and risk of suicidal behavior, we found that studies with favorable results for antidepressant use (i.e., reduced suicide risk or no effect) are more often published in psychiatric journals than studies with unfavorable results (i.e., increased suicide risk).
- Lead-authors with financial conflicts of interest (fCOI) published more favorable results than lead-authors without ties to the pharmaceutical industry, and we found strong evidence of selective publication of studies conducted by lead-authors with fCOI.
- Lead-authors with fCOI published their studies in psychiatric journals with higher impact factor (IF) and rank than lead-authors without ties to the pharmaceutical industry.

What this adds to what was known?

- Selective publication and systematic biases related to fCOI are well established in randomized controlled trials (RCTs) but have been rarely documented in observational studies.
- This study provides evidence that research producing inconvenient results that challenge common clinical practice and discourse receive less scientific attention within academic psychiatry.

What is the implication and what should change now?

- There is a disbalance in the dissemination and appraisal of inconvenient results within psychiatric specialty journals. Publication formats that are less affected by the direction of results, such as preregistered reports, may remedy this problem.
- More awareness about the impact of financial relationships of researchers and academic publishers with the pharmaceutical industry is necessary. Research should be as independent from commercial interests of the industry as possible.
- Psychiatrists should be encouraged to inform themselves about potential harms of psychiatric drugs based on scientific sources outside of their field for a more balanced appraisal of the evidence.

to unmeasured variables remains a major limitation of observational studies [11].

Besides treatment selection, other biases in observational studies are less often discussed. For example, compared to RCTs, few observational studies are preregistered, granting researchers flexibility in the choice of the database, outcome variables, confounding variables, or analytical methods, thus allowing unnoticed p-hacking. Selective reporting and citation of studies with convenient results may further distort syntheses of the scientific literature [12−14].

Consistent with the results of meta-analyses of RCTs [15−20], in a recent meta-analysis of observational studies, we found that, depending on drug class and indication, antidepressant use was either associated with unclear effects or even increased suicide risk [21]. We further found evidence of selective publication; the association between antidepressant use and increased suicide risk became substantially stronger after imputing missing studies with trim-and-fill procedure. Despite these findings, the predominant discourse in academic psychiatry is that antidepressant treatment prevents suicide, especially in adults with depression [22,23]. The popularity of antidepressants among (academic) psychiatrists and the firm belief that their benefits outweigh harms may lead to selective publication of favorable results, especially by authors with financial conflicts of interest (fCOI) [21]. It could be that psychiatric journal editors selectively accept favorable results. Favorable results may also be disseminated more frequently within a specialty, for example via selective citations in reviews [12]. Finally, authors who obtain unfavorable results may choose nonpsychiatric journals because they experienced difficulties in publishing their results in psychiatric journals.

In the present study, we thus aimed to examine selective publication and citation biases in psychiatric journals by addressing the following research questions. Compared to observational studies with unfavorable results (increased suicide risk with antidepressants), are observational studies with favorable results (reduced suicide risk with antidepressants) 1) more frequently published in psychiatric journals than in nonpsychiatric journals, 2) published in psychiatric journals with higher rank and impact factor (IF), 3) cited more frequently, and 4) less often rejected in psychiatric journals?

2. Materials and methods

The study protocol was preregistered on the Open Science Framework; https://osf.io/avhg4/. Data and statistical code are also available there.

