Methodological difficulties in a systematic review of social marketing for sun protection: implications for research and practice

Sandra C. Jones
University of Wollongong, sandraj@uow.edu.au

Keryn Johnson
University of Wollongong, kerynj@uow.edu.au

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Methodological difficulties in a systematic review of social marketing for sun protection: 
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Keryn Johnson B App Sc (Physio), MAPA 
Sandra Jones BA MBA MPH MAssessEval PhD

Abstract

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Introduction

Social marketing for sun protection

The recognition of the high social and economic costs of skin cancer has led to increasing numbers of health promotion programs over the past 25 years, beginning in 1981 with the first recognized, widespread, primary prevention campaign - the Victorian Cancer Council’s “Slip, Slop, Slap” (Garvin and Eyles, 2001; NSW Health Department and The Cancer Council NSW 2001). As two-thirds of the risk of melanoma is acquired in the first 15 years of life, a large number of interventions have been targeted at children and adolescents. While many of these programs have achieved significant improvements in sun protection knowledge and attitudes, mixed results have been seen in regards to achieving behaviour change (Hill and Boutler, 1996; Murphy, 2002; Wesson and Silverberg, 2003). Recent systematic reviews have pointed to evidence of effectiveness in educational and policy initiatives in primary school, recreational or tourist settings, but more evidence is needed on what elements are essential for effective programs (Saraiya et al., 2004). Systematic review or meta-analysis is seen as the most valid and reliable process for providing this evidence-base but is often problematic when undertaken within a public health context.

Systematic review

Systematic review is a process of systematic search, examination, and synthesis of all available research utilising strict inclusion and exclusion criteria, in order to derive new information from an existing knowledge base, often through the use of meta-analysis or the quantitative synthesis of effect sizes (Harden and Thomas, 2005). While often used to combine studies in order to estimate an “average effect”, it can also be used as a method for
exploring heterogeneity between studies (Rosenthal and DiMatteo, 2001). This review was concerned with the latter objective, as it was undertaken in order to provide an evidence-base for social marketing programs in this field, and thus sought to investigate how elements from a social marketing framework were utilised within sun protection interventions. The review, therefore, analysed sun protection interventions in terms of: the use of models or theories guiding planning, processes and evaluation; the use of formative research; evidence of an environmental analysis of the issue which could be seen through targeting environmental or social barriers, the use of a "settings" approach, and/or targeting secondary audiences for interventions; message factors and dissemination channels; and campaign length.

Method

The review took in published evaluations of programs directed at children’s or adolescents’ sun protection behaviours that had a primary prevention focus, gave some quantitative measure of effect size for specified behavioural outcomes, and utilised randomised or non-randomised pre and post test designs with comparison groups. A range of databases were used that covered marketing, medical, educational, sociological, psychological and public health sources, utilizing a broad combination of search terms. References were then followed up from retrieved articles and experts contacted to identify any omissions.

Approximately 2,000 titles were scanned for sun protection interventions aimed at all age groups, leaving a final 147 published studies on sun protection interventions. These were then initially coded by two researchers to retrieve all interventions aimed at children or adolescents, utilizing the previously stated study designs. This resulted in 21 interventions available for further coding, once papers describing the same intervention were removed. Studies were examined and coded by two researchers using pre-established data forms, with disagreements reconciled by consensus, and studies rated for quality. While originally aiming to combine the studies through meta-analysis, the diverse nature of the data and behavioural outcomes recorded, would not allow any valid quantitative synthesis of the outcome measures. Instead absolute and relative effect measures for all outcomes were calculated by a method utilized by the US Task Force on Community Preventive Services in their 2004 systematic review, with “absolute” change a function of: Δ I - Δ C; and “relative” change a function of (Δ I / I pre - Δ C / C pre) X 100 (Saraiya et al., 2004). Information was then combined via narrative synthesis.

The following sections report the difficulties encountered in undertaking the review.

