## Reporting Bias is Highly Prevalent in Systematic Reviews and Meta-Analyses of Medial Patellofemoral Ligament Reconstruction

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INTRODUCTION: Medial patellofemoral ligament reconstruction (MPFLR) is a successful surgical treatment indicated for patients with recurrent instability. To ensure that the results of MPFLR are accurately portrayed in the literature and of high quality, it is important to review published studies for reporting bias in the form of spin. The purpose of this study was to analyze reporting bias in the form of spin present in the abstracts of systematic reviews and meta-analyses evaluating MPFLR.

METHODS: This study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Peer-reviewed systematic reviews were collected from PubMed, Scopus, and Embase databases using the search "medial patellofemoral ligament reconstruction" or "MPFLR" AND "systematic review" OR "meta-analysis" in January of 2024. The full texts of the included studies were read, and then the abstracts were assessed for the 15 most common types of spin. A Measurement Tool to Assess Systematic Reviews (AMSTAR 2) was used to assess the quality of the studies. Several study characteristics were analyzed including PRISMA adherence, year of publication, Level of Evidence, Clarivate Impact Factor, and their association with the presence of spin, as well as the number of spin types present, was determined using t-tests, analysis of variance (ANOVA), Fischer Tests, and Spearman's Rank Coefficients.

RESULTS: A total of 57 studies published from 2007-2024 were included in the review. Spin was present in 51 out of 57 studies (89.5%). Each type of spin was observed in at least one study with the exceptions of spin types 1, 7, 13, and 15. The median number of spin types identified per study was 3 (range: 0-5, mean =  $3.02 \pm 1.45$ ). The three most common types of spin were type 5 (48/57, 84.2%), followed by type 3 (32/57, 56.1%), and then type 9 (30/57, 52.6%) (Table 1). The category of spin that was most prevalent was misleading reporting (spin types 3, 5, 6, 10, 11, 13, 14), present in 50 out of the 51 studies that contained spin (98.0%). Misleading reporting (spin types 3, 5, 6, 10, 11, 13, 14), also had the highest frequency, with a total of 107 instances across the 50 studies. Forty-seven of 51 (92.2%) studies contained spin within the category of misleading interpretation (spin types 1, 2, 4, 9, 12). However, the frequency of misleading interpretation was lower than that of misleading reporting, with a total of 62 instances across the 47 studies. Based on AMSTAR 2 assessment, 5 studies (8.8%) received a low confidence rating. The remaining 52 studies (91.2%) received a critically low confidence rating. No studies fell into the moderate or high confidence rating categories. The AMSTAR 2 confidence rating was significantly associated with the number of spin types present (p=.0006). There was a statistically significant negative correlation between the numerical AMSTAR 2 rating and the presence of spin. The average numerical AMSTAR 2 score for studies with no spin was 11.7, while the average for studies with spin was 9.2 (p=0.0194). As the number of spin types present increased, the numerical AMSTAR 2 rating decreased in a statistically significant manner (p=.007). In addition, there was a statistically significant association between the Clarivate Impact Factor and the presence of spin. The average journal Impact Factor of the studies that had spin present was greater than the average journal Impact Factor of the studies that did not have spin present (p=.0128).

DISCUSSION AND CONCLUSION: The majority of the included studies had a critically low AMSTAR 2 confidence interval rating, demonstrating the poor quality of evidence in systematic reviews and meta-analyses evaluating MFPLR. Spin was present in the majority of systematic reviews and meta-analyses of MPFLR. Spin types 5, 3, and 9 were the most prevalent in all studies, indicating a tendency for authors to assert in their abstracts that MPFLR is a beneficial treatment. The presence of at least one type of spin was significantly associated with higher Clarivate Impact Factor suggesting that systematic reviews and meta-analyses published in higher impact journals were more likely to have spin in their findings. The high levels of bias demonstrated in the analyzed studies indicate that methodologically focused risk of bias tools may be blind to additional ways that bias might be introduced. Systematic reviews and meta-analyses contain the most comprehensive evidence regarding a clinical question, so it is important to identify spin that may be included in these studies. Greater efforts are needed to ensure that the abstracts of publications accurately represent the results in the full text, so orthopaedic surgeons can make well-informed clinical decisions regarding patient care.

## Table 1: Frequency of Spin Type and Category

Category	Type	Description	Abstracts
Misleading interpretation			
	1	The conclusion formulates recommendations for clinical practice not supported by the findings	0 (0.0%)
	2	The title claims or suggests a beneficial effect of the experimental intervention not supported by the findings	1 (1.8%)
	4	The conclusion claims safety based on non-statistically significant results with a wide confidence interval	26 (45.6%)
	9	The conclusion claims the beneficial effect of the experimental treatment despite reporting bias	30 (52.6%)
	12	The conclusion claims equivalence or comparable effectiveness for non- statistically significant results with a wide confidence interval	5 (8.8%)
Misleading reporting			
	3	Selective reporting of or overemphasis on efficacy outcomes or analysis favoring the beneficial effect of the experimental intervention	32 (56.1%)
	5	The conclusion claims the beneficial effect of the experimental treatment despite a high risk of bias in primary studies	48 (84.2%)
	6	Selective reporting of or overemphasis on harm outcomes or analysis favoring the safety of the experimental intervention	5 (8.8%)
	10	Authors hide or do not present any conflict of interest	13 (22.8%)
	11	The conclusion focuses selectively on statistically significant efficacy outcome	9 (15.8%)
	13	Failure to specify the direction of the effect when it favors the control intervention	0 (0.0%)
	14	Failure to report a wide confidence interval of estimates	6 (10.5%)
Inappropriate extrapolation			
	7	The conclusion extrapolates the review findings to a different intervention (e.g., claiming efficacy of one specific intervention although the review covered a class of several interventions)	0 (0.0%)
	8	The conclusion extrapolates the review's findings from a surrogate marker or a specific outcome to the global improvement of the disease	1 (1.8%)
	15	The conclusion extrapolates the review's findings to a different population or setting	0 (0.0%)