Table 1. Description of studies

Study	Drug-class	Favorable?	fCOI	Study quality	Journal	Rank
Bilen 2011	Any	No	No	7	Emergency Medicine Journal	-
Bjorkenstam 2013	SSRI	No	No	7	PLoS One	-
Carlsten 2009	SSRI	Unclear	No	8	BMC Geriatrics	-
Castelpietra 2017	SSRI + SNRI	Unclear	Yes	8	European J of Clinical Pharmacology	55.36
Chartrand 2012	Any	Unclear	No	7	Depression and Anxiety	84.07
Cheung 2014	SSRI + SNRI	Unclear	No	9	Journal of Affective Disorders	74.30
Coupland 2011	SSRI + SNRI	No	No	9	BMJ	95.00
Coupland 2015	SSRI + SNRI	No	No	9	BMJ	95.00
Didham 2005	SSRI	Unclear	No	6	British J. of Clinical Pharmacology	-
Eikelenboom 2019	Any	No	No	9	Psychological Medicine	89.36
Erlangsen 2009	Any	Unclear	No	9	Journal of Affective Disorders	77.35
Gibbons 2007	SSRI + SNRI	Unclear	Yes	6	American Journal of Psychiatry	97.34
Leon 1999	SSRI	Unclear	Yes	7	American Journal of Psychiatry	95.63
Martinez 2005	Any	No	No	7	BMJ	95.00
Olfson 2006	SSRI + SNRI	Unclear	Yes	8	Archives of General Psychiatry	99.47
Olfson 2008	SSRI	Unclear	Yes	8	Journal of Clinial Psychiatry	92.57
Olmer 2012	Any	Unclear	No	7	The J.of Nervous & Mental Disease	44.82
Rahman 2014	Any	Unclear	No	8	PLoS One	-
Rahme 2008	SSRI	Unclear	Yes	8	Journal of Clinial Psychiatry	92.57
Raja 2009	Any	No	No	5	Journal of Affective Disorders	77.35
Sondergard 2007	SSRI + SNRI	No	Yes	9	Archives of Suicide Research	-
Spittal 2019	Any	No	No	5	Epidemiology & Psychiatric Sciences	90.00
Swanson 2015	Any	Unclear	No	8	Pharmacoepidemiol. & Drug Safety	-
Termorshuizen 2016	Any	No	No	4	Journal of Psychopharmacology	79.23
Tiihonen 2006	SSRI + SNRI	Unclear	Yes	9	Archives of General Psychiatry	99.47
Valuck 2016	SSRI + SNRI	Unclear	Yes	8	British Journal of Psychiatry	91.20
Wang 2015	Any	Unclear	No	9	Journal of Affective Disorders	74.30

Abbreviations: fCOI, financial conflicts of interest of study lead authors; IF, journal impact factor.
Full bibliographic information for all studies is provided in the Supplement.

2.1. Study design

We based our analyses on our previously published systematic review and meta-analysis of observational studies on new generation antidepressants and suicide risk [21]. Following a preregistered protocol, we searched MEDLINE, PsycINFO, Web of Science, PsycARTICLES, and SCOPUS for observational studies (cohort or case-control) published from 1990 to January 2020 on the use of new-generation antidepressants (selective serotonin reuptake inhibitors [SSRIs], serotonin-noradrenaline reuptake inhibitors [SNRIs], and other new generation serotonergic-noradrenergic drugs) and the risk of suicidal behavior (suicide and suicide attempts). Two investigators independently screened the titles and abstracts and subsequently assessed the full texts. Any discrepancies were resolved by consensus.

For the current study, we assessed the following variables for each of the included studies.

2.2. Data extraction and coding

2.2.1. Favorability of results

In the protocol, we defined that a study had favorable results when the risk estimate (RE) was <1, meaning that antidepressant use was associated with a lower risk of suicidal behavior than nonuse. Since the confidence interval included the null effect in many studies, we used two approaches to handle this problem (not specified in the protocol). First, to use as much statistical information as possible, we ran metaregression models with the risk estimate as an outcome and the variable of interest (e.g., citation frequency) as a predictor. Second, we classified a study as having a favorable result if the RE was statistically significantly reduced for all drug classes studied; as uncertain if the 95% CI included the null effect and as unfavorable if the RE was significantly increased. Because no study had favorable results based on this definition, only two categories were analyzed (unclear vs. unfavorable).

IF	Psychiatric journal?	Suicide study	Cites PubMed	Cites Google	Rejected?	Prev. subm. Psychiatr. j.?	Difficulty publish
1.44	No	No	9	61	-	-	-
3.53	No	Yes	8	38	Yes	Yes	4
-	No	Yes	18	81	Yes	No	3
2.68	No	Yes	0	12	No	-	3
4.61	Yes	No	9	25	-	-	-
3.57	Yes	No	2	29	Yes	No	3
14.00	No	Yes	191	743	Yes	No	4
19.70	No	Yes	25	91	No	-	3
2.78	No	Yes	16	70	-	-	-
5.81	Yes	No	10	28	No	-	3
3.76	Yes	Yes	3	12	Yes	Yes	3
9.13	Yes	Yes	44	218	No	-	3
6.34	Yes	Yes	18	121	-	Yes	4
7.00	No	Yes	62	316	No	-	3
13.94	Yes	Yes	48	262	-	-	-
5.05	Yes	Yes	9	43	-	-	-
1.84	Yes	Yes	2	11	-	-	-
3.23	No	No	6	15	Yes	Yes	2
5.05	Yes	Yes	6	33	No	-	3
3.76	Yes	Yes	3	16	-	-	-
-	Yes	Yes	6	42	-	-	-
5.88	Yes	No	5	21	No	-	1
2.91	No	Yes	17	32	-	-	-
4.18	Yes	Yes	0	3	-	-	-
13.94	Yes	Yes	56	294	Yes	No	3
6.35	Yes	Yes	2	26	No	-	3
3.57	Yes	No	4	18	Yes	Yes	3

