

# Personal Health and Consumer Informatics

## The Impact of Health Oriented Social Media Applications on Health Outcomes

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### Summary

**Objectives:** The rapid evolution in the world-wide use of Social Media tools suggests the emergence of a global phenomenon that may have implications in the Personal Health and Consumer Health Informatics domains. However the impact of these tools on health outcomes is not known. The goal of this research was to review the randomized controlled trial (RCT) evidence of the impact of health oriented Social Media informatics tools on health outcomes.

**Methods:** Evaluations of Social Media consumer health tools were systematically reviewed. Research was limited to studies published in the English language, published in Medline, published in the calendar year 2012 and limited to studies that utilized a RCT methodological design.

**Results and Conclusions:** Two high quality Randomized Controlled Trials among over 600 articles published in Medline were identified. These studies indicate that Social Media interventions may be able to significantly improve pain control among patients with chronic pain and enhance weight loss maintenance among individuals attempting to lose weight. Significantly more research needs to be done to confirm these early findings, evaluate additional health outcomes and further evaluate emerging health oriented Social Media interventions. Chronic pain and weight control have both socially oriented determinants. These studies suggest that understanding the social component of a disease may ultimately provide novel therapeutic targets and socio-clinical interventional strategies.

### Keywords

Social media, mHealth, consumer health informatics, randomized controlled trials, review

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### Introduction

The consumer technology landscape is rapidly emerging and evolving. One of the fastest growing types of consumer technologies are Social Media technologies. Social Media tools employ both mobile and web-based technologies to, by definition, enable users to communicate, create and collaborate in highly interactive ways. [1] Several indicators collectively suggest that Social Media use has moved from novelty to global phenomenon and as such should be considered in the Personal Health and Consumer Health Informatics categories. For example, by early 2012, approximately seven billion people living in the world had access to over 1 million apps. These apps had been downloaded more than 18 billion times across the almost six billion phones and innumerable computers in current use worldwide [2, 3]. In addition, consumers began spending more time on social networks than on any other category of website—roughly 20 percent of their total time online via personal computer (PC), and 30 percent of total time online via mobile devices [4]. Total time spent on Social Media in the U.S. across PCs and mobile devices increased 37 percent to 121 billion minutes in July 2012, compared to 88 billion in July 2011 (4). In sum, Social Media has become the number one activity on the web worldwide [5].

Among health and wellness consumers, 80% of internet users or 59% of all adults have looked online for health information, while 34% of internet users (25% of adults) have read someone else's commentary or experience about health or medical issues on an online news group, website, or blog [6]. As such fully one third (33%) of consumers specifically use Social Media for health

purposes [7]. Forty two percent of these consumers have used Social Media to access health-related consumer reviews (e.g. of treatments or physicians), nearly 30% have supported a health cause, 25% have posted about their health experience, and 20% have joined a health forum or community [7]. Most consumers (61%) are likely to trust information posted by providers, and 41% are likely to share with providers via Social Media [7].

Finally mHealth, the use of mobile devices for health and healthcare purposes, is also a global phenomenon in itself. Mobile devices are often used by certain populations as the platform of choice for Social Media type interactions. There are now more cell phones in Africa than the European Union or the United States. As such, far more families around the world can now call a doctor when sick, find health information, receive a medication alert, and talk to a health expert. Medical and Public Health providers themselves can also obtain real time professional consultations, medical records can be accessed and outbreaks of infectious diseases can be tracked in real time. In the US, like the rest of the world, mHealth is growing rapidly. Among consumers, this growth is being led by young adults, racial and ethnic minorities and those in need of specific health information [8].

Despite this rapid growth in Social Media for health and healthcare purposes, there is a significant need for comprehensive impact evaluations that definitively characterize the costs and benefits of mobile health and Social Media [9]. For this reason, the current review focused on high quality studies which evaluate the impact of Social Media interventions on health outcomes.

## Methods

### Conceptual Framework

To guide this literature review, the Consumer Health Informatics Impact framework was used. This framework was chosen because of its focus on consumer health informatics tools, its incorporation of potential barriers and drivers of access and utilization of consumer health informatics tools, and because health oriented Social Media tools can be reasonably classified as a type of Consumer Health Informatics tool or application.

Briefly, this model envisions consumers as the primary end users of various types of consumer health informatics (including Social Media) tools. These users may be subjected to one or more individual and/or system level barriers and/or promoters to utilization. In turn, utilization of these tools by target end users may be associated with at least one of several potential types of impacts on health. These include processes of care impacts, impacts on intermediate outcomes of care, relationship centered outcomes, clinical outcomes, and economic outcomes [10].

### Literature Search Methods

Searching the literature involved identifying reference sources, formulating a search strategy and executing and documenting each search. Medical subject heading (MeSH) terms were used to search the National Library of Medicine/Medline database. Electronic searching was conducted on December 9<sup>th</sup>, 2012. To identify articles that were potentially relevant, terms related to Social Media combined with terms relevant to health were used. In addition, to focus this review on the best available evidence, included studies designs were limited to randomized controlled trials (RCTs). See Table 1.0 for a list of all terms used in the search strategy.

### Title Review

All the titles of retrieved studies were scanned. The title review phase was designed to capture as many studies as possible that reported on the impact of Social Media applications on health outcomes. All titles that were thought to address this question were promoted to the abstract review phase.

### Abstract Review

The abstract review phase was designed to definitively identify articles that applied to the primary question of evaluating the impact of health oriented Social Media applications on health outcomes. An abstract was excluded at this level if it did not relate to this question, or for any of the following reasons: no Social Media application included in the study; no evaluation of a Social Media application; not an RCT; or non-English language study.

### Article Review

Full articles selected for review during the abstract review phase underwent another review to determine whether they should be included in the full data abstraction. If articles were deemed to have applicable information, they were included in the data abstraction.

## Results and Best Paper Selection

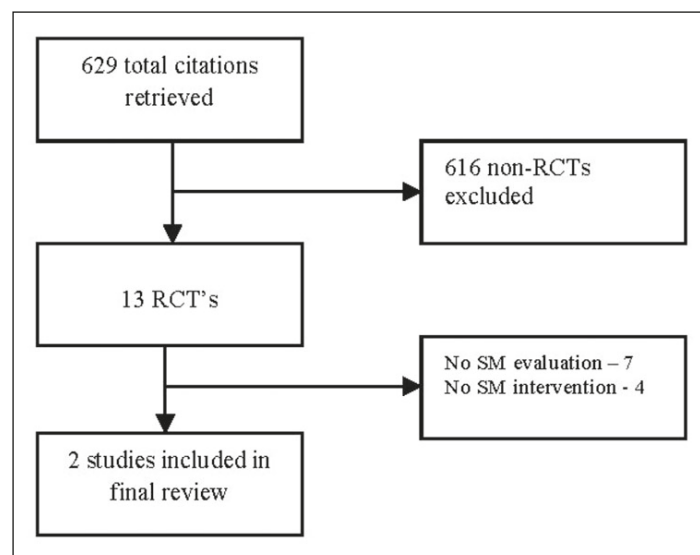
Using the search strategy and methodology outlined above 629 titles were identified. Of these titles 616 were excluded because they were not randomized controlled trials. Another 5 studies were excluded because there was no evaluation of a Social Media intervention in the paper. Additionally, 4 more studies were excluded because there

was actually no Social Media intervention proposed in the study. Finally, one of the 2 mHealth papers and the only paper citing Facebook were both excluded because they did not include an evaluation. As a final result, 2 studies were included in the final review and were both selected as the best papers for the year 2012. The results of the literature search are detailed below. See Table 1.0 and Figure 1.0.

The final selected studies represent the highest quality evaluations of the impact of Social Media oriented interventions on health outcomes in the year 2012. See Table 2.0 for citations of the selected studies.

The purpose of the first study by Burke et.al., was to determine the effect of self monitoring of diet by using a Personal Digital Assistant (PDA) or PDA with daily tailored feedback on weight loss and maintenance. Dietary self monitoring among those attempting weight loss has historically been accomplished via paper diaries. Electronic technologies have the potential to reduce the burden and/or increase the efficacy, convenience and impact of self monitoring on weight loss. In this study 210 overweight/obese individuals were recruited from the community and randomized to a behavioral intervention + paper diary, behavioral intervention + PDA or a behavioral intervention + PDA+ tailored feedback.

The results showed that consumers randomized to a behaviorally based weight loss program that was supplemented with PDA



**Fig. 1** Flow diagram depicting the selection of manuscripts for this review.

**Table 1** Search Strategy

Search Term	2012 Citations
Social Media + Health	197
Social Networking	164
Web 2.0 + Health	33
mHealth	50
Twitter + Health	38
Facebook + Health	73
Crowdsourcing	3
Blog + Health	58
Podcast	12
<b>Total</b>	<b>629</b>

**Table 2** Selected Papers

- Burke LE, Styn MA, Sereika SM, Conroy MB, Ye L, Glanz K, et al. Using mHealth technology to enhance self-monitoring for weight loss: a randomized trial. *Am J Prev Med* 2012;43(1):20-6.
- Ruehlman LS, Karoly P, Enders C. A randomized controlled evaluation of an online chronic pain self management program. *Pain* 2012;153(2):319-30.

providing individualized feedback, achieved short term (6 months) weight loss levels that were greater than control. In addition, long term (24 months) weight loss levels were comparable to paper based controls. Participants in the treatment groups also exhibited higher self monitoring adherence at all time points.

The goal of the second included study by Ruehlman et. al, was to evaluate the efficacy of an online chronic pain management program. In this study 305 adults with chronic pain were randomized to self determined access to an online program that administered a pain questionnaire that was scored and used to generate a series of recommendations for completing learning modules. All learning modules include both online and offline activities. A “digital navigator” assists the participant through the learning modules and enables the participant to send emails or invite a friend to join the activities. It also allows the user to create and track self monitoring tasks and provides graphical feedback of user progress.

Patients randomized to the intervention group demonstrated significant decreases in pain severity, pain-related interference and emotional burden, perceived disability, catastrophizing, pain-induced fear, depression, anxiety, and stress as well as a significant

increase in knowledge about the principles of chronic pain and its management as compared to controls. Interestingly participants in this study experienced a much smaller attrition rate than has been described in similar non Social Media based pain self management programs.

## Conclusions and Outlook

The selected studies suggest that Social Media oriented health interventions can achieve measurable impact on health outcomes, comparable to non Social Media based interventions. These interventions may also exert an effect on adherence. While these studies are promising, in the future, much more research regarding the value of Social Media health interventions needs to be done if the scientific evidence base is to ever catch up and be able to inform the global demand. While these two studies represent the best available studies published in 2012, they also represent the only randomized controlled trials of Social Media oriented health interventions published in Medline in 2012. At this pace, it is a challenge to see how science can have a meaningful impact on informing decisions of patients, consumers, providers or policy makers along these lines.

There are several significant and potentially compelling reasons in addition to global consumer demand why high quality research regarding the impact of Social Media on health is needed. These include the potential positive or negative impact of Social Media on health communication generally and patient provider communication specifically. In addition, the impact of Social Media on patient engagement, patient centeredness of care, satisfaction with care and outcomes need to be definitively elucidated. For example, it is well known that both chronic pain syndromes and weight gain/loss have social and culturally oriented determinants. Given that by design, Social Media tools foster interactive social engagement, these studies may also suggest that understanding the social component and social context of disease may ultimately provide novel therapeutic targets and enable effective socio-clinical interventional strategies.

In addition, because of the reported predilection of racial and ethnic minorities, among

others to use Social Media, the impact of these tools on healthcare disparities should be similarly evaluated rigorously. In the same way that no one pharmaceutical agent is sufficient to adequately treat all diseases, it is unlikely that one Social Media intervention that is proven to be effective will work as effectively in all health conditions and patient populations. As such, scientific research goals, in addition to evaluating health impacts of Social Media tools, should include elucidating design, implementation and evaluation principles or strategies that can be generalized under defined conditions and those that are more limited to specific target populations. Only then can evidence based choices be made by all.

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