

## INTERNATIONAL PRESTIGE OF SPORTS BIOMECHANICS SERIALS

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This study measured the prestige of seventy-five serials in the international sports biomechanics community. The 2007 ISBS membership was surveyed by electronic mail and asked to rate the typical quality/prestige of the serials on a five point scale. Descriptive statistics of ratings were calculated for the sixty-five respondents and correlated with the 2006 impact factor (IF) reported in the *Journal Citation Reports*. Mean ratings showed that international perception of sports biomechanics serials was unique from other areas of biomechanics and this perception was weakly ( $r = 0.34$ ) correlated with the IF. Based on these data, it appears that the IF is an inappropriate index for evaluating the international prestige of sports biomechanics serials.

**KEY WORDS:** bibliometrics, citation, impact factor, peer review.

### INTRODUCTION:

The impact factor (IF) is a key statistic for evaluating scientific journals reported in the *Journal Citation Reports*. The IF essentially is the mean number of citations a typical paper in that journal receives over a two year period in all the journals indexed. Despite many papers reporting major limitations of the IF (Bollen et al. 2006; Frank, 2003; Harter & Nisonger, 1997; Kurmis, 2003; Saha et al. 2003; Seglen, 1997; Smith, 1998), use of the IF continues to grow and is now misused in evaluating research institutions and individual faculty (Cameron, 2005; Garfield, 2006; Kurmis, 2003; Seglen, 1997).

One consistent bias of the IF relates to differences across scientific disciplines (Frank, 2003; Jones, 2007; Seglen, 1997; Stanzer 1995). The small size of the discipline of biomechanics and the number of scholars who utilize biomechanics in many traditional disciplines (medicine, biology, engineering, kinesiology) complicates the use of the IF for evaluating biomechanics journals. Knudson and Chow (2008) surveyed the members of the American Society of Biomechanics on the perception of prestige of biomechanics serials. They reported a weak ( $r = 0.35$ ) correlation between mean ratings and the IF, and demonstrated that there were clear differences in serial ratings across the five interest areas of the Society. The complete North American perception ratings of the sport and exercise biomechanics interest area from this study were reported by Knudson (2007) He reported there was no significant correlation between ratings and IF in this interest area.

Another consistent bias of the IF is against journals that publish in languages other than English (Kurmis, 2003; Seglen, 1997). Sports biomechanics is a discipline where the majority of the research has clearly shifted away from the Americas to Europe and Asia (Fortenbaugh, 2007). Given the specificity of serial prestige even with a small field like biomechanics (Knudson & Chow, 2008) and potential changes in the international research in sports biomechanics, the IF is not likely to be a valid indicator of prestige of sports biomechanics serials. The purpose of this study was to document the international perception of the prestige of serials in the field of sports biomechanics and confirm the low association between prestige in sports biomechanics and the *Journal Citation Reports* IF.

### METHOD:

A survey listing 75 serials (Table 1) regularly publishing research related to sport and exercise biomechanics was emailed to the 2007 members ( $n = 291$ ) of the International Society of Biomechanics in Sports. Two additional emails were sent to remind members of the opportunity to participate in the study. The serials used in this study were similar to the ones used in Knudson & Chow (2008), but with more international journals added so that greater than half were not published in North America. Most of the international journals, however, still published papers in English. Two more emails were sent to remind members of

the opportunity to participate in the study. Respondents were asked to rate their assessment of the mean quality or impact of papers in these serials on the 5 point scale used by Knudson & Chow (2008):

- 4 Likely High Quality/Impact
- 3
- 2 Likely Moderate Quality/Impact
- 1

Likely Low Quality/Impact or Unknown

Respondents were also asked to report their primary interest area and geographic location. The three interest areas were: sports biomechanics, exercise/rehabilitation biomechanics, and ergonomics/human factors biomechanics. Respondents were classified into three geographic areas: North/South America, Europe/Africa, and Asia/Australia. Serial ratings were compiled and descriptive statistics calculated for each serial. Ratings were correlated with the 2006 IF for all serials with an IF in 2006 ( $n = 54$ ). Statistical significance was accepted at the  $P < 0.05$  level and descriptive data are reported as mean  $\pm$  SD.