Results

Developmental detail:

In coding papers on developmental aspects of interventions such as theoretical basis and formative research, many papers gave little or no information. Decisions on these details were thus made on the presumption that if it was not mentioned within the written article, it was not done. While this perhaps disadvantaged those papers with tight word constraints, from a social marketing perspective the use of theory and formative research is crucial to understanding the target audience and identifying facilitators and barriers to behaviour change. It is therefore extremely important to state and explain what theory and formative research was used, and how this influenced the formation of strategies.
Theory
In all, 11 papers identified one or more behavioural theories used as a basis for their intervention, and were coded as such. However, of these, only six could be seen to give any explanation of how these theories influenced the development of strategies. This is highlighted by two programs reporting the “Stages of Change” model as one of a combination of theories used as a basis for their intervention, but none appeared to segment the target audience on the basis of this model, nor evaluate individuals’ or groups’ stage of change, pre or post testing.

Formative research
Eleven papers also stated the use of formative research in the development of their programs, mainly in the form of focus groups, surveys regarding sun protective behaviours and barriers to sun protection, and formative evaluation of concepts and strategies used within interventions. Four papers were seen to refer to other, usually earlier papers which described in more depth the development of their programs. With the exception of these studies, few papers provided in-depth information on how their formative research was used to develop strategies. No studies appeared to use their formative research for any further segmentation of the target audience.

Process detail:
The full description of recruitment and baseline characteristics of participants, and the content and process of interventions, is essential in order to investigate possible bias or moderating factors influencing results. Within sun protection, gender, age, and skin type and/or ethnicity, are known predictors of sun protective behaviours. A breakdown of these descriptors between study groups is thus needed in order to ensure the equivalence of groups before intervention, and allow a fuller understanding of outcomes. Intervention detail is needed on what was done, how it was delivered, where and when it was done. For this review, detail was specifically sought on the use of environmental strategies, dissemination channels, and message framing.

Participant description
Ten studies were seen to have a poor description of participants, with six giving no demographic or skin type information, two giving no breakdown of these descriptors between intervention and comparison groups, and two studies lacking one of the above factors in baseline reporting. In all but one of these studies there was no subsequent information given on the equivalence of these groups at baseline. Eight of these studies were randomized trials on individual or group level, whereby it could be assumed that the randomization process has ensured these characteristics should be evenly spread throughout the samples. However, the small sample sizes of many group trials, in particular, mean that some investigation of group equivalence should be performed. This lack of detail made judgements on the validity of results difficult.

Intervention description
Three studies had poor descriptions of the interventions. While this does not alter the validity of results, it makes a comprehensive review of those factors which lead to effective interventions difficult. No information was given on message framing in any intervention.
**Evaluative detail**

When synthesizing evaluation data, problems were seen in a lack of specifically stated follow-up periods, the wide range of behavioural outcomes and their measurement, and a lack of detail in outcome measures. Outcome measures chosen by the 21 interventions varied widely. The review decided upon seven primary outcome measures to describe appropriate sun protective behaviours. The reported outcomes that best described these designated behavioural outcomes were then taken, based on subjective assessment by the coder. If there were multiple measures a decision was made on the most appropriate measure to use. While there was wide variation in the behavioural outcomes and how they are measured, the use of seven primary outcomes hoped to minimize the combination of widely variant outcomes, thus providing more valid results.

**Follow-up**

Difficulties were noted in calculating the length of time between the cessation of an intervention and the follow-up period for testing for behavioural change, as some papers did not specifically report the follow-up duration. The review sought to delineate behaviour change that was seen at short-term follow-up (less than 12 weeks) from that seen at longer term (12 weeks or more), as interventions showing these longer term results would be seen as providing stronger evidence of behaviour change. Within the 21 studies, follow-up periods varied considerably from immediate testing after the finish of an intervention, to seven months post intervention. Problems particularly arose in coding those programs utilizing ongoing environmental strategies or “settings” approaches targeting policy or structural change. Technically these programs should be seen as ongoing until follow-up, unless a distinctive end to the campaign is cited earlier. They were therefore taken as short-term follow-ups for the review. Where longer term follow-up was recorded, outcomes from immediate follow-up after short duration interventions were not taken into consideration for this review. It was felt the use of immediate follow-up after short duration interventions could not be seen as recording an actual change of behaviour, although interventions lasting four weeks or more may have changed behaviour through earlier program components. One study reported immediate follow-up after a one to two hour curriculum, therefore behavioural outcomes were interpreted in this light. Another study used immediate follow-up with outcome surveys taken throughout the campaign to measure hat use on exiting the intervention setting. While this may show behaviour change for one day, assuming that hat use at exit is indicative of hat use through the day, it allows no determination on whether the intervention can influence a longer term change. These contextual differences need to be taken into account when synthesizing evidence from these studies.