2.2.2. Publication in psychiatric journals

The classification was based on the title of the journal, or, in case of doubt, based on the Clarivate's ''Journal Citation Report'', where journals are classified according to their field (e.g., psychiatry).

Impact factor (IF) and Journal rank for the your of study publication were retrieved from Clarivate's ''Journal Citation Report''. If a journal was not listed in the Journal Citation Report, then we handled it as missing. The journal rank is calculated by sorting journals according to their IF within each field (psychiatry, general medicine, etc.) and then calculating the percentile. Higher rankings thus correspond to higher IFs within specialty journals.

Citation frequency was extracted from information given by Google Scholar and PubMed on March 21, 2021. Citation frequencies were heavily skewed; a few publications were cited very often, and therefore log-transformation was used for metaregression analysis. Furthermore, because citation frequency correlates substantially with year of publication, this was accounted for by including the year of publication in the metaregression analysis.

2.2.3. Publication history

Information was requested from the corresponding authors of the studies via email, with two reminders and additionally contacting coauthors in case of nonresponse. We asked for the following information: difficulty publishing (from 1 ''very easy'' to 5 ''very difficult''), previous rejections, and type of journals (psychiatric vs. nonpsychiatric).

2.2.4. Further variables

Antidepressant use and suicide risk as main study objectives were inferred from title and abstract. No such main objective was assumed if antidepressant exposure was only one among many risk factors studied and if suicidal behavior was not the primary outcome.

Financial conflicts of interest (fCOI) were recorded as present if a study lead author (first or senior author) had

Table 2. Moderating variables and risk for suicidal behavior and antidepressant use

		Suicides			
Moderator	**Value**	**RE or β (95%-CI)**	***P***	**Q**	***P***
fCOI	No	1.98 (1.43 to 2.76)	<0.01	11.36	<0.01
	Yes	1.08 (0.88 to 1.33)	0.42		
Psychiatric Journal	No	1.83 (1.25 to 2.7)	0.01	3.83	0.05
	Yes	1.20 (0.92 to 1.58)	0.17		
Ranking – Psychiatric J.		−0.03 (−0.05 to 0)	0.04		
IF - Psychiatric Journals		−0.05 (−0.11 to 0)	0.05		
Citation frequency					
Google, Psychiatric J.		0.0 (−0.18 to 0.17)	0.97		
PubMed, Psychiatric J.		−0.02 (−0.21 to 0.18)	0.84		
Google, all journals		0.10 (−0.09 to 0.29)	0.29		
PubMed, all journals		0.18 (0 to 0.36)	0.05		

Abbreviations: fCOI, financial conflicts of interest of study lead authors; IF, journal impact factor.
RE: risk estimate from meta-analysis, values > 1 are unfavorable results indicating increased risk for suicidal behavior with antidepressant use.
β: regression coefficient in metaregression, positive values indicate an increasingly unfavorable result with an increase of the value of the predictor.
Q: meta-analytic test for subgroup difference.

declared financial relationships with the pharmaceutical industry, including sponsored professorships, in the target article or other studies published around the same time.

Study quality was rated with a 10-point scale that assesses study quality based on six domains (population framework, study design, description of demographic data, description of clinical data, description of outcome data, and covariate adjustment) and ranges from 0 (minimal quality) to 10 (maximal quality). The scale and its rating system are shown in the online supplement to our systematic review (21; see: https://jech.bmj.com/highwire/filestream/177849/field_highwire_adjunct_files/0/jech-2020-214611supp001_data_supplement.pdf.

2.3. Data analysis

2.3.1. Main analysis

We used random-effects metaregression models with REs as the outcome variable and the variables described above as predictors. This approach also accounts for different sample sizes across studies. We also classified studies according to the favorability of outcome and compared groups with χ^2-tests or Fisher's test, t-tests, or Wilcoxon tests for skewed variables.

