# Social norms interventions to change clinical behaviour in health workers: a systematic review and meta-analysis

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## Scientific summary

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# Scientific summary

## Background

Health workers routinely carry out behaviours that affect patient diagnoses, care, treatment and recovery. Many of these behaviours have clear guidelines for best practice. Examples include appropriate ordering of diagnostic tests, appropriate prescription of antibiotics and regular recall of patients with long-term conditions. Health workers face many challenges when following evidence-based professional practice, such as lack of time, competing demands and requests from patients. There is evidence that social influences are important in clinical practice. One proposed solution has been to implement behaviour change interventions based on social or peer norms. Social norms are the implicit or explicit rules that a group uses to determine values, beliefs, attitudes and behaviours. A social norms intervention seeks to change the clinical behaviour of a target health worker by exposing them to the values, beliefs, attitudes or behaviours of a reference group or person. These social norms interventions can form part of an audit and feedback initiative, or may be developed as another behaviour change intervention. These are often interventions with reach: they can be implemented across multiple health workers and settings at a low cost, so there is the potential for large absolute gain.

The Behaviour Change Technique taxonomy v1 is a list, drawn up by an international team of experts, of 93 distinct behaviour change techniques that are used in behaviour change interventions. There are five behaviour change techniques that we believe involve social norms, and we have used these to classify components of social norms interventions:

1. social comparison – draw attention to others' performance to allow comparison with the person's own performance
2. information about others' approval – provide information about whether other people approve or disapprove of the behaviour that the person is doing or will do
3. credible source – provide verbal or visual communication from a credible source in favour of or against the behaviour to persuade the target to change behaviour
4. social reward – arrange praise, commendation, applause or thanks if, and only if, there has been effort and/or progress in performing the behaviour
5. social incentive – inform that praise, commendation, applause or thanks will be delivered if, and only if, there has been effort and/or progress in performing the behaviour.

A systematic review of the evidence was required to establish whether or not social norms interventions are effective in the modification of the behaviour of health workers, and what factors influence their effectiveness.

## Objectives

The overall aim was to conduct a systematic review to assess the impact of social norms behaviour change techniques compared with controls (alternative interventions, no intervention or comparison of one social norm behaviour change technique with one or more other social norms behaviour change techniques) on compliance with evidence-based professional practice among health workers. The review addressed two research questions:

1. What is the effect of social norms interventions on the clinical behaviour of health workers and resulting patient outcomes?
2. Which contexts, modes of delivery and behaviour change techniques are associated with the effectiveness of social norms interventions on health worker clinical behaviour change?

## Methods

### *Design*

This study design was a systematic review and meta-analysis.

### *Identification of studies*

Studies were eligible for the review if the population was health-care workers who were targeted by a social norms intervention that sought to change their clinical behaviour by exposing them to the values, beliefs, attitudes or behaviours of a reference person or group. Only randomised controlled trials were eligible for inclusion in the review, including cluster, factorial, parallel, crossover and stepped-wedge trials. A search strategy was developed using an extensive iterative scoping process. Searches were undertaken in MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature, British Nursing Index, ISI Web of Science, PsycINFO and Cochrane trials on 24 July 2018. Titles and abstracts were reviewed against the inclusion criteria to exclude any that were clearly ineligible. Two reviewers independently screened all of the remaining full texts to identify relevant papers.

### *Data collection*

The data that were extracted from eligible studies included trial design, outcome measurement, results, intervention description, details of the context and mode of delivery data. Behaviour change techniques in the intervention and control arms were coded using the Behaviour Change Techniques taxonomy v1. An assessment of study quality was undertaken using the Cochrane risk-of-bias tool. All data were extracted independently by two researchers using prespecified data collection forms. Any disagreements were resolved through discussion, moderated by a third researcher or discussed at a research team meeting. Training was provided and the processes were piloted to encourage consistency. In the protocol we had envisaged that we would contact authors for additional information; we were not able to do this owing to the size of the review. We made some effort to search for companion papers, such as protocols or process evaluations, in cases where there was missing information in the main paper on key items, such as the intervention description or the outcomes; however, this did not fully replace contact with the authors.

