

Community engagement for health via coalitions, collaborations and partnerships (on-line social media and social networks) – a systematic review and meta-analysis (component 3): FINAL Protocol

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Clarification of Scope

The study protocol (reported herein) is for the third and final component of our work on the use and effectiveness of community engagement in interventions that target health behaviours and outcomes among disadvantaged communities. In the previous Components 1 and 2, we focused on projects that utilise coalitions, collaborations or partnerships with community members (Brunton et al. 2014). Studies evaluating online social media and networks are the focus of this synthesis, using a subset of interventions identified (but not synthesised) in Component 1.

Background

Preventable behaviours, such as smoking, alcohol consumption, and overeating, have been identified as a major cause of mortality and morbidity and interventions to change such behaviours are key to improving population health (Michie & Johnston 2012). Involving communities in decision-making and in the planning, design, governance and delivery of interventions has become central to guidance and national strategy for promoting public health (Department of Health (DH) DH 2002; DH 2004; DH 2005). The National Institute of Health Care Excellence (NICE) plays a crucial role in providing guidance on best practice for community engagement. Since the publication of NICE Community Engagement guidance (NICE, 2008), there has been considerable activity with a view to understanding the nature of community engagement, its benefits, and challenges in its evaluation (for example Sheridan and Tobi 2010).

Community engagement can take many forms, including volunteering, peer delivery, community coalitions, advocacy and social networks; and community members can be involved to varying degrees within a public health strategy, including leading, collaborating, consulting or being informed about the design, delivery or evaluation of an intervention (O'Mara-Eves et al. 2013). Our previous research suggests that interventions utilising community engagement show large beneficial effects and in projects where community members lead, or collaborate in the design, delivery and evaluation of health interventions, greater beneficial effects for behavioural outcomes are seen (O'Mara-Eves, et al. 2013; Brunton et al. 2014). Further, behavioural outcomes appear to be larger for interventions focused on infection or injury prevention in comparison to other health domains such as healthy eating, physical activity or mental health (Brunton et al. 2014).

The emergence of online, electronic peer-to-peer social networking sites and social media applications have increased exponentially in recent years. Social network sites include MySpace,

Facebook, LinkedIn, Cyworld and Bebo. Social media tools include those such as Twitter, with approximately 15 million UK users (Wang 2013) and newer vehicles such as Tumblr, Instagram and Snapchat. This mirrors rapid technological advances in Internet interaction via the Web and newer accessing methods such as cloud computing (Laranjo et al. 2014). This social interaction through social media and online social networks is considered an emerging form of community engagement (Kavanaugh and Patterson 2001).

Social media and social networking are terms that are used interchangeably, but there are differences. Social media is a group of mobile and web-based technologies where information is shared or exchanged, discussed or co-created (Kaplan and Haenlein 2010; Kietzmann and Hermkens 2011). Online social networks are more interactive: Boyd and Ellison (2007) define online social network sites as 'web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system' (Boyd and Ellison 2007:p.211). Thus while social media appears to engage communities through information or knowledge exchange, social networking seeks to develop community engagement itself. This suggests that the use of an online social network or exchange of information through social media encompasses both a type of community engagement and a method of delivering an intervention. However, it is unclear the extent to which community members build these 'virtual communities' through their involvement in the initiation, development and evaluation of the social network or social media application.

Online social networks allow individuals to build a network of connections with other users virtually. In the context of health promotion, these are usually seen as a platform for mental health and social support, and provision of health related information (Eysenbach et al. 2004; Laranjo et al. 2014). Some suggest that the principles of social cognitive theory underlying information exchange in social media interventions presents a potential for successful health promotion interventions (Yoon and Tournassi 2014). Social media and social networking sites are increasingly used by children and adults (Maher et al. 2014). There is thus a growing potential for reaching large numbers of diverse populations with health promotion interventions using online social media and social networks.