2.3.2. Subgroup analysis

We ran all analyses separately for SSRIs and SNRIs. Analysis was also restricted to studies where the main objective was antidepressant exposure and suicide risk. A separate analysis was also conducted with adjustment for study quality via metaregression models.

3. Results

Results for the analyses where studies were classified according to the statistical significance of effects (unclear vs. unfavorable) were inconclusive due to a lack of statistical power. We show these findings in the online supplement, and below we exclusively report the results from the meta-regression models.

3.1. Description of studies

There were 27 studies available for the analyses (Table 1). Based on statistical significance, no study had favorable results (reduced suicide risk with antidepressants), 10 (37%) were classified as unclear (inconclusive results), and 17 (63%) had unfavorable results (increased suicide risk with antidepressants). Nine studies (33%) had lead authors with fCOI. The mean study quality was 7.56 (SD = 1.40, range 4–9). Seventeen studies (63%) were published in psychiatric journals. The median journal rank was MD = 90.60% (n = 20, SD = 14.60, interquartile range IQR = 77.35–95.00), and the median IF was 4.61 (n = 25, SD = 4.56, IQR = 3.53–19.70). The median number of citations in PubMed was 9.00 (M = 21.44, SD = 38.07, IQR = 3.50–18.00, range 0–191), and for Google Scholar it was 33.00 (M = 98.56, SD = 157.15, IQR = 19.50–86.00, range 3–743). We received feedback on publication history from the authors of 17 studies (63%); the others did not respond.

3.2. Favorability of results and publication in psychiatric journals

For suicides, the meta-analytic results of the 17 study results published in psychiatric journals indicated no

Suicide attempts				Suicide and suicide attempts combined			
RE or β (95%-CI)	*P*	Q	*P*	RE or β (95%-CI)	*P*	Q	*P*
2.05 (1.54 to 2.71)	<0.01	25.28	<0.01	2.02 (1.66 to 2.46)	<0.01	37.17	<0.01
0.85 (0.66 to 1.09)	0.17			0.96 (0.82 to 1.12)	0.59		
2.16 (1.48 to 3.14)	<0.01	8.25	<0.01	1.99 (1.56 to 2.55)	<0.01	11.35	<0.01
1.16 (0.87 to 1.55)	0.3			1.20 (0.99 to 1.45)	0.06		
−0.02 (−0.04 to 0)	0.06			−0.02 (−0.04 to −0.01)	0.01		
−0.05 (−0.11 to 0.01)	0.09			−0.05 (−0.09 to −0.02)	0.01		
−0.39 (−0.64 to −0.14)	<0.01			−0.18 (−0.33 to −0.04)	0.02		
−0.32 (−0.68 to 0.04)	0.08			−0.13 (−0.31 to 0.04)	0.13		
0.09 (−0.06 to 0.24)	0.23			0.09 (−0.02 to 0.20)	0.10		
0.14 (−0.01 to 0.29)	0.07			0.14 (0.04 to 0.24)	0.01		

significantly increased risk for patients treated with antidepressants (RE = 1.20, 95% CI = 0.92 to 1.58) (Table 2). In contrast, the 10 study results published in nonpsychiatric journals reported a significantly increased suicide risk (RE = 1.83, 95% CI = 1.25 to 2.70); test for subgroup difference: $P = 0.05$. Similar findings were found for suicide attempts as outcome and for suicides and suicide attempts combined, and subgroup differences were statistically significant (both $P < 0.01$). The mean study quality was almost identical for studies published in psychiatric and nonpsychiatric journals (M = 7.47, SD = 1.62 vs. M = 7.70, SD = 0.95, t = 0.41, df = 25, $P = 0.69$) and controlling for study quality in a metaregression model provided similar or even stronger evidence for lower REs in psychiatric journals compared to nonpsychiatric journals (Table 3).

3.3. Journal rank/IF of studies published in psychiatric journals

In the subset of studies published in psychiatric journals, for suicide as an outcome, metaregression showed that REs significantly decreased with increasing journal rank, β = −0.03, 95% CI = −0.05 to 0.00, $P = 0.04$ (Table 2). That is, with increasing journal rank, the RE was more favorable for antidepressants. These findings were not statistically significant for suicide attempts as outcome ($P = 0.06$) but significant for suicides and suicide attempts combined ($P = 0.02$). When the IF was used as a predictor and suicide as an outcome, the REs again decreased with increasing IF, β = 0.05, 95% CI = −0.11 to 0.00, $P = 0.05$ (Table 2). Comparable results were found for suicide attempts ($P = 0.09$) and suicide and suicide attempts combined ($P = 0.01$). However, none of the associations between favorability of results and higher journal rank/IF remained statistically significant after adjustment for study quality (Table 3).