### RESULTS:

Sixty-five responses were received representing 19 different countries, with 22% from the Americas, 46% from Europe, and 32% from Asia/Australia. The response rate was twenty-two percent, with the vast majority reporting a primary interest in sports biomechanics (92%), 8% in exercise/rehabilitation biomechanics, and 0% in ergonomics/human factors.

Descriptive data on the prestige ratings for the serials are listed in Table 1, with the serials presented in rank order and the distribution divided into thirds. The overall mean rating was  $1.6 \pm 0.7$  across the serials. There was a significant ( $r_{52} = 0.34$ ,  $P = 0.01$ ) but weak correlation between mean ratings and 2006 IF.

### DISCUSSION:

This study reported the first ratings of the international prestige of serials in the field of sports biomechanics. Many of the top third journals are similar to the top third reported for North American biomechanists (Knudson, 2007), so the data confirm that the prestige of serials publishing sports biomechanics in the international community is different from the prestige of other biomechanics interest areas. These ratings and the Knudson (2007) data are important for authors who want to publish their research in journals perceived as influential and more likely to be read by scholars in sport biomechanics.

Four journals were clearly the most prestigious outlets in sports biomechanics (2 SD above the mean): the *Journal of Biomechanics*, *Sports Biomechanics*, *Journal of Applied Biomechanics*, and *Medicine and Science in Sports and Exercise*. *Sports Biomechanics* and *ISBS Proceedings* were rated nominally higher by the international community (3.3 and 2.7, respectively) compared to the North American sports and exercise respondents (2.5 and 1.8, respectively) reported by Knudson (2007). This result was consistent with the Knudson and Chow (2008) observation of about one rating point difference for serials with greater interest area affinity with the respondents. Other journals that were rated in the middle third in the Knudson and Chow data, but were rated higher (now in the top third) by the international sample were the *Journal of Strength and Conditioning Research*, *Scandinavian Journal of Medicine and Science in Sports*, *European Journal of Sport Science*, *Journal of Science and Medicine in Sport*, *British Journal of Sports Medicine*, and the *Journal of Human Movement Studies*. Also noteworthy is the appearance in the top third of the open access serial *Journal of Sports Science & Medicine*. ([www.jssm.org](http://www.jssm.org)).

**Table 1 International Prestige Ratings (Mean  $\pm$  SD) and 2006 Impact Factor (IF) of Sports Biomechanics Serials**

| Serial                   | Rating        | IF   | Serial              | Rating        | IF   |
|--------------------------|---------------|------|---------------------|---------------|------|
| J Biomech                | 3.4 $\pm$ 0.9 | 2.5  | J Atl Training      | 1.4 $\pm$ 1.1 | 1.7  |
| Sports Biomech           | 3.3 $\pm$ 0.8 | ---- | Am J Phy Med Reh    | 1.4 $\pm$ 1.2 | 1.3  |
| J App Biomech            | 3.2 $\pm$ 1.0 | 0.6  | J Ortho Res         | 1.4 $\pm$ 1.3 | 2.8  |
| Med Sci Sports Ex        | 3.2 $\pm$ 1.0 | 2.9  | Act Physiol         | 1.4 $\pm$ 1.4 | ---- |
| J Sports Sciences        | 2.9 $\pm$ 1.1 | 1.8  | J Neurphysiol       | 1.4 $\pm$ 1.4 | 3.7  |
| Clin Biomech             | 2.7 $\pm$ 1.2 | 1.4  | Int J Sp Sci Coach  | 1.3 $\pm$ 1.2 | ---- |
| Proc: ISBS               | 2.7 $\pm$ 1.3 | ---- | Phys Therapy        | 1.3 $\pm$ 1.2 | 1.5  |
| Br J Sports Med          | 2.6 $\pm$ 1.1 | 2.2  | Perc Mot Skills     | 1.3 $\pm$ 1.3 | ---- |
| Am J Sports Med          | 2.5 $\pm$ 1.2 | 2.7  | Sci & Sports        | 1.3 $\pm$ 1.3 | 0.1  |
| Gait & Posture           | 2.5 $\pm$ 1.4 | 2.0  | J Biomech Sci Eng   | 1.3 $\pm$ 1.3 | ---- |
| J EMG Kine               | 2.4 $\pm$ 1.3 | 1.7  | Med Sport Sci       | 1.3 $\pm$ 1.3 | ---- |
| Res Quart Ex Sp          | 2.3 $\pm$ 1.2 | 1.0  | Arc Phy Med Rehab   | 1.3 $\pm$ 1.3 | 1.8  |
| Ex Sport Sci Rev         | 2.3 $\pm$ 1.4 | 3.0  | J Exp Bio           | 1.3 $\pm$ 1.4 | 2.6  |
| Sports Med               | 2.3 $\pm$ 1.4 | 3.5  | - - - - -           |               |      |
| Hum Mov Sci              | 2.2 $\pm$ 1.2 | 1.3  | Exp Br Res          | 1.3 $\pm$ 1.7 | 2.0  |
| Int J Sports Med         | 2.1 $\pm$ 1.1 | 1.2  | J Sport Rehab       | 1.2 $\pm$ 1.1 | 0.6  |
| J St Cond Res            | 2.1 $\pm$ 1.2 | 1.3  | J Ex Sci Fit        | 1.2 $\pm$ 1.1 | ---- |
| J Sci Med Sport          | 2.1 $\pm$ 1.3 | 1.2  | J Rehab Med         | 1.2 $\pm$ 1.3 | 2.2  |
| J Hum Mov Stud           | 2.1 $\pm$ 1.3 | 0.1  | Phys Ther Sport     | 1.1 $\pm$ 1.1 | 0.5  |
| Sc J Med Sci Sports      | 2.1 $\pm$ 1.4 | 2.0  | Res Sports Med      | 1.1 $\pm$ 1.2 | ---- |
| J App Physio             | 2.1 $\pm$ 1.5 | 3.2  | Jap J B Sports Ex   | 1.1 $\pm$ 1.3 | ---- |
| J Biomec Eng             | 2.0 $\pm$ 1.3 | 1.3  | Mus & Nerve         | 1.1 $\pm$ 1.4 | 2.5  |
| Eur J Ap Physio          | 2.0 $\pm$ 1.3 | 1.6  | J Med Biomech       | 1.0 $\pm$ 1.1 | ---- |
| Eur J Sport Sci          | 1.9 $\pm$ 1.2 | ---- | Biology Sport       | 1.0 $\pm$ 1.1 | 0.1  |
| J Sports Sci Med         | 1.9 $\pm$ 1.2 | 0.5  | Int J Sport Hlt Sci | 1.0 $\pm$ 1.1 | ---- |
| - - - - -                |               |      | Aus J Physio        | 1.0 $\pm$ 1.1 | 1.5  |
| Sports Eng               | 1.9 $\pm$ 1.4 | ---- | Physiotherapy       | 0.9 $\pm$ 1.0 | ---- |
| Mot Control              | 1.8 $\pm$ 1.4 | 1.6  | Hum Factors         | 0.8 $\pm$ 1.0 | 0.9  |
| J Bone Jt Sur (Am&Br)    | 1.8 $\pm$ 1.5 | 2.1  | Med Bi Eng Comp     | 0.8 $\pm$ 1.1 | 1.0  |
| App Ergo                 | 1.7 $\pm$ 1.2 | 0.8  | Kor J Sports Biomec | 0.8 $\pm$ 1.0 | ---- |
| Ergonomics               | 1.7 $\pm$ 1.3 | 0.8  | Jap J P F Sp Med    | 0.7 $\pm$ 1.0 | 0.1  |
| J Mot Behav              | 1.7 $\pm$ 1.3 | 1.5  | Ch J Sports Med     | 0.6 $\pm$ 0.8 | ---- |
| J Physiol (L&P)          | 1.7 $\pm$ 1.5 | 3.0  | Kor J Sport Sci     | 0.6 $\pm$ 0.8 | ---- |
| J Sports M Ph Fit        | 1.6 $\pm$ 1.1 | 0.6  | Sportverletzung Sp  | 0.6 $\pm$ 0.9 | 0.4  |
| Clin J Sports Med        | 1.5 $\pm$ 1.3 | 1.7  | Deut Zeit fur Sport | 0.6 $\pm$ 1.0 | 0.7  |
| J Oth Sports Ph Ther     | 1.5 $\pm$ 1.3 | 1.5  | Br J Med Bio Res    | 0.5 $\pm$ 0.9 | 1.1  |
| Int J Ap Sports Sci      | 1.5 $\pm$ 1.4 | ---- | Med delo Sport      | 0.4 $\pm$ 0.7 | ---- |
| Am J Physiol (all sect.) | 1.5 $\pm$ 1.5 | 4.0  | Med Sportiva        | 0.4 $\pm$ 0.8 | 0.1  |
|                          |               |      | Geneeskunde en Sp   | 0.4 $\pm$ 0.9 | ---- |

Journals that dropped from the top third in the Knudson and Chow (2008) data into to the middle third of the current ratings were *Experimental Brain Research*, *Journal of Orthopaedic Research*, *Muscle & Nerve*, *Journal of Experimental Biology*, *Physical Therapy*, and *Archives of Physical Medicine and Rehabilitation*. It is likely the unique disciplinary demands of sports biomechanics (e.g. sport, skills, training status, applied) are perceived as influential as other scientific issues in rating the importance of sports biomechanics serials. It is not possible to determine if these variations in the perception of some journals between North American and

international raters are related to the respondent's greater focus on the applied discipline of sports biomechanics or the international perspective.

The weak correlation between prestige ratings was similar to the weak association reported by Knudson and Chow (2007). The 2006 IF accounted for only 12% of the variance in the prestige of sports biomechanics serials. This was also consistent with previous studies with large samples of journals that report weak or no correlations between the IF and disciplinary ratings of quality (Bensman, 1996; Donohue & Fox, 2000; Sellers et al. 2004). It appears that the IF is an inappropriate index of journal prestige in sport biomechanics. All these data provide strong evidence that it is inappropriate to 'evaluate' individual papers or the sports biomechanics research of scholars by using the IF. The contributions of individual papers or a scholar to the field of sports biomechanics should be based on a critical review of the merits of the individual papers, not the journals in which the research is published. Starbuck (2005) modeled scholarly publishing and found that low acceptance rates and rigorous review policies of journals ensures that many important or influential papers will be published in journals perceived as having lower prestige, once again reinforcing the notion that the IF is not a good indicator for evaluating individual papers.

One limitation of this study is the small percentage of responses from the ISBS membership. The ISBS membership is only a portion, albeit a substantial portion, of the international sports biomechanics community and may be more likely to read English language scientific literature. Another limitation is the rating scale that assigns a zero to journals perceived as low prestige or were unknown to the respondents. This increases the variability of the ratings and cannot differentiate between poor perception, lack of knowledge, or access. The scale, however, accurately reflects which journals will be visible and perceived as important by the ISBS scientific community. It is likely that the perceptions of journal prestige of the ISBS respondents are generally representative of the Society and the international sports biomechanics community.

#### **CONCLUSION:**

The data support the conclusion that journal prestige in the international sports biomechanics community was unique and not similar to other biomechanics interest areas. Prestige in sports biomechanics serials is weakly related to the *Journal Citation Reports* impact factor (IF), so the IF is an inappropriate index for evaluating prestige of sports biomechanics serials.

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