Nonetheless, existing evidence on the effectiveness of online social media networks applied to health is equivocal, with reviews of intervention studies reporting null, positive and mixed findings. For example, in a recent meta-analysis a positive mean effect on health behaviour outcomes was reported (Hedges' $g = 0.24$; 95% CI 0.04 to 0.43) though substantial heterogeneity in effect size estimates was present (Laranjo et al. 2014). A systematic review by Maher et al (2014) reported a range of effect sizes, but these generally did not reach statistical significance. In considering these findings, the authors noted that participant attrition was variable and fidelity and engagement was very low (5-15%). Two other systematic reviews report that there is no robust evidence for effectiveness of online social networks (Eysenbach et al. 2004; Niela-Vilen et al. 2014). Many of these findings are difficult to interpret, as the reviews combine studies that contain both direct comparisons of standalone online social network/social media interventions and those which contain online social interventions as one part of more complex, multi-component interventions designed for self management or therapy. The latter type of intervention studies effectively prevent exclusive examination of the effectiveness attributable to online social media / social network

element(s). Only some of the interventions were explicitly based on theories of behaviour change (such as 'social network' and 'social cognitive' theories). These may have been more effective because they were based on pre-existing theory (Taylor et al. 2012). In addition, some of the identified reviews were fairly limited in scope, focusing only on a small range of health behaviours and outcomes (Laranjo et al. 2014; Maher et al. 2014) or specific populations such as parents or pregnant women (e.g. Niela-Vilen et al. 2014). One exception is a systematic review by Eysenbach et al. (2004), which examined health intervention in the broadest sense to include emotional and social support, health education or health related behaviour change. In this review, social networks were defined as a 'group of individuals with similar or common health related interests and predominately non-professional backgrounds (patients, healthy consumers or informal caregivers) who interact and communicate publicly through a computer communication network such as the internet, or through any other computer based tool (including non-text based systems such as voice bulletin board system) allowing social networks to build over a distance' (p.1). Of the 45 included studies, 20 RCTs were identified. These included six interventions categorised as standalone online social networks, though most of the 'standalone' interventions included trained health professionals as moderators or facilitators of the groups.

Our previous work on community engagement suggests further need for investigation of whether engagement across all aspects of design, delivery and evaluation could impact effectiveness, and whether specific topics such as injury prevention or infection prevention are more effective using online social media or social network interventions. Heterogeneity in effects across studies might also be explained by other intervention elements, such as whether the social network intervention is standalone or part of a multi-component intervention and whether health professionals act as moderators or facilitators of the groups. The examination of participant characteristics and intervention elements using meta-regression and QCA may identify elements that moderate effectiveness of online social network interventions and explain what works, for whom, and under what circumstances.

For this review we will adopt the definition of social networks provided by Eysenbach et al. (2004), which encompasses a broader range of health behaviour targets than other reviews. We propose to synthesise the most recent controlled trials of online social network and social media interventions.

The overarching research questions from NICE were as follows:

RQ1. How effective are community engagement approaches at improving health and wellbeing and reducing health inequalities?

RQ2. Across disadvantaged groups, how effective are community engagement approaches at encouraging people to participate in activities to improve their health and wellbeing and realise their capabilities?

RQ3. What processes and methods facilitate the realisation of community and individual capabilities and assets amongst disadvantaged groups?

RQ4. Are there unintended consequences from adopting community engagement approaches?

RQ5. What processes identified in the literature are more aligned with effective interventions, and which (if any) are more aligned with non-effective interventions?

To address these research questions in relation to studies of online social media and social networks, four research sub-questions (SQ) will be addressed:

SQ1. What is the extent of community engagement (including modifiable processes) across design, delivery and evaluation in social media and social networking interventions? (Addresses RQ1, RQ3)

SQ2. What health issues and populations have been studied using online social media / social networking? (Addresses RQ2, RQ5)

SQ3. How effective are online social networks in improving health and wellbeing and reducing health inequalities? (Addresses RQ1)

SQ4. Do particular programme features (e.g. health topic, extent of engagement, population type) account for heterogeneity in effect size estimates across studies? (Addresses RQ3, RQ4, RQ5)

Methods

Searching for relevant literature

A detailed account of the original search process is reported elsewhere (Brunton et al. 2014). In brief, citations of potentially relevant systematic reviews and trials were identified through searching key electronic registers. Screening of systematic reviews' included studies and reference lists provided potentially relevant trial citations. These were combined with citations identified from searching key electronic trials registers. Searching and screening of these trials on the basis of title and abstract identified a total of 223 potentially relevant community engagement studies – please see Brunton et al. 2014 in press: p.69 for more information. These will be combined with social media intervention studies identified in our previous review of community engagement (O'Mara-Eves et al. 2013). Backward (searching the references of included articles) and forward (searching articles citing included articles using Web of Knowledge) citation chasing will be used to locate further primary articles of potential relevance.

Screening

To be included in Component 3, the studies will meet the following inclusion criteria specified in Component 1:

- 1) published in English language;
- 2) after 2004 (inception date of Facebook);
- 3) in an OECD country;
- 4) using a control/comparison group intervention design;
- 5) targeting disadvantaged populations;
- 6) evaluated using at least one health outcome.

The following additional criteria will also be applied for inclusion in Component 3 syntheses:

- 7) study employs online social media or online social networking.

Two systematic reviews identified as part of our scoping work noted that previous systematic review findings about the value of social media or social networking interventions were limited due to their incorporation as one component in a multi-component intervention strategy utilising other interventions, such as in-person group lessons, mass media campaigns or additional information provided by leaflet (Eysenbach et al. 2004; Niela-Vilen et al. 2014). If the dataset of included studies is sufficiently large enough to provide a robust synthesis, we propose the potential addition of another criterion to test the effectiveness of social media or social networking interventions alone:

- 8) the use of social media or social networking alone is compared to a control condition (i.e. no other intervention was utilised alongside online social media or social networks).

Complex interventions where online social networking is only one element within a multi-component intervention will be excluded. This criterion has been added because of the uncertainty in ascertaining the extent to which an intervention effects can be directly attributed to community engagement alone, versus the extent to which an intervention is effective because of other types of intervention offered in a multi-component intervention (Maher et al. 2014).

These eight criteria will be applied to the titles and abstracts of all the potentially relevant trials identified. To trial the screening criteria, a pilot round of screening will be conducted on a random selection of 30 document titles and abstracts and modified where necessary. Two reviewers will screen titles and abstracts independently with disagreements reconciled through discussion, with moderation by a third researcher where necessary. Where insufficient information is available in the title and abstract to make a decision, the full-text article of the document will be retrieved for further inspection. Once all of the studies' titles and abstracts have been screened, the full-text documents will be retrieved for those records marked for inclusion. The retrieved documents will then be re-screened independently by two reviewers on the basis of the detail available in the full-text article. Those documents that pass the inclusion criteria on the basis of full-text screening will be included in the review. Measures of inter-rater agreement (the percent agreement and Cohen's kappa) will be calculated and reported for each stage of screening.

Data collection and analysis

The relevant full-text studies will be rated for their methodological rigour and quality using the critical appraisal checklists provided in the 'Methods for the development of NICE public health guidance' manual (NICE 2012). Two reviewers will independently rate each study and results will be compared, with any disagreement reconciled through discussion.

Data extraction forms will be developed to record relevant study characteristics (e.g., population, community engagement and intervention elements) and statistical information for each trial meeting the inclusion criteria. For each relevant outcome effect size estimates and sample sizes (or statistics that could be used to derive these) will be extracted for the treatment and control groups where available. Evidence tables will be completed using templates based on those provided in NICE methods guidance (NICE 2012). Two reviewers will independently conduct data extraction, and the

final version agreed upon to maintain accuracy. If necessary, a third team member will arbitrate in disagreements.

Data syntheses

To answer our research questions about the extent of community engagement across design, delivery and evaluation in social media and social networking interventions and the health issues and populations under study, a descriptive analysis will be conducted and framework synthesis of the processes of community engagement will be undertaken. The processes of community engagement described under the 'Actions' column of the conceptual framework developed in our previous review of community engagement (O'Mara-Eves et al. 2013) and further developed in Component 2 of the current project (Brunton et al. 2014 in press) (see Appendix 1) will be used as the basis for the present analysis.

Studies will be coded with respect to whether there was evidence of the following modifiable processes:

- collective decision making
- bi-directional communication
- training support (i.e. for community members to learn how to take part)
- administrative support (i.e. paid staff to organise meetings, take and circulate minutes, etc.)
- sustainable funding processes
- frequency of coalition meetings
- duration of coalition meetings
- timing of coalition meetings
- adequacy of time allowed for relationships to develop
- conflict resolution / negotiation skills
- reflection skills
- scheduling interactions to take place at times and in situations suitable to community members' needs
- other modifiable processes not described above (to capture any newly emerging processes).

We will extract Yes/No data (or amounts stated by authors) from all process evaluations for potentially modifiable processes of community engagement. Consultation with NICE Stream 2 colleagues about emerging processes of community engagement in the literature may identify additional processes beyond those in the conceptual framework. We will add these as they are identified. The resulting data extracted from this set of process evaluations will undergo a framework synthesis, where we 'populate' the framework above with studies that describe each process; and then thematically compare and contrast aspects of each process looking at differences in age groups, gender or socioeconomic disadvantage using an adaptation of previously developed methods (Oliver et al. 2008; Ritchie and Spencer 1994; Thomas et al. 2012).

To evaluate the effectiveness of community engagement within the context of online social network interventions, we will undertake a synthesis comprised of three interconnected parts:

- (1) Meta-analyses to pool effect size estimates across the included studies.

(2) A statistical moderator analysis, which will seek to test identified sub-groups for differential effectiveness, based on pre-defined intervention elements.

(3) A synthesis using Qualitative Comparative Analysis (QCA), which aims to generate theory about *necessary* and *sufficient* intervention components that are associated with effective interventions.

Each method is described in more detail below.

Meta-analysis

A series of meta-analyses will be conducted to test our first research question: how effective are online social network interventions at improving health and wellbeing and reducing health inequalities?

Primary outcomes from each included study will be grouped according to common measures, and following on from our previous work (Brunton et al. 2014) outcomes will be classified into domains according to a conceptualisation of a causal pathway (where data permits). The domains, in order of the theory of change, are: self-efficacy, health behaviour change and finally clinical/ physiological consequences.

Random effects meta-analysis models will be fitted using the *metan* command in Stata v.12.1 (Statacorp, College Station, TX) based on the assumption that the studies are estimating different effects. Appropriate summary statistics (e.g., standardised mean difference) will be selected based on the type of data reported in the primary studies. Cochran's (1954) test will be used to assess evidence for heterogeneity, with a *p*-value less than 0.05 taken to indicate evidence of heterogeneity. The I^2 statistic (possible range 0% to 100%) will be used to quantify the amount of between-study heterogeneity. Values less than 25% have been suggested to indicate low heterogeneity; values between 25 and 50% moderate heterogeneity; and values greater than 50% high heterogeneity.

For studies where the relevant empirical data are not reported or available from the study authors, narrative synthesis will be conducted.

Meta-regression

A series of meta-regressions will be conducted to test our second research question: *Do particular programme features account for heterogeneity in effect size estimates across studies?*

Planned analyses will be conducted where there is evidence of heterogeneity. A range of programme features including extent of community engagement, health target, theoretical basis of intervention, and inclusion of health professionals will be assessed. Meta-regression models will be fitted (where data permits) using the *metareg* command in Stata v.12.1 (Statacorp, College Station, TX). A minimum of ten studies is usually considered sufficient for undertaking meta-regression analyses, and for dichotomised constructs at least three studies in each category are required. For each potential moderator, the pooled effect size and corresponding 95% confidence intervals (CIs), proportion of between-cluster variability (adjusted R^2) accounted for by the moderator variable and I^2 - the proportion of residual between-study variation due to heterogeneity will be reported

(Borenstein 2009). We will examine funnel plots for asymmetry, using the *metafunnel* command in Stata v.12.1, in order to assess publication bias.

Qualitative Comparative analysis

Using the programme features identified in the synthesis, we will conduct Qualitative Comparative Analysis (QCA) to explore further our second research question: *do particular programme features account for heterogeneity in effect size estimates across studies?*

The studies included in the QCA will either be those that tested a direct comparison of online social networks or social media with and without health professionals as moderators or group leaders (if this data set is large and sufficiently coherent); OR a sub-set of studies from the other moderator analysis which enables us to explore issues which this analysis was unable to resolve. This approach will be used to develop theory on the *necessary* and *sufficient* intervention characteristics that are associated with effectiveness.

We will then use the outcome of our moderator analyses to initiate a ‘dialogue’ between the data and the analysis, resulting in additional study characteristics being captured. The output from this process will be the development of new theory to explain why particular outcomes have been observed – based on an iterative examination of study characteristics and their outcomes (Thomas et al. 2014).

Project timeline

The project timeline will proceed according to the stages presented in Appendix 1. We anticipate delivering a draft report to funders by January 19th 2015. Monthly meetings between the research team and NICE project management team will continue to be held, in order to keep both teams apprised of the progress of the review.

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