### *Data analysis*

In the meta-analysis, we included those studies that reported a primary outcome measure (clinical behaviour of a health worker) or a secondary outcome (patient outcome) that could be converted into a standardised mean difference. The approach that we took to utilise the five social norms behaviour change techniques in the analysis was to subtract the control arm behaviour change techniques from those in the intervention arm, to identify the active ingredients being tested in the trial.

To assess the effect of social norms interventions on the behaviour of health workers, we performed a fixed-effects meta-analysis and presented forest plots, stratified by behaviour change technique. Sources of variation in terms of the type of social norm, context and mode of delivery that were explored using forest plots and metaregression; network meta-analysis was undertaken to rank the effectiveness of the social norms interventions. We adopted a fixed-effects approach to meta-analysis, which we considered to yield a summary of the evidence in these trials (i.e. the average effect) rather than an estimate of a common underlying treatment effect. We also reported a random-effects analysis. We performed sensitivity analyses including only studies with a low risk of bias, excluding continuous outcomes reported as 'mean percentage' that were $< 20\%$ or $> 80\%$, including only studies in which the standard deviation was not imputed and using alternative values of imputed intraclass correlation coefficient. We investigated the impact of publication bias in the reported studies using a funnel plot.

### *Patient and public involvement*

A member of the public played a full and active role in the independent Study Steering Committee, bringing a patient and carer perspective to the meetings. Six members of the public attended

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workshops, in which we discussed the relevance of the review to patients and carers; they provided feedback on the study design and discussed dissemination.

An independent Study Steering Committee provided encouragement and wise counsel throughout the project.

## Results

In total, 7980 studies were identified using database searches, 4428 abstracts were screened, 477 full-text papers were screened, 116 studies were included and the findings are based on 106 studies.

### *Study and intervention characteristics*

There were 100 comparisons suitable for meta-analysis, which tested social comparison ($n = 79$), credible source ($n = 7$) and social reward ($n = 2$) against the control. Some studies tested more than one social norms intervention together: social comparison and credible source ($n = 6$), social comparison and social reward ($n = 2$) and multiple social norms interventions (more than two) together ($n = 4$). Over half of the included trials were conducted in North America; most studies were set in primary care and hospitals, targeting doctors. A broad range of behaviours were targeted, including prescribing, managing conditions and test ordering. Two-thirds of the trials were cluster randomised controlled trials. The interventions were delivered in a variety of formats. Delivery timing varied in that one-third of interventions were delivered on one occasion and the rest were delivered on multiple occasions. Most of the interventions were delivered by someone outside the specific organisation, often an investigator, and three-quarters aimed to increase, rather than decrease, the target behaviour. There was a lack of clarity in reporting some of the intervention characteristics in up to one-third of the studies.

### *Overall results*

Overall, combined data suggested that interventions that included social norms components were associated with an improvement in health worker behaviour (primary outcome) of 0.08 standardised mean differences (95% confidence interval 0.07 to 0.10) ($n = 100$ comparisons), and an improvement in patient outcomes (secondary outcome) of 0.17 standardised mean differences (95% confidence interval 0.14 to 0.20) ($n = 14$), on average. There was a large amount of heterogeneity, with an overall $I^2$ of 85.4% for the primary outcome and 91.5% for the secondary outcome. Some studies reported substantially higher or lower effect sizes than these summary statistics for social norms interventions, and this heterogeneity was investigated by examining the effect of variation in behaviour change technique, context and mode of delivery using forest plots, metaregression and network meta-analysis.

### *Results by social norms behaviour change techniques*

The network meta-analysis suggested that the three types of social norms intervention were most effective, on average, compared with the control: credible source (standardised mean difference 0.30, 95% confidence interval 0.13 to 0.47), social comparison combined with social reward (standardised mean difference 0.39, 95% confidence interval 0.15 to 0.64) and social comparison combined with prompts and cues (standardised mean difference 0.33, 95% confidence interval 0.22 to 0.44). Social comparison delivered on its own (standardised mean difference 0.05, 95% confidence interval 0.03 to 0.08), social comparison with social support (unspecified) (standardised mean difference 0.10, 95% confidence interval 0.04 to 0.16) and social comparison with credible source (standardised mean difference 0.08, 95% confidence interval 0.03 to 0.12) were all effective, on average, compared with control. There was no evidence to suggest that social reward (standardised mean difference 0.03, 95% confidence interval –0.08 to 0.13) was effective, although this was based on a small number of studies. We did not find studies that examined the effect of the other two social norms.

### *Results by context and mode of delivery*

The meta-analysis suggested that social norms interventions were effective with a variety of types of health workers, and that they may be less effective with nurses and allied health professionals than with

doctors. They have been successful across a wide range of clinical behaviours, including prescribing, tests and management and communication around health conditions, but may be less effective with hand-washing and referrals. They appeared equally effective in primary and secondary care, but may be less effective in community and care home settings. The effect appeared to be reasonably consistent across different types of reference group, including peers, senior persons, patients and mixed populations. Social norms interventions were, on average, slightly more effective at reducing behaviours (e.g. reducing antibiotic prescriptions) than increasing them (e.g. increasing hand-washing). Interventions appeared similarly effective regardless of who delivered them; there was some indication that interventions delivered by supervisors were less effective. The effect was similar regardless of whether the intervention came from an internal or external source. Delivering the intervention once was sufficient: there was no evidence of an increased effect from more frequent delivery. All methods of delivery of social norms interventions were effective apart from face to face: delivery by website appeared to be the most effective method. The number of studies in some of these categories was low, so the findings on context and mode of delivery are tentative.

### *Risk of bias*

The risk of bias was high for the blinding of participants and personnel; therefore, we cannot rule out the possibility of response bias. Using a funnel plot, we found some evidence that the review may be missing some unpublished negative trials or may include more positive trials than justified owing to selective outcome reporting. When we looked only at the trials at low risk of bias for each key domain in sensitivity analyses, the overall treatment effect changed very little, suggesting that the results were robust and not strongly influenced by the trials at high/unclear risk of bias.

## Conclusions

### *Implications for health care*

A social norms intervention seeks to change the clinical behaviour of a target health worker by exposing them to the values, beliefs, attitudes or behaviours of a reference group or person. Social norms interventions were frequently used by health-care organisations as a way of improving how health care was delivered. This review of the literature suggests that the overall result is modest and very variable, but that there is the potential for social norms interventions to be scaled up to target behaviour change in large populations, and that when optimally designed these interventions can have a large effect on the target behaviour and resulting patient outcomes. The most effective social norms interventions were providing approval of the desired behaviour from a credible source, and social comparison combined with social reward or another recognised behaviour change technique, prompts and cues. These interventions can be effective in a variety of NHS contexts.

Recommendations for research:

1. Credible source has been identified as an effective intervention component. It is not commonly used and many people responsible for behaviour change policy may not be familiar with it. Additional work is required to develop credible source interventions for use in the NHS. As a first step, a narrative synthesis of the trials using credible source in this review, together with the qualitative papers, process evaluations and protocols associated with those trials, would provide a more detailed picture of the credible source interventions that are associated with more successful outcomes.
2. Social comparison is currently used more frequently in the NHS than credible source. We identified a high level of heterogeneity in the effectiveness of social comparison. We have started to unravel this heterogeneity, and research suggests that social comparison can successfully be enhanced by the addition of social reward, prompts and cues or another recognised behaviour change techniques, social support (unspecified), but further research would provide more depth to these findings.

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3. Qualitative work with health workers, managers and policy-makers is needed to understand the acceptability and feasibility of credible source, social comparison and social reward interventions and to understand who the most credible sources are.
4. The review included some large factorial trials that tested several behaviour change interventions simultaneously; this design can be an efficient way of exploring different components of behaviour change interventions and their interactions. Some trials used novel methods to minimise bias, such as 'attention' controls in which participants were given the identical behaviour change intervention for an alternative target behaviour: this type of design is to be encouraged.
5. The quality of trial reporting was mixed and in many cases it was difficult to extract the necessary information required in this review. Researchers should use appropriate reporting guidelines, such as TIDier (Template for Intervention Description and Replication) and CONSORT. The methodological quality of trials was also mixed, and this needs to be addressed in future studies.
6. Trials were excluded from the review when the intervention did not target a specific behaviour. We plan to undertake a separate review of those studies that did not include a target behaviour to assess whether or not the effects of those interventions vary from the effects found in the current review.

## Study registration

This study is registered as PROSPERO CRD42016045718.

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