**Outcome measures**

Outcomes were presented via mean scores, percentages, one as odds ratios, and one study presented via line graphs. Six studies reported mean scores but no standard deviations, three did not give the number of participants used to calculate scores and a few studies made the reader search for these participant numbers. Data was to be analysed via the Cochrane Collaboration’s Review Manager computer program (The Cochrane Collaboration, 2002) however, due to the diverse nature of the data and behavioural outcomes, many category and sub-category analyses were left with only one or two studies. As this would not allow any valid quantitative synthesis of the outcome measures, meta-analysis was determined to be inappropriate. The timing of pre and post testing for behavioural outcomes was inappropriate in some studies, with children or parents asked to recall sun protection practices from many months previously, or questioned regards specific seasonal behaviours that had not been experienced between interventions and post-testing.
Discussion

The difficulties highlighted above show the importance of standardised reporting of social marketing and health promotion interventions. There is a continual need to review past practice in order to inform future practice and progress theory. However, many of the papers reviewed lacked information about one or more aspects of their intervention. While this made review difficult, it also means opinions are formed with incomplete information. The efforts given to in-depth coding and review, with detailed data information sheets with which to make decisions, has attempted to minimise bias, but those programs which are clearly described are more likely to have their details correctly reported.

Jarlais et al. (2004) describe similar issues arising in HIV/AIDS research synthesis at the Centers for Disease Control and Prevention in the United States. This has led this organization to develop a checklist - The Transparent Reporting of Evaluations with Non-randomised Designs (TREND). The authors state the checklist was developed in order to standardize the reporting of interventions and data in peer-reviewed publications so that “the conduct and findings of research are transparent” (p. 362). This list is consistent with the CONSORT statement (Consolidated Standards of Reporting Trials) which was developed for randomised-controlled trials, but expands on the information requested to include items relevant to public health interventions such as information on the target population, the use of behavioural theory, the setting where the intervention was delivered, and added data on baseline equivalence between groups (Jarlais et al., 2004; Moher, Schulz and Altman, 2001). The use of these checklists by authors when preparing reports on any public health interventions would greatly reduce the problems encountered when attempting to synthesise outcomes over a number of studies, allowing for a greater validity in the final results.

Some reporting needs which are particular to sun protection relate to the season and weather conditions in which interventions and testing are conducted. Sun protection requirements differ on a seasonal basis, and evaluation of some outcomes can be greatly affected by environmental characteristics of the follow-up period, especially when looking at incidents of sunburn which is highly related to UV levels and temperature (Dobbinson, 2004). At the same time, some standardisation of outcome measures in relation to sun protection would greatly assist quantitative or qualitative comparisons.

Conclusion

While the systematic review described above categorised some interventions as effective, and others as ineffective within the parameters chosen to measure success, all programs should add to the knowledge pool of what works best, where and when. However, this knowledge pool can only increase if researchers describe interventions clearly and definitively, so that the readers of their reports can make valid judgments on the quality and effectiveness of interventions, and gain some understanding of the elements that have contributed to the programs success or lack of success. In terms of practice of research, more standardisation is needed in the way studies are reported. From a meta-analyst point of view, the full description of study outcomes is essential. Therefore sun protection outcomes measured as continuous measurements, should provide standard deviations as well as mean scores, and both continuous and dichotomous data should be provided with the subject numbers used to derive these calculations. Comprehensive description of interventions, with length and follow-up periods clearly stated are also needed. Clear description would thus allow easier review with less error.
References:


