More than a drop in the ocean? Can social media really enhance dissemination in the clinical pain sciences?

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A barrier to dissemination of clinical research is that it depends on the end-user searching for or 'pulling' relevant knowledge from the literature base. Social media offers an alternative approach by 'pushing' relevant knowledge straight to the end-user, via blogs and sites such as Facebook and Twitter. That social media is very effective at improving dissemination seems well accepted. It seems assumed that reach = impact. Remarkably, however, there is no empirical evidence of end-user behavioural change. We aimed to fill this gap in knowledge by quantifying the impact of social media release on dissemination of original articles in the clinical pain sciences.

HYPOTHESIS

We hypothesised that a targeted **social media release can increase dissemination of original research articles** in the clinical pain sciences. The number of HTML views and PDF downloads of the target article were considered measures of dissemination.

METHODS

On a randomly selected week during a three month study period, **sixteen PLoS ONE articles were blogged** on BodyinMind.org and released via Facebook, Twitter, LinkedIn and ResearchBlogging. A second randomly selected date within the study period was used as a control. **The primary outcomes were HTML views and PDF downloads of the target article over 7 days.** The former we took to reflect some engagement with the target article itself by visiting it on the PLoS website. The latter we took to reflect a higher level of engagement by downloading the article to an individual library for future reference. We also obtained measures of social media *reach* – unique blog post viewers and tweets – and social media *engagement* - Facebook likes, shares or comments, and virality, which is the proportion of unique viewers who then like, share or comment.

Statistical analysis

We undertook a 2 x 2 repeated measures ANOVA on each primary outcome variable. The first factor was 'Date' (two levels: release date or control date). The second was 'Period' (two levels: before or after the date). To maximise the likelihood of detecting an effect on each primary outcome variable, which we took to reflect levels of engagement and behavioural change, we did not correct for multiple measures and set α =0.05.

### Relating impact to social media reach and engagement

We calculated the relationship between primary outcomes and social media reach and engagement. We undertook 2 linear regressions with increase in HTML views or PDF downloads as the dependent variable, and the following measures the independent variables:

Reach: (i) number of unique **people who viewed** the blog in the 28 days after social media release **(ii) number of retweets** of the initial tweet of the blog;

Engagement: (iii) number of people who created a **like, comment, or share** of the blog post on Facebook, and **(iv)** virality – the percentage of viewers who then **created a story** on Facebook

RESULTS – HTML VIEWS

Social media release increased HTML views of the target article
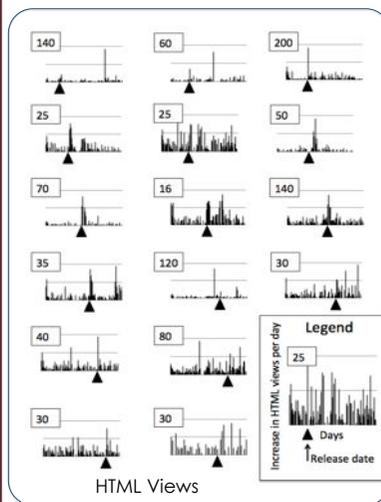
HTML Views

Mean (SD) change in HTML views

	7 days prior	7 days post
Target article	37 (83)	128 (152)
Control	22 (17)	27 (18)

The critical statistical result was a Date x Period interaction ($F_{(1,15)}$ =7.39, p =0.016), which, on inspection of the data, seemed to drive the main effect of Date ($F_{(1,15)}$ =6.01, p =0.027), & the main effect of Period ($F_{(1,15)}$ =6.26, p =0.024). All post-hoc comparisons were significant, with p <0.02.

Social media release was associated with an increase in HTML views of 175 (234), which equates to 8 (10)% or a large effect size (Cohen's d =0.8).

An estimate of reach as a predictor of change in impact

Increased HTML views of target article was related to virality (p =0.019). A 1% increase in virality corresponded to almost 2 extra HTML views of target article in the week after social media release. Increase in HTML views of target article was unrelated to the number of unique users who viewed the blog post (p =0.089), or clicked on the blog post (p =0.059) or the number of tweets of the blog post (p =0.898).

Increased PDF downloads of target article was unrelated to all measures of social media reach or engagement (p >0.16 for all).

RESULTS – PDF DOWNLOADS

Social media release increased PDF downloads of the target article

PDF Views
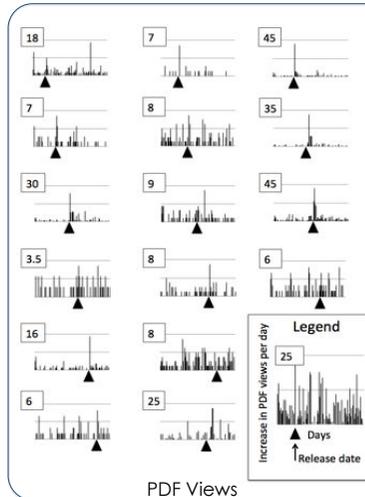
Mean (SD) change in PDF downloads

	7 days prior	7 days post
Target article	6 (10)	24 (27)
Control	4 (3)	4 (3)

The critical statistical result was a Date x Period interaction ($F_{(1,15)}$ =14.74, p =0.002), which seemed to drive the main effects of Date ($F_{(1,15)}$ =6.57, p =0.02) & Period ($F_{(1,15)}$ =10.83, p =0.005). All post-hoc comparisons were significant (p <0.01).

Social media release was associated with an increase in PDF downloads of 34 (52), which equates to 9 (14)%, or a large effect size (Cohen's d =0.6)

Our **hypothesis** that social media can increase the dissemination of original research in the clinical pain sciences was supported.

The effect of social media release was probably smaller (although more than a drop in the ocean) for our site, which is small, young and specialised, than it would be for sites with greater gravitas, for example the *New England Journal of Medicine*, or the IASP.

Social medial reach did not relate to a change in end-user behaviour, which would not be predicted on the basis of the common assumption that reach = impact. However, the proportion of 'followers' who then engage via a like, share or comment, does relate well to a change in end-user behaviour. This finding implies that it is not a matter of having more friends, but rather having good ones. To our knowledge this is the first empirical evidence of social media impact, rather than reach, in the medical and health sciences.

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