3.4. Citation frequency

Considering the 17 studies published in psychiatric journals, results indicated that citation frequency according to Google Scholar increased with favorability of study results in metaregression models with suicide attempts as outcome (β = −0.39, 95% CI = −0.64 to −0.14, $P < 0.01$) and also for suicides and suicide attempts combined (β = −0.18, 95% CI = −0.33 to −0.04, $P = 0.02$) (Table 2). However, citations, according to PubMed, were not significantly associated with the favorability of results. Associations between citation frequency and favorability of results became largely inconclusive after adjustment for study quality. When considering all studies (published in both psychiatric and nonpsychiatric journals), findings were reversed, indicating an increased citation frequency of unfavorable results. Controlling for study quality strengthened these positive associations (Table 3).

3.5. fCOI

As already reported in Hengartner et al. [21], the funnel plot was asymmetrical in studies conducted by lead authors with fCOI, both visually and statistically (Egger's test: t = −2.14, df = 26, $P = 0.04$), suggestive of selective publication. By contrast, we found no funnel plot asymmetry in studies conducted by lead authors without fCOI (Egger's test: t = −0.85, df = 31, $P = 0.40$). For suicide as an outcome, studies by lead authors with fCOI reported more favorable outcomes (RE = 1.08, 95% CI = 0.88 to 1.32), compared to studies by lead authors without fCOI (RE = 1.98, 95% CI = 1.43 to 2.76), Q = 11.36,

$P < 0.01$. Comparable results were found for suicide attempts as outcome and suicide and suicide attempts combined (Table 2). The mean study quality did not differ significantly between studies with and without fCOI (M = 7.89, SD = 0.93 vs. M = 7.39, SD = 1.58, t = 0.87, df = 25, $P = 0.39$). Therefore, the association between fCOI and more favorable results remained nearly unchanged and statistically significant when study quality was controlled for in meta-regression (Table 3).

Not prespecified in the protocol, but worth noting are the associations between fCOI and journal rank/IF. Within psychiatric journals, studies by lead-authors with fCOI were published in journals with significantly higher IF (MD = 6.35, IQR = 5.80–11.53), compared to studies by lead authors without fCOI (MD = 3.76, IQR = 3.57–4.61), Wilcoxon-test W = 4, $P < 0.01$. Similar differences were found for journal rank (MD = 95.62, IQR = 92.57–98.40 vs. MD = 77.35, IQR = 74.30–84.07, Wilcoxon-test: W = 0, $P = 0.001$). These findings essentially remained unchanged when study quality was included as control variable.

3.6. History of rejection and difficulty of publishing

According to author feedback, unfavorable results were not rejected more often or more difficult to publish, but the response rate was low (67%). Due to missingness, potential unrepresentativeness, and a lack of statistical power, the results are inconclusive. Detailed results are reported in the online supplement but must be interpreted with caution.

3.7. Subgroup analyses

The results of the prespecified subgroup analyses are reported in the online supplement.

4. Discussion

The aim of this meta-analytic study was to examine systematic biases within academic psychiatry in the dissemination and appraisal of observational studies with unfavorable results for the association between antidepressant use and suicide risk. Our results showed that studies published in psychiatric journals report significantly more favorable results than studies published in nonpsychiatric journals. More specifically, studies published in nonpsychiatric journals indicate that antidepressant use is associated with significantly increased suicide risk, while studies published in psychiatric journals report inconclusive results close to the null effect. Importantly, these findings were independent of study quality. There was further evidence of selective publication of studies conducted by lead authors with fCOI. Lead authors with fCOI reported more favorable results and more frequently published in high-impact psychiatric journals. These findings were again independent of study quality. Within psychiatric journals, studies with

Table 3. Effects with and without controlling for study quality: results from metaregressions

	Adjustment for	Suicides		Suicide attempts		Suicide and suicide attempts combined	
Moderator	**Study quality**	**β (95%-CI)**	***P***	**β (95%-CI)**	***P***	**β (95%-CI)**	***P***
fCOI	No	−0.63 (−1.01 to −0.26)	<0.01	−0.90 (−1.28 to −0.52)	<0.01	−0.77 (−1.01 to −0.51)	<0.01
	Yes	−0.58 (−0.99 to −0.017)	0.01	−0.88 (−1.27 to −0.49)	<0.01	−0.75 (−1.01 to −0.48)	<0.01
Psychiatric Journal	No	−0.42 (−0.86 to 0.01)	0.05	−0.61 (−1.08 to −0.15)	0.01	−0.51 (−0.81 to −0.20)	<0.01
	Yes	−0.48 (−0.88 to −0.08)	0.02	−0.78 (−1.24 to −0.32)	<0.01	−0.61 (−0.90 to −0.32)	<0.01
Ranking – Psychiatric J.	No	−0.03 (−0.05 to 0.00)	0.04	−0.02 (−0.04 to 0.00)	0.06	−0.02 (−0.04 to −0.01)	0.01
	Yes	−0.01 (−0.03 to 0.00)	0.09	−0.01 (−0.03 to 0.01)	0.20	−0.01 (−0.03 to −0.00)	0.04
IF - Psychiatric Journals	No	−0.05 (−0.11 to 0.00)	0.05	−0.05 (−0.11 to 0.01)	0.09	−0.05 (−0.09 to −0.02)	0.01
	Yes	−0.03 (−0.07 to 0.02)	0.20	−0.01 (−0.07 to 0.05)	0.65	−0.03 (−0.06 to 0.01)	0.15
Citation frequency							
Google, Psychiatric J.	No	0.00 (−0.18 to 0.17)	0.97	−0.39 (−0.64 to −0.14)	<0.01	−0.18 (−0.33 to −0.04)	0.02
	Yes	−0.00 (−0.18 to 0.17)	0.97	−0.30 (−0.67 to 0.06)	0.10	−0.12 (−0.27 to 0.04)	0.14
PubMed, Psychiatric J.	No	−0.02 (−0.21 to 0.18)	0.84	−0.32 (−0.68 to 0.04)	0.08	−0.13 (−0.31 to 0.04)	0.13
	Yes	−0.02 (−0.21 to 0.18)	0.87	−0.15 (−0.55 to 0.24)	0.43	−0.06 (−0.24 to 0.11)	0.47
Google, all journals	No	0.10 (−0.09 to 0.29)	0.29	0.09 (−0.06 to 0.24)	0.23	0.09 (−0.02 to 0.2)	0.10
	Yes	0.15 (−0.06 to 0.35)	0.15	0.24 (0.05 to 0.43)	0.01	0.17 (0.02 to 0.28)	0.01
PubMed, all journals	No	0.18 (0.00 to 0.36)	0.05	0.14 (−0.01 to 0.29)	0.07	0.14 (0.04 to 0.24)	0.01
	Yes	0.21 (0.02 to 0.40)	0.03	0.27 (0.10 to 0.43)	<0.01	0.20 (0.10 to 0.31)	<0.01

Abbreviations: fCOI, financial conflicts of interest of study lead authors; IF, journal impact factor.

β: regression coefficient in meta-regression, positive values indicate an increasingly unfavorable result with an increase of the value of the predictor.

more favorable results were published in journals with higher IF/ranking and were more frequently cited in the literature, but these associations diminished and became statistically nonsignificant after controlling for study quality. The author survey on publication history and difficulty publishing yielded inconclusive results due to a low response rate.

Antidepressant treatment is often considered important in the prevention of suicide, especially in adults with depression [22,23], even though the best evidence from meta-analyses of RCTs and observational studies indicates that antidepressant use has no clear effect on suicidal behavior or that it may even increase the suicide risk [15−19,21]. That antidepressant use may increase suicide risk thus potentially poses a serious public health issue, given the widespread prescription of these drugs and unsubstantiated claims to the contrary within academic psychiatry [24−26]. The scientific principle requires that conflicting results are critically appraised and that studies with unfavorable results (i.e., antidepressant use associated with increased suicide risk) are given appropriate attention and epistemic weight in the psychiatric field. Our study indicates that this is not necessarily the case, as the findings of observational studies published in psychiatric journals are consistently more favorable than findings published in nonpsychiatric journals. Moreover, there is weak evidence that these studies may also attract more citations. The impact of these biases in how psychiatrists are actually informed about favorable and unfavorable results remains unknown because psychiatrists may use scientific sources outside their field. Future research should thus aim at evaluating the impact of selective publication on the knowledge-formation of psychiatrists.

Likewise, the reasons for the disbalance in the dissemination and appraisal of conflicting study results within the psychiatric field are not fully clear. However, in accordance with previous research in psychiatry and other medical specialties, our study indicates that fCOI and the protection of guild interests play an important role [25,27−30]. This is also confirmed by our findings that lead authors with financial ties to pharmaceutical companies selectively publish more favorable results (mostly in high-impact psychiatric journals) than industry-independent lead authors. Perhaps lead authors with fCOI not only have better publication record due to support from the industry but may also appear more attractive to high-impact journals. Further research into the mechanisms underlying unbalanced publishing of serious safety issues such as treatment-emergent suicidal behavior is thus required. Publication formats such as registered reports, where studies are reviewed and accepted for publication before the direction of results is known, may prevent biased assessments. Likewise, eliminating (or restricting) financial relationships of publishers, journal editors, and reviewers with the pharmaceutical industry may also prove efficient [29,30].

Our study has some limitations. Foremost, the study samples were too small for some subgroup analyses, thus inflating the risk of both type I and type II errors. This was particularly problematic for the classification of favorability of study results based on statistical significance. For about one-third of the studies, we did not receive feedback from the authors, thus the findings about publication history and difficulty of publishing must be interpreted with caution. As discussed in detail in our previous publication [21], REs from observational studies are potentially biased because of treatment selection. However, treatment selection could lead to both underestimation and overestimation of REs. Results from studies that statistically accounted for confounders did not differ significantly from unadjusted studies [21]. Moreover, there is no indication that psychiatric journals would prefer to publish rigorous, high-quality studies on this controversial topic because studies published in psychiatric journals were not of higher quality. In particular, four studies reported unadjusted REs only; they were all published in psychiatric journals.

In conclusion, our analyses show that observational studies reporting unfavorable results for the association between antidepressant use and suicide risk are less likely to be published in psychiatric journals. Given the selective publication within the field, it is recommended that psychiatrists should actively search for information in nonpsychiatric journals to achieve a more balanced view of the evidence. Lead authors with fCOI selectively publish more favorable results, and within psychiatric journals, these influential researchers also publish their studies in prestigious journals with high IF and ranking. These biases may introduce a distorted evidence base and an unbalanced dissemination and appraisal of findings within academic psychiatry. Thus, studies about the potential harms of pharmaceutical products should ideally be conducted in the absence of author fCOI.

CRediT authorship contribution statement

Martin Plöderl: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Writing − original draft, Writing − review & editing. **Simone Amendola:** Investigation, Investigation, Methodology, Validation, Writing − review & editing. **Michael Pascal Hengartner:** Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing − original draft, Writing − review & editing.

Declaration of Competing Interest

MPH declares to receive royalties from Palgrave Macmillan for a book about antidepressants. MP and SA have no competing interests to declare.

Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jclinepi.2023.07.015.

References

[1] Berlin JA, Glasser SC, Ellenberg SS. Adverse event detection in drug development: recommendations and obligations beyond phase 3. Am J Public Health 2008;98:1366−71.

[2] Golder S, Loke YK, Wright K, Norman G. Reporting of adverse events in published and Unpublished studies of health care interventions: a systematic review. PLoS Med 2016;13(9):e1002127.

[3] Mayo-Wilson E, Fusco N, Li T, Hong H, Canner JK, Dickersin K, et al. Harms are assessed inconsistently and reported inadequately Part 2: nonsystematic adverse events. J Clin Epidemiol 2019;113:11−9.

[4] Mayo-Wilson E, Fusco N, Li T, Hong H, Canner JK, Dickersin K, et al. Harms are assessed inconsistently and reported inadequately part 1: systematic adverse events. J Clin Epidemiol 2019;113:20−7.

[5] Wisniewski SR, Rush AJ, Nierenberg AA, Gaynes BN, Warden D, Luther JF, et al. Can phase III trial results of antidepressant medications be generalized to clinical practice? A STAR*D report. Am J Psychiatry 2009;166(5):599−607.

[6] Zimmerman M, Clark HL, Multach MD, Walsh E, Rosenstein LK, Gazarian D. Have treatment studies of depression become even less generalizable? A review of the inclusion and exclusion criteria used in placebo-controlled antidepressant efficacy trials published during the past 20 years. Mayo Clin Proc 2015;90(9):1180−6.

[7] Silverman SL. From randomized controlled trials to observational studies. Am J Med 2009;122:114−20.

[8] Anglemyer A, Horvath HT, Bero L. Healthcare outcomes assessed with observational study designs compared with those assessed in randomized trials. Cochrane Database Syst Rev 2014;2014:MR000034.

[9] Concato J, Shah N, Horwitz RI. Randomized, controlled trials, observational studies, and the hierarchy of research designs. N Engl J Med 2000;342:1887−92.

[10] Hemkens LG, Contopoulos-Ioannidis DG, Ioannidis JP. Agreement of treatment effects for mortality from routinely collected data and subsequent randomized trials: meta-epidemiological survey. BMJ 2016;352:i493.

[11] Avorn J. In defense of pharmacoepidemiology–embracing the yin and yang of drug research. N Engl J Med 2007;357:2219−21.

[12] de Vries YA, Roest AM, de Jonge P, Cuijpers P, Munafo MR, Bastiaansen JA. The cumulative effect of reporting and citation biases on the apparent efficacy of treatments: the case of depression. Psychol Med 2018;48:2453−5.

[13] Duyx B, Urlings MJE, Swaen GMH, Bouter LM, Zeegers MP. Scientific citations favor positive results: a systematic review and meta-analysis. J Clin Epidemiol 2017;88:92−101.

[14] Greenberg SA. How citation distortions create unfounded authority: analysis of a citation network. BMJ 2009;339:b2680.

[15] Aursnes I, Tvete IF, Gaasemyr J, Natvig B. Even more suicide attempts in clinical trials with paroxetine randomised against placebo. BMC Psychiatry 2006;6:55.

[16] Gunnell D, Saperia J, Ashby D. Selective serotonin reuptake inhibitors (SSRIs) and suicide in adults: meta-analysis of drug company data from placebo controlled, randomised controlled trials submitted to the MHRA's safety review. BMJ 2005;330:385.

[17] Stone M, Laughren T, Jones ML, Levenson M, Holland PC, Hughes A, et al. Risk of suicidality in clinical trials of antidepressants in adults: analysis of proprietary data submitted to US Food and Drug Administration. BMJ 2009;339:b2880.

[18] Sharma T, Guski LS, Freund N, Gotzsche PC. Suicidality and aggression during antidepressant treatment: systematic review and meta-analyses based on clinical study reports. BMJ 2016;352:i65.

[19] Plöderl M, Hengartner MP, Bschor T, Kaminski JA. Commentary to ''antidepressants and suicidality: a re-analysis of the re-analysis''. J Affect Disord 2020;273:252−3.

[20] Hengartner MP, Plöderl M. Newer-generation antidepressants and suicide risk in randomized controlled trials: a Re-analysis of the FDA database. Psychother Psychosom 2019;88(4):247−8.

[21] Hengartner MP, Amendola S, Kaminski JA, Kindler S, Bschor T, Plöderl M. Suicide risk with selective serotonin reuptake inhibitors and other new-generation antidepressants in adults: a systematic review and meta-analysis of observational studies. J Epidemiol Community Health 2021;75:523−30.

[22] Isacsson G, Rich CL, Jureidini J, Raven M. The increased use of antidepressants has contributed to the worldwide reduction in suicide rates. Br J Psychiatry 2010;196(6):429−33.

[23] Zalsman G, Hawton K, Wasserman D, van Heeringen K, Arensman E, Sarchiapone M, et al. Suicide prevention strategies revisited: 10-year systematic review. Lancet Psychiat 2016;3(7):646−59.

[24] Healy D, Aldred G. Antidepressant drug use & the risk of suicide. Int Rev Psychiatry 2005;17:163−72.

[25] Hengartner MP. Evidence-biased antidepressant prescription: overmedicalisation, flawed research, and conflicts of interest. London, UK: Palgrave Macmillan; 2021.

[26] Hjelmeland H, Jaworski K, Knizek BL, Marsh I. Problematic advice from suicide prevention experts. Ethical Hum Psychol Psychiatry 2018;20(2):79−85.

[27] Cosgrove L, Wheeler EE. Drug firms, the codification of diagnostic categories, and bias in clinical guidelines. J Law Med Ethics 2013;41:644−53.

[28] Ioannidis JP. Evidence-based medicine has been hijacked: a report to David Sackett. J Clin Epidemiol 2016;73:82−6.

[29] Jureidini J, McHenry LB. The illusion of evidence-based medicine: exposing the crisis of credibility in clinical research. Adelaide: Wakefield Press; 2020.

[30] Smith R. Medical journals are an extension of the marketing arm of pharmaceutical companies. PLoS Med 2005;2(